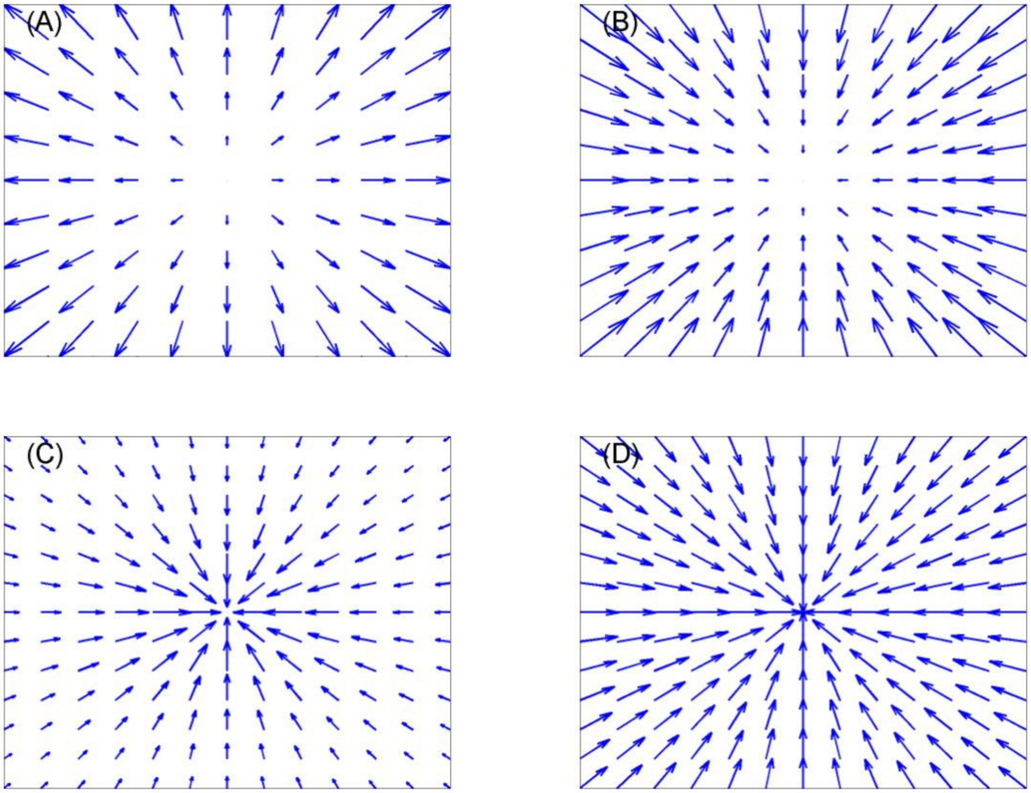
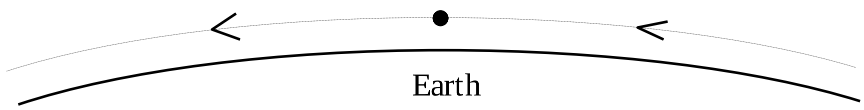
CT11-1. Which of the following plots shows the gravitational acceleration field due to a point mass at the origin?



CT11-2. A satellite is in circular orbit at an altitude of 100 miles above the surface of the Earth.



The satellite's pre-launch weight is its weight measured on the ground. The magnitude of the force of gravity on the satellite while it is in orbit is..

A) slightly greater than its pre-launch weight.
B) the same as its pre-launch weight.
C) slightly less than its pre-launch weight.
D) much less than its pre-launch weight, but not zero.
E) zero.

CT11-3. Review of integration in spherical coordinates. What is the correct formula for the volume integral of a function f(r,θ,φ) over the inside of a sphere of radius R?

A) $\int_0^R dr \int_0^\pi d\theta \int_0^{2\pi} d\varphi \, r \sin\theta \; f(r,\theta,\varphi)$ B) $\int_0^R dr \int_0^{2\pi} d\theta \int_0^\pi d\varphi \, r \cos\theta \; f(r,\theta,\varphi)$

C) $\int_0^R dr \int_0^\pi d\theta \int_0^{2\pi} d\varphi \, r^2 \sin\theta \; f(r,\theta,\varphi)$ D) $\int_0^R dr \int_0^{2\pi} d\theta \int_0^\pi d\varphi \, r^2 \cos\theta \; f(r,\theta,\varphi)$

CT11-4. A spherical shell has inner radius a, outer radius b, and density ρ. For radii $R>b$, how does the gravitational potential Φ due to the sphere change depend on R?

