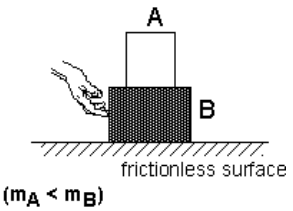
Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block a does not slip on block b which means it is also moving to the right

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force points to the right therefore acceleration has to point to the right

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are moving to the right. The initial velocity is zero. Therefore the net force has to point to the right

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block a slips on block b but it is still moving to the right. Therefore its velocity points to the right

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Block a moves to the right slower than block b. That is why it slips

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: There is still a frictional force points to the right that acts on block a

End of Response

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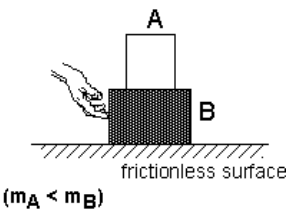

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If the reference fram is with the frictionless surface, then it must be to the right since velocity = change in distance over change in time. The change in distance is to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the left

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force is acting on B, and block B has a force acting on block A.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Newton's Third Law

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: This is the direction of the net force.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: This is an example of Newton's Third Law again. Equal and opposite forces acting on one another.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Once again, Newton's Third Law force pairs, and net force = mass * acceleration.

End of Response

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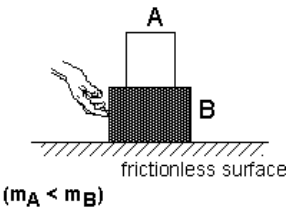
Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: A continues traveling with B. Therefore it has the same velocity relative to the table.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The accelerations of the two blocks should be the same, and since there is a constant force on B there must be an acceleration in the direction of the force.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The vertical forces should cancel out for both blocks since there is not vertical acceleration. There is no friction, so the only uncancelled force should be the force from the hand.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Although the velocity relative to block b is to the left, in relation to the table, A should still be moving to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The only horizontal force on block a should be the friction force from block b. Therefore there should still be a force to the right causing acceleration. However, since a starts to slip it does not recieve the same amount of force necessary to maintain the same acceleration as b.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The gravity and vertical normal forces should cancel out since the block has no vertical acceleration. The only horizontal force on block a should be the friction force from block b. Therefore that is the net force assuming that air resistance is neglected.

End of Response

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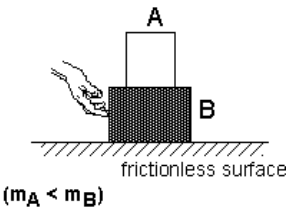

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: kinetic friction keeps block A on block B, therefore block A moves in the same direction as block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: if there is no friction, the blocks will continue moving in the same direction at the same speed until another force acts on them. Therefore the acceleration is zero.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: the only force acting on the objects is the hand that is pushing the blocks.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: block B will be moving but block A will be in the same position.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: block is not moving, therefore the acceleration is zero. Block B is accelerating, which means it must have a larger acceleration.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: it slips, which means there is no force acting to the left or right of the block.

End of Response

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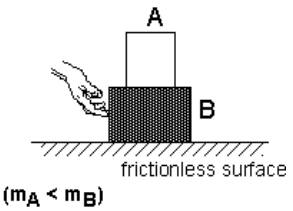

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Relative to the observer, block A is also moving to the right if that's the direction of block B and A does not slip on B. Their paths are the same.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: if a constant force is applied, then chances are that the acceleration is constant as well since their masses are constant.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The forces on block A cancel eachother out, making it appear at rest with respect to block B, causing a net force of zero.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain:

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain:

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain:

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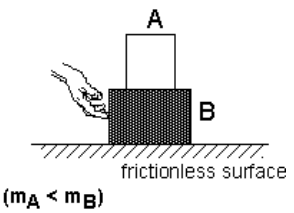
Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A has the same velocity as Block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The acceleration will be in the direction of the force.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force on A is 0 so it doesn't accelerate and for B its to the right since the acceleration is in that direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: If the block starts slipping it will move to the left (opposite the direction of the motion of B).

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The acceleration is towards the left since it starts moving that way but its magnitude is not as much as that of Block B.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Since it starts moving to the left.

End of Response

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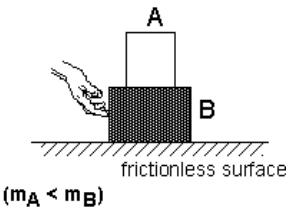

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block B is bieng pushed to the right with a constant force then Block A will also have a velocity to the right since in does not move a top of B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: If they are pushed with a net force to the right they will have an initial velocity with a direction to the right for a short time.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block A has the normal force and the force on gravity, and the friction between the two blocks on it and Fg and Fn cancel each other out, and so the net force is from the friction. Block b has 3 forces acting upon it; gravity, the table pushing up, and the hand pushing to the right. Gravity and normal force cancel out, and so your left with the rightward force of the push.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: If block A had a + velocity it would be moving with the block and since it is not moving with the block B it has no velocity.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: If a was accelerating as much a b it would not be slipping on the surface of contact.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: Th block is not stationary on top of block B since has overcome the static friction and now it begin to fall of the block.

End of Response

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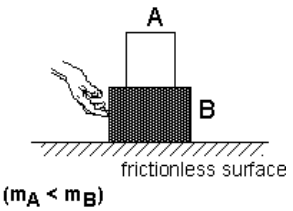

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: The velocity will be the same as block B since it is sitting ontop.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The hand is pushing block B along the table and so there is a force acting upon it. So does block B, it may not be apparent, but there is a static friction force that holds block A on block B, so there is a force and acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Static friction is holding block A in its postition, which is opposite of the movement of the block system. On block B, the net force must be to the right since the system is accelerating to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Block A wishes to remain in its current location as block B continues to move.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The block will be moving in the opposite direction as block B, so therefore the sign will be different that block B and if block B is positive, the block A's acceleration will be negative

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Static friction is no longer holding, and since the block wants to remain in its location, the acceleration will be to the left, and the kinetic friction on block A to block B will now be pointing to the left. The kinetic friction is the dominating force, so it cause the net force to point left.

End of Response

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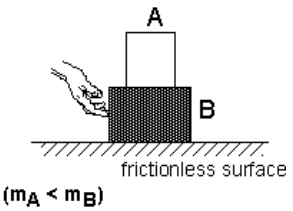

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A is attached to block B through friction between them, and as block B moves so does block A.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both blocks are being accelerated because there is no friction to slow down the constant force being constantly applied.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are moving to the right, therefore the net force on them must likewise be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Although block A is moving to the left in reference to block B, it is still moving to the right overall

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: block B begins to move to the left in comparison to block A, and therefore its acceleration is more to the left so that its overall magnitude of acceleration is less than that of block B

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The friction force is being overpowered by block A's acceleration to the left.

End of Response

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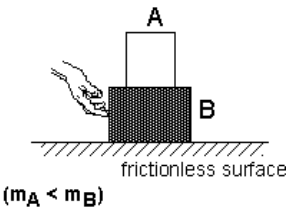

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not slip on block B, and block B is moving at a certain velocity to the right, then block A must be moving with it in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The hand pushes block B with constant force, thus, as stated by Newton's second law, it must be accelerating. Also, if block A is moving with Block B and not slipping, then block a is also moving to the right and accelerating.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: If block A isn't slipping, then there must be some friction force preventing it from remaining at rest. This friction force is to the right, and since it is accelerating it has a net force. Again, since Block B is accelerating, it has a net force by Newton's second law. It is in the direction of motion.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: If the object is slipping, it is resisting the friction, overcoming it. It should remain motionless as B moves to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: There should be no acceleration because Block A has enough force to counteract that of friction. If the acceleration is zero, it is obviously less than the acceleration of B.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: If it is not accelerating, there should be not net force acting on the block.

End of Response

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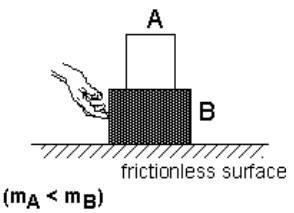
Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since A is in contact with B and does not move, it follows the same velocity as B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both blocks will have the same acceleration since the hand pushes both with the same velocity.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The source of the force to the right on block B is the pushing by the hand. An equal force on block A created by friction in contact with block B acts to the right with the same magnitude.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Even though the block begins to slip, its force still moves in the right direction.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: As block B moves faster to the right, block A does not experience that same change in velocity.

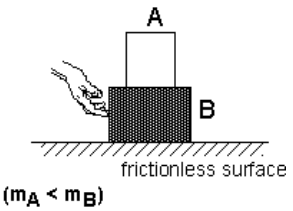
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: What was a constant force on block A becomes a net force to the left. This is due to the loss of static friction on block A when it was in contact with block B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block a moves with block b due to friction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The hand is pushing with constant force, indication constant velocity.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The blocks are being pushed by the same force; however block a travels only due to friction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block a still moves to the left, but block b is moving faster.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Block b is constantly accelerating due to the force...block a can only accelerate as fast as friction allows.

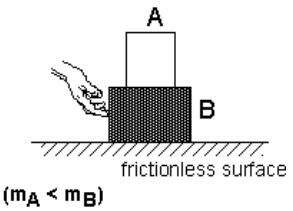
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: It is still travelling in the same direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since Block A does not move with respect to Block B, and Block B has a velocity to the right - Block A must also have a velocity toward the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The blocks are speeding up, and the velocity is towards the right, therefore the acceleration must also be to the right. The net force is also in the right direction for both blocks, so the acceleration must be in the right direction.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force on Block A is the friction force on Block A by Block B - and is therefore to the right (the direction that opposes motion). And Block B's net force is to the right because of the hand pushing it to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block B is moving towards the right - if Block A is moving in the same direction - just at a lower acceleration, then the velocity is still towards the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The acceleration of Block A is still to the right, just has a lower magnitude than the acceleration of Block B, and therefore appears to slip form Block B.

