IB PHYSICS 2

Name: _____

Period: _____ Date: _____

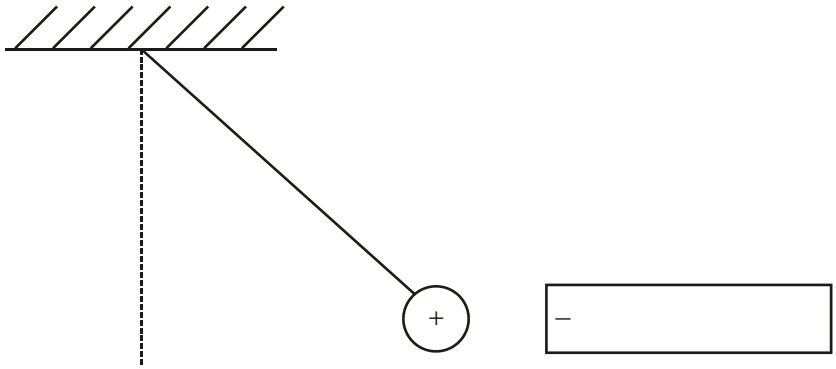
Marks: ____ Raw Score: ____ IB Curve: ____

DEVIL PHYSICS

BADDEST CLASS ON CAMPUS

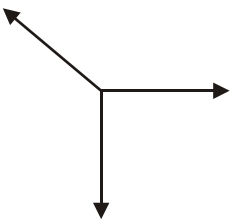
CHAPTER 2A TEST REVIEW

2. A small electrically charged sphere is suspended vertically from a thread. An oppositely charged rod is brought close to the sphere such that the sphere is in equilibrium when displaced from the vertical by an angle of 45°.

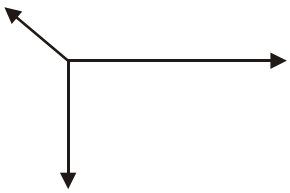


Which **one** of the following best represents the free body diagram for the sphere?

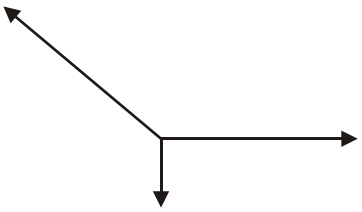
A.



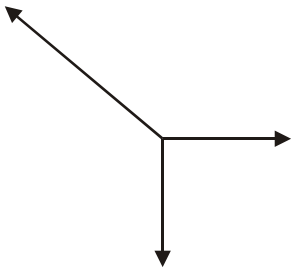
B.



C.



D.



(1)

4. This question is about equilibrium.

Explain whether each of the following is in equilibrium.

(a) A satellite in orbit at constant speed round the Earth.

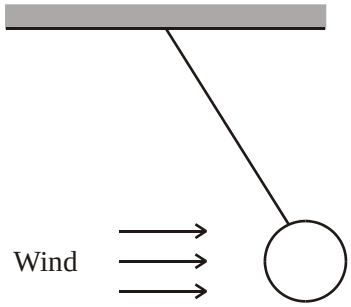
.....

.....

.....

(2)

(b) A small weight suspended on a string and blown to one side by a wind so that the string makes a constant angle with the vertical, as shown below.



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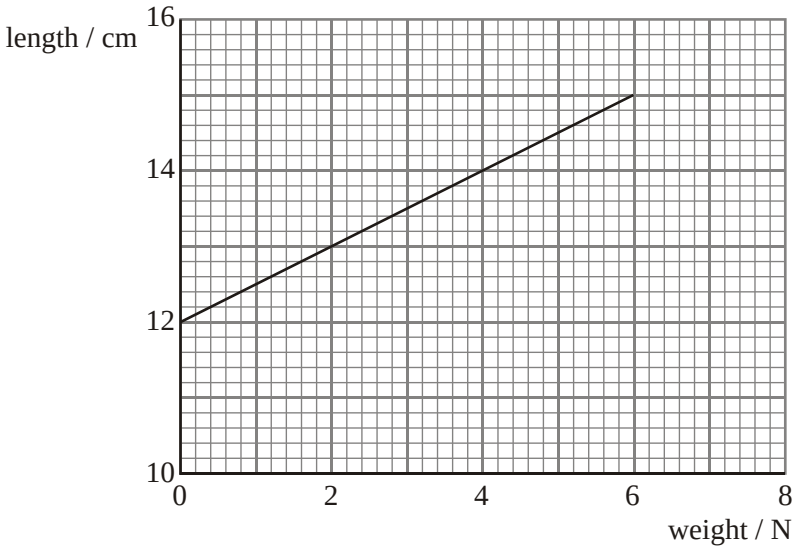
(2)
(Total 4 marks)

