

Forces Paper 1 Problems

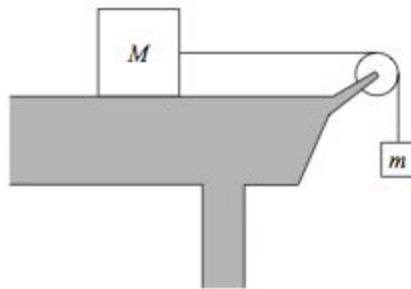
1.

4. An object is released above the surface of Earth. Which of the following correctly describes the speed and acceleration before it reaches terminal speed?

	Speed	Acceleration
A.	increases	remains constant
B.	increases	decreases
C.	remains constant	remains constant
D.	remains constant	decreases

2.

5. An object of mass m is connected via a frictionless pulley to an object of mass M , where $M > m$. M rests on a horizontal frictionless surface.



What is the acceleration of the system?

- A. $\frac{mg}{(M+m)}$
- B. $\frac{(M+m)g}{m}$
- C. $\frac{gm}{M}$
- D. Zero

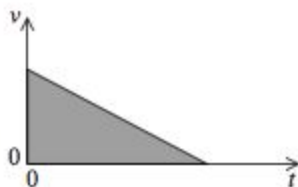
3.

5. Which of the following is always true for an object moving in a straight line at constant speed?

- A. No forces act on the object.
- B. No resultant force acts on the object.
- C. The momentum of the object is zero.
- D. No work is being done on the object.

4.

3. The graph below shows how velocity v varies with time t for a ball thrown vertically upwards from the Earth's surface.

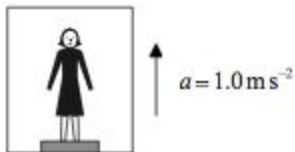


The shaded area is equal to the

- A. displacement.
- B. final velocity.
- C. change in velocity.
- D. acceleration.

5.

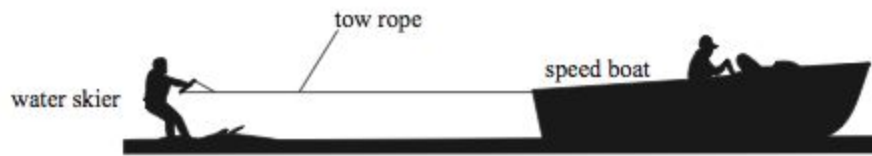
6. A person of weight 600 N is standing on a weighing scale in a lift (elevator). The lift is accelerating upwards at 1.0 ms^{-2} . Which of the following is the reading on the scale?



- A. 0 N
- B. 540 N
- C. 600 N
- D. 660 N

6.

7. A speed boat tows a water skier so that the skier accelerates.



The magnitude of the force exerted on the skier by the tow rope must be

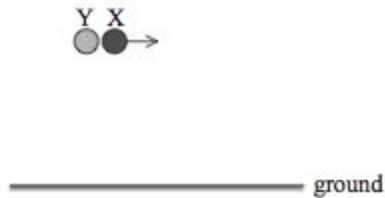
- I. greater than the magnitude of the total resistive force acting on the skier
- II. equal to the magnitude of the force exerted on the tow rope by the skier
- III. equal to the magnitude of the force causing the boat to accelerate.

Which of the above factors is/are correct?

- A. I and II only
- B. I and III only
- C. II only
- D. III only

7.

6. Balls X and Y are at the same height. X is projected horizontally at the same time that Y is dropped. Y is the same size as X but has half its mass.

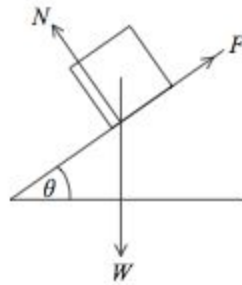


Ignoring air resistance, which statement is **true**?

- A. Y will hit the ground before X.
- B. Y will hit the ground after X.
- C. Y will hit the ground at the same time as X.
- D. The outcome can only be determined if the initial speed of X is known.

8.

7. A block rests on a plane inclined at an angle θ to the horizontal. Which of the following gives the relationships for the normal reaction N and the frictional force F with the weight W ?



