

Dynamics - 2018

1. 9702/11/M/J/18/No.8

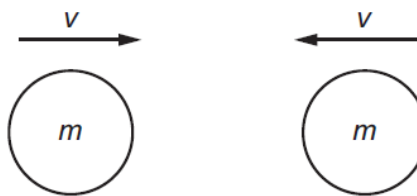
The momentum of a car of mass m increases from p_1 to p_2 .

What is the increase in the kinetic energy of the car?

- A $\frac{(p_2^2 - p_1^2)}{2m}$ B $\frac{(p_2 - p_1)^2}{2m}$ C $\frac{p_2 - p_1}{2m}$ D $\frac{p_1 - p_2}{2m}$

2. 9702/11/M/J/18/No.9

Two similar spheres, each of mass m and travelling with speed v , are moving towards each other.



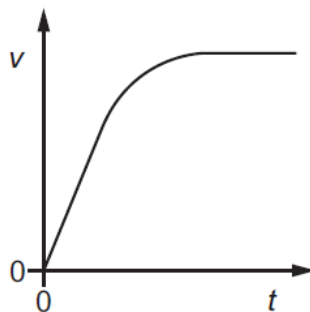
The spheres have a head-on elastic collision.

Which statement is correct?

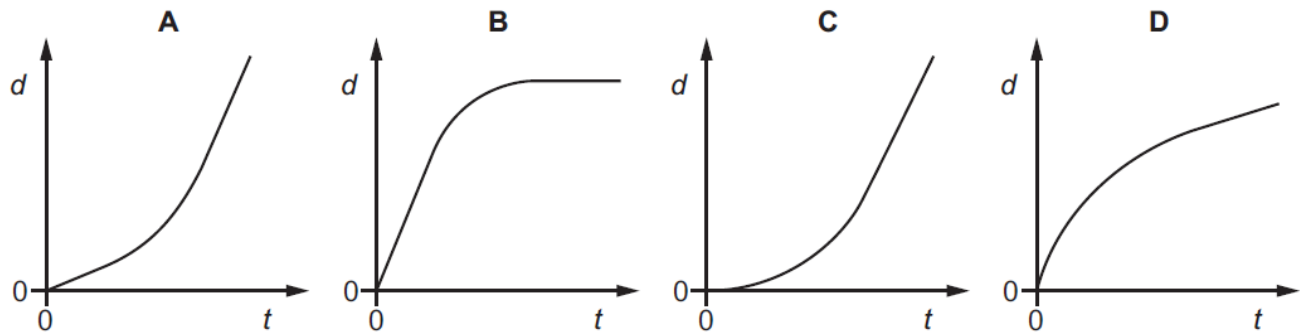
- A The spheres stick together on impact.
 B The total kinetic energy after impact is mv^2 .
 C The total kinetic energy before impact is zero.
 D The total momentum before impact is $2mv$.

3. 9702/12/M/J/18/No.7

A sky-diver falls vertically from a helicopter and reaches constant (terminal) velocity. The graph shows the variation with time t of the speed v of the sky-diver.



Which graph shows the variation with time t of the distance d fallen by the sky-diver?



4. 9702/12/M/J/18/No.8

A tennis ball of mass 55g is travelling horizontally with a speed of 30 ms^{-1} . The ball makes contact with a wall before rebounding in the horizontal direction with a speed of 20 ms^{-1} . The ball is in contact with the wall for a time of $5.0 \times 10^{-3} \text{ s}$.

What is the average force exerted on the wall by the ball?

- A 110 N B 220 N C 330 N D 550 N

5. 9702/12/M/J/18/No.9

An elastic collision occurs between two bodies X and Y. The mass of body X is m and the mass of body Y is $4m$. Body X travels at speed v before the collision and speed $\frac{3v}{5}$ in the opposite direction after the collision. Body Y is stationary before the collision.



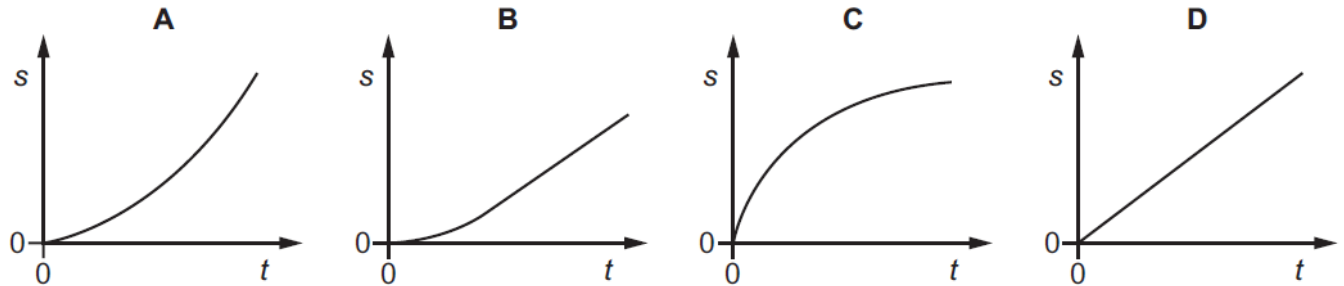
What is the kinetic energy of body Y after the collision?

- A $\frac{8}{10}mv^2$ B $\frac{34}{50}mv^2$ C $\frac{16}{50}mv^2$ D $\frac{1}{5}mv^2$

6. 9702/13/M/J/18/No.8

A sky-diver falls from a stationary balloon at time $t = 0$. As the sky-diver falls, her speed and the air resistance increase until the force of the air resistance is equal to her weight.

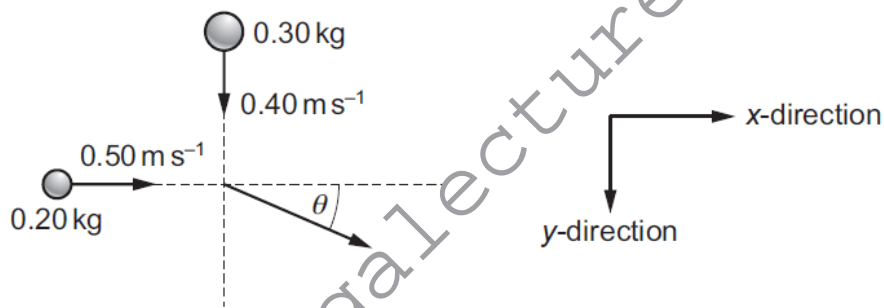
Which graph best shows the variation with time t of the displacement s for the motion of the sky-diver?



7. 9702/13/M/J/18/No.9

A ball of mass 0.20 kg , travelling in the x -direction at a speed of 0.50 m s^{-1} , collides with a ball of mass 0.30 kg travelling in the y -direction at a speed of 0.40 m s^{-1} .

The two balls stick together after the collision, travelling at an angle θ to the x -direction.



What is the value of θ ?

- A 39° B 40° C 50° D 51°

8. 9702/12/F/M/18/No.10

Steel pellets, each with a mass of 0.60g, fall vertically onto a horizontal plate at a rate of 100 pellets per minute. They strike the plate with a velocity of 5.0 m s^{-1} and rebound with a velocity of 4.0 m s^{-1} .

What is the average force exerted on the plate by the pellets?

- A 0.0010 N B 0.0054 N C 0.0090 N D 0.54 N