6. A weight is suspended from a spring. The variation with weight of the length of the spring is shown below.



What is the value of the spring constant (force constant) of the spring?

A. 0.4 N cm^{-1}
B. 0.5 N cm^{-1}
C. 2.0 N cm^{-1}
D. 2.5 N cm^{-1}

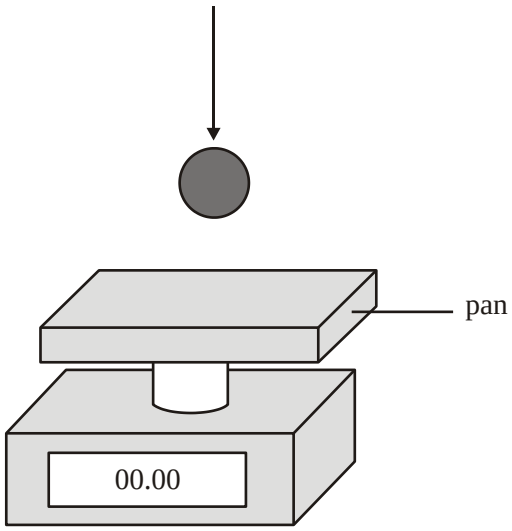
(1)

9. If the resultant external force acting on a particle is zero, the particle

A. must have constant speed.
B. must be at rest.
C. must have constant velocity.
D. must have zero momentum.

(1)

10. A ball of weight *W* is dropped on to the pan of a top pan weighing balance and rebounds off the pan.



At the instant that the ball has zero velocity when in contact with the pan, the scale will read

A. zero.
B. a value less than *W* but greater than zero.
C. *W*.
D. a value greater than *W*.

(1)

12. A frictionless trolley of mass *m* moves down a slope with a constant acceleration *a*. A second similar frictionless trolley has mass 2*m*. The acceleration of the second trolley as it moves down the slope is

A. $\frac{1}{2}a$.
B. a.
C. $2a$.
D. $4a$.

(1)

14. A body starting from rest moves along a straight-line under the action of a constant force. After travelling a distance *d* the speed of the body is *v*.

The speed of the body when it has travelled a distance $\frac{d}{2}$ from its initial position is