	N	F
A.	$W \sin \theta$	$W \sin \theta$
B.	$W \sin \theta$	$W \cos \theta$
C.	$W \cos \theta$	$W \sin \theta$
D.	$W \cos \theta$	$W \cos \theta$

9.

5. The diagram shows a girl attempting (but failing) to lift a heavy suitcase of weight W . The magnitude of the vertical upwards pull of the girl on the suitcase is P and the magnitude of the vertical reaction of the floor on the suitcase is R .

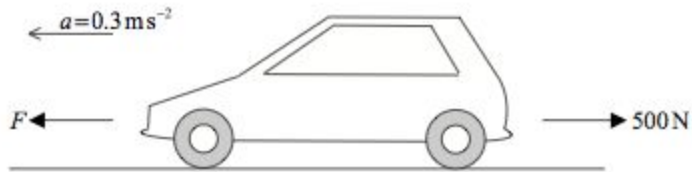


Which equation correctly relates W , P and R ?

- A. $W = P + R$
B. $W > P + R$
C. $W < P + R$
D. $W = P = R$

10.

5. A car of mass 1000 kg accelerates on a straight, flat, horizontal road with an acceleration $a=0.3 \text{ ms}^{-2}$. The driving force F on the car is opposed by a resistive force of 500 N.

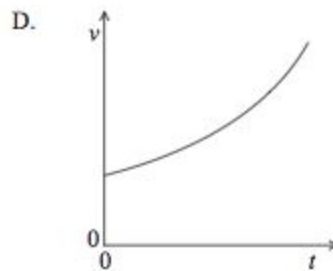
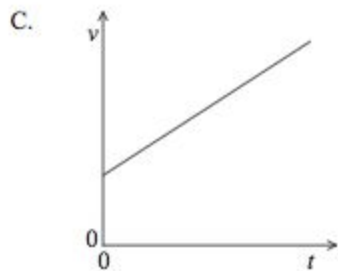
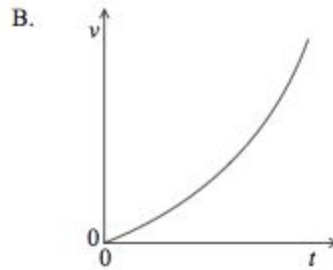
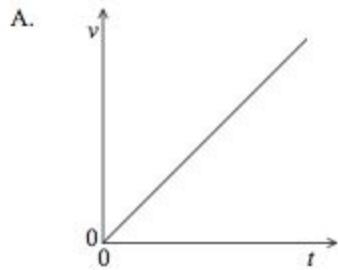


The net (resultant) force on the car is

- A. 200 N.
- B. 300 N.
- C. 500 N.
- D. 800 N.

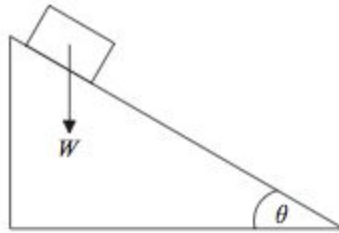
11.

5. A car accelerates from rest. The acceleration increases with time. Which graph shows the variation with time t of the speed v of the car?



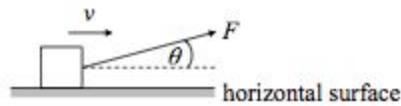
12.

2. An object slides down an inclined plane that makes an angle θ with the horizontal. The weight of the object is W .



Which of the following is the magnitude of the component of the weight parallel to the plane?

- A. $W \sin \theta$
 B. $\frac{W}{\sin \theta}$
 C. $W \cos \theta$
 D. $\frac{W}{\cos \theta}$
- 13.
4. A force F acts on a block at an angle θ with respect to a horizontal surface.



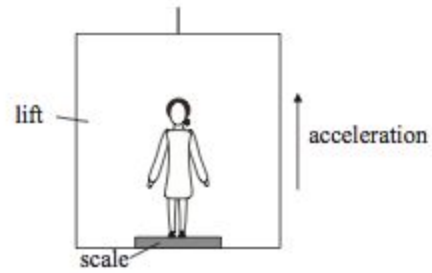
The block is moving with a constant velocity v along the surface. A resistive force acts on the block.

Which of the following correctly represents the forces acting on the block?

- A.
- B.
- C.
- D.

14.

