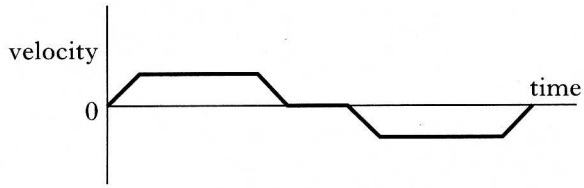


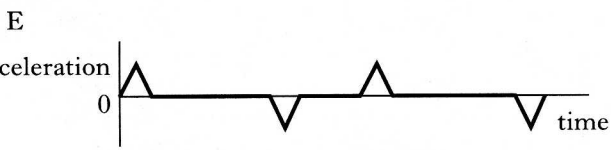
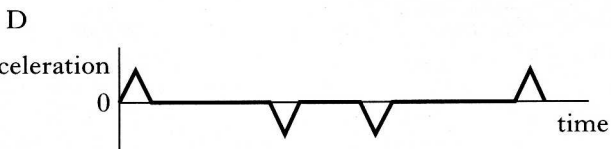
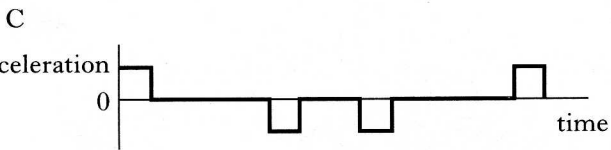
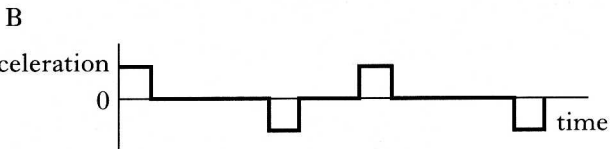
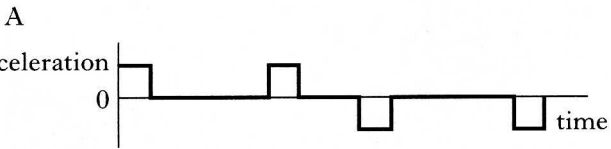
SECTION A

Answer questions 1–30 on the answer sheet.

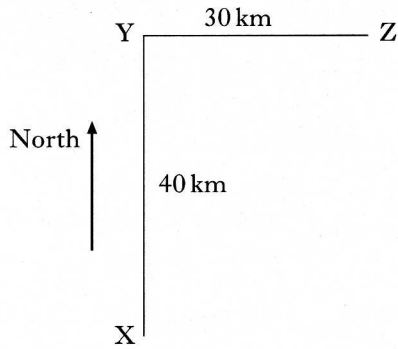
1. A lift in a hotel makes a return journey from the ground floor to the top floor and then back again. The corresponding velocity-time graph is shown below.



Which of the following shows the acceleration-time graph for the same journey?



2. A car travels from X to Y and then it travels from Y to Z, as shown in the following diagram.



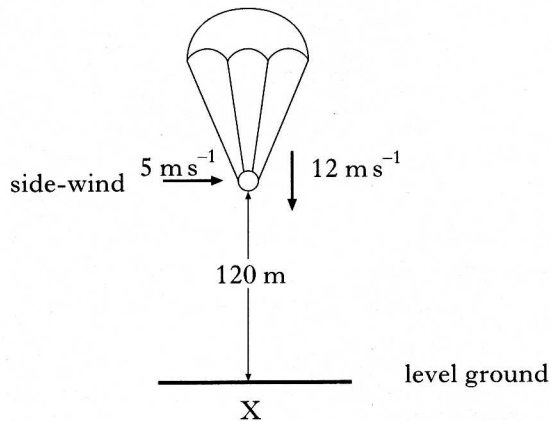
X to Y takes a time of one hour. Y to Z also takes one hour. Which of the following is a correct list of the magnitudes of the final displacement, average speed and average velocity for the complete journey?

	<i>Displacement</i> (km)	<i>Average speed</i> (km hr ⁻¹)	<i>Average velocity</i> (km hr ⁻¹)
A	50	35	35
B	70	35	25
C	50	35	25
D	70	70	50
E	50	70	25

[Turn over

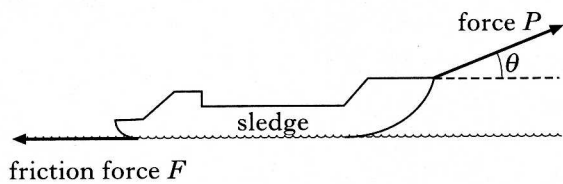
3. An object attached to a parachute falls from a helicopter which is hovering at a height of 120 m above point X.

The object falls with a constant vertical component of velocity of value 12 m s^{-1} . A steady side-wind gives the object a constant horizontal component of velocity of value 5 m s^{-1} .



How far from point X does the object hit the ground?