A. $\frac{v}{4}$.
B. $\frac{v}{2}$.

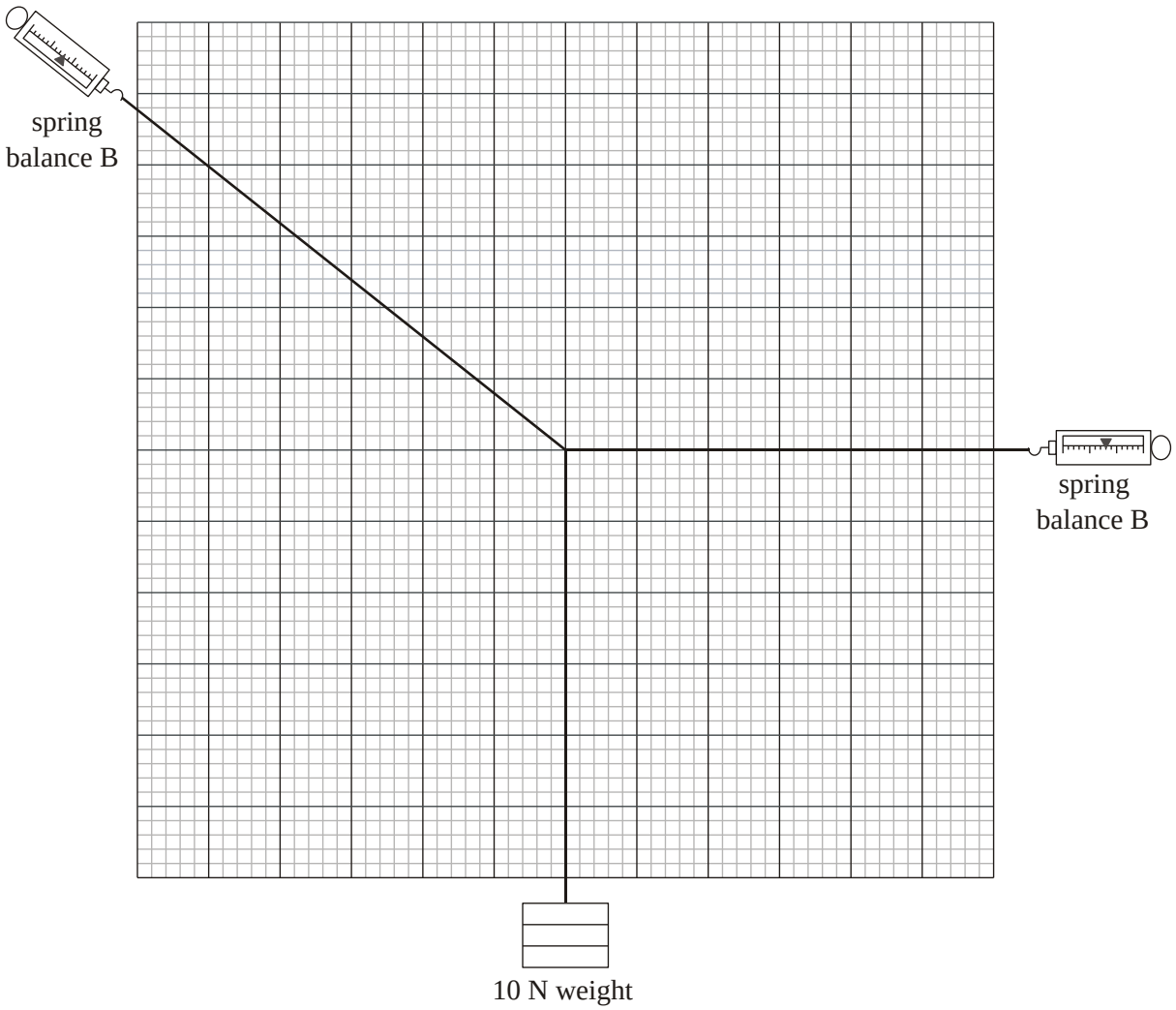
C. $\frac{v}{\sqrt{2}}$.

D. $\frac{v}{2\sqrt{2}}$.

(1)

16. This question is about vectors.

A student sets up the apparatus shown below to investigate forces.



The weight of 10.0 N is suspended from spring balance A by means of a light string. Spring balance B is also attached to the string. The spring balance B is pulled horizontally as shown.

(a) Using the grid on the diagram, draw a scale diagram to determine the readings on each of the spring balances.

Reading on spring balance A: .....

Reading on spring balance B: .....

(4)

(b) Suggest why it is **not** possible for the whole length of the string joining spring balances A and B to be horizontal with the weight still suspended.

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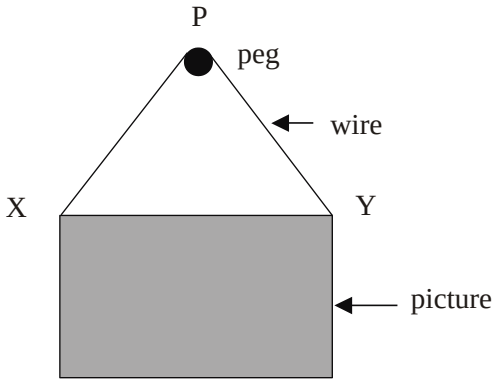
(1)
(Total 5 marks)

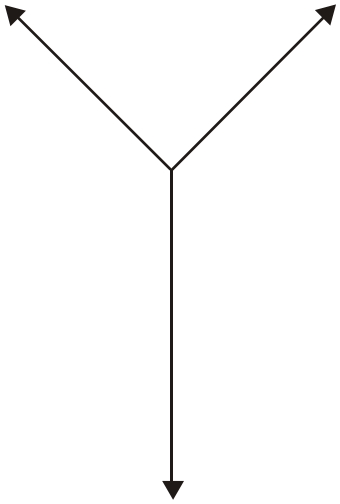
18. A picture is supported vertically by a wire that is looped over a horizontal light peg P. There is no friction between the wire and the peg.



