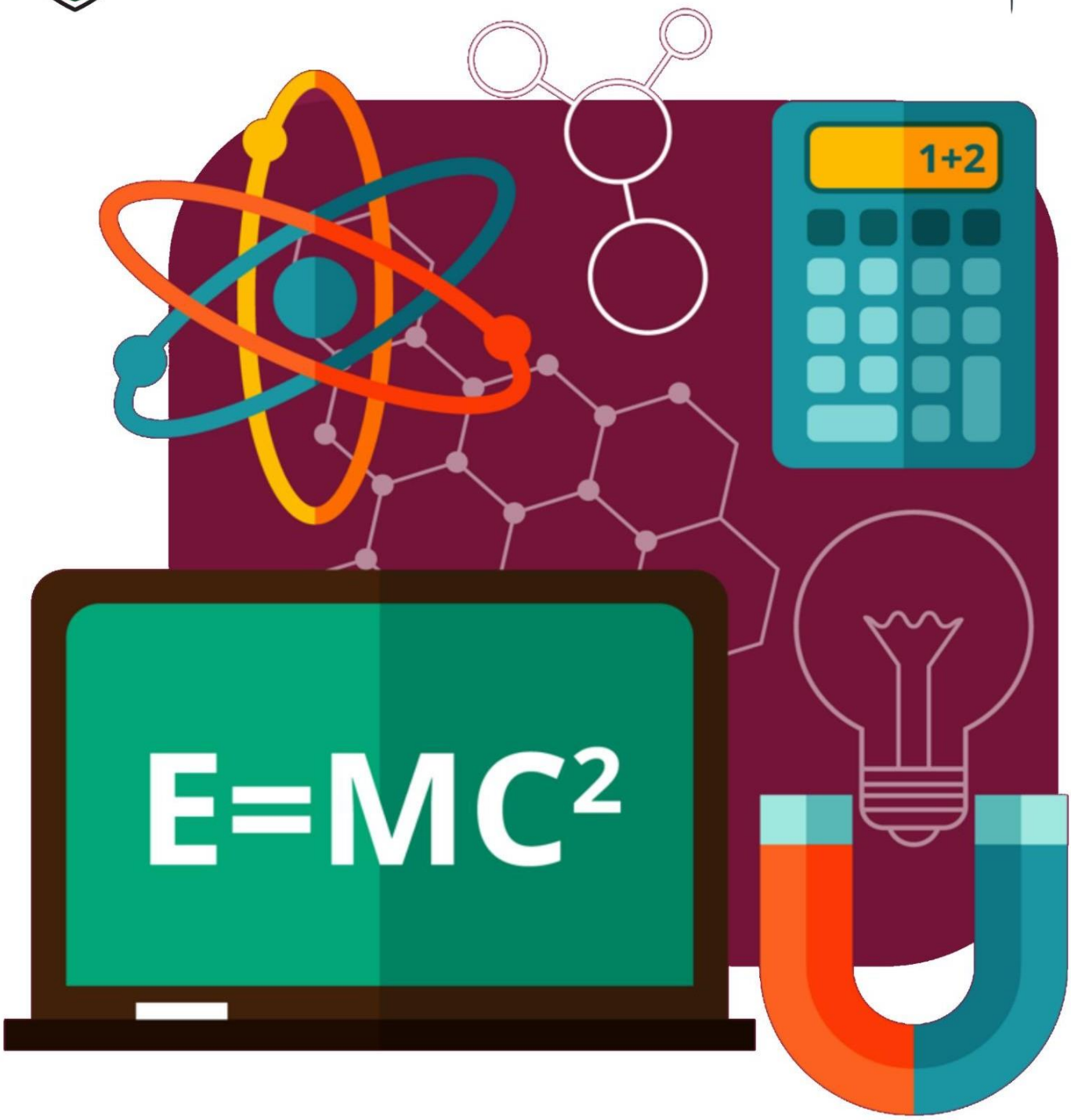
PAST PAPERS



PHYSICS

DONE BY: Ahmad Qatawneh

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:

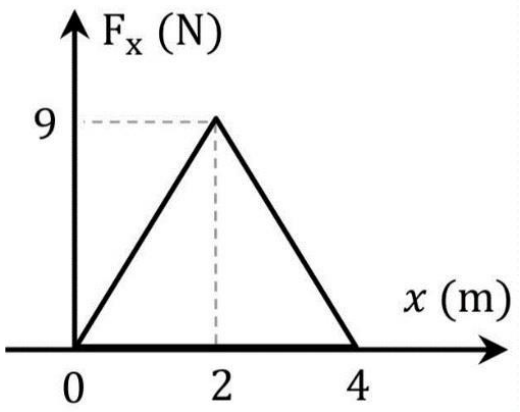
A) 8.4

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?