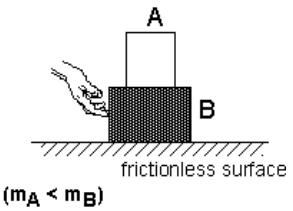
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The net force on Block A is still towards the right - it is the kinetic friction. But it is simply less than the maximum static friction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: it is sitting on block b which is moving to the right and it is not slipping so it also must be moving to the right, from the perspective of somone view both blocks

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: from the perspective of someone looking at both blocks they are accelerating as a whole since they are moving to the right they must be accelerating to the right

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: friction is moving block a to the right while the force applied by the hand is moving block b othe right

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: since block a is slipping block b is moving and block a is actually holding stil, it just appears to be slipping backward because block b is moving forward

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: block a has stopped moving with block b and is now moving by itself thus it is not accelerating because it is not being accelerated like that

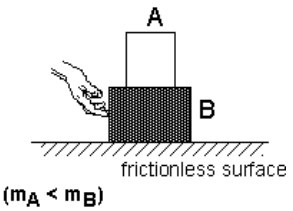
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: as block a begins to 'slip' it is actually ceasing to be moving with block b, it is now holding still while block b slides beneath, since it itself is not actually moving the net force on it is zero.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: if it doesnt slip it is to the same direction as block B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: the hand applies force to the block and the one block applies force in the same direction as the hand, so the they are all to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: since they are being accelerated to the righ and not moving up and down the net acc is also to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: some of the force from the hand is being harvested in block A in the form kinetic friction, in the same direction as the hand force.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: some of the force from the hand is being harvested in block A in the form kinetic friction, in the same direction as the hand force.

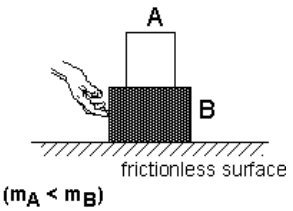
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: some of the force from the hand is being harvested in block A in the form kinetic friction, in the same direction as the hand force.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: The box is not moving and therefore, it's velocity is zero. Only box b is moving.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The acceleration direction is the same as the same with the direction of delta velocity. Velocity of block a is zero, therefore, acceleration is zero.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force is considered as the total forces on an object. since block b is moving, it's greatest force is toward the right. Block a is zero, so net force equal zero

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: The velocity would be toward the right because it's moving with block B, but only just a little bit. not at the same velocity as block b.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Magnitude of block a would be lesser than block b because block a is just friction while block b has the hand force adding to it.

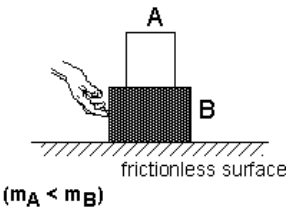
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The net force on a would be to the right because block b is somewhat putting a force onto block a making it move by a little.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A is on top of Block B, the friction between them causes Block A to move, since it doesn't slip that means it is moving along with Block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force is towards the right, therefore the acceleration is also towards the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The force on block B is to the Right because the hand is pushing it to the right. The force of friction on Block A is towards the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: The Block has movement from the hand pushing it to the right, it has passed static friction and is now moving, it won't move as fast as block b but at least as fast as in the earlier example.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: For question 16, A's net force is less because it is falling behind Block B, it has reached the limit from static friction and begins to fall behind.

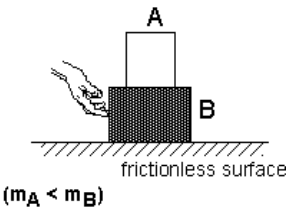
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: It's acceleration is zero, therefore the net force is zero.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A itself is not moving but it is sitting on top of Block B which is moving with a velocity to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: If the force is constant then the block is moving at the same speed, so there is no change in velocity and therefore no change in time. Again, block A has the same velocity and acceleration as Block B.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The force of the friction on Block a is to the right because if it were to the left then it would slide off of block B. The hand is pushing from the left to the right so the force on Block b is to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The block is moving with a velocity to the right, block A moves the opposite direction because block b accelerates, putting an equal but opposite force on a, which has no force from the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: The equal and opposite rule.

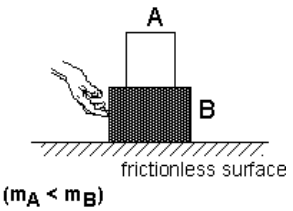
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: An equal and opposite force pushes it backward reltative to block B, causing it to move to the left. So the force is to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block a is not slipping from the top of block B it means that A is moving with the same velocity of B due to the friction between these two blocks. Therefore if block B's velocity is towards right, then A's velocity must be towards right as well.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: If a constant force is acted on block b to move it, and there is no friction between the surface and block b(which means that there are no forces acting against the applied force) then block b must move with a constant acceleration in the direction of the applied force. If block A is moving along with block B due to the reason given above, then block As acceleration must be the same with block Bs

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: when we look seperately to the blocks, we see that the net force applied on both of the blocks are towards the right. If the objects are moving towards a direction with constant acceleration, then the net force applied on those objects must be in the direction of the acceleration

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: For sure the velocity is not to the left because the direction of net force on block a is certainly not to the left. the velocity can either be 0 or to the right and that would depend on the constant of friction between a and b

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: both of the blocks were initially going with an initial velocity. When we apply a greater force on B, the net force acting on B will be much greater than the forces applied before, therefore its acceleration must be greater. In the case of A, it's very unlikely for its velocity to change direction, therefore it's acceleraton vector must be less than Bs.

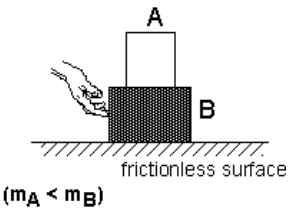
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: if its acceleration vector is towards left, the net forces on it must also be towards left

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right
Q5: Explain: If block A does not slip on block B, then they are effectively a single system, so that if B moves, A moves with it.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right
Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right
Q8: Explain: The net force is to the right on block B, so accel for B is also to the right. As in question 6, since A doesn't move from B, it moves as well with the same motion.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right
Q10: At the instant shown, what is the direction of the net force on block B? : to the right
Q11: Explain: If the accelertaion is to the right, the net force is also. See answer to question 9.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right
Q13: Explain: It requires a certain level of magnitude of accelration before A begins to slip, and in that time it gains a certain amount of force in the direction of acceleration, which it retains as it begins to slip from block B (acceleration decreases).

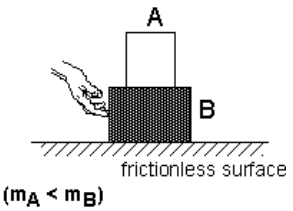
Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right
Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B
Q16: Explain: As A slips, the acceleration decreases, yet there is still some present, so it is in the direction of B, yet with a lesser magnitude

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right
Q18: Explain: Since acceleration is to the right, the net force must also be in the same direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: With a reference point as the surface, A is moving to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: A and B must be accelerating at the same rate, because block A does not slip. Because a force is applied to the right, acceleration must also occur in that direction.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force must be to the right in both cases, because as was explained in problem 9, they are both accelerating to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: The hand is pushing to the right, so it can be assumed that the velocity is in that direction as well.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The magnitude of the acceleration of block A is less than B but greater than 0. There must have been static friction between A and B, or else A would have slipped from the beginning, so there must still be some amount of friction that causes block A to accelerate, however the magnitude is less than that of B

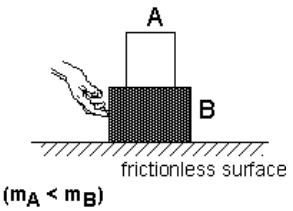
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: There must have been static friction between A and B, or else A would have slipped from the beginning, so there must still be some amount of friction that causes block A to accelerate. Because of this, A still accelerates to the right, which means a net force still exists on block A which causes it to accelerate

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: There is no force acting directly on block A that is directly causing it tomove. Has to do with instances involving Newton's First Law of motion.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force of the hand is pusing on block B while block A is 'moving because it is sitting on block B, there is no constant force like the hand pushing on block A.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block B is moving to the rigt so the net force is to the right. Block A is not accelerating so it is zero but if block be were to stop instantly then then A might fly off B due to momentum then it would have force and stuff.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: It is moveing to the left so its velocity is in the left direction?

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: At the instant they gegin to slip block A acceleration is increating in the left direction. this means that the the acceleration of A is greater than B? they might be the same though?

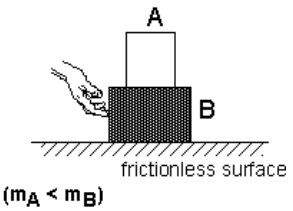
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : unanswered

Q18: Explain:

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right
Q5: Explain: If the frame of reference is from the floor, block a is moving at a constant velocity to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right
Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right
Q8: Explain: Since the force is constant, the acceleration is constant on the frictionless surface and the force is pushing to the right so the accel is going to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right
Q10: At the instant shown, what is the direction of the net force on block B? : to the right
Q11: Explain: The net force is going to the right since the net force is the resultant force of all the forces involved. When that is found, the resultant is going to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right
Q13: Explain: Since block A is slipping, it is actually still moving to the right but block b is moving faster so block b is slipping out from under it, making A seem like it is standing still.