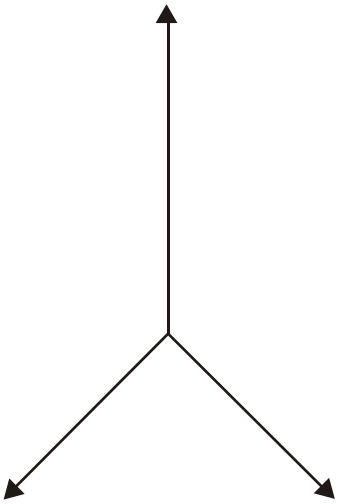
The mass of the picture is uniformly distributed and PX = PY.

Which of the following best represents the free body diagram of the forces acting on the peg?

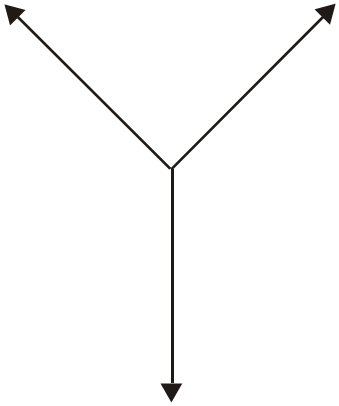
A.



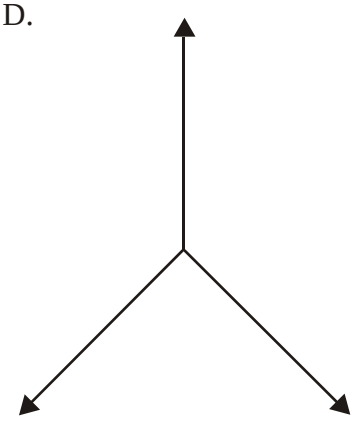
B.



C.

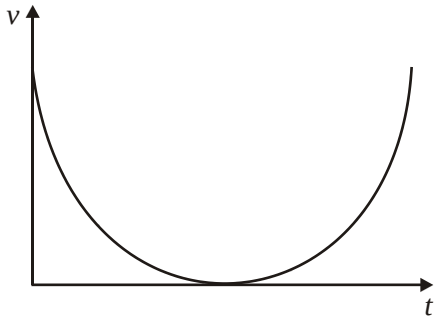


D.

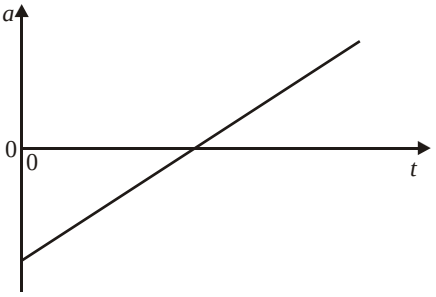


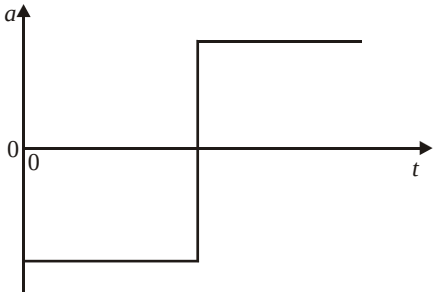
(1)

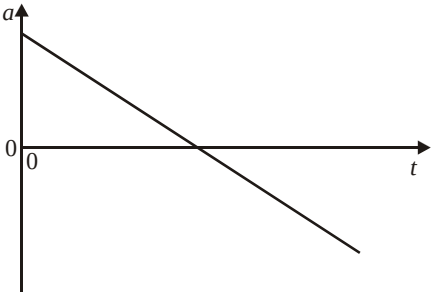
23. The graph shows the variation with time *t* of the velocity *v* of an object.

