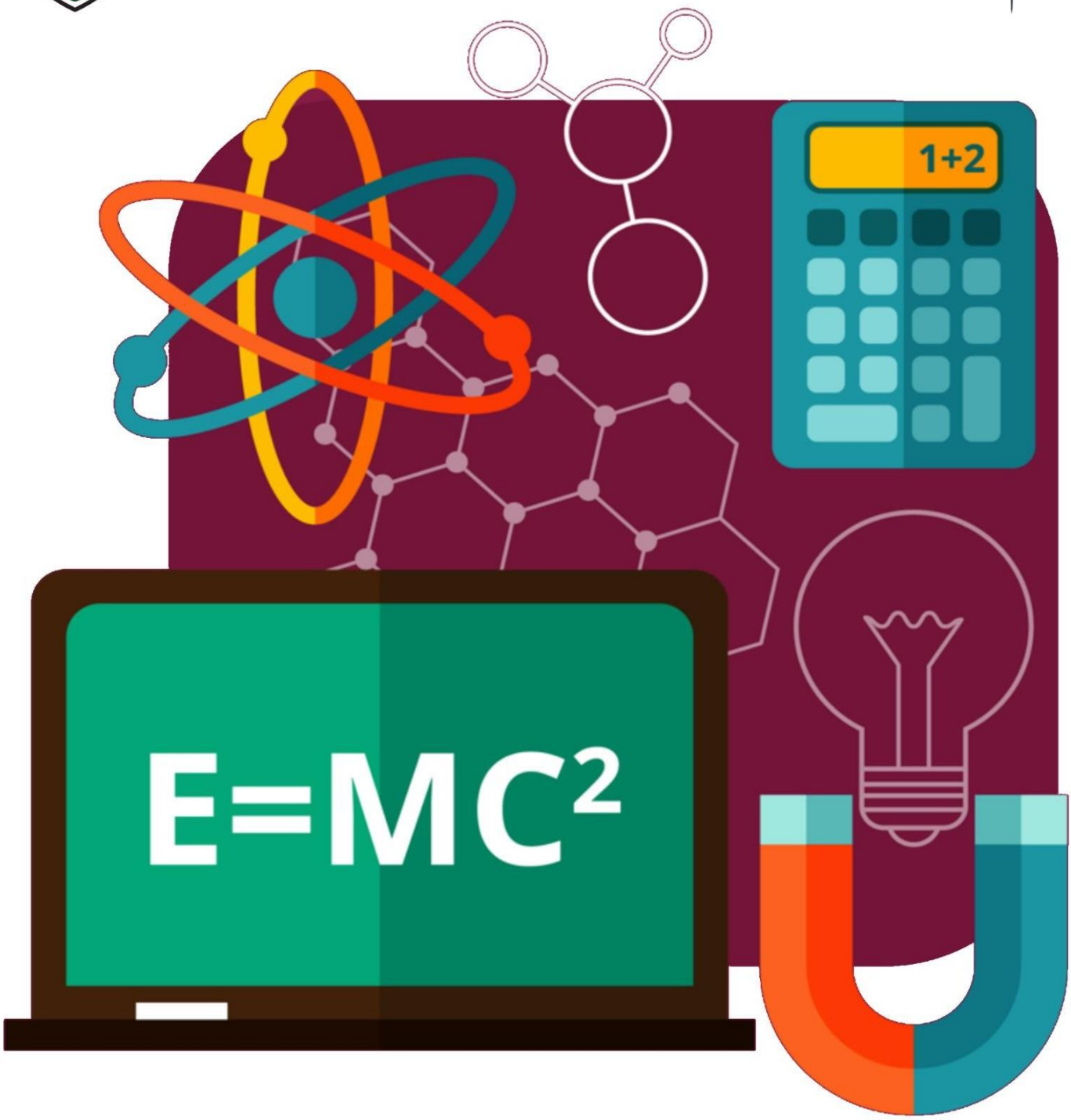
PAST PAPERS



PHYSICS

Chapter 2/3/4

1. Which of these statements is (are) true?

1- An object can have zero velocity and zero acceleration

2- An object can have zero velocity and non-zero acceleration

3- An object can have zero acceleration and be in motion

A) 1 only **B) 1 and 3** **C) 1 and 2** **D) 1,2, and 3** **E) None**

2. A car of mass M travels in a straight line at constant speed along a level road. The coefficient of friction between the tires and the road is □ and the air resistance force (drag force) is D. The magnitude of the net force on the car is:

A) μMg+D **B) μMg** **C) D** **D) Zero** **E)** $\sqrt{(\mu Mg)^2 + D^2}$

3. The speed of a 4.0 N box, sliding across a level ice surface decrease at the rate of 0.61 m/s^2. The coefficient of kinetic friction between the box and the ice is: (use $g = 10 m/s^2$).

A) 0.06 **B) 0.25** **C) 0.41** **D) 0.70** **E) 1.22**

4. What force (in N) is needed to stop a 1000-kg car moving at 25 m/s during a time interval of 10 seconds?

A) 400 **B) 500** **C) 250** **D) 2000** **E) 2500**

5. The velocity of a particle moving along the x-axis is given by: v(t) = 2t+1 where **t** is in seconds and v(t) in m/s. The average acceleration (in m/s^2) over the time interval 0 to 2s is:

A) 2.0 **B) -1.0** **C) 0** **D) 1.0** **E) -2.0**

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6. An object is moving along the positive x-direction its acceleration -3 m/s^2. Which of the following statements is correct:

A) the speed of the object will decrease.

B) the object will accelerate.

C) the speed of the object will increse.

D) the object will never reverse its direction of motion.

E) the object will always be moving in the positive x-direction.

7. A PHY-105 student on the moon releases an apple from a height of 1.25 m above the surface on the Moon .The speed of the apple just before it hits the moon's surface is : (Recall that the acceleration of gravity on the moon is one-sixth that on the earth)

A) Zero

B) 24.50

C) 4.95

D) 2.02

E) 4.08

8. A stone is projected vertically upwards. Which of the following statements is WRONG?

A) as it moves up its speed decreases.

B) as it moves down its speed increases.

C) its acceleration is always 9.8 m/s^2 towards the center of earth.

D) at maximum height its acceleration is zero.

E) when it reverses its direction of motion it has zero velocity

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9. A car moving in one-dimension travels from point A to point B at an average speed of 40 km/h. It then reverses direction and moves from point B back to point A at 20 km/h. Its average speed (in km/h) over the entire trip is:

A) 26.7 **B) 20.0** **C) 40.0** **D) 0** **E) 60.0**

10. A rocket rises vertically from rest with an acceleration of 3 m/s² until it runs out of fuel at a height of 600 m. After this it is in free fall motion. How long (in s) will it take the rocket to reach ground?

A) 60.0 **B) 18.8** **C) 33.1** **D) 6.5** **E) 23**

11. A car is traveling along the positive x direction at 20 m/s Find the velocity of the car after 37.0 s if the car decelerates at 1.0 m/s² assume that the deceleration remains constant.

A) 17 m/s in the Negative x-direction

B) 57 m/s in the Positive x-direction

C) 21 m/s in the Positive x-direction

D) 57 m/s in the Negative x-direction

E) 17 m/s in the Positive x-direction

12. Which of the following statements is CORRECT?

A) an object can accelerate even when the F_R acting on it is zero.

B) when you walk forward without skidding, the static friction is the force that caused you to move.

C) weight is a scalar quantity.

D) the normal force is the reaction force to the weight of an object.

E) acceleration is always in opposite direction to the resultant force

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13. The position of an object moving along the x-axis varies with time according to the equation $x(t) = t^2 + 3t - 1$. The average velocity (in m/s) of this object over the time interval 1 to 3s is:

A) -7.0 **B) 10** **C) 7.0** **D) -1.5** **E) 1.5**

14. An object is thrown vertically upwards with an initial speed of 30 m/s. After 4 s, the object is:

A) moving down at 20 m/s

B) moving up at 20 m/s

C) at its maximum height

D) moving down at 9.2 m/s

15. The position of a particle moving along the x axis is given by: $X(t) = (21m) + (22m/s)t - (6.0m/s^2)t^2$, where t is in s. What is the average velocity during the time interval t= 0.0 s to t=3.0 s?

An object is thrown vertically upward from the top of a 30 m high building with an initial speed of 20 m/s. The average velocity (in m/s) during the time interval t=0 to t=5 s is:

A) 13.8 downward

B) 0

C) 4.5 downward

D) 4.5 upward

E) 13.8 upward

16. Two objects A and B are at the same height. A is projected vertically upwards with a speed of 20 m/s. At the same time B is projected vertically downward at 20 m/s. Which of the following statements is CORRECT?

A) A and B reach the ground at the same time.

B) A reaches the ground before B.

C) A and B must have different velocities when reaching the ground

D) A and B reach the ground with the same velocity.

E) when reaching the ground B has higher velocity than A.

17. A force accelerates a body of mass M. The same force applied to a second body produces three times the acceleration. The mass of the second body will be:

A) 2M **B) M/3** **C) M/2** **D) 9M** **E) 3M**

18. A 2.0 kg box slides down an incline titled at an angle 30.0 above horizontal, with an initial speed of 3.3 m/s. The coefficient of kinetic friction between the box and the incline is 30.0. What is the acceleration of the block (in m/s^2)?