A) $\Phi \sim R^2$
B) $\Phi \sim R$
C) $\Phi \sim$ independent of R
D) $\Phi \sim 1/R$
E) $\Phi \sim 1/R^2$

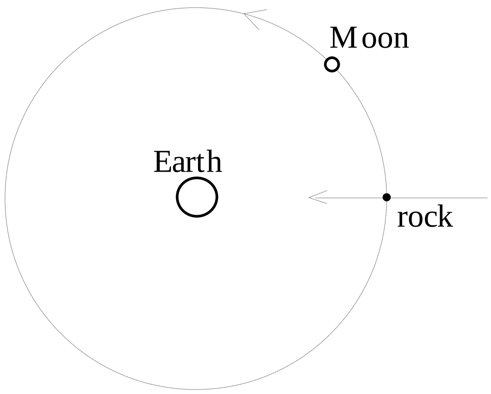
CT11-5. A spherical shell has inner radius a, outer radius b, and density ρ. For radii $R<a$, how does the gravitational potential Φ due to the sphere change depend on R?

A) $\Phi \sim R^2$ B) $\Phi \sim R$
C) $\Phi \sim$ independent of R D) $\Phi \sim 1/R$ E)

CT11-6. A rock is released from rest at a point in space far from Earth, beyond the orbit of the Moon. The rock falls toward the Earth and crosses the orbit of the Moon. When the rock is the same distance from the Earth as the Moon, the acceleration of the rock is: (Ignore the gravitational force between the rock and the Moon.)

A) greater B) smaller C) the same as

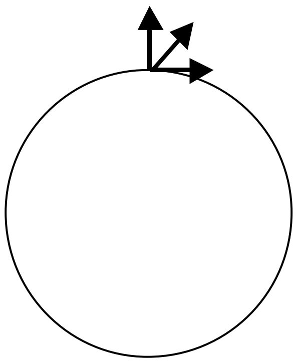
the acceleration of the Moon.



As the rock falls toward the Earth, its acceleration is:

A) constant. B) not constant.

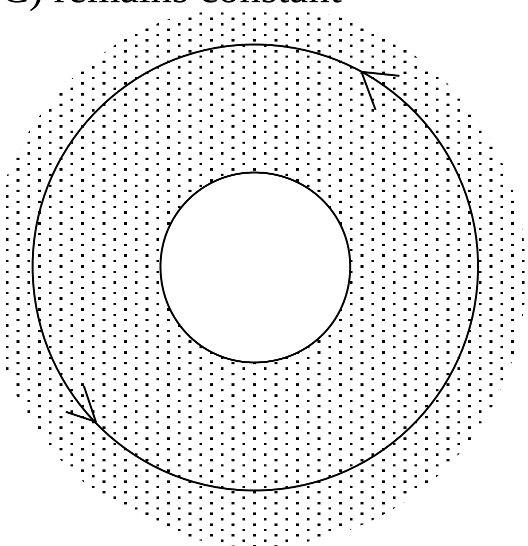
CT11-7. Does escape velocity depend on launch angle? That is, if a projectile is given an initial speed v_o, is it more likely to escape an (airless) planet, if fired straight up than if fired at an angle?



A) Yes B) No

CT11-8. A satellite is in circular orbit around a planet that has a very tenuous atmosphere extending up to the altitude of the satellite. Due to atmospheric drag, the speed of the satellite:

A) increases B) decreases
C) remains constant



CT11-9.
Suppose the Earth had no atmosphere and a projectile was fired from a mountain top with sufficient speed to put it in circular orbit. The magnitude of the acceleration of the projectile while in orbit would be

A) much less than g (because it doesn't fall to the ground)

B) much greater than g

C) approximately g

D) Impossible to tell.