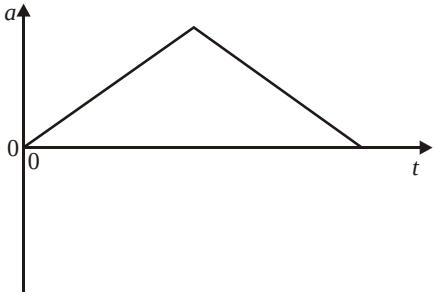


Which **one** of the following graphs best represents the variation with time *t* of the acceleration *a* of the object?

A.


B.


C.


D.


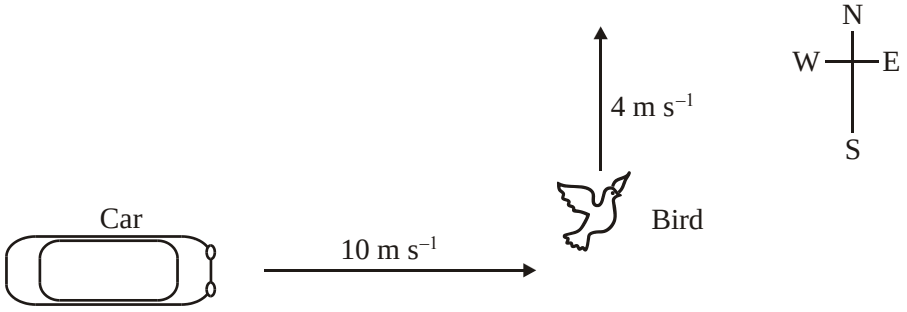
(1)

24. A ball, initially at rest, takes time *t* to fall through a vertical distance *h.* If air resistance is ignored, the time taken for the ball to fall from rest through a vertical distance *9h* is

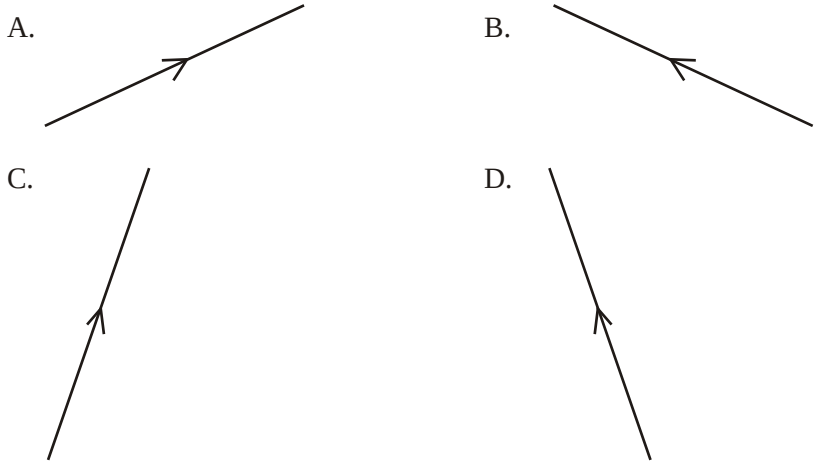
A. *3t.*
B. *5t.*
C. *9t.*
D. 10*t*.

(1)

26. A car is heading due East at a speed of 10 m s^{-1}. A bird is flying due North at a speed of 4 m s^{-1}, as shown below.