A) 1.24 up

B) 1.24 down

C) 2.35 up

D) 2.35 down

E) 0

19. The only force acting on a particle of mass (1 kg) along the x-axis varies with distance x as shown in the figure. If the particle started from rest at = 0, the speed (in m/s) at = 4 m is:

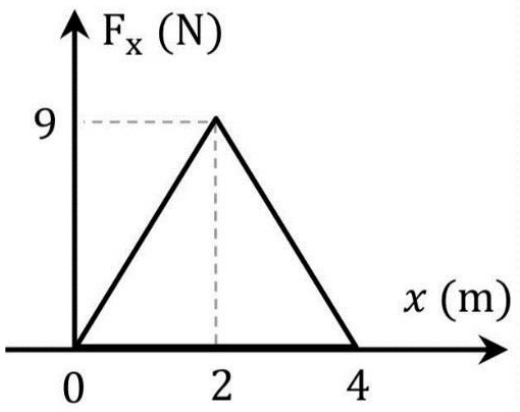
A) 8.4

B) 18

C) 22.5

D) 0

E) 6.0



20. A 5 kg block sits on a rough horizontal surface. A force of magnitude F = 10 N acting parallel to the surface is applied to the block. The coefficient of static and kinetic friction between the block and the surface are μs = 0.5 and μk = 0.4 respectively. What is the magnitude (in N) of the friction force acting on the block?

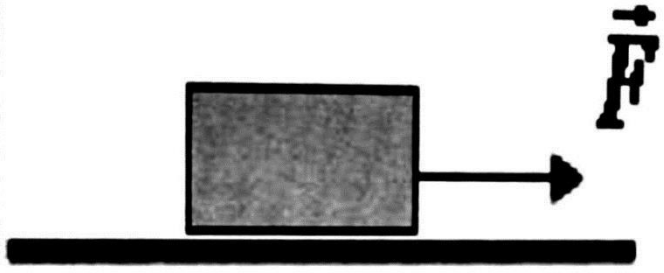
A) 10

B) 19.6

C) 0

D) 14.5

E) 24.5



21. A block of mass m = 4.0 kg slides down a 35 degrees incline when a force of F = 10 N is applied upward parallel to the incline. If the coefficient of kinetic friction between the block and the incline is 0.2, find the acceleration (in m/s²) of the block as it moves down the inclined plane:

A) 3.1

B) 4.0

C) 0.44

D) 2.7

E) 1.5

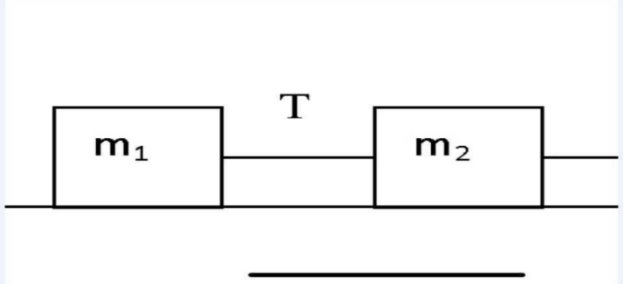
22. Two masses m1 = 2.0 kg and m2 = 4.0 kg are connected by a light inextensible string as shown in the figure. The system is pulled along a frictionless surface by a force F = 18 N. The value of the tension T (in N):

A) 24.0

B) 3.0

C) 6.0

D) 12.0



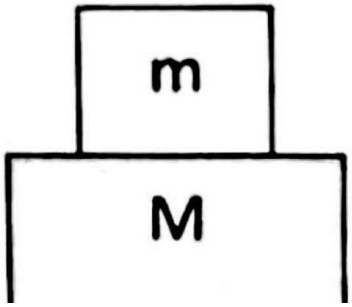
23. In the figure mass M = 4.0 kg and mass m = 2.0 kg. The ground surface is frictionless, while the coefficient of static friction between the two masses is 0.30. Find the maximum value of F (in N) such that mass m moves with mass M without sliding.

A) 25.9

B) 3.2

C) 17.6

D) 11.8



24. Determine the stopping distance (in m) for an automobile moving with an initial speed of 25 m/s, if it decelerates at 2.5 m/s² and the driver's reaction time is 0.4 s:

A) 125

B) 10

C) 135

D) 625

E) 100

25. A 2.0-kg block is on the verge of sliding down a rough inclined plane that makes an angle of 40 degrees with the horizontal. The coefficient of static friction μ_s is:

A) 0.50 **B) 0** **C) 0.84** **D) 0.64** **E) 0.7**

26. Two objects each of mass M are connected by a light inextensible cord. The system is attached by another cord to the ceiling of an elevator that is accelerating upward at 2 m/s², the ratio of the tensions T1/T2 is:

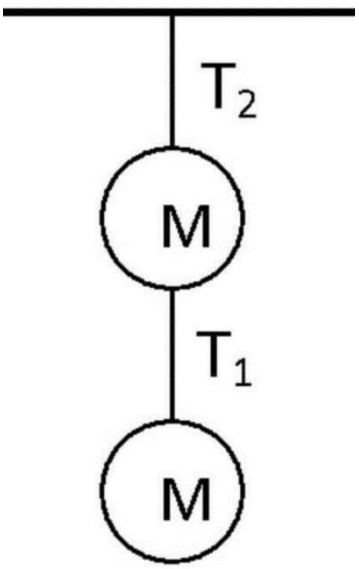
A) 2

B) 1

C) 5/3

D) 3/2

E) 1/2



27. A ball is thrown downward from the top of a building with an initial speed of 25 m/s. It strikes the ground after 2.0 s. How high is the building, assuming negligible air resistance?

A) 20 m **B) 30 m** **C) 50 m** **D) 70 m** **E) 40 m**

28. A 50-N crate sits on a horizontal floor where the coefficient of static friction between the crate and the floor is 0.50. A 20-N force is applied to the crate acting to the right. What is the resulting static friction force (in
N) acting on the scale?

A) 20 to the left

B) 25 to the left

C) 20 to the right

D) 0

E) 25 to the right

29. A car starts from rest and accelerates at a steady 6.00 m/s2. How far does it travel in the first 3.00 s?

A) 9.00 m **B) 18.0 m** **C) 27.0 m** **D) 36.0 m** **E) 54.0 m**

30. If you triple both masses in the shown Atwood machine (become three times as large) the resulting acceleration will be:

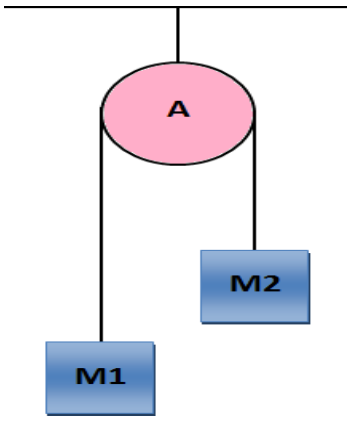
A) three times as large

B) one-third as large

C) the same

D) one-sixth as large

E) six times as large



31. Assume that blood flows into the aorta at a rate 1.0 m/s over a distance of exactly 0.5m,from which it flows then through an artery at a rate of 0.6 m/s for another 0.5m . the average speed for that mass of blood over the total specified distance is about :

A) 0.75

B) 1.00

C) ZERO

D) 0.63

E) 0.83

32. The position of an object moving along the x-axis is denoted according to the equation x(t)=t^2+3t-1. The average velocity of that object in (m/s) over the interval 1 to 3s is :

A) -7.00
B) +7.00
C) Zero
D) 10.00
E) 1.5

33. Two objects with masses Ma=M and Mb=2M are released from rest at the same height h above the ground. Ignoring air resistance, which of the following statements is correct?

A) Mb reaches the ground before Ma.

B) Ma reaches the ground before Mb.

C) Ma and Mb reach the ground at the same time.

D) Ma and Mb have the same speed before hitting the ground

E) Answers C and D are correct

34. A car moves along the x-direction such that its position is defined as the function of time given by x=t^2+t-2 ,where x is in meters and t in seconds. The average velocity (in m/s) of the car during the time interval t=1 to 3 seconds is:

A) 3

B) 10

C) 0

D) 5

E) 3

35. A car is moving at a constant velocity v. Upon applying the brakes, the car decelerates uniformly and stops after moving a distance D. If the initial velocity is 2v the stopping distance becomes:

A) 2D

B) 4D

C) D

D) 6D

E) 0.5D

36. A stone is thrown vertically upwards with a speed of 18 m/s from the edge of a cliff 60m high. The time in seconds it takes to reach the bottom of the cliff is:

A) 2.1

B) 28.4

C) 18.2

D) 9.60

E) 5.80

37. A man starts from the origin and walks 20 m along the positive x-axis. He then turns around and moves 12 m along the negative x-axis. If the time of the whole journey is 6 s. Then his average speed in (m/s) is:

A) 5.3

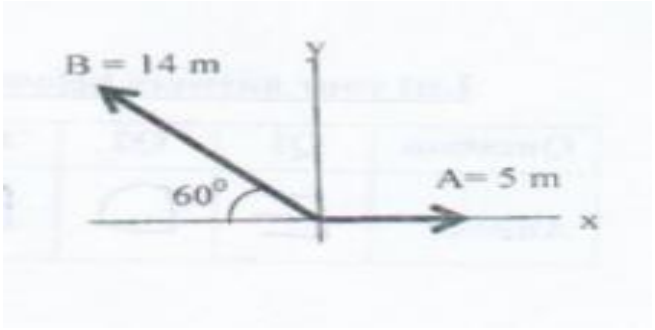
B) 1.3

C) 3.3

D) 0

E) 2.0

38. Vectors A and B are represented as shown in the figure. What is the angle of their resultant R=A+B with respect to the positive x-axis?



A) 44.5

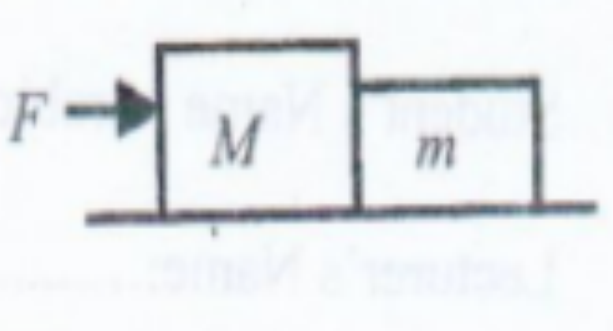
B) 135.5

C) 77

D) 99.4

E) 112

39. A block of mass M=6.0 kg is in contact with another block of mass m=4.0 kg on a rough horizontal surface. The coefficient of friction uk=0.2 and a force F=25 N is applied as shown in the figure. What is the magnitude of the force (In N) of block M on the smaller block m ?



