**9** A girl is jumping on a trampoline.
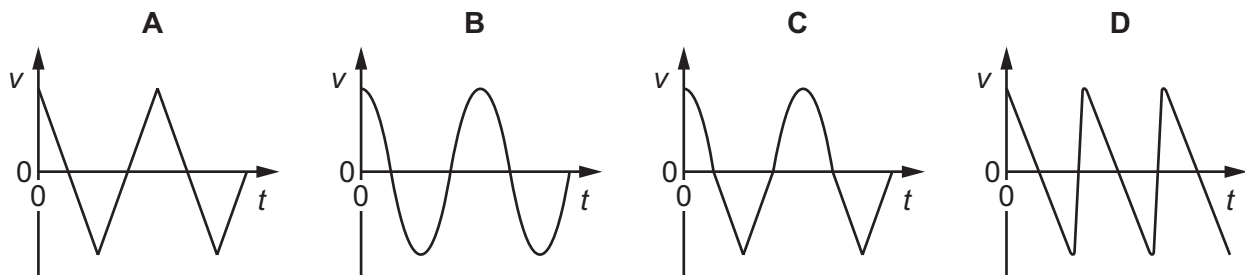
Which graph shows the variation of the girl's velocity $v$ with time $t$?



**10** In order that a train can stop safely, it will always pass a signal showing a yellow light before it reaches a signal showing a red light. Drivers apply the brake at the yellow light and this results in a uniform deceleration to stop exactly at the red light.

The distance between the red and yellow lights is $x$.

If the speed of the train is increased by 20%, without changing the deceleration of the train, what must be the minimum distance between the lights?

**A**   $1.20\,x$ **B**   $1.25\,x$ **C**   $1.44\,x$ **D**   $1.56\,x$

**11** Two frictionless trolleys are moving towards each other along the same horizontal straight line. Their masses and velocities are shown.
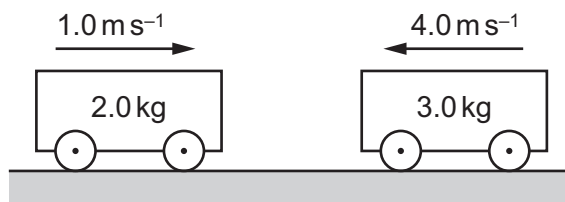


The trolleys collide and stick together.

What is the velocity of the trolleys after the collision?

**A**   $2.0\,\mathrm{m\,s^{-1}}$ to the left

**B**   $2.0\,\mathrm{m\,s^{-1}}$ to the right

**C**   $2.8\,\mathrm{m\,s^{-1}}$ to the left

**D**   $2.8\,\mathrm{m\,s^{-1}}$ to the right

**12** A bullet of mass 8.0 g travels at a speed of $300\,\mathrm{m\,s^{-1}}$. The bullet hits a target and stops after a time of 100 μs.

What is the average force exerted by the target on the bullet?

**A**   24 N **B**   240 N **C**   2400 N **D**   24 000 N