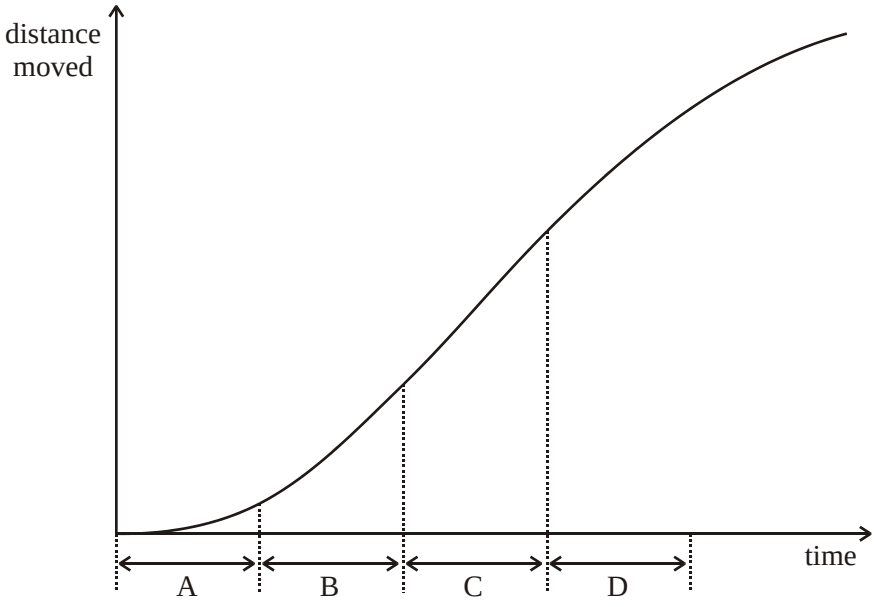


Which **one** of the following vectors represents the velocity of the bird relative to a person in the car?



(1)

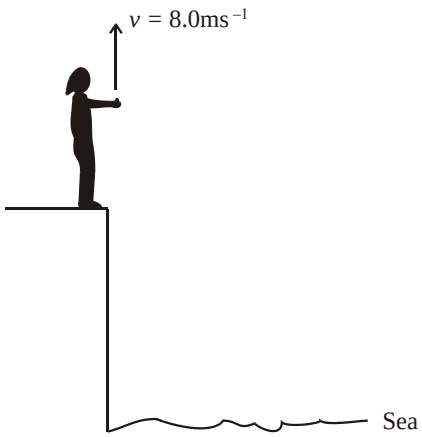
30. The graph below shows the variation with time of the distance moved by a car along a straight road. During which time interval does the car have its greatest acceleration?



(1)

31. This question is about throwing a stone from a cliff.

Antonia stands at the edge of a vertical cliff and throws a stone vertically upwards.



The stone leaves Antonia's hand with a speed $v = 8.0 \text{ms}^{-1}$.

The acceleration of free fall g is 10 m s^{-2} and all distance measurements are taken from the point where the stone leaves Antonia's hand.

(a) Ignoring air resistance calculate

(i) the maximum height reached by the stone.

.....

.....

.....

(2)

(ii) the time taken by the stone to reach its maximum height.

.....

.....

(1)

The time between the stone leaving Antonia's hand and hitting the sea is 3.0 s.

(b) Determine the height of the cliff.

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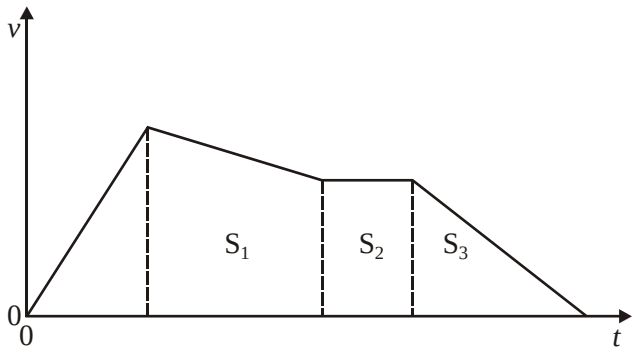
.....

.....

(3)

(Total 6 marks)

33. The variation with time t of the speed v of a car moving along a straight road is shown below.



Which area, S_1, S_2 or S_3, or combination of areas, represents the total distance moved by the car during the time that its speed is reducing?

A. S_1
B. S_3
C. $S_1 + S_3$
D. $S_1 + S_2 + S_3$

(1)

35. This question is about linear motion.

A police car P is stationary by the side of a road. A car S, exceeding the speed limit, passes the police car P at a constant speed of 18 m s^{-1}. The police car P sets off to catch car S just as car S passes the police car P. Car P accelerates at 4.5 m s^{-2} for a time of 6.0 s and then continues at constant speed. Car P takes a time *t* seconds to draw level with car S.

(a) (i) State an expression, in terms of *t*, for the distance car S travels in *t* seconds.

.....

(1)

(ii) Calculate the distance travelled by the police car P during the first 6.0 seconds of its motion.

.....

.....

(1)

(iii) Calculate the speed of the police car P after it has completed its acceleration.

.....

.....