A) 10.0N

B) 16.3N

C) 2.20N

D) 25.0N

E) 17.2N

40. In the figure mass m=2 kg and the coefficients of static and kinetic friction are Us=0.4, uk=0.2 respectively. The acceleration in (m/s^2) of mass m is:

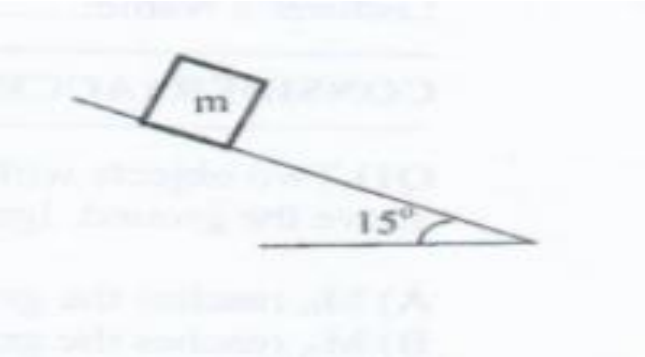
A) 0.64

B) 0

C) 9.8

D) 7.8

E) 2.0



41. In the figure the coefficient of kinetic friction between mass m and the horizontal surface is uk=0.10 and m1=4.0 kg, m2=2.0 kg. As m2 moves down, the acceleration of the system (In m/s^2):

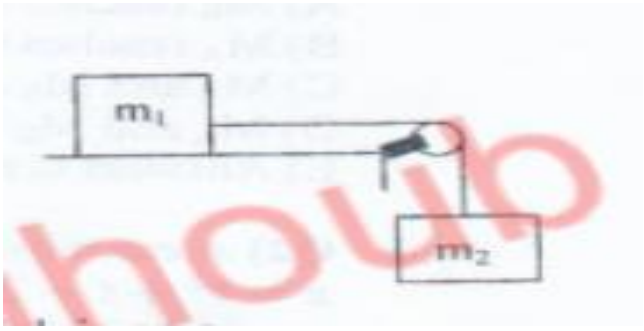
A) 2.6

B) 3.3

C) 9.8

D) 7.8

E) 0



42. The figure shows the force F(x) that acts on a 2 kg mass moving along the x-axis. The mass starts from the origin with an initial velocity of 3 m/s. Its final speed (In m/s) at x=10m is:

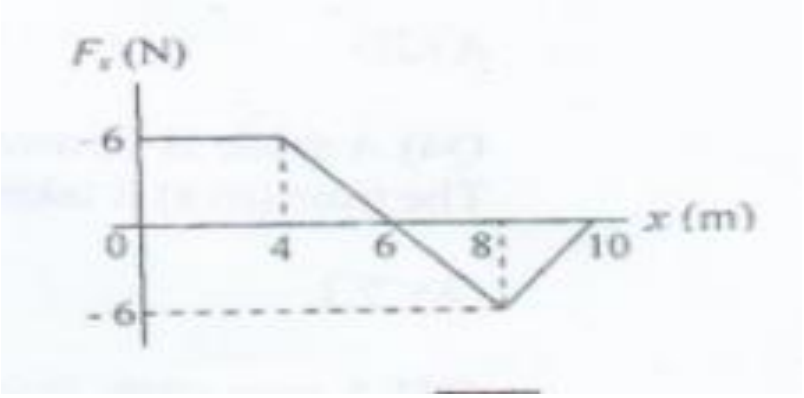
A) 7.1

B) 4.2

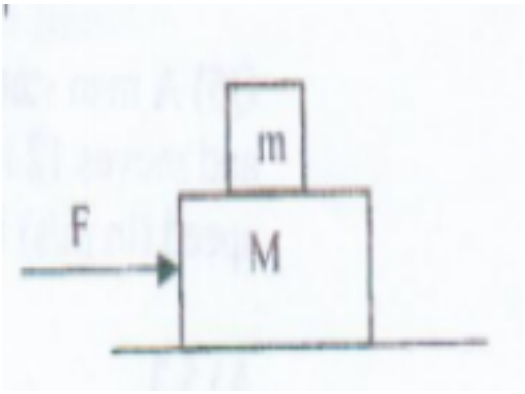
C) 0

D) 5.2

E) 6.1



43. In the figure shown, the horizontal surface is frictionless and M=4 Kg, m=2 Kg. If the coefficients of static and kinetic friction between the surfaces of the blocks m and M are u(s)=0.4 and u(k)=0.2, then the maximum allowed value of the force F (In N) such that the block m doesn't slide is:



A) 11.8

B) 3.9

C) 7.8

D) 23.5

E) 47.0

Q1: An object starts from rest at the origin and moves along the x-axis with a constant acceleration of 4 m/s². Its average velocity as it goes from x = 2 m to x = 8 m is:

A) 1 m/s **B) 2 m/s** **C) 3 m/s** **D) 5 m/s** **E) 6 m/s**

Q2: Two blocks of masses m=2.0 kg and M=4.0 kg are in an elevator that is moving downwards and decelerating at 3 m/s². The normal force (in N) that mass m exerts on mass M is approximately:

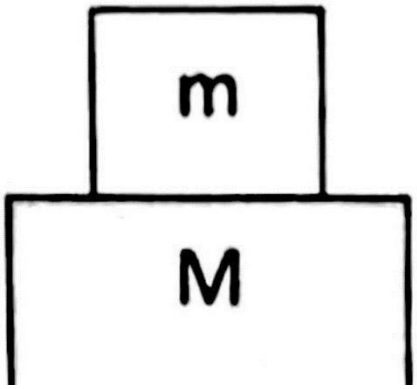
A) 14.0

B) 20.0

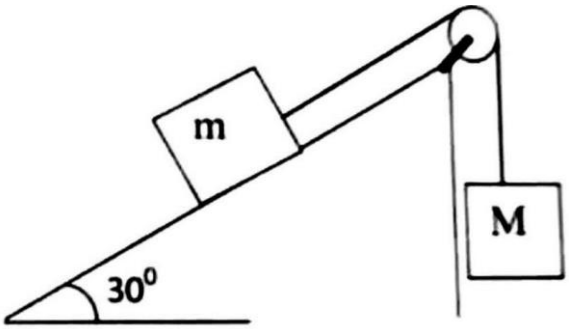
C) 25.6

D) 0

E) 6.0



Q3: In the figure shown, all surfaces are smooth. Mass m = 6 kg; while mass M = 5 kg. The acceleration of mass M (m/s^2) is approximately: (ignore the masses of the pully and the rope)



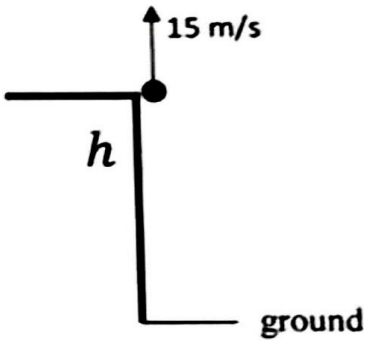
A) 7.1; downward

B) 7.1; upward

C) 1.8; upward

D) 1.8; downward

Q4: A stone is projected vertically upwards with a speed of 15 m/s from the top of a building of height h. After 2 seconds the stone is:



A) moving up at 34.6 m/s

B) moving down at 34.6 m/s

C) momentarily at rest

D) moving up at 4.6 m/s

E) moving down at 4.6 m/s

Q5: Two identical stones are dropped from rest and feel no air resistance as they fall. Stone A is dropped from height h, and stone B is dropped from height 2h. If stone A takes time t reach the ground, stone B will take time:

A) 4t **B) 2t** **C) $\sqrt{2}$ t** **D) t/ $\sqrt{2}$** **E) t/2**

Q6: Three objects are connected by massless wires over a massless frictionless pully as shown in the figure. The tension in the wire connecting the 10.0-kg and 15.0-kg objects is measured to be 133N. What is the mass M?

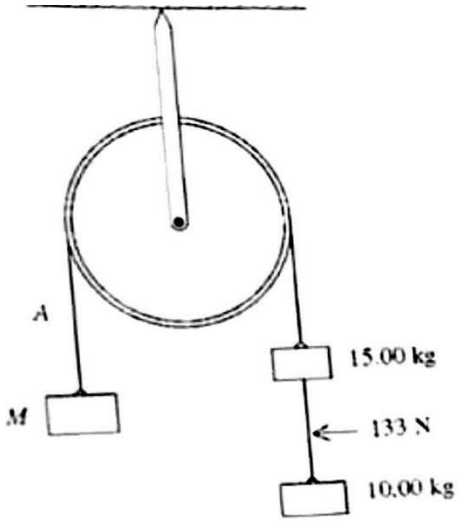
A) 8.33 kg

B) 33.9 kg

C) 35.0kg

D) 52.8 kg

E) 95.0 kg



Q7: The dots in the figure show the position of an object moving along the x-axis as a function of time. Which of the following statements about this object is true over the time interval shown?

A) The object is accelerating to the left.