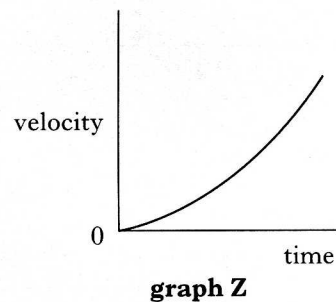
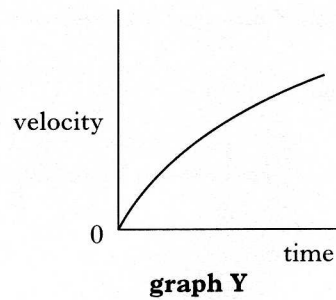
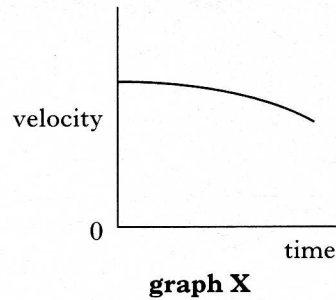
- A 24 m
 B 50 m
 C 60 m
 D 120 m
 E 150 m
4. A sledge is dragged at a **constant velocity** along the snow against a horizontal frictional force F . The rope pulling the sledge is at an angle of θ to the horizontal, as shown.



When the sledge is moving horizontally with a constant velocity, the force P pulling the rope is equal to

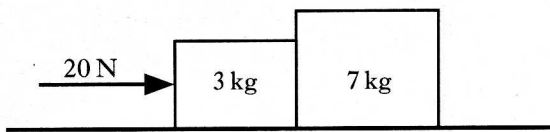
- A F
 B $F \cos \theta$
 C $F \sin \theta$
 D $\frac{F}{\cos \theta}$
 E $\frac{F}{\sin \theta}$

5. A ball is thrown horizontally over the edge of a cliff. When air resistance **is taken into account**, which graphs represent the horizontal and vertical components of the velocity of the ball during its flight?



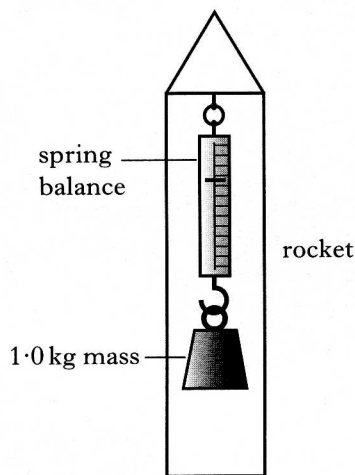
	Horizontal component of velocity	Vertical component of velocity
A	graph X	graph X
B	graph X	graph Y
C	graph Y	graph X
D	graph Y	graph Z
E	graph Z	graph Z

6. A horizontal force of 20 N is applied as shown to two wooden blocks of masses 3 kg and 7 kg. The blocks are in contact with each other on a frictionless horizontal surface.



What is the size of the horizontal force acting on the 7 kg block?

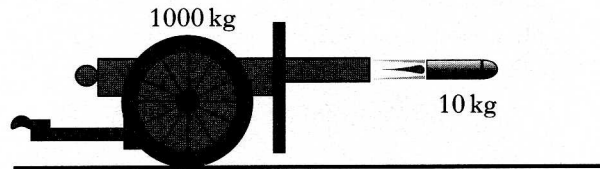
- A 20 N
 B 14 N
 C 10 N
 D 8 N
 E 6 N
7. An object of mass 1.0 kg hangs from a spring balance which is suspended on the inside of a small rocket, as shown below.



What is the reading on the balance when the rocket is accelerating upwards from the Earth's surface at 2.0 m s^{-2} ? Use $g = 9.8 \text{ m s}^{-2}$.

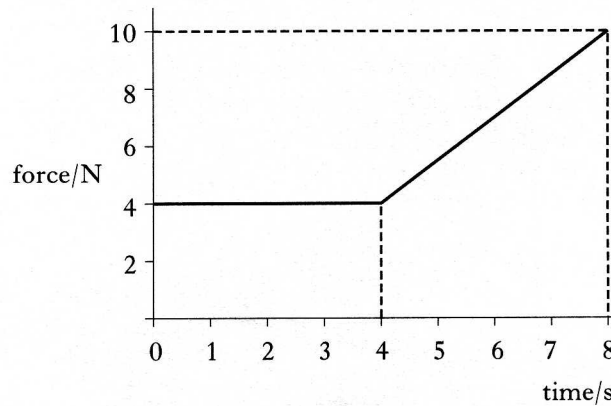
- A 0 N
 B 2.0 N
 C 7.8 N
 D 9.8 N
 E 11.8 N

8. A field-gun of mass 1000 kg fires a shell of mass 10 kg with a velocity of 100 m s^{-1} East.



The velocity of the field-gun just after firing the shell is

- A 0 m s^{-1}
 B 1 m s^{-1} East
 C 1 m s^{-1} West
 D 10 m s^{-1} East
 E 10 m s^{-1} West.
9. The graph below shows the force which acts on an object over a time interval of 8 seconds.



The momentum gained by the object during this 8 seconds is

- A 12 N s
 B 32 N s
 C 44 N s
 D 52 N s
 E 72 N s.

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