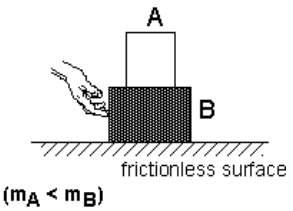
Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right
Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B
Q16: Explain: The accel on both blocks is still going right but the mag of accel on B is greater because it is moving faster than block a.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right
Q18: Explain: The net force is still to the right since block A is still moving to the right, the net force is still found by finding the resultant vector. When this is done, the net force is still moving to the right despite the fact that it is moving slower than block b.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: constant force was appled to the blocks from the right

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: velocity is constant

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: net force is to the right because blocks are moving to the right. if net force was zero the blocks would remain stationary

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: if forces was still applied to block b the only way block a would slip off is if no forces was acting on it unless there was a force pushing on block a to the left

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: acceleration of block b is zero thus block a is bigger

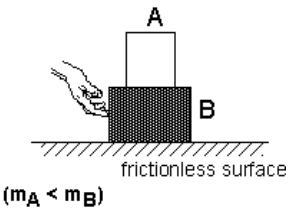
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: no forces are acting on block a except the normal force and the contact force

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: because it is 'attached' to block B, so if block B is moving to the right, so is block A

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: the blocks are moving to the right, therefore their acceleration is to the right

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: gravity and normal add up to zero, so all you are left with is the force to the right

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: block A is remaining stationary while block B slips out from underneath it

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: I am not really sure about these two

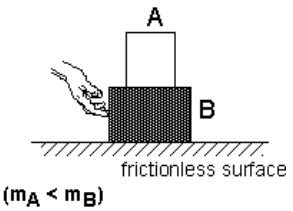
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: it is not moving, so there is no net force

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: since the A does not slip on block B, it means that the friction force is acting on the block A to move along with block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Since both of the blocks are moving to right, then acceleration on both blocks must be in same direction.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Although net force acting on block A and net force acting on block B is a different type of force, they must be in the same direction, since both are accerelating in the same direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Although problem states that block A begins to slip, they says that it is still on top of block B, therefore I assumed that the block A is moving along with block B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since block A started to move into the same direction as block B from still, it must mean that the block A is accerelating along with B. But since it's slipping from block B, it means magnitude of acceleration of A is less then that of a block B.

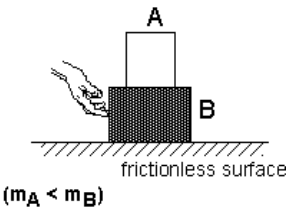
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Since accerelation is in same direction, direction of the netforce on block A must be in the same direction as block B, but has less magnitude.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because A is on top of B and A doesn't slip (accelerate backwards or stay in teh same position along the table) so teh net force is to teh right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: B is accelerating to the right because a constant force is applied and there is no opposing force. A accelerates in that direction because there is a constant force (by the block B) pushing it foraward

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Net acceleration proportional (maginitude and direction) to the net force and so they must be both in the right direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A still moves to the right with relation to the table but with reltion to B it moves to the left. The change in acceleration doesn't automatically change the direction of the velocity

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: Block A has less mass and so by newton's second law F=ma and the force of friction (which opposes motion) is now greater than the pushing force so a is bigger.

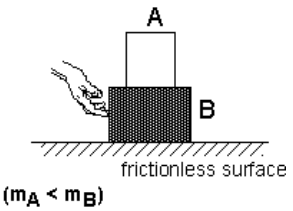
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Because acceleration and net force have to be in teh same direction by newton's second law.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block B's velocity is to the right, and block A is on top of block B, as well as n ot slipping on block B, so its velocity must be in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The force is constant, and the mass of the blocks are constant. Since F=ma, and both the total force, and the total mass are constant, the acceleration must be constant.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: both blocks are moving to the right, so the majority of the net force on each block must also be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Although block A is moving to the left relative to block B, it is still moving to the right relative to the table.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: The force on block B is constant, where as block A is slowing down. |negative acceleration of A| > 0.

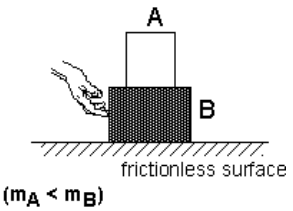
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Block A has just begun to slip, so it is still moving at a velocity near block B's to the right, so the net force should still be to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: it moves the same way block b does

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: net sum of forces are in that direction

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: normal and gravitational cancel and only the horizontal push is left

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: same direction just not as fast

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: slip takes away some of block A's acceleration

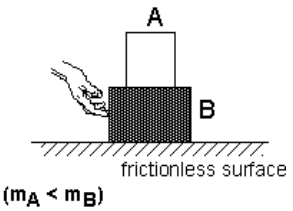
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: still to the right

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A has the same velocity as block B

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: Neither of the blocks are accelerating.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block B is being pushed to the right and has no other horizontal forces. The static friction force of block A is to the right to keep it from slipping off of the left of block B

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: It is still moving toward the right but not as fast as block B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Because the static friction force is less than the applied force, A slips off B.

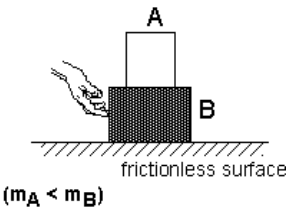
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The net force is still to the right, except the friction force isn't great enough to overcome the applied force.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right
Q5: Explain: If the top block is not slipping, then it must be moving in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right
Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right
Q8: Explain: If the bottom block is being accelerated in one direction and the top block is not slipping, then that block must also be accelerating in the same direction. The friction forces it in the same direction because the friction is opposing the slipping of the block off the bottom block

Q9: At the instant shown, what is the direction of the net force on block A? : to the right
Q10: At the instant shown, what is the direction of the net force on block B? : to the right
Q11: Explain: If both are accelerating to the right then the net force on both must be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero
Q13: Explain: The block on the bottom is still moving to the right, but friction has been overcome and is no longer moving the top block.

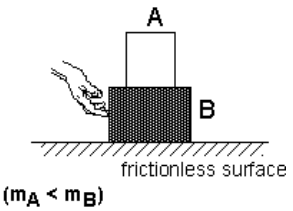
Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left
Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B
Q16: Explain: The acceleration is in the opposite direction of the friction because it is overcoming the friction.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero
Q18: Explain: If the block is not accelerating, it cant have any net force.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: Block A has no forces on it going forward or backward. There are only the normal force from block B and the force of gravity on it.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: Block B is moving at a constant velocity because a constant force is being applied. Therefore, the acceleration will be zero because there is no change in velocity. Block A has no velocity so it will have no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: For block B, the net force is to the right because normal force and gravity cancel each other out because the block isn't moving up or down. And it is moving to the right, so the net force must be in that direction. For block A, its net force is zero because no force is being applied from the right or left, and normal force and the force of gravity cancel each other out.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Block A is moving to the left because it is slipping, which means the velocity is in that direction also.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: By Newton's third law, Block B has to have a force acting equal but opposite to it, and block A is doing just that.

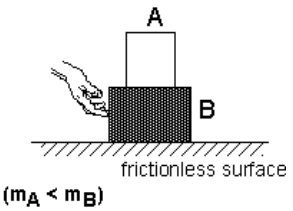
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: It is still zero because no force is being applied to if from the left and right, and the normal and gravity forces cancel out.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: In the whole system, block A does move, to the right, with block B. So, in the system, the velocity of Block A is the same direction as Block B, to the right

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The block is moving from rest, and moves to the right, so the velocity increases, and so the acceleration is position, in the direction of travel.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: In order for the block to move, there has to be a positive net force in the direction of travel.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Now block B moves without Block A. So the velocities are different. BUt still in the same overall direction, just at different magnitudes

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: THe magnitude is different. Block A's is less, cause it still moves, but less, and in the opposite direction.

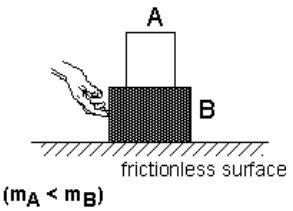
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: In order for block A to not move with Block B, the netforce on Block A has to be in the oposite direction thatn the netforce of Block B

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If A does not slip off B, then it must be traveling with B, in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: It is a constant force, so F = ma. Since m stays the same, then acceleration must stay the same too, to satisfy the condition that the force stays the same.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: It is moving to the right, so the net force must be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: It is still moving to the right, just not as fast as B is.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: A is just kind of staying how it was going most likely, while B is accelerating to the right.

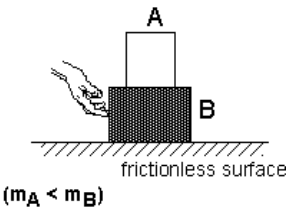
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The hand is still pushing right, from the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Friction and normal forces keep the block A from sliding off block B and therefore block B has to travel with block A

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Force equals mass times acceleration. Since a force is applied to the mass, there must be acceleration. And since the force is to the right, the acceleraion must also be to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: THe table is frictionless, so there are no force holding the objects back.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A slips on block B, so that means its acceleration is decreasing, but it's velocity is still to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: when block A slips on block B, it is slowing down, and that means the acceleration has to be in the opposite direction, which is to the left.

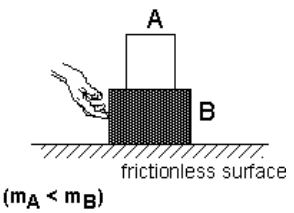
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: THe friction force is no longer able to hold block A so that it could move forward

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: it said that a didn't slip so it must be moving with block b

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: if the person is still pushing it then it has a force pushing it to the right and therefor it is still speeding up

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: if they are both moving together then they both have the same acceleration in the same direction just diffrent maginitudes

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: it is still moving in the same direction but it isn't moving as fast now.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: it would be equal because it has lost it's ability to keep up with block b and is now slipping back at the same amount as it is being pulled by block b.

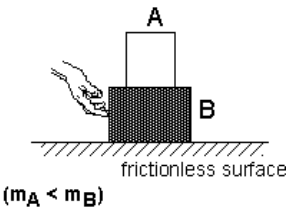
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: it is now excelorating to the left so the net force must also be that way

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: same as B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: they must both be the same. since not fric, Fnet is to the right therefore a is as well

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Fnet must be in same dir as a

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: given in above

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: there is probably a net force on a that remains to the right. obviously since it slips it decelerates with respect to B.

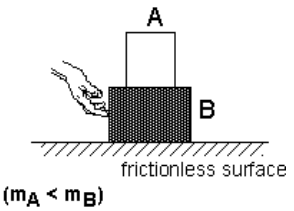
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: only friction acts on A in horozontal dir, and this opposes the direction of slippage.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since Block A doesn't slip on block B, and block B is moving to the right, A also must be moving to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: Since both are moving to the right at a constant speed, neither have an acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : zero

Q11: Explain: Both blocks are moving at a constant speed. Therefore, they both have equal forces in all directions and no acceleration. This means that the net force is also zero.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: The velocity of A is to the right, but with not as much magnitude as before. It's velocity is decreasing, but still to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: The magnitude of the acceleration of block A is greater than block B becuase B has no acceleration the instant after a larger constant force is applied. A, however, is slipping, and therefor slowing its velocity. It has a negative acceleration in respect to B.