(1)

(iv) State an expression, in terms of t, for the distance travelled by the police car P during the time that it is travelling at constant speed.

.....

(1)

(b) Using your answers to (a), determine the total time *t* taken for the police car P to draw level with car S.

.....

.....

.....

(2)

(Total 6 marks)

41. When a body is accelerating, the resultant force acting on it is equal to its

A. change of momentum.
B. rate of change of momentum.
C. acceleration per unit of mass.
D. rate of change of kinetic energy.

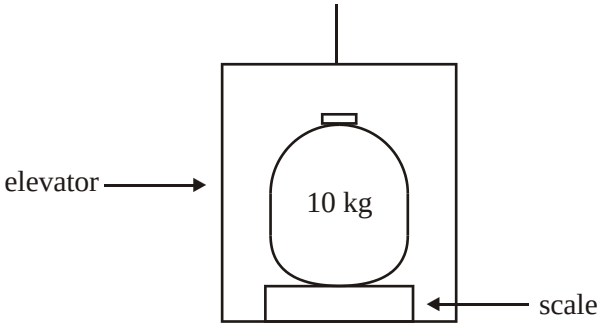
(1)

42. An object is moving at constant velocity. Which **one** of the following quantities **must** have zero magnitude?

A. Weight of object
B. Momentum of object
C. Kinetic energy of object
D. Resultant force on object

(1)

43. An elevator (lift) is used to either raise or lower sacks of potatoes. In the diagram, a sack of potatoes of mass 10 kg is resting on a scale that is resting on the floor of an accelerating elevator. The scale reads 12 kg.



The best estimate for the acceleration of the elevator is

A. 2.0 m s^{-2} downwards.
B. 2.0 m s^{-2} upwards.
C. 1.2 m s^{-2} downwards.
D. 1.2 m s^{-2} upwards.

(1)

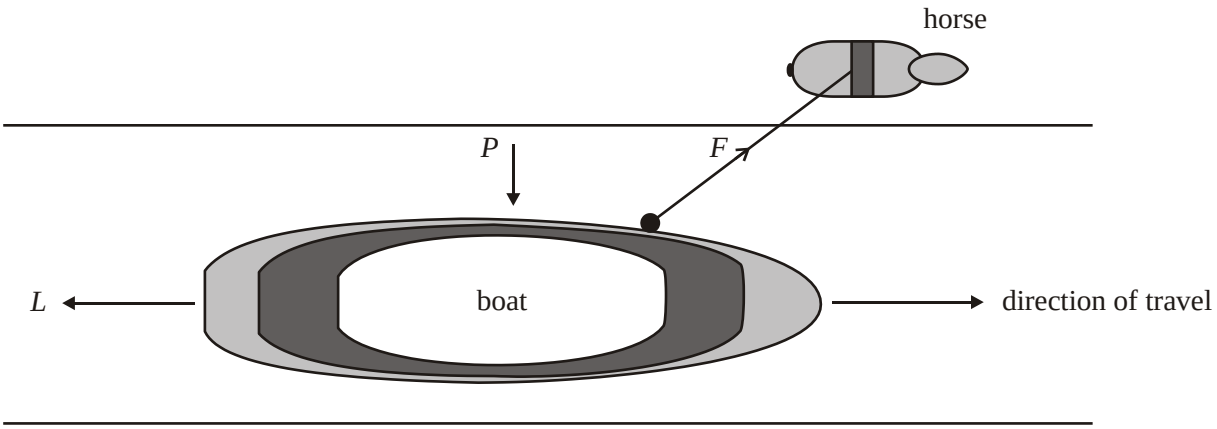
45. Two blocks having different masses slide down a frictionless slope.

Which of the following correctly compares the accelerating force acting on each block and also the accelerations of the blocks down the slope?