B) The object is accelerating to the right

C) The object is moving at constant velocity

D) The average speed of the object is 9 m/s

E) The average velocity of the object is 3 m/s

Q8: A 5-kg block rests on a 30.0° incline as shown. The coefficient of static friction and kinetic friction between the block and the incline are μ_s = 0.70 and μ_k = 0.50. Find the minimum value of the force F that must act on the block just to start it moving up the incline is approximately:

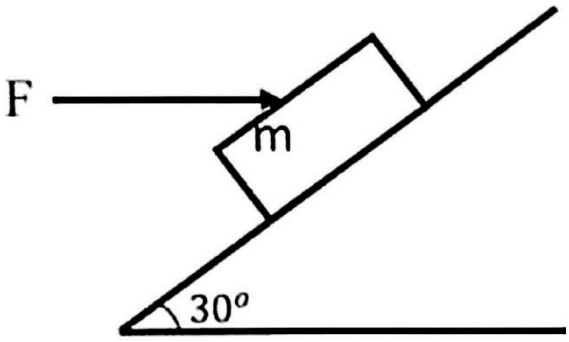
A) 24.42

B) 105.1

C) 14.1

D) 33.3

E) 46.7



Q9: A box with a weight of 50 N rests on a horizontal surface. A person pulls horizontally on the box with a force of F_H = 15 N and it does not move. To start it moving, a second person pulls vertically upward on the box with a force F_V. If the coefficient of static friction is 0.4, what is the smallest vertical force F_V for which the box moves?

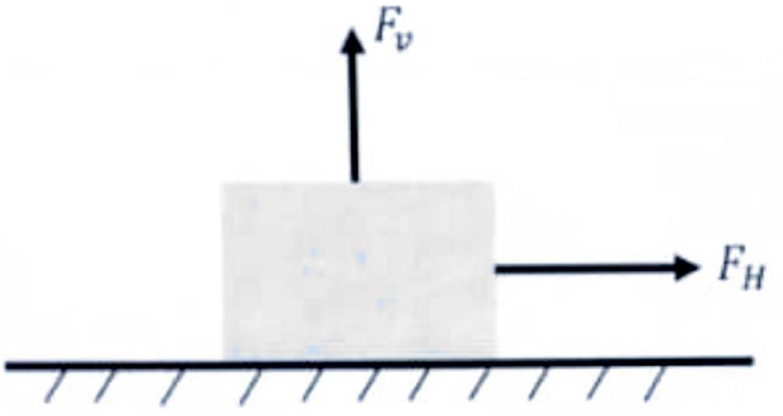
A) 87.5 N

B) 12.5 N

C) 20 N

D) 6 N

E) 37.5 N



Q10: In the figure, ALL FOUR vectors have the same magnitude of 5 units. The magnitude of the resultant vector $\vec{R} = \vec{A} + \vec{B} + \vec{C} + \vec{D}$ is:

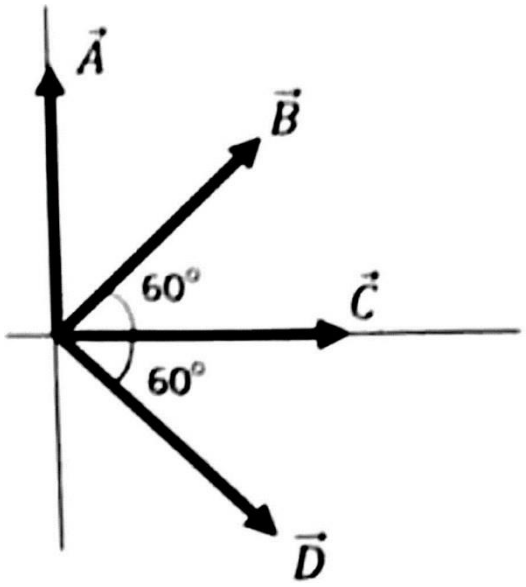
A) 5 units

B) 11.2 units

C) 15 units

D) 7.1 units

E) 20 units



Q11: In the figure, a block of mass M hangs at rest. The rope that is fastened to the vertical wall is horizontal and has a tension T_1 = 52 N. The rope that is fastened to the ceiling has a tension T_2 = 91 N and makes an angle Θ with the ceiling. What is the mass M?

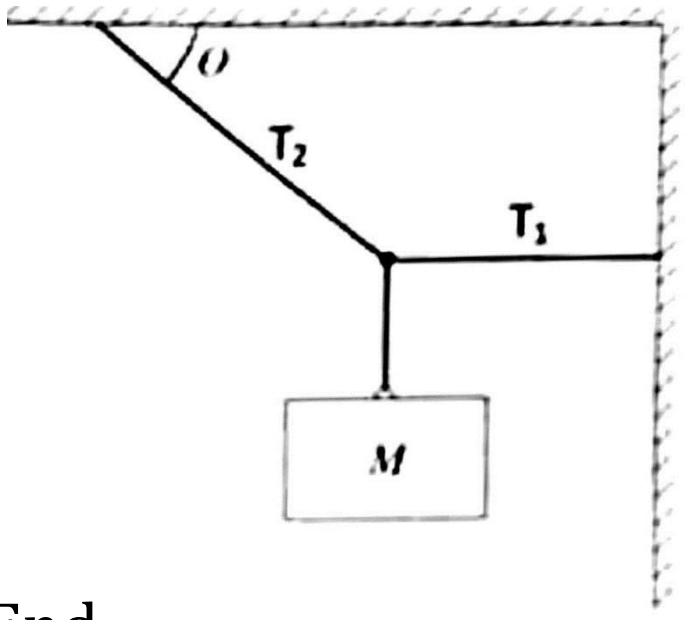
A) 7.6 kg

B) 74.5 kg

C) 52.2kg

D) 1.4 kg

E) 4.0 kg



The End

Solutions:

Q1:

$$v_{avg} = \frac{v_{(x=2)} + v_{(x=8)}}{2}$$

$$v_2^2 = v_1^2 + 2a\Delta x$$

$0 \to 2$: $v_2^2 = 0 + 2*4*2$

$v_2 = 4$ m/s

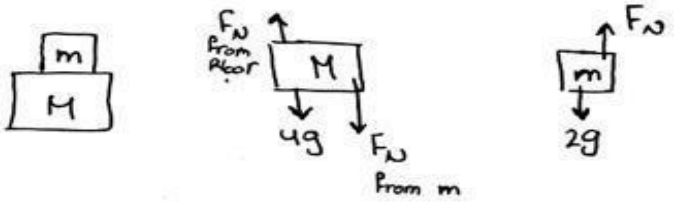
$0 \to 8$: $v_2^2 = 0 + 2*4*8$

$v_2 = 8$ m/s

$$v_{avg} = \frac{4+8}{2}$$

$v_{avg} = 6$ m/s (E)

Q2:



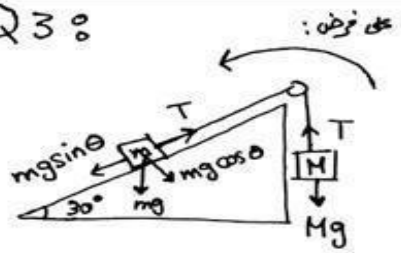
$\Sigma F = m*a$

$2g - F_N = 2*-3$

$F_N = 25.6$ N

(C)

Q3:



$mg\sin\theta - T = ma$ *

$T - Mg = Ma$ *

$mg\sin\theta - ma = Ma + Mg$

$Ma + ma = mg\sin\theta - Mg$

$$a = \frac{mg\sin\theta - Mg}{(M+m)} = -1.8 \text{ m/s}^2$$

downward ↓

عكس عقارب الساعة ←

(D)

Q4:

$v_2 = v_1 + at$

$v_2 = 15 - 9.8*2$

$v_2 = -4.6$ m/s

-ve sign ⇓ moving down

(E)

Q5:

Stone A

$\Delta x = v_1 t + \frac{1}{2} a t_1^2$

$h = 4.9 t_1^2$

$t_1 = \sqrt{0.2h}$

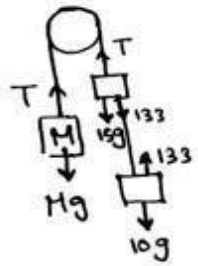
Stone B

$2h = 4.9 t_2^2$

$t_2 = \sqrt{0.4h} \rightarrow \sqrt{2} * \sqrt{0.2h}$

$t_2 = \sqrt{2}\, t_1$ (C)

Q6:



$Mg - T = Ma$ *

$T - 133 - 15g = 15a$ *

$133 - 10g = 10a$ *

$a = 3.5\ m/s^2$

$T - 133 - 147 = 52.5$

$T = 332.5\ N$

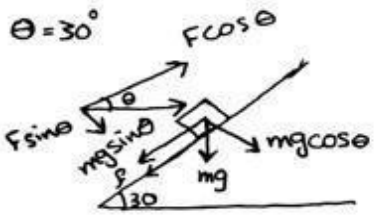
$M*9.8 - 332.5 = M*3.5$

$M = 52.8\ Kg$ (D)

Q7:

The object is accelerating to the right (B)

Q8:



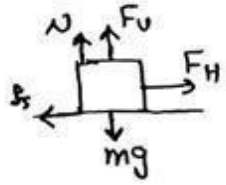
$F\cos\theta = mg\sin\theta + \mu_s(F\sin\theta + mg\cos\theta)$

$F\cos\theta - \mu_s F\sin\theta = mg\sin\theta + \mu_s mg\cos\theta$

$$F = \frac{mg\sin\theta + \mu_s mg\cos\theta}{(\cos\theta - \mu_s \sin\theta)}$$

$F = 105.1\ N$ (B)

Q9:



$N + F_v = mg$

$N = mg - F_v$ *

$F_H = f_s$

$F_H = \mu_s(mg - F_v)$

$F_v = mg - \frac{F_H}{\mu_s}$

$F_v = 50 - \frac{15}{0.4}$

$F_v = 12.5\ N$

(B)

Q 10 :