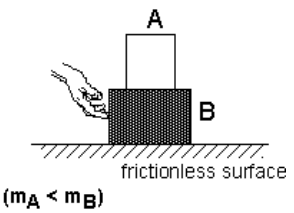
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: A is accelerating to the left. Therefore, the larger force must be pushing to the left. The net force is to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Common sense...? the block will move to the right if pushed on the left side.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: All of the forces acting on the lower block in the horizontal direction must equal m*a, and in the direction of the net force (to the right). As for block A, the acceleration will be to the right as well (with respect to the table).

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : zero

Q11: Explain: Block B has a net force of 0, since the friction between the blocks is countering the forward force applied by block A.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A was accelerating to the right up until the slipping point, and therefore it will continue to move to the right (but with no more acceleration).

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The top block is no

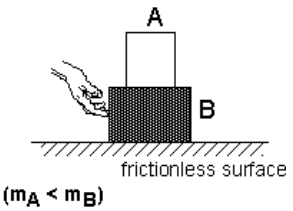
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Most just a guess.. not really sure.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: As block B is going to the right and block A does not slip, block B must also be going to the right

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Constant force implies acceleration, since mass can not be zero. since no other force act in the horizontal direction, acc. must be to the right

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Net force is in the same direction as acceleration

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Friction, which causes the block to move to the right, is still there because the blocks are in contact.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Although block A is still moving to the right, block B is moving to the right at a faster rate, and thus has a larger acceleration

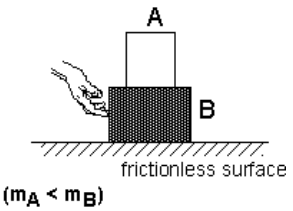
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: in the same direction as the acceleration

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: since b is to the right and block a is on top of b and not slipping it must be moving the same direction as b.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: the force on a is zero so acceleration is zero also. b moves to the right and there a a force appiled so there must also be a acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: no net force on block a because nothing is touching it. and causing a force to the right. block b moves right and therefore must have a net force directed to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: the friction force has been overcome and nothing is hold block a on top of b so it is falling backwards.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: block b has a net force so therefore an acceleration, yet it is going to move oppisite to the motion of block b. less than because it has not fallin off yet.

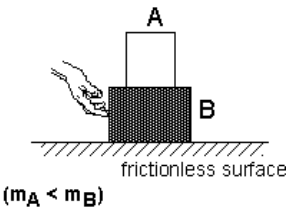
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: the friction has let go and now the block is not going to move with block a but instead to the oppisite direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because it is moving to the right. The forces acting on it horizontally are friction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The surface they are sliding on is frictionless so they will just keep going.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: They are moving to the right so the direction of the net force must also be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Block A cannot move to the left since there is no force pushing it that direction other than kinetic friction.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: Since the acceleration of block B is zero and A is changing velocity the accleration of A must be greater.

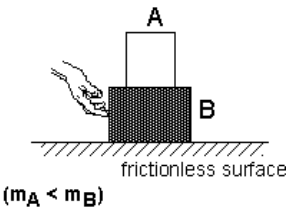
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: It is acclerating in that direction so the net force must be acting in that direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not slip, then it is moving in the same direction as B, when looked at from the reference frame of the Earth.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The block is being pushed with a constant force, there is a constant speed/velocity (the mass of the blocks isn't changing, F=ma). So the acc. of both blocks must be 0 because there is no change in velocity

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block A: the gravitation force is canceled by the normal force. And there is no force pushing A to the right (because in that ref. frame it is not moving to the right).Block B: the gravity force and the combination of normal forces cancelled out and just the force moving the the right is present.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : other

Q13: Explain: A is moving to the left on top of the block B, but we don't know how far to the right (how fast velocity is) Block B moves. So if B moves faster to the right then A moves to the left, then the Velocity is to the right; if the block moves faster to the left than B moves to the right, then velocity is to the left. If they are equal, the velocity is zero.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: A constant force means no change in speed if the mass stay same. Since that is true, there is no acceleration for Block B. Block A starts moving, from (relative to Block B) rest, so there is acceleration, so some acceleration is greater than none.

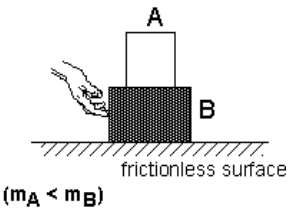
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The gravitational force cancels o

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: static friction holds the block in place, and is an equal, and opposite force to the force put on block b.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: a constant force is applied, so acceleration is zero.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The hand pushes block b to the right, causing it to move, making the force acting to the right, larger than any other. Block a is not moving in respect to block b, and has zero net force.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: a friction force becomes strong enough to move the block, and is in an opposite direction as to the motion of block b.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: neither block has acceleration since velocity is constant.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

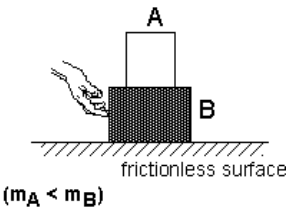
Q18: Explain: the friction force pushes the block to the left, giving it velocity and a net force in that direction.

End of Response

Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: The question simple ask the direction of velocity. The direction of velocity is always in the same direction of displacement.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both blocks are incresing velocity. So the change is to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: They are in oppisite directions because block B is being push and static friction is holding block A in place.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The displacement is now to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: For A to slip the force on Block B has to be bigger than the static friction on A. F=ma so the acceleration is what changes things from the previous example.

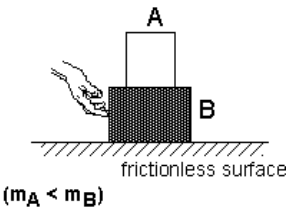
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Static fricition is still pointing to the left. The difference now is that the push is greateer than it.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: because it isn't slipping and it is moving with block B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: because it is moving to the right so there must be an acceleration to the rright

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: bEcause it is moving to the right

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: because now the force is only larger so the friction is lettting slip ... well B is movin faster than A but A is still on B and there is still friction between them ... so A is goin the same direction as B

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: becasuse friction is greater than accerlation so .... that is why it is moving to the side ?????

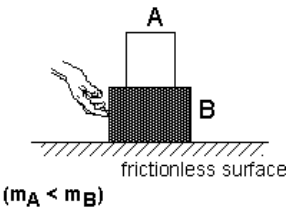
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: because it is moiving in opposite direction

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: A hand pushes block B to the right, the block is moving to the right, so Block B has a velocity vector to the right

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: Both blocks are moving with a constant velocity so there is no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force being applied to the balls is moving to the right since they are being pushed to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Since block B is moving to the right and block A is slipping off, it is not moving at all.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: Block A has a zero acceleration since it is not moving anywhere and B has a zero acceleration because it moves with a constant velocity.

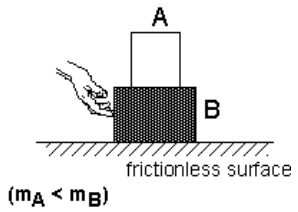
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: There is a force pushing to the right, Block B, and a friction force pulling to the left, so they equal each other out. The gravitational force and the normal force also equal each other out.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: the velocity of block A is zero with respect to block B, since it is not slipping on block B. With respect to the ground, Block A would have the same direction and magnitude of the velocity of block B. So really there can be two different answers to this question, it just depends on with respect to what.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: If block A is not slipping that means that the forces exerted on it are equal and opposite, which would make the acceleration zero. For block B, there is a constant force on the block by the hand so the block must accelerate to the right (the direction of the force).

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: This goes with the answer above, that block A is not slipping so all forces must be equal and opposite which makes a net force of zero on the block. for block B, it is accelerating to the right, so the net force must be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: this is the velocity relative to block B. Because the force exerted on block A by B is greater than the static frictional force between block A and B, the block moves to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since the velocity before slipping was zero and now there is a velocity, then there must be an acceleration in the same direction as the velocity. the mag. of acceleration of A is less than B because the slipping has just occured.

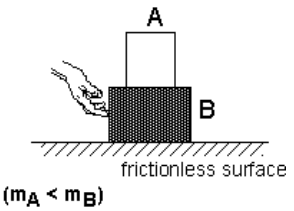
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: If block A is accelerating to the left, there must be a net force in that direction for that to occur.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: Since block A does not slip, it is not moving, and therefore has no velocity.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Since Block A does not slip, it means that it is not moving at that instant. As a result, the net force on Block A is zero and therefore it is not accelerating. Since the block is being pushed to the right and the velocity is in the right direction, the acceleration must also be to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Again, since block A is not moving, it's net force is zero. For block B, since the force being applied is from the left to the right, the direction of the net force will also be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: As block B begins to accelerate to the right, the frictional force holding block A on block B losens, but since it simply slips from block B there is no velocity.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since Block A just slips from the acceleration of block B, there is no net force and therefore there is no direction on the acceleration. As a result, the magnitude of acceleration for A is less than that for B.

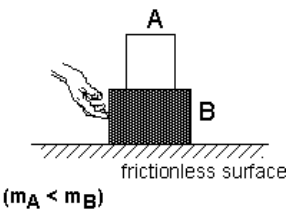
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: Since the acceleration is zero, the net force on block A must be consistent with these facts and also be zero.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: relative to the surface the velocity of block A should be the same as that of block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: After reaching a constant velocity there is no acceleration of either block because the net forces are zero.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : zero

Q11: Explain: There is a static friction force exerted on block A by block B and an equal force being exerted back and vice versa(?).