	Accelerating force	**Acceleration**
A.	Equal	Equal
B.	Equal	Different
C.	Different	Equal
D.	Different	Different

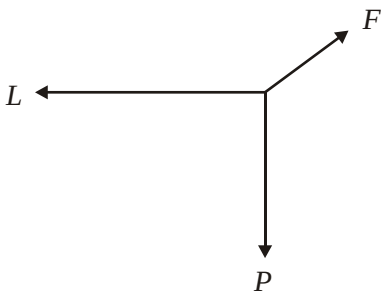
(1)

46. A horse pulls a boat along a canal at constant speed in a straight-line as shown below.

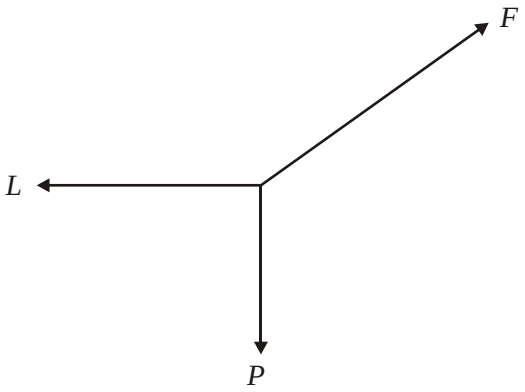


The horse exerts a constant force *F* on the boat. The water exerts a constant drag force *L* and a constant force *P* on the boat. The directions of *F*, *L* and *P* are as shown. Which **one** of the following best represents a free-body diagram for the boat?

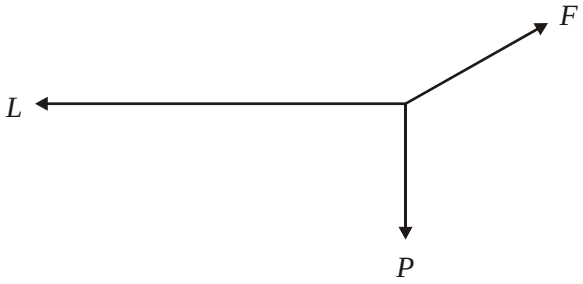
A.



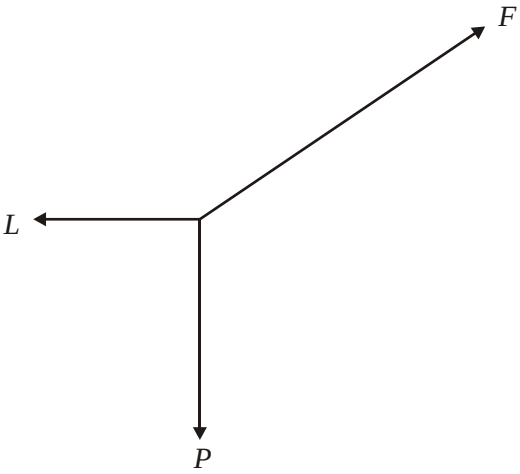
B.



C.

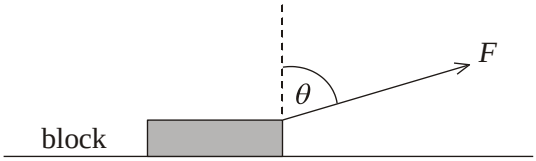


D.



(1)

48. A block of mass *m* is pulled along a horizontal, frictionless surface by a force of magnitude *F*. The force makes an angle with the vertical.



The magnitude of the acceleration of the block in the horizontal direction produced by the force F is

A. $\frac{F}{m}$.

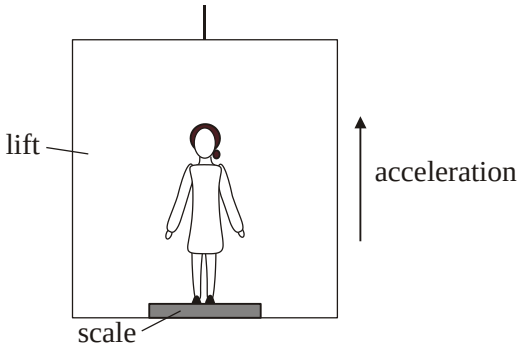
B. $\frac{F\sin\theta}{m}$.

C. $\frac{F\cos\theta}{m}$.

D. $\frac{F\tan\theta}{m}$.

(1)

51. Mandy stands on a weighing scale inside a lift (elevator) that accelerates vertically upwards as shown in the diagram below. The forces on Mandy are her weight W and the reaction force from the scale R.



The reading of the scale is

A. $R + W$.

B. W.

C. R.

D. $R - W$.

(1)