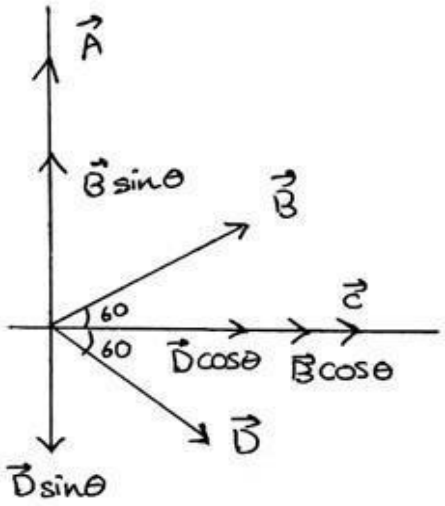
$$\vec{R} = \vec{A} + \vec{B} + \vec{C} + \vec{D}$$

$$R_x = \vec{B}\cos\theta + \vec{C} + \vec{D}\cos\theta$$

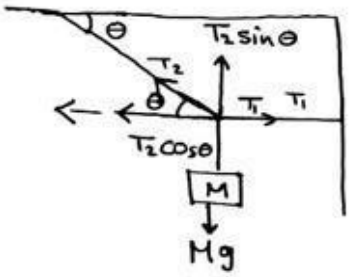
$$R_y = \vec{A} + \vec{B}\sin\theta - \vec{D}\sin\theta$$

$R_x = 10$ $\qquad$ $R_y = 5$

$$\vec{R} = \sqrt{10^2+5^2} = 11.2 \text{ units}$$ (B)



Q 11 :



$$T_2\cos\theta = T_1$$

$$\cos\theta = \frac{T_1}{T_2}$$

By calculator → $\theta = 55.2°$

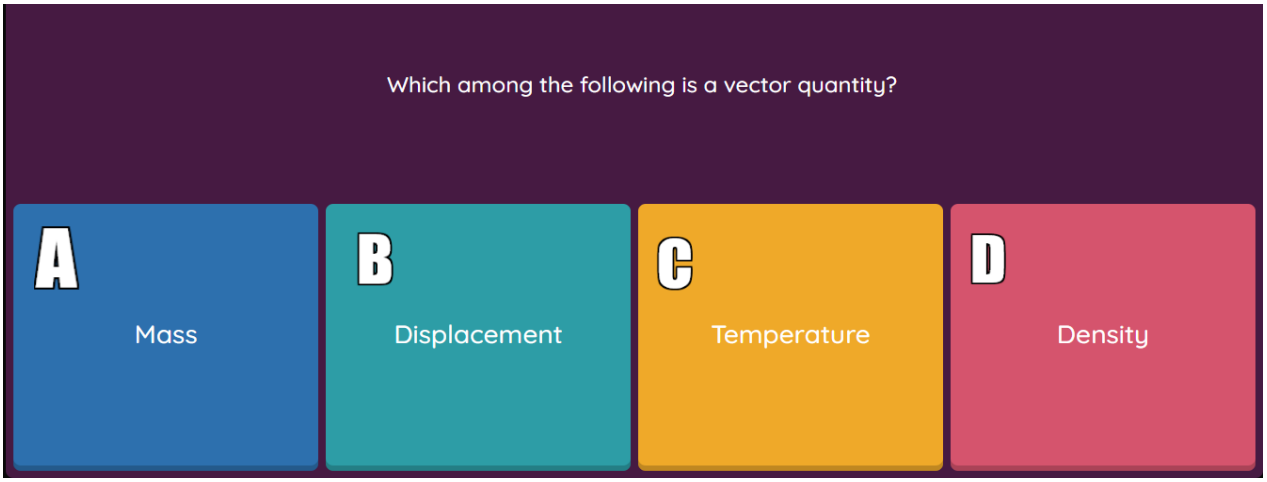
$$Mg = T_2\sin\theta$$

$$M = \frac{T_2\sin\theta}{g}$$

$$M = \frac{91 * \sin(55.2)}{9.8}$$

$$M = 7.6 \text{ Kg}$$ (A)

I find that the harder I work, the more luck I seem to have.

1- 

2- All of the following are base units of the SI system except:

A) kilogram.

B) kelvin.

C) meter.

D) volt.

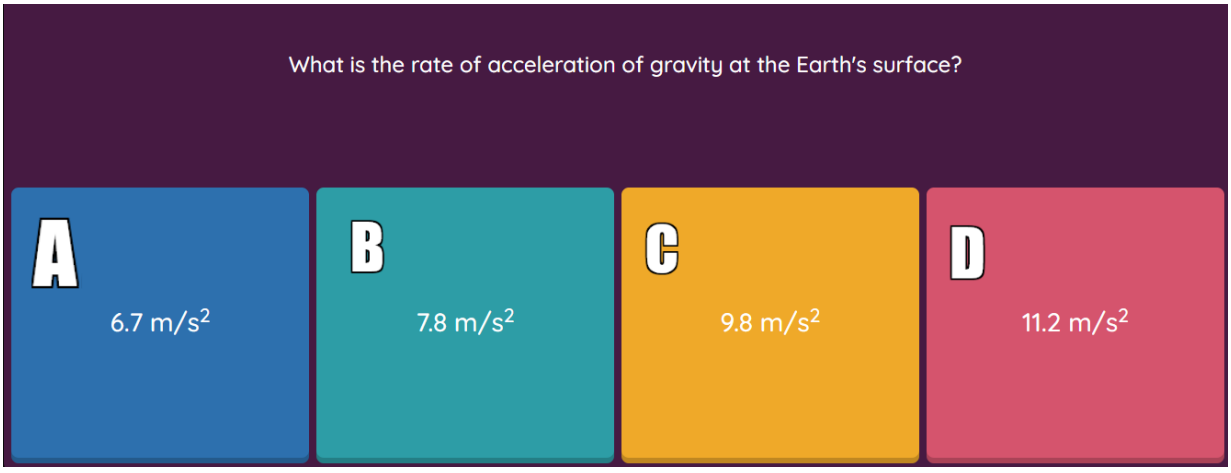
3- What is the conversion factor between km/h2 and m/s2?

A) 7.72 ¸ 10-6 m/s2

B) 2.78 ¸ 10-1 m/s2

C) 1.30 ¸ 104 m/s2

D) 3.60 m/s2

4- 

1	2	3	4
B	D	A	C

5- The number of significant figures in 10001 is

A) two.

B) three.

C) five.

D) six.

6- The number of significant figures in 0.01500 is

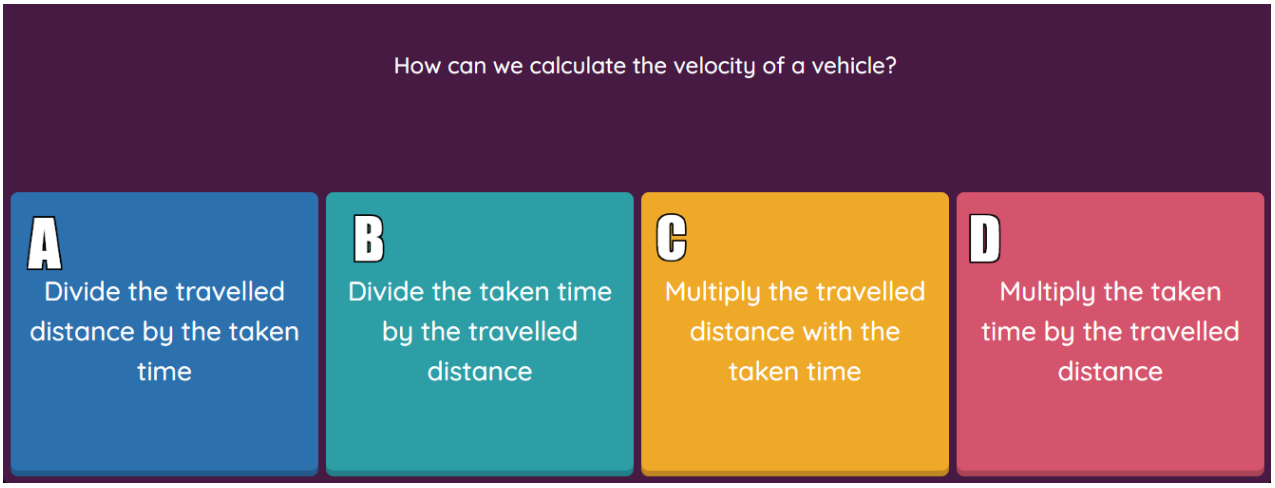
A) two.

B) three.

C) four.

D) five.

7-



8- Starting from city A, a car drives 250 miles east to city B, then 300 miles north to city C, and finally 700 miles west to city D. What is the distance between city A and city D?

A) 300 mi

B) 400 mi

C) 500 mi

D) 600 mi

5	6	7	8
C	C	A	C

9- A person stands 35.0 m from a flag pole. With a protractor at eye level, he finds that the angle at the top of the flag pole makes with the horizontal is 25.0 degrees. How high is the flag pole? (The distance from his feet to his eyes is 1.7 m.)

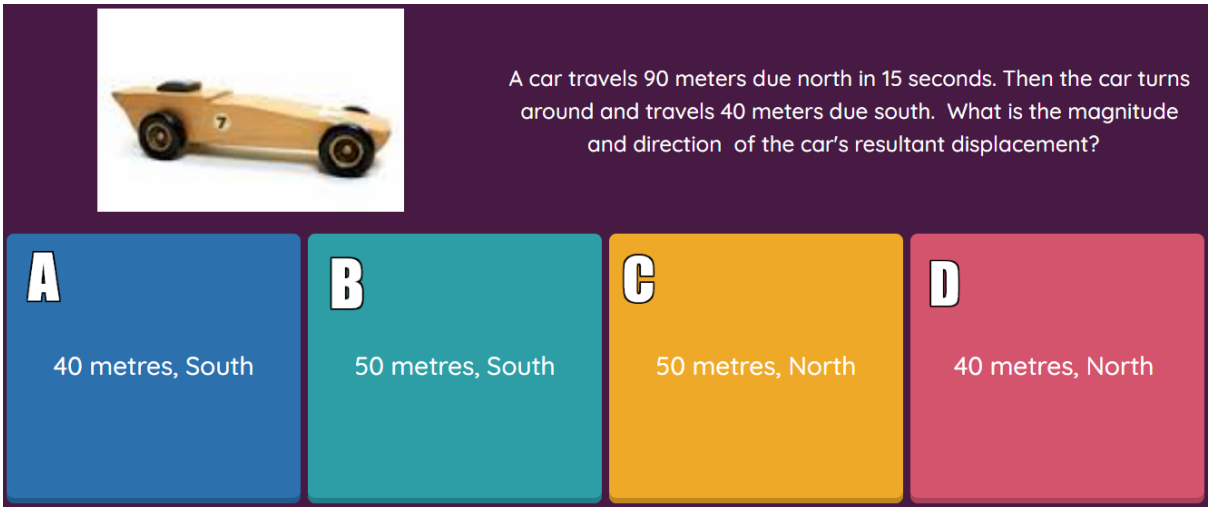
A) 10 m

B) 20 m

C) 30 m

D) 80 m

10-



11- Suppose that an object travels from one point in space to another. Make a comparison between the displacement and the distance traveled.