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: the velocity is in the same direction relative to the surface. relative to Block B it is to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain:

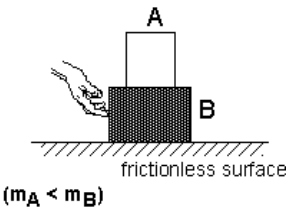
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : unanswered

Q18: Explain:

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A did not slip, then it must be traveling in the same direction as block B at the same velocity.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the left

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Block A is inclined to stay at its original position before a force was applied to block B. Therefore its acceleration will be to the right, however there is not enough acceleration to overcome the force of static friction between block A and block B, therefore block A does not move. Block B accelerates in the direction that the force is applied, which is to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are moving to the right, therefore the direction of the net forces acting on them must also be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: When block A is slipping, its velocity is still in the direction of block B's velocity, however the magnitude of block A's velocity is less than block B's.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: When block A begins to slip, it indicates that block B is gaining velocity at a more rapid rate which constitutes a greater acceleration.

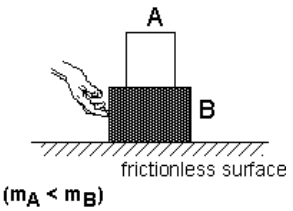
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Since block A is slipping, it is moving to the left, which indicates that the net force acting on block A should be in the same direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: A does not slip, it must be moving with B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: They're speeding up to the right, they must be accelerating to the right

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Same as question 9.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: They're still moving to the right, B is just moving faster.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Friction no longer can hold block A against its resitance to movement.

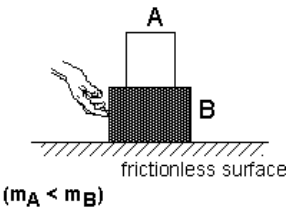
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: There is no net force acting on block A, they balance eachother out.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: A does not move relative to B. B moves to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Assuming the blocks are moving, are there is a constant force (greater that the force of friction), then the direction of acceleration for both blocks will be in the direction og the chnage in velocity: to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: From question 9, the applied force is greater than the force of friction, so the net force (Applied - friction) is in the direction of acceleration: to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: A is stil headed in the same direction as B, just not as fast.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The distance covered by A during that instant is less than that covered by B, therfore, the change in velocity is less for A than B, therefore the acceleration for A is less than B.

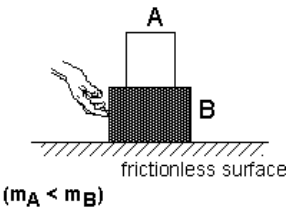
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The applied force is greater than the force of friction, so the net force (Applied - friction) is in the direction of acceleration: to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block is moving right so that is the direction of its velocity.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The hand is pushing with constant force so both of the blocks have no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The blocks are moving to the right so that is the direction of their net force.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Block is not moving, it is just staying in place as Block B moves under and away from it.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Block A is not moving so it does not have acceleration. Block B is moving so its acceleration is greater.

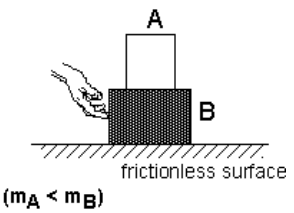
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: It is 0 because Block A is not moving.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A and block B are both moving in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : unanswered

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: They are pushed with a constant force.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block A is not moving, the net force = 0. Block B is moving to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Block B is moving to the right while block A is not moving, so it is sliping.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: They are pushed at a constant force.

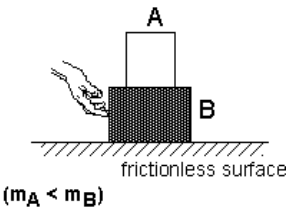
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: Block B is moving, but block A does not move.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A is moving right with block B so that is the way of its velocity.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Everything is moving to the right so I figured that the acceleration is also moving that way.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Net force is the total combined force and the blocks are moving to the right so that is the way the net force is facing.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: I think that block A will not move if it block B is pushed fast enough.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: I think that block A will not be moving and since block B is moving and has acceleration it is greater than zero.

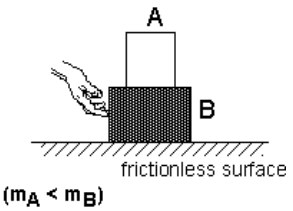
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: If block A is not moving then the net force on it will be zero.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A does not slip, so the friction is sending the direction of the velocity in the same direction as Block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: The constant force results in a constant velocity, so the acceleration is zero for both blocks.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block B is moving according to the constant force on it, which pushes it to the right. Block A is moving with Block B so it, so the net force is also to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: The friction force is not enough push the velocity to the right, so there is no net force.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: They both are zero.

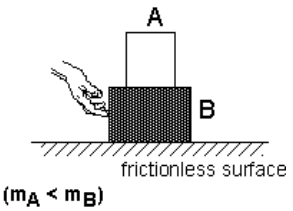
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: no forces acting on it, other than gravity.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: It's velocity is zero because the box itself is not moving

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Block B is moving to the right but Block A has no velocity therefore it cant have acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the left

Q11: Explain: This is because B is being pushed to the right and friction is trying to push B to the left.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Now it is moving on block B to the left. Whereas in the first example it wasn't moving.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: This is because block A did not have acceleration before it was moving.

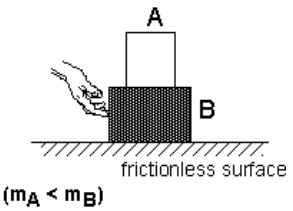
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: To the left because that is the direction it is traveling on block B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: It is moving in the same direction as block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Block a is accelerating the same amount and in the same direction as block B.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are accelerating to the right and force equals mass times acceleration.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: It is still moving to the right, only it is not as fast as block B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Block B is moving faster then block A which means it is accelerating at greater amount then block A.

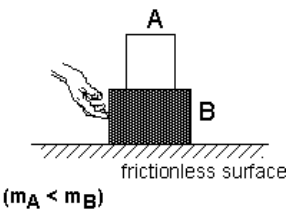
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Block A is still accelerating in that direction. Only the net force on block A is less then the net force on block B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: The object is not moving.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the left

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The gravitational force and the normal force on A cancel out, and the friction force on block A is pointing to the left so that means that the Fnet is also to the left, so the direction of acceleration or m*a is to the left

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Same reasoning as above.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The block A is now slipping to the left so the velocity is in that direction.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: The acceleration must be greater then the acceleration of B so that the system doesn't move as one whole object, but one block moves independently to the other. Block A's m*a vector must be greater then B's.

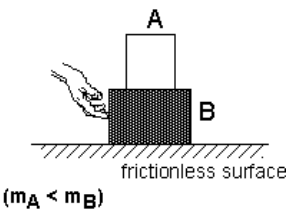
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The net force must equal the m*a vector, which is to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A is on top of B and since gravity is keeping it in place, Block B,s velocity is equal to A,s

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: This block is accelerating with Block A on top of it therefore, both of the blocks are accelerating in the same direction. To the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: both of these iteams have a net force equal. Mass times acceleration would push these items to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Block B.s velocity is greater of that of A and the friction between block A and B slips. A slows down in the opposite direction of B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: B has a greater acceleration of A, therefore the magnitude of acceleration is greater when they slip.

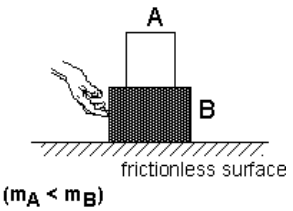
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The net force is less then Block B at that instant of time. Less net force then the block it is on means it points in the opposite direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not fall, then it moves in the same direction as block B, which is to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the left

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Block B accelerates to the right due to the applied force. Block A is able to stay on block B due to its normal forces and friction which points to the left. As the force on B increases, it will overcome the frictional force.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks move to the right so the net force must point in that direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: As a greater force is applied on block B, friction can no longer keep block A on top of block B so while block B moves to the right, A does not move.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Only B moves, thus it has the greater acceleration.

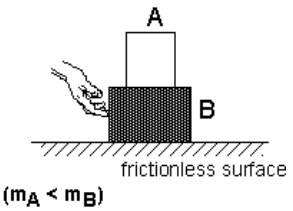
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: It no longer moves with block B so the forces cancel and give A a net force of zero.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: It is moving with Block B. Thus there has to be acceleration in the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: They are both moving in that direction (versus not moving at all)

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: They have acceleration to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Kinetic Friction prevents it from slipping further. If we ignore F(K) then there is no force.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Kinetic friction takes place. But since it's still slipping, the acceleration of B is greater than that of A.

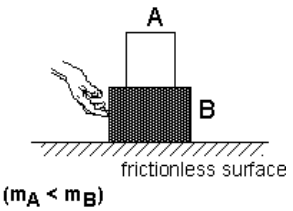
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : other

Q18: Explain: After it slips, if falls down with gravity.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not slip off block B then the movement of block A is in the same direction of block B. Therefore the velocity for block A is also to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: If block B is speeding up and block A does not slip off of block B then block A would be speeding up too. Because the blocks are both speeding up to the right, the acceleration is pointed to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: If the net force were zero then there would be no movement but the net force is not zero. The movement of the blocks is to the right and therefore the net force on the blocks is to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is slipping to the left of block B but does not fall off block B. The velocity of block A is to the right, the acceleration is to the left. Therefore block A is moving to the right but slowing down, the velocity is still to the right for block A.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The mag. of accleration fo A is less than the mag. of accleration of B because if it were equal it would fly off block B. If they were equal it would also quickly move off of block B but it is just slipping slightly.

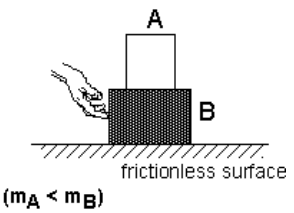
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The net force is to the right. The magnitude of this force to the right has been lessened by the acceleration to the left. Block A is still traveling to the right, just at a slower rate, which indicates that the net force is still to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Friction will cause A to move with block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: For block B, there is a net force to the right, therefore there is a acceleration in that same direction. For block A, there is a net Force from friction, therefore it will also accelerate to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The netforce is in the same direction as acceleration, thefefore they will both be to the right. For B, the net force is the hand, for A it is the friction between A and B.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is still going to the right, however block B now has a greater velocity. Block A has just begun to slip.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Block A still has kinetic friction acting on it just after it slips, therefore it is still accelerating to the right. However, since it has started to slip the acceleration of B is greater than A.