7. 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 .

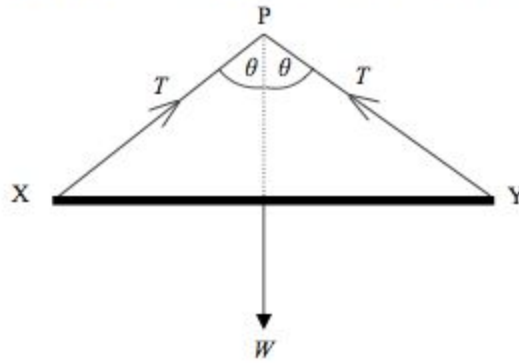


The reading of the scale is

- A. $R + W$.
- B. W .
- C. R .
- D. $R - W$.

15.

4. A uniform metal bar XY of weight W is hung from a horizontal support at point P by two wires of negligible mass.



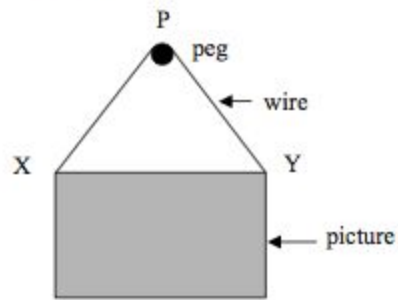
Each wire makes an angle θ with the vertical.

Which of the following is equal to the tension T in one of the wires?

- A. $\frac{W}{\cos \theta}$
- B. $\frac{W}{2 \cos \theta}$
- C. $\frac{W}{\sin \theta}$
- D. $\frac{W}{2 \sin \theta}$

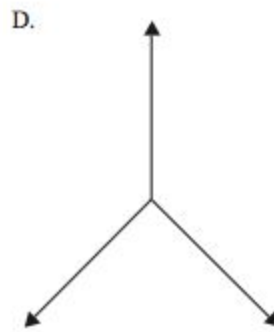
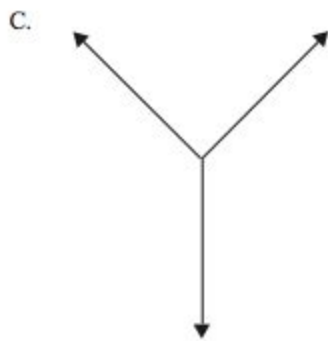
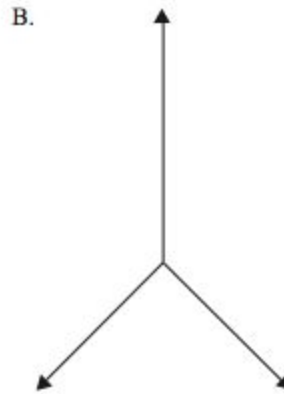
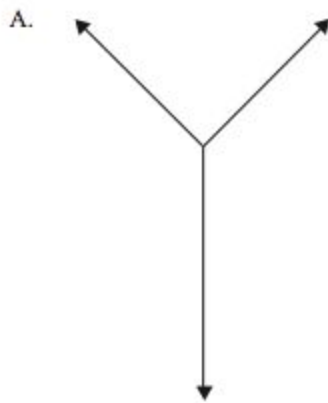
16.

8. 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?

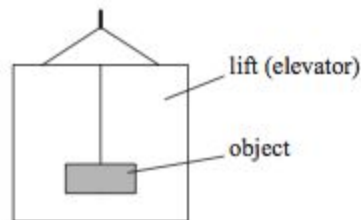


17.

10. The net force acting on a body is zero. Which of the following quantities must also have zero magnitude for this body?
- A. Momentum
 - B. Velocity
 - C. Speed
 - D. Acceleration

18.

8. An object is suspended from the roof of a lift (elevator) as shown below.



When the lift is moving upwards at **constant speed**, the weight of the object is W and its mass is M .

Which of the following correctly gives the mass and the weight of the object as the lift is **accelerating upwards**?

	Mass	Weight
A.	M	W
B.	M	greater than W
C.	greater than M	W
D.	greater than M	greater than W

1. B	7. C	13. D
2. A	8. C	14. C
3. B	9. A	15. B
4. A	10. B	16. B
5. D	11. B	17. D
6. A	12. A	18. A

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