A) The displacement is either greater than or equal to the distance traveled.

B) The displacement is always equal to the distance traveled.

C) The displacement is either less than or equal to the distance traveled.

D) The displacement can be either greater than, smaller than, or equal to the distance traveled.

12- A new car manufacturer advertises that their car can go "from zero to sixty in 8 s". This is a description of

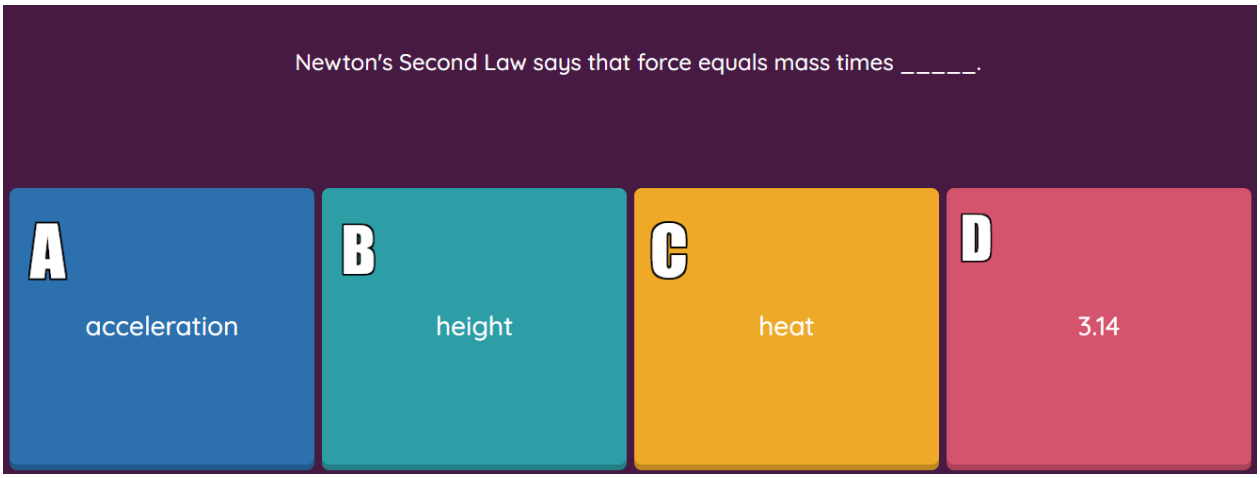
A) average speed.

B) instantaneous speed.

C) average acceleration.

D) instantaneous acceleration.

9	10	11	12
B	C	C	C

13- 

14- Suppose that an object is moving with a constant velocity. Make a statement concerning its acceleration.

A) The acceleration must be constantly increasing.

B) The acceleration must be constantly decreasing.

C) The acceleration must be a constant non-zero value.

D) The acceleration must be equal to zero

15- Suppose that an object is moving with constant acceleration. Make a statement concerning its motion with respect to time.

A) In equal times its speed increases by equal amounts.

B) In equal times its velocity changes by equal amounts.

C) In equal times it moves equal distances.

D) A statement cannot be made using the information given.

16- Objects A and B both start from rest. They both accelerate at the same rate. However, object A accelerates for twice the time as object B. What is the distance traveled by object A compared to that of object B?

A) the same distance

B) twice as far

C) three times as far

D) four times as far

13	14	15	16
A	D	B	D

17- When an object is released from rest and falls in the absence of friction, which of the following is true concerning its motion?

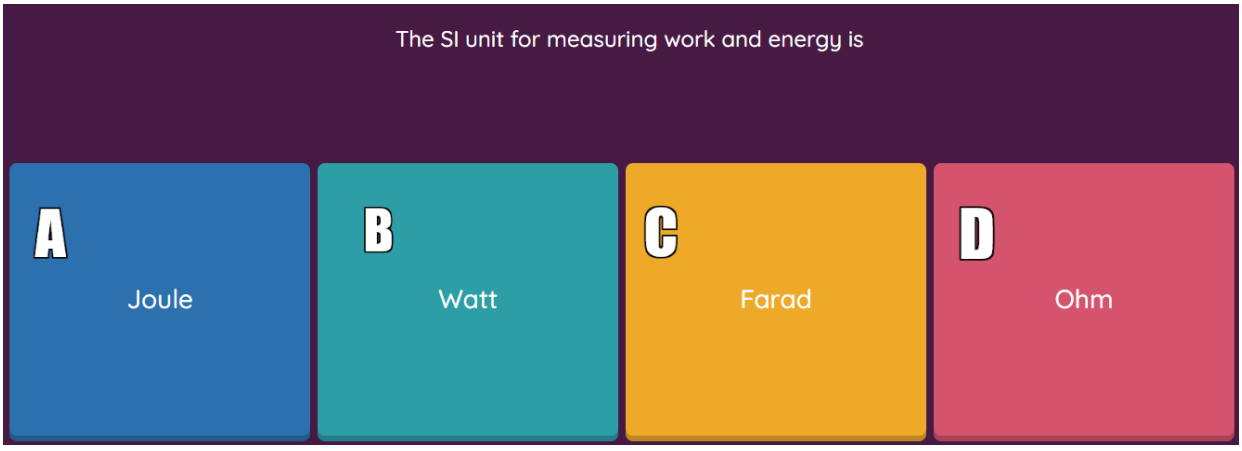
A) The speed of the falling object is proportional to its mass.

B) The speed of the falling object is proportional to its weight.

C) The speed of the falling object is inversely proportional to its surface area.

D) None of the above is true.

18-



19- Suppose a ball is thrown straight up. Make a statement about the velocity and the acceleration when the ball reaches the highest point.

A) Both its velocity and its acceleration are zero.

B) Its velocity is zero and its acceleration is not zero.

C) Its velocity is not zero and its acceleration is zero.

D) Neither its velocity nor its acceleration is zero.

20- Suppose a ball is thrown straight up. What is its acceleration just before it reaches its highest point?

A) zero

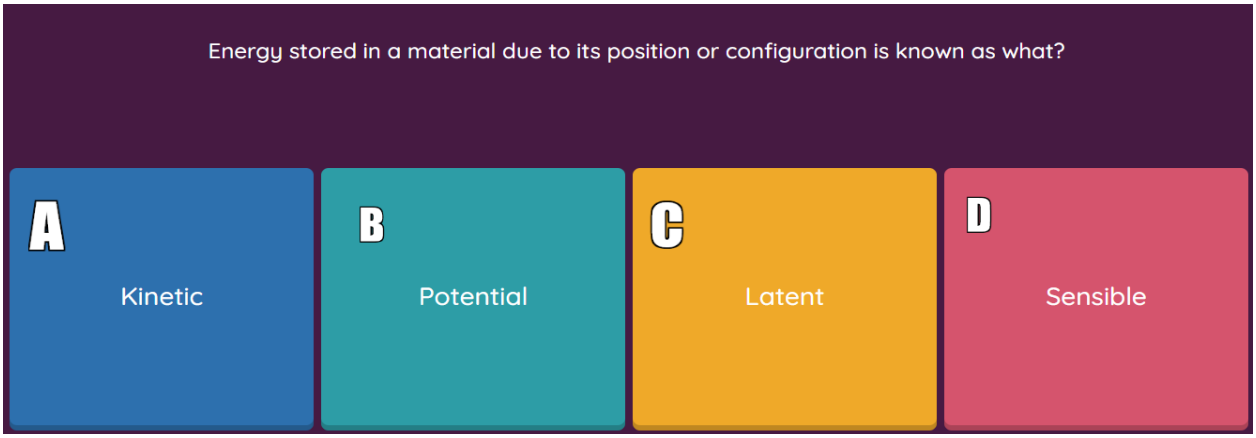
B) slightly less than g

C) exactly g

D) slightly greater than g

17	18	19	20
D	A	B	C

21-



22- A car travels 40 kilometers at an average speed of 80 km/h and then travels 40 kilometers at an average speed of 40 km/h. The average speed of the car for this 80 km trip is:

A) 40 km/h

B) 45 km/h

C) 53 km/h

D) 60 km/h

E) 80 km/h

23- Q2) A car starts from rest and goes down a slope with a constant acceleration of 5 m/s2 . After 5 seconds the car reaches the bottom of the hill. What is its speed at the bottom of the hill?