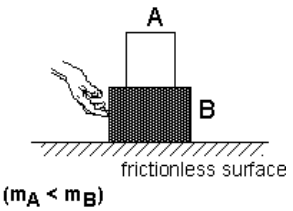
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The acceleration is still to the right, and the net force is now caused by kinetic friction instead of static friction, therefore the direction of the net force is to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: BECAUSE THE BOOK IS ACTUALLY MOVING TO THE RIGHT, BECAUSE IT IS ON TOP OF THE BOOK BELOW IT AND THAT BOOK IS MOVING.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: the are both moving to the right and starting to move from a stopped position.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are accelerating to the right from a stopped position.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: because it was moving to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: because it starts to resist the movement to the right, therfore meaning that it was resisiting the accelration of block b, thus the acceleration was in the opposite direction thus to the left.

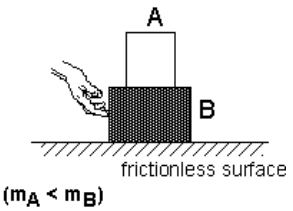
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Because it is moving to the left in comparison to block B, not to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since block A is on top of block B and block A does not slip, we can think of both blocks as one object, so both would be the same velocity.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Because without friction all the force goes to acceleration, and the force is going in the right direction

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block A and B can be thought of as one object, and that object is accelerating to the right, so the net force must be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : other

Q13: Explain: We're not sure because we dont know how much block A is slipping. If the surface between a and be is totally frictionless, then A's velocity would be zero. but the larger the friction, the more B will push a to the right

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Well, assuming that block is slipping so much that it has the same position of the ground below it, it has zero acceleration from the point of view of the ground.

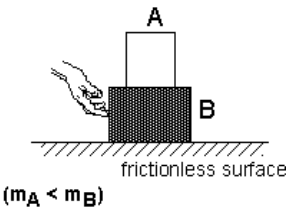
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: there is no longer any net forces acting on block A since block B now has no force upon. The thing about these questions I dont understand is that I would think that something could slip at different rates, ie: the faster block B moves the more the slippage, so the rate of slipping is a major factor in these types of problems. But, as usual, i will probably be inlightened by the brilliant genius o

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: It is moving to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: They are both moving to the right, which means they must be accelerating to the right - since F = ma. If there is any F, they must be accelerating.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force must be to the right, otherwise the blocks would not move in that direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : other

Q13: Explain: The velocity of the block is downward, so it falls.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: It is still accelerating to the right, but not as much so as block B. Thus, it falls off.

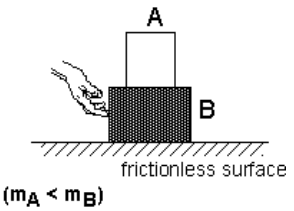
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: It's net force is to the right, but it is not large enough to keep up with B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A does not slip on top of Block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The hand is pushing with a force on a frictionless table, so the blocks must be accelerating, both in the same direction.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The horizontal force on block B by the hand is not cancelled by any other force, so its net force must be to the right. Similarly, the static friction force on block A by block B is not cancelled.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: The block is still moving to the right, even though it has begun to slip, since there is kinetic friction between blocks A and B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since kinetic friction force is less than static friction, block A has a smaller net force and thus a smaller acceleration.

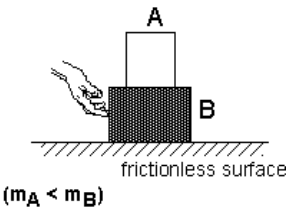
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Block A still has kinetic friction acting on it by Block B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because block a isn't slipping it's velocity is equal to block b's.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The acceleration of block a is zero. But the acceleration of block b is going to the right, because the block has a force on pushing it on the right in the positive x direction.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The only forces acting on block a is gravity and normal and they are canceling each other out making the net force zero on block a. On block b, because it is moving to the right the net force is also pointing in the left direction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: It is still to the right, because it hasn't fallen off block b, so the velocity would still be to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The acceleration would be to the left because the block is moving in the negative x direction, causing the acceleration to be negative. It would be less then the magnitude of acceleration of block b because the acceleration of block a would be subtracted from block b.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

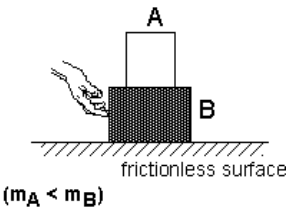
Q18: Explain: The net force of block a would be to the right still, because the magnitude going to the left wouldn't be larger than the magnitude moving to the right.

End of Response

Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because block A is not slipping on block B, and block B is moving to the right, then block A is going to be moving to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The blocks are being pushed with a constant force, not at a constant velocity. Because they are on a frictionless surface, the force exerted by the hand will result in an acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The blocks are accelerating to the right, so their net force pretty much has to be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is still moving in the same direction as block B, it is just now starting to not move as fast.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Friction force is what causes block A to move when block B is pushed. What happened when the block began to slip is the static friction was broken and now kinetic friction is what is affecting block B, causing it to accelerate.

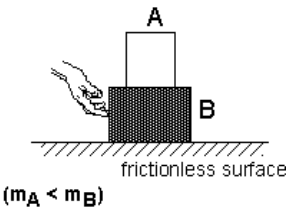
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: There is still force causing block A to accelerate in the same direction as block B, just not as great as before.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Friction is what keeps the block A on block B, since friction is the only force that is acting on block A in the x axis, the velocity is to the right since friction is going the same direction as the initial force on block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Since the force is constant, that means that the acceleration is constant also, therefore acceleration will be to the direction of the motion.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: the only force actiong on block A on the x axis is friction, therefore the net force will be the same direction as the friction force. The only force action on Block B with respect to the x axis is the initial force, therefore the net force = initial force and initial force is to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: the only force on block A with respect to the x axis is friction. the friction's direction is to the right, therefore the velocity is to the right. the fact that the block is slipping only means that the initial force on block B overcomes the force of friction on block A.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: At that instant, the force of friction on block A and the initial for

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : unanswered

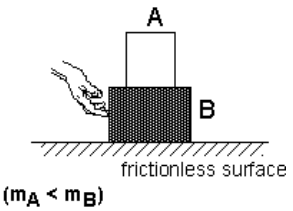
Q18: Explain:

End of Response

Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since the table is frictionless, an applied force will result in motion. Since A does not slip, it moves with B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Relative to the table, both blocks are being pushed to the right on the frictionless surface.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: For A, the magnitude of the normal force from B equals A's gravitational force. There is a friction force in the the direction of acceleration from A to B, which is to the right, and must be less than the force from acceleration, as the object doesn't slide.For B, the net force is to the right as the object is being pushed.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Although the velocity is slowing, the block is still moving to the right as it is still atop the moving B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: 15: A's FBD will show only the forces acting directly on it. The net force due to accelation must have become greater than the force due to static friction, and the force due to kinetic friction is always less than static. But, since there is some friction between A and B, the block is still being carried forward relative to the table, so the direction of acceleration of block A is still to the right, but the magnitude has decreased.

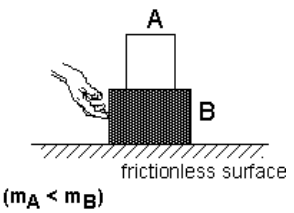
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: Since the block is still moving to the right relative to the table, the direction of the velocity must be to the right. But, since this velocity has become smaller since the block has begun slipping (and moving less quickly to the right, relative to the table), the change in velocity is to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : other

Q5: Explain: It is connected in a system to block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: It goes from rest to a constant speed in the right direction.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Force is mass times acceleration therefore it seems logical to assume that the net force will be in the same direction as the acceleration.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: It is moving in a negative direction.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: The magnitude of the frictional force will be great enough that it will keep block A from moving in the negative direction.

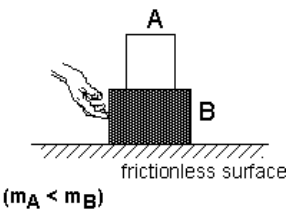
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: It is moving to the right with a much smaller magnitude than the block on the bottem, which is why it looks to be slipping.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because block A is moving with block B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Block B is accelerating to the right because the force is pointing to the right, and block A is accelerating to the right because it moves with block A

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force of block A is zero because friction cancels out the force, the net force of block B is pointing to the right because block B is accelerating to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Because block A is not exerted by any force

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: no force is exerted on block A therefore the acceleration of block A is zero, hence the magnitude of acceleration of B is larger than that of A

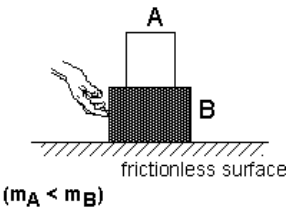
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: No force is exerted on block A

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not slip on block B then the velocity of A relative to B is zero which means that the velocity of A is the same as B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The only horizontal force on block B is the exerted on it by the hand so it is accelerating in the direction the hand is pushing it. The velocity of A is the same as the velocity of B so A is also accelerating in the direction the hand is pushing block B.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net force on an object will be in the same direction as the acceleration of the object, or rather and object accelerates in the direction of the net force exerted on it.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: A is still moving to the right, just not as fast as B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain:

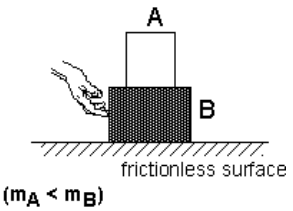
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: The net force and acceleration will be in the same direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: it moves with block B

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: B is being pushed to the right hence accel in same direction and A is moving with B

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: there are no forces acting on A cept grav and normB is moving to the right therefore net force to the right

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: still moving that direction just slower than B

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: A is not moving with B anymore and no force is acting on it B is still accelerating and A is not

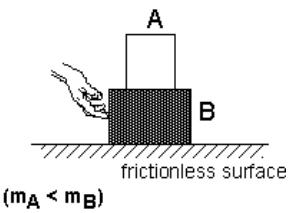
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: friction btw B and A

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: because it's moving with block b, it has the direction of velocity with b.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: A and B are moving on a frictionless table. the net force exerted on them is to the right, so the acceleration is to the right, too.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: because it's moving on a frictionless table, its gravitational force is cancled out with the normal force, so the force left is the constant pushing on the block which is to right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: A starts to slip meaning that it's moving to the opposite direction of B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: since the velocity is to left and it moves from 0 velocity, so it's accelerating to the left. becase the net force of A is smaller than it of B, the accelaration of A is smaller.

