A function, f, satisfies the wave equation:

$$\frac{\partial^2 f}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 f}{\partial t^2}$$

Which of the following functions work?

A) Sin(k(x – vt))

B) Exp(k(-x – vt))

C) a(x + vt)^3

D) All of these.

E) None of these.

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In fact, ANY function f (x +/- vt) is a good solution!!

Shape travels left (+) or right (-).

A "right moving" solution to the wave equation is:
$f_R(z,t) = A\cos(kz - \omega t + \delta)$
Which of these do you prefer for a "left moving" soln?

A) $f_L(z,t) = A\cos(kz + \omega t + \delta)$
B) $f_L(z,t) = A\cos(kz + \omega t - \delta)$
C) $f_L(z,t) = A\cos(-kz - \omega t + \delta)$
D) $f_L(z,t) = A\cos(-kz - \omega t - \delta)$
E) more than one of these!

(Assume k, ω, δ are positive quantities)

To think about; Is(are) the answer(s) really just "preference" (i.e. human convention) or are we forced into a choice?

Two different functions f_1 (x,t) and f_2 (x,t) are solutions of the wave equation.

$$\frac{\partial^2 f}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 f}{\partial t^2}$$

Is (A f_1 + B f_2) also a solution of the wave equation?

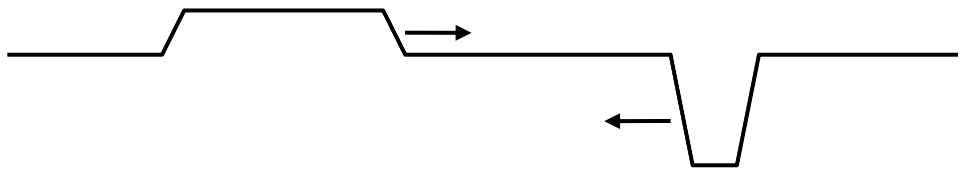
A) Yes, always

B) No, never.

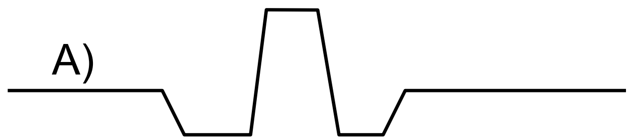
C) Yes, sometimes, depending of f_1 and f_2 .

9.9

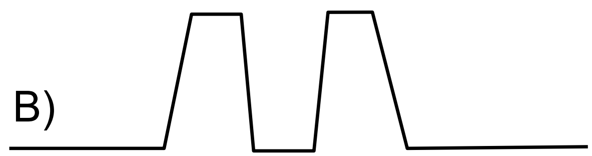
Two impulse waves are approaching each other, as shown. Which picture correctly shows the total wave when the two waves are passing through each other?



A)



B)



C)

D)