A) 1 m/s

B) 12.5 m/s

C) 25 m/s

D) 50 m/s

E) 160 m/s

24- A 5.0-kg block is on an incline that makes an angle 30□ with the horizontal. If the coefficient of static friction is 0.5, the maximum force that can be applied parallel to the plane without moving the block is:

A) 0 N

B) 3.4 N

C) 21.1 N

D) 45.6 N

E) 55 N

21	22	23	24
B	C	C	D

25- A 5.0-kg block is resting on a horizontal plank. The coefficient of static friction is 0.50 and the coefficient of kinetic friction is 0.40. After one end of the plank is raised so the plank makes an angle of 30□ with the horizontal, the force of friction is:

A) 0 N

B) 17 N

C) 20 N

D) 25 N

E) 49 N

26- Q12) A 5.0-kg block is on an incline that makes an angle of 30□ with the horizontal. If the coefficient of static friction is 0.50, the minimum force that can be applied parallel to the plane to hold the block at rest is:

A) 0 N

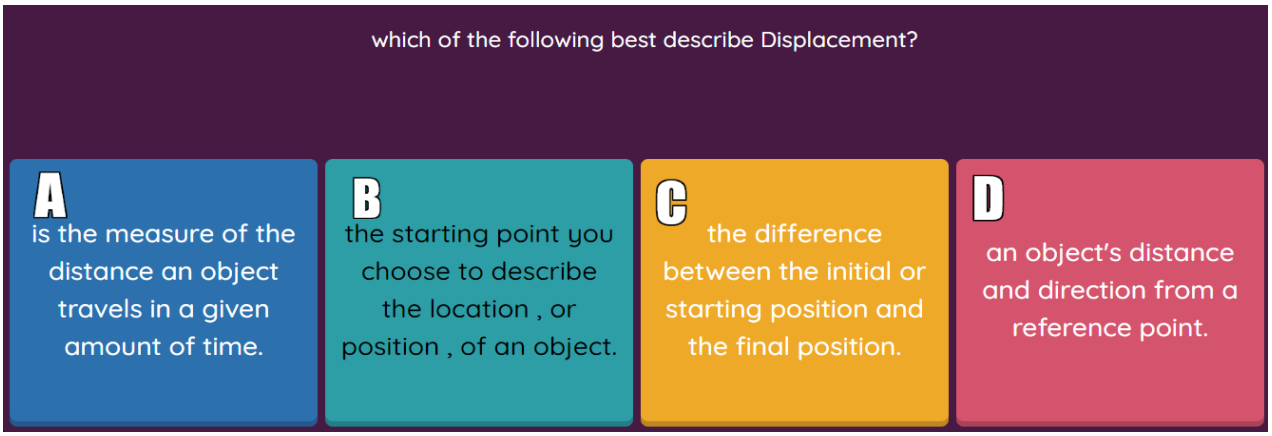
B) 3.4 N

C) 21.1 N

D) 24.5 N

E) 46 N

27-



28- A 5.0-kg block is on an incline that makes an angle 30□ with the horizontal. If the coefficient of static friction is 0.5, the maximum force that can be applied parallel to the plane without moving the block is:

A) 0 N

B) 3.4 N

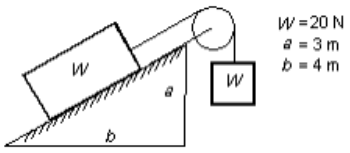
C) 21.1 N

D) 45.6 N

E) 55 N

25	26	27	28
B	B	C	D

29- The system shown remains at rest. The force of friction on the block on the slope is:



A 4 N
B 8 N
C 12 N
D 16 N
E 20 N

30- A 1000-kg airplane moves in straight flight at constant speed. The force of air friction is 1800 N. The net force on the plane is:

A) 0 N

B) 11600 N

C) 1800 N

D) 9800 N

E) none of these

31- A rock is dropped from the top of a vertical cliff and takes 3.00 s to reach the ground below the cliff. A second rock is thrown vertically from the cliff, and it takes this rock 2.00 s to reach the ground below the cliff from the time it is released. With what velocity was the second rock thrown, assuming no air resistance?

A) 4.76 m/s upward

B) 5.51 m/s downward

C) 12.3 m/s upward

D) 4.76 m/s downward

E) 12.3 m/s downward

32- An object moving along the x-axis has an initial velocity $v = 1$ m/s at t = 0. Its velocity two seconds later is -3 m/s. What is the average acceleration (in m/s^2) of the particle between $t = 0$ and $t = 2$s?

A) 2 B) 4 C) 0 D) - 2 E) - 4

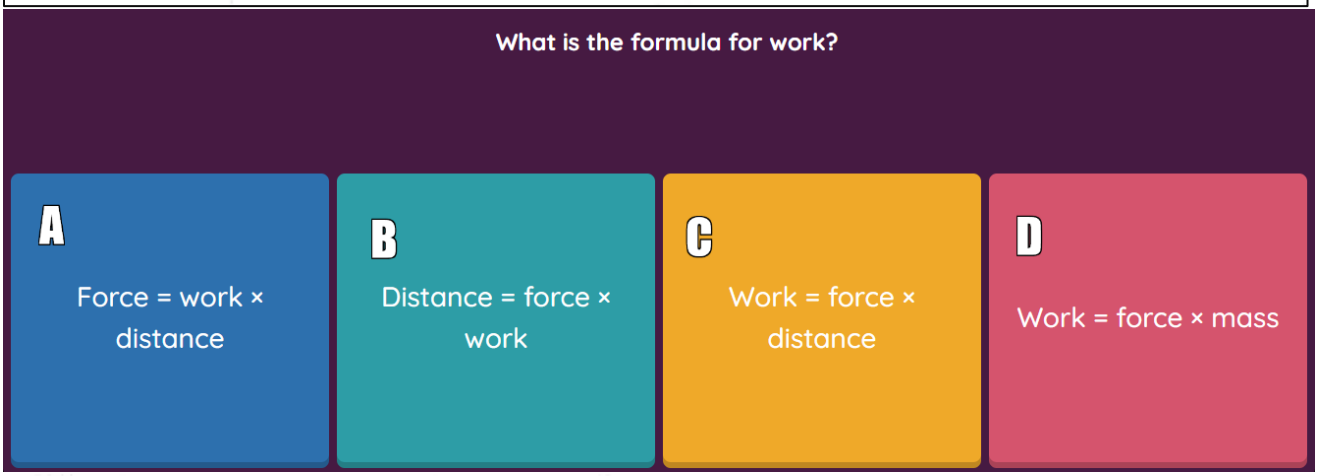
29	30	31	32
B	A	E	D

33-

Q2) A stone is projected vertically upwards from the surface of the ground with an initial speed of 15 m/s. Its average speed (in m/s) over the time interval from its projection to the moment just before hitting the ground is:

A) 7.5 B) 9.8 C) 0 D) 12.5 E) 5.9

34-

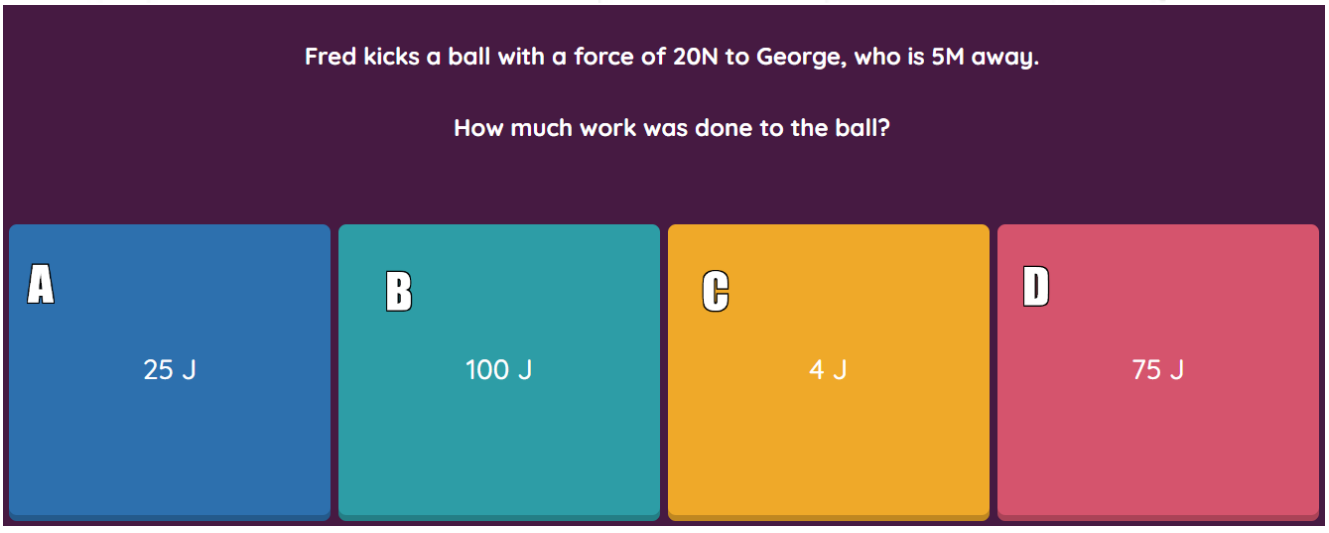


35-

Q4) A helicopter is ascending vertically upwards at a constant speed of 12 m/s. When it is at a height of 60 m above the ground it releases a box. The speed (in m/s) of the box just before it hits the ground is:

A) 12 B) 34.3 C) 16.7 D) 9.8 E) 36.3

36-



33	34	35	36
A	C	E	B

37-

If a system is *isolated*, the total energy of the system

A	B	C	D	E
Increases constantly.	Decreases constantly.	Is constant.	Depends on the work done on the system.	Depends on the work done by the system.

38-

Q3) A car is moving along the positive x-axis at a constant speed of 15 m/s. The driver notices a red traffic light 30 m ahead of him. Thus the driver immediately applies the breaks, and the car decelerates uniformly at 3 m/s². Which of the following statements is correct?

A) The car will stop at a position 7.5 m before reaching the traffic light.
B) The car will stop at a position 7.5 m after the traffic light.
C) The car will stop at a position 2.5 m before reaching the traffic light.
D) The car will stop at a position 2.5 m after the traffic light.
E) The car will stop exactly at the position of the traffic light

39-

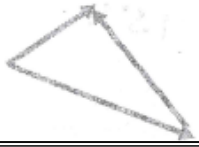
Q5) In each figure, the set of forces act on an object. Which set does NOT change the state of motion of the object?