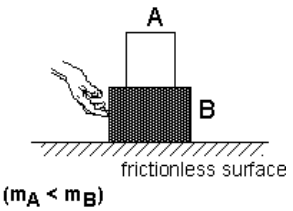
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: because A is moving with acceleration to the left, so the net force if to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If block A does not slip, then its static friction with block B moves it the way block B moves.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: A force is applied on block B to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Block B is moving to the right, the table is frictionless, providing no kinetic friction, and a force to the right is applied to the block that is not countered with any other horizontal force.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The kinetic friction moves the block to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: The same force is applied on block A which has a lower mass than block B.

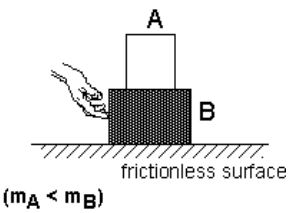
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: No force is applied on block A.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right
Q5: Explain: The acceleration is to the right also and the block is moving in that direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right
Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right
Q8: Explain: That is the direction the blocks are moving.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right
Q10: At the instant shown, what is the direction of the net force on block B? : to the right
Q11: Explain: Also because that is the direction the block is moving.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right
Q13: Explain: The block is still moving in the same direction of B but is moving at alesser velocity because it is slipping

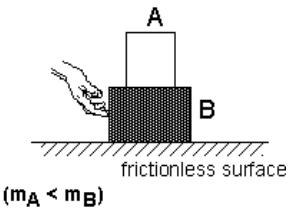
Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left
Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B
Q16: Explain:

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left
Q18: Explain: Since the block is slipping the the direction of the acceleration changes the net for in the opposite direction is larger than the net force pushing on block B.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: The block is moving with block B to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: If the force is constant, then that would mean the velocity is constant indicating that there is no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: On block A, there is only a frictional force acting on it to the left to keep it on top of blcok B. However, block B is being pushed to the right by a hand and is moving so the net force will be to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is still heading along with block B, but the force exerted on block B by the hand is greater than the friction force between A and B so block A's velocity is still the same as block B which is to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: Block A will not be accelerating quite as fast as block B because of the friction force to hold it on block B is not great enough. So block A's acceleration will be less than and in the opposite direction as block B's.

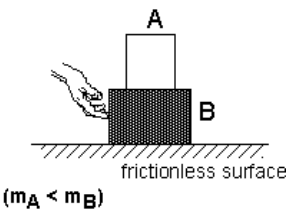
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: There is still a frictional force acting on it and that is all.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : zero

Q5: Explain: block a is not moving in relation to block b so there is no velocity, because it is just sitting on top.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: because the force is constant so there is no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: block a does not move in relation to b, b is moving to the right so the net force is to the right, but a has no net force since it has nothing but the normal force and gravity acting on it.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: because block a starts to slip the block is going to move away from the direction that the bottom block is moving so that is to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: the acceleration should be equal, just in opposite directions.

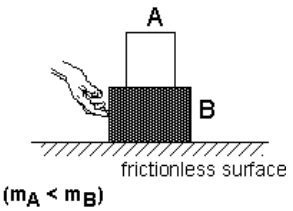
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: because the block is starting to slip, the opposite way that the bottom block is moving

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: because the box is moving to the right by the friction force of the lower box.. its velocity is in the same direction as the lower block.

Q6: At the instant shown, what is the direction of the acceleration of block A? : other

Q7: At the instant shown, what is the direction of the acceleration of block B? : other

Q8: Explain: because the acceleration is the sum of the forces, and there is both forces of gravity and horizontal forces acting on the boxes, the acceleration will point diagonally..

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: because block a is not moving the net force on it is zero.. the friction, pushing and normal forces on block cancel out to equal zero.. since box 2 is moving, the force acting on that block faced towards the movement of the box.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: because block b is going to the right and block a is slipping, block a has a certain speed in the opposite direction of block b.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: because of newton's third law, both boxes exert the same force on eachother, so since the net forces on eachother were the same, they must move at the same acceleration.

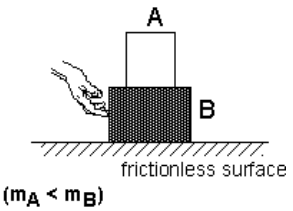
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : other

Q18: Explain: it is angled to the lower left because the force due to gravity and the pushing force add to equal a leftward pointing force.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: if there is no slip on block B, then A must be moving along with it, therefore it is moving right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: If it's being pushed by a constant force, then the velocity is constant, making acceleration zero.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Net force is the way with which the object is moving.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Block A doesn't move, block B moves under it.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: B is moving faster than A can keep down on it, so it must have a higher acceleration because A does nto move.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

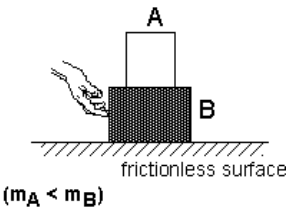
Q18: Explain: It does not move because block B moves under it. A just stays in thes ame place.

End of Response

Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If the frame of reference is the ground relative to block A, A is moving at a constant velocity to the right relatice to the ground.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the left

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force of the acceleration is trying to push block A off block b to the left, yet friction is pulling the block to the right holding it on.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: If block b is being pushed with a constant force and there is no friction on the surface then the block will accelerate in the direction of the force. The net force on block a is zero because block a is not moving relative to block b. There is no acceleration, therefore the sum of the forces must add up to zero.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: If you are considering the velocity relative to the ground it is still to the right. If the velocity is being compared relative to block b the velocity vector will point to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: The force of the lower block has to have an effect on the upper block has to have a great enough magnitude of force to overcome the Friction force between the two blocks. Therefore the acceleration must be greater for block b.

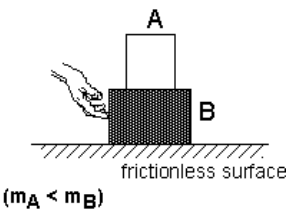
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: The block is moving to the left so the sume of the forces must point in the left direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since the table is frictionless, block B will move when a force is exerted on it, in the direction of the force.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Since the blocks began at rest, and then were moving to the right, the only acceleration is going to be in the direction they're moving.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Since block B is moving to the right, and there is no friction, the only force that has not been canceled out is the force due to the push. Block A has no force in the vertical directionj, since it is canceled out, and the force in the horizontal direction is only that due to friction.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Since block A has less mass than block B, it will slip in the opposite direction of B's movement.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: Since B is still moving at constant speed, any acceleration that A has will be greater than that of B.

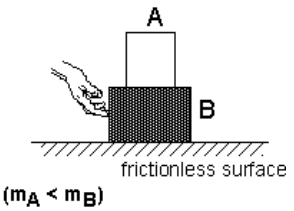
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: If block A is slipping backward, the friction force is no longer holding it.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If the blocks slip, then it's almost as if the blocks act as one unit, with the whole thing moving toward the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: There is no friction on the table, and since there is a constant force applied to the block, that means that there is constant acceleration (to the right).

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Both blocks are accelerating to the right, so they must have net forces that point toward the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The block is slipping to the left, so its velocity must point in that direction.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: I'm not really sure. Block B is still accelerating to the right, and there's no force pushing Block A to the left...not sure.

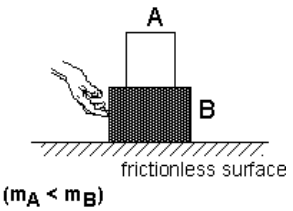
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: I guessed. I'm not sure!

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right
Q5: Explain: The force being applied is to the right, thus the velocity will be in that direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero
Q7: At the instant shown, what is the direction of the acceleration of block B? : zero
Q8: Explain: As the force is constant the velocity of each block is constant.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right
Q10: At the instant shown, what is the direction of the net force on block B? : to the right
Q11: Explain: The only force we are working with is being applied to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right
Q13: Explain: The force is to the right.

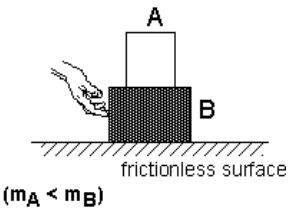
Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left
Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B
Q16: Explain: As block A.'s velocity slows it it towards the left. I'm unsure of the second answer.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : other
Q18: Explain: I'd have to say the net force is either gravity or a constant force, so perhaps in a downwards direction.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: A does not slip and is travelling on B which is going right

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: given, hand pushes block B with a constant force to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: On A, forces are Normal, Weight, and Friction.On B, forces are Normal, Weight, friction and a normal from the pushing

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Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: The force of friction is overcome.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: A is changing direction while B is being pushed with constant force.

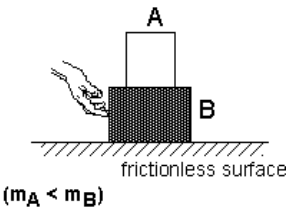
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: It is accelerating to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: If the block is not slipping then it is being carried by Block B through friction to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both boxes went from rest to having a velocity towards the right therefore the acceleration is towards the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: In order to accelerate towards the right the et force of the blocks must be directed towards the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: Block A is slipping back on Block B so it is going in the opposite direction of block B which is towards the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since block A is moving towards the left after not moving on the block the acceleration must be towards the left. However it is just slipping so itsw magnitude is a bit less of else it would go to the left and off Block B very quickly.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

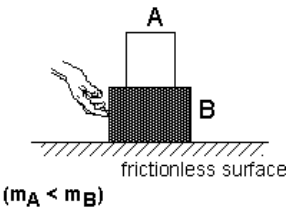
Q18: Explain: In order to have an acceleration towards the left the net force of block A must be towards the left.

End of Response

Pretest #4 (N23), Autumn 2003 *University of Colorado, Boulder*

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Because block A does not slip, that means that the friction between A and B is causing A to move with the same force as B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Because both blocks started from rest there is a change in velocity meaning acceleration. Because the surface under B is frictionless, there is no force to slow it down and change its velocity, so AFTER the instant shown there is no acceleration.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: The net Force is to the right because the objects are moving to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is still moving to the right, just at a slower rate than block B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: Since the velocity of B is constant, its acceleration is zero. Since the friction of A on B is constant, A also moves at a constant velocity with zero acceleration. Its velocity is just less than B.

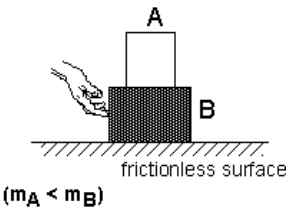
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Assuming that Block A is still travelling with B, slipping a little but not entirely, it is still moving to the left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: if a doesn't slit, that means b has friction to pull block a with it.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: the hand pushes on a, and friction of b on a does the same thing.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: net force is in the direction of accelartion

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: to an outside observer, its still moving right

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A = mag. of acceleration of B

Q16: Explain: no idea.

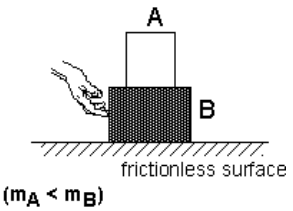
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: because its moving more left.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block is DOES NOT slip on block B, so their velocities have to bein the same direction.

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : zero

Q8: Explain: If the blocks are being pushed with a constant force, there is no change in veolcity.

Q9: At the instant shown, what is the direction of the net force on block A? : to the left

Q10: At the instant shown, what is the direction of the net force on block B? : zero

Q11: Explain: There is no force acting on Block A, it is not in an inertial reference frame, Newtons Law does not hold here.Block B motion is to the right, so the force in this direction (pushing force) must be greater than all other forces acting on this block.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Because the only force acting on the system is to the right, It would be impossible for Block A to travel to the left. However, it is not travelling to the right with the same velocity as Block B due to the slipping.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: With the increased force, Block A is 'overtaken' by Block B, hence the acceleration of Block A must be opposite to its direction of travel.The acceleration of Block B must be greater than that of Block A, because both blocks are moving in the same direction, but Block B is moving at a faster rate than Block A, due to the increase in force.

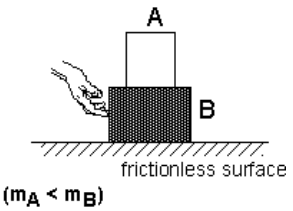
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: Without friction, there is no force acting on Block A, it is analogous to a coffee cup on the dashboard of a moving car. With only contact forces, the only thing in contact with A is B, and these forces (normal and gravity) cancel out.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Block A is moving in the same direction as block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: They are moving moving in the direction of from the right from an initial position. This means so are their velocity and acceleration vectors.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: They are both to the right, that is why they are moving to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: Block A is still moving to the right, just not as fast as block B is moving to the right.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: Block A has a acceleration in magnitude less than that of block B, which I believe to be zero, as block A stops moving, and block B continues to move.

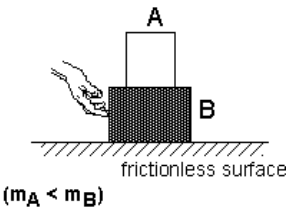
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: If the acceleration is zero, then so is the net force.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Friction is so great, that block A remains in place on block B. It's moving to the right because block B is moving to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both objects are moving together, therefore both acceleration is the same.

Q9: At the instant shown, what is the direction of the net force on block A? : zero

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: For block A not to move. The force of friction equals the force block B is being pushed at. The net force on block A is zero.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: Block a is remaining in place, or it wouldn't slop. It's not changing distance, therefore no change in velocity.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : zero

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Acceleration on block B is greater than the force of friciton on block A. Block A is sliping because the acceration force is greater than friction and greater than block A's net force.

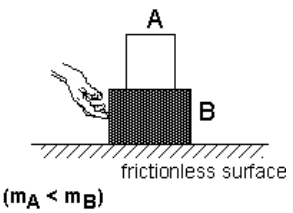
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: It's either zero, or close to zero. I always think about the moving how the actor can pull a table cloth off of the table top and not break a glass of wine. The objects on the table just remain in place, this is the same kind of situation. Block b is moving so fast that block A has to affect of it's forces.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since A does not slip off, its going in the same direction of block b, which is right

Q6: At the instant shown, what is the direction of the acceleration of block A? : zero

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Force is not exerted on block a, so it is not accelerating, but for block b, there is an acceleration to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : other

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: B is moving towards the right, but A is being moved due to its fritional force.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: A begins to slip off to the left so the velocity is towards the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: In order for A to slip off to the left, its accel must be greater than that of B or it will just stay put on block B.

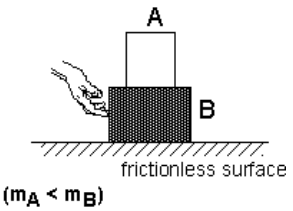
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: There is frictinal, normal, gravitational forces acting on the block when it begins to slip. However its still going to fall off to the left and onton the ground.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: Since the block does not slip, static friction pushes it the same way as block B.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: Both have force in the same direction and acceleration is always in the same direction as force.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: That is the direction that the blocks are accellerating.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: It is still moving to the right, just not as quickly as block B.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the right

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Because A starts mopving backward in relation to the accelerating block B then we know the acceleration of A is less, but still in the same direction because of kenetic friction.

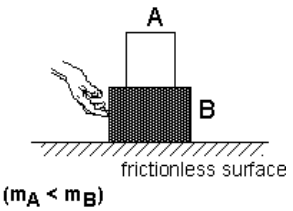
Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the right

Q18: Explain: Kenetic friction is not equal to the force of the hand on block b, but it is in the same direction because A is still accelerating to the right.

End of Response

Student#: **NAME:**

Two blocks of unequal mass ($m_A < m_B$) are placed on a frictionless table. A hand pushes block B with a constant force to the right. Block A does not slip on block B. At the instant shown, the velocity of block B is to the right.



Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: beacause A dosn't slip on B, so they move together, since B's velocty is to the right, so A's to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: cuz they both move to the right. so the acceleration goes to the right.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: F=ma. the acceleration goes to the right, so the net force goes to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the left

Q13: Explain: because the friction goes to the left, opposite of B's velocity, so A will goes toward left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A > mag. of acceleration of B

Q16: Explain: cuz the force is constant, F=ma, A's m is smaller so A's accleraiton is larger.

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: the accelrration points to the left, so the net force goes to the left.

End of Response

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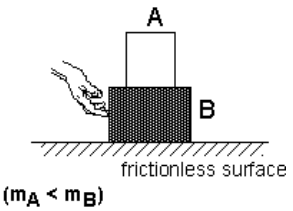

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: It is being pushed to the right.

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: The force is being applied from the left pushing right so it causes the two blocks to speed up.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: Since no force is being directly applied to block a, friction is causing it to move to the right along with block A, so its force is to the right.

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : zero

Q13: Explain: At that instant, block B continues to move, but block A stands still.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: Since there is no longer a force decelerating block A, and there is on block b, block b will have a greater magnitude

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : zero

Q18: Explain: There are no forces acting on Block a just after it slips on block b.

End of Response

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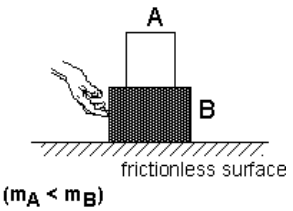

Q4: At the instant shown, what is the direction of the velocity of block A? : to the right

Q5: Explain: block A and B are moving in the same direction and thus their velocity vectors are in the same direction, force of push is tranferred from B to A by friction force between the two blocks.. (assuming as we are said that block A does not slide)

Q6: At the instant shown, what is the direction of the acceleration of block A? : to the right

Q7: At the instant shown, what is the direction of the acceleration of block B? : to the right

Q8: Explain: since force is a vector it will have the same direction as the acceleration of the block B, due to the direct proportionality of those two, same is for block A as the force of push is tranferred through the force of friction from B to A.

Q9: At the instant shown, what is the direction of the net force on block A? : to the right

Q10: At the instant shown, what is the direction of the net force on block B? : to the right

Q11: Explain: acceleration and net force are in the same direction,. since b accelerates to the right net force will be ot the righ as well... same for A

Now the hand begins to exert a larger, constant force, and block A begins to slip on block B. The following questions relate to the motion of block A at an instant just after it has begun to slip but while it is still on top of block B.

Q12: At the instant just after block A begins to slip on block B, what is the direction of the velocity of block A? : to the right

Q13: Explain: becuase magnitude of velocity of block B is gretaer than theat of block A in the opposite directions, thus when we add those vectors, resulting vector will be pointing to the right, if we take velocity relative to the block B than velocity of vector A would be to the left.

Q14: At the instant just after block A begins to slip on block B, what is the direction of the acceleration of block A? : to the left

Q15: At the instant just after block A begins to slip on block B, is the magnitude of the acceleration of block A greater than, less than, or equal to that of block B? : mag. of acceleration of A < mag. of acceleration of B

Q16: Explain: because for some time blcok A will still be on the top of block B

Q17: At the instant just after block A begins to slip on block B, what is the direction of the net force on block A? : to the left

Q18: Explain: relative to the block B, becaus eit moves away form it.

End of Response