A) 

B) 

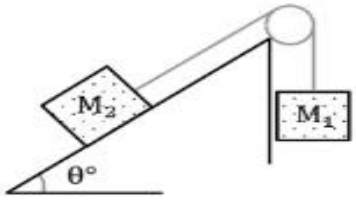
C) 

D) 

E) 

40-

In the figure, $M_1 = 5$ kg , $M_2 = 8$ kg and $\theta = 30°$. All the surfaces are frictionless. The acceleration (in m/s^2) of mass M_2 is:



A) 2.5 DOWN THE INCLINE
B) 2.5 UP THE INCLINE
C) 0.75 DOWN THE INCLINE
D) 0.75 UP THE INCLINE
E) 0

37	38	39	40
C	B	B	C

41- An object moving along the x-axis has an initial velocity $v = 1 m/s$ at $t = 0$. Its velocity two seconds later is -7 m/s. What is the average acceleration in (m/s^2) of the particle between $t = 0$ and $t = 2$?

A) 2 B) 4 C) 0 D) − 2 E) − 4

42- A stone is projected vertically upward from the surface of the ground with an initial speed of 25 m/s. Its average speed (in m/s) over the time interval from its projection to the moment just before hitting the ground is:

A) 7.5 B) 9.8 C) 0 D) 12.5 E) 5.9

43- Which of the following statements is WRONG?

A) While mass is a scalar quantity, weight is a vector quantity.

B) The action force and the reaction force can never act on the same object.

C) If an object is moving at constant velocity, then the resultant force acting on it is zero.

D) An object can move at constant velocity if only one force acts on it.

E) The acceleration is always along the direction of the resultant force.

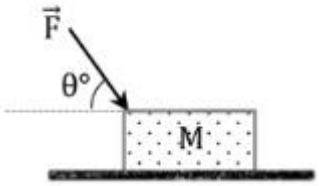
44- You run a race with a friend. At first your kinetic energy is the same as his kinetic energy, but he is running faster than you are. When you increase your speed by 20 percent, you are running at the same speed he is. If your mass is 105 kg what is his mass (in kg)?

A) 88 B) 73 C) 115 D) 96 E) 81

41	42	43	44
E	D	D	B

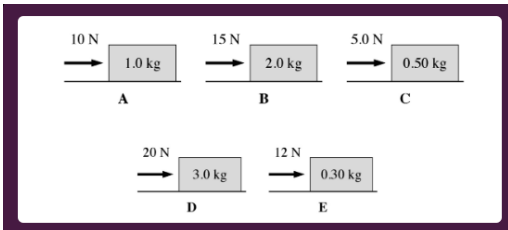
45-

In the figure the force F = 20N, M = 4kg , θ = 30° and the coefficient of kinetic friction between the ground and the block is $\mu_k = 0.2$, The acceleration of the block is:



A) 4.98 B) 6.81 C) 1.87 D) 9.81 E) 5.73

46-

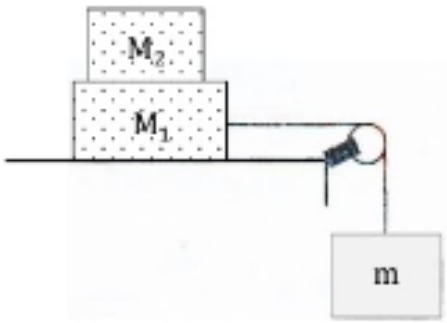


Each of the boxes shown is pulled for 10 m across a level, frictionless floor by the force given. Which box experiences the greatest change in its kinetic energy?

A B C D E

47-

In the figure, all surfaces are rough, $M_1 = 4$ kg and $M_2 = 2$ kg and the coefficient of friction $\mu_s = 0.5$ and $\mu_k = 0.2$ for all surfaces. Find the maximum value of mass m (in kg) such that mass M_2 will move with mass M_1 without sliding. Ignore masses of all strings and the mass of the pulley.



A) 84 B) 23 C) 60 D) 33 E) 4.9

45	46	47
C	D	A

48- An object is thrown vertically upwards with an initial speed of 30 m/s. After 4 s, the object is:

A) moving down at 20 m/s

B) moving up at 20 m/s

C) at its maximum height

D) moving down at 9.2 m/s

49- Which of the following statements is CORRECT?

A) anobjectcanaccelerateevenwhentheFR actingonitiszero.

B) when you walk forward without skidding, the static friction is the force that caused you to move.

C) weight is a scalar quantity.

D) the normal force is the reaction force to the weight of an object.

E) acceleration is always in opposite direction to the resultant force

50- AforceacceleratesabodyofmassM.Thesameforceappliedtoa second body produces three times the acceleration. The mass of the second body will be:

A) 2M B) M/3 C) M/2 D)9M E) 3M

51- Whatforce(inN)isneededtostopa1000-kgcarmovingat25m/s during a time interval of 10 seconds?

A) 400 B) 500 C) 250 D) 2000 E) 2500

52- A PHY-105 student on the moon releases an apple from a height of 1.25 m above the surface on the Moon .The speed of the apple just before it hits the moon's surface is : (Recall that the acceleration of gravity on the moon is one-sixth that on the earth)

A) Zero

B) 24.50

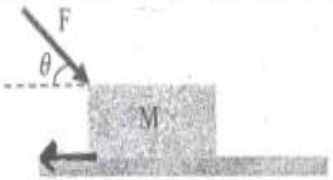
C) 4.95

D) 2.02

E) 4.08

48	49	50	51	52
D	B	B	E	E

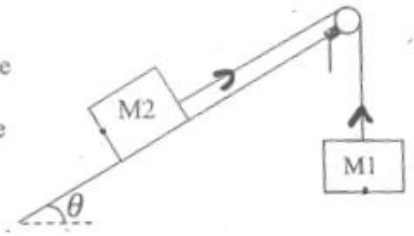
Q7) In the figure the force F = 40 N, M = 4 kg, $\theta = 30^0$ and the coefficient of kinetic friction between the ground and block is $\mu_k = 0.2$. The Acceleration (in m/s^2) of the block is:



A) 0.4 B) 3.5 C) 8.2
D) 9.8 E) 5.7

53-

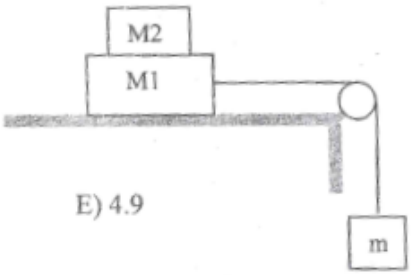
Q8) In the figure M1 = 3 kg, M2 = 5 kg and $\theta = 30^0$. All the surfaces are frictionless. The acceleration (in m/s^2) of mass M2 is:



A) 0.6 up the incline B) 0.6 down the incline
C) 2.5 up the incline D) 2.5 down the incline
E) 0

54-

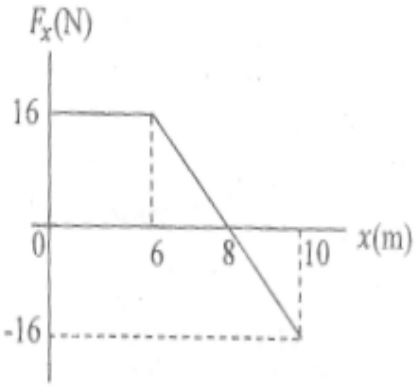
Q9) In the figure, all surfaces are rough. M1=3 kg and M2 = 1 kg and the coefficients of friction $\mu_s = 0.5$ and $\mu_k = 0.2$ for all surfaces. Find the maximum value of mass m (in kg) such that mass M2 will move with mass M1 without sliding. Ignore masses of all strings and the mass of the pulley.



A) 2.8 B) 3.7 C) 4.0 D) 5.6 E) 4.9

55-

Q11) A 4.0-kg object starts moving from the origin with a speed of 2 m/s under the effect of a variable force F_x that acts along the x-axis as shown in the figure. The speed (in m/s) of the object at $x = 10$ m is:



A) 9.8 B) 6.9 C) 7.2
D) 10.0 E) 1.1

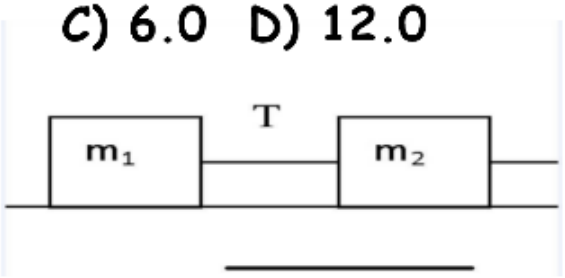
56-

53	54	55	56
E	A	D	C

57-

22. Two masses m1 = 2.0 kg and m2 = 4.0 kg are connected by a light inextensible string as shown in the figure. The system is pulled along a frictionless surface by a force F = 18 N. The value of the tension T (in N):

A) 24.0 B) 3.0 C) 6.0 D) 12.0



58-

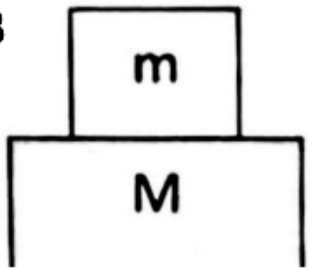
21. A block of mass m = 4.0 kg slides down a 35 degrees incline when a force of F = 10 N is applied upward parallel to the incline. If the coefficient of kinetic friction between the block and the incline is 0.2, find the acceleration (in m/s²) of the block as it moves down the inclined plane:

A) 3.1 B) 4.0 C) 0.44 D) 2.7 E) 1.5

59-

23. In the figure mass M = 4.0 kg and mass m = 2.0 kg. The ground surface is frictionless, while the coefficient of static friction between the two masses is 0.30. Find the maximum value of F (in N) such that mass m moves with mass M without sliding.

A) 25.9 B) 3.2 C) 17.6 D) 11.8



57	58	59
E	C	C