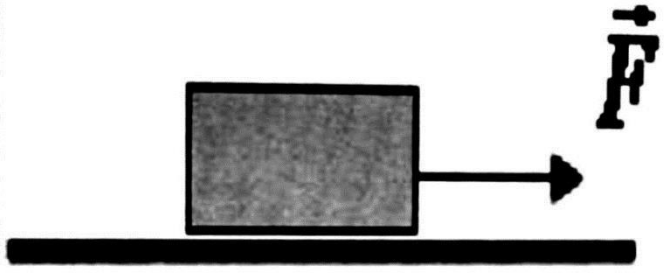
A) 10

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

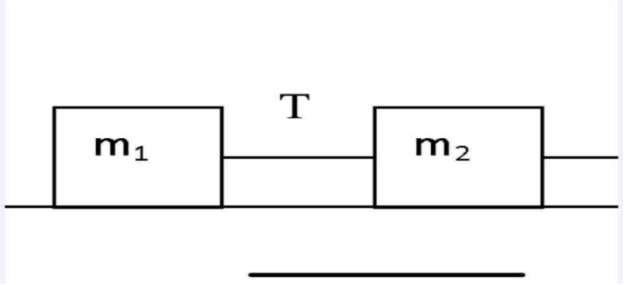
22. Two masses m1 = 2.0 kg and m2 = 4.0 kg are connected by a light inextensible string as shown in the figure. The system is pulled along a frictionless surface by a force F = 18 N. The value of the tension T (in N):

A) 24.0

B) 3.0

C) 6.0

D) 12.0



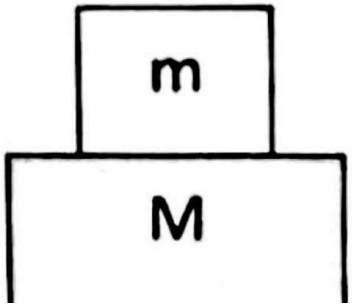
23. In the figure mass M = 4.0 kg and mass m = 2.0 kg. The ground surface is frictionless, while the coefficient of static friction between the two masses is 0.30. Find the maximum value of F (in N) such that mass m moves with mass M without sliding.

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:

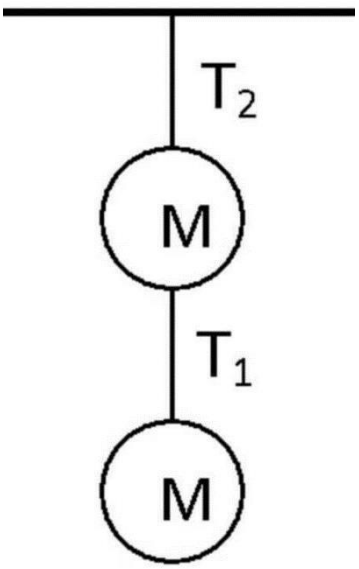
A) 2

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:

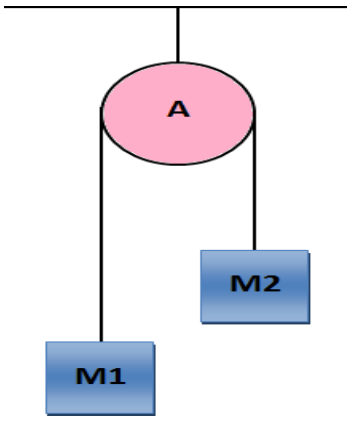
A) three times as large

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

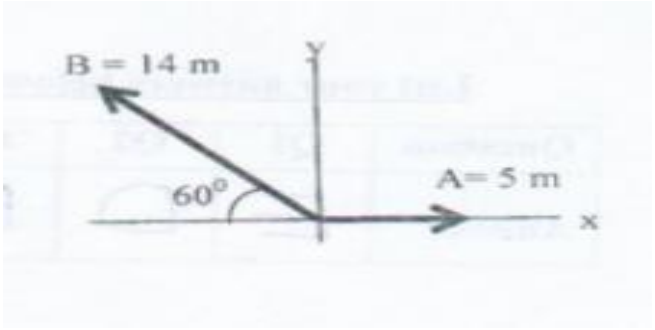
B) 1.3

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

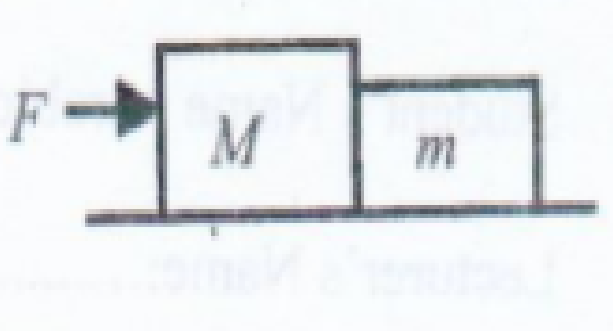
B) 135.5

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:

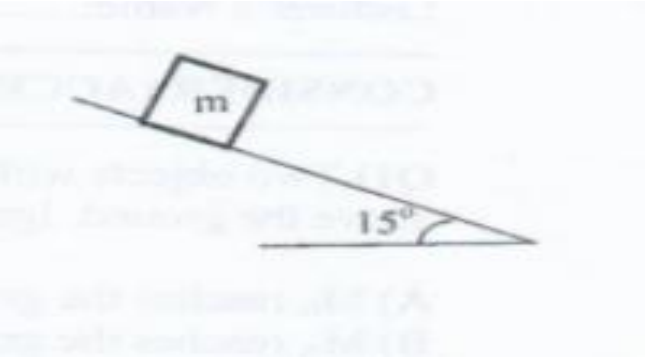
A) 0.64

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):

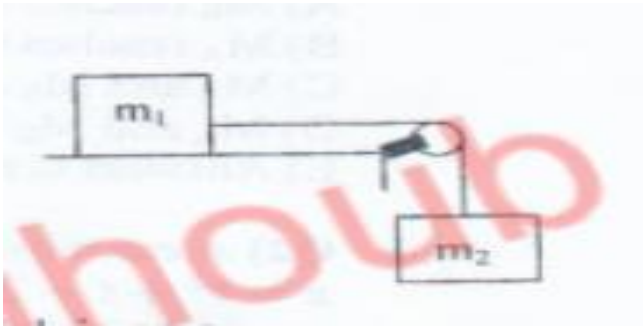
A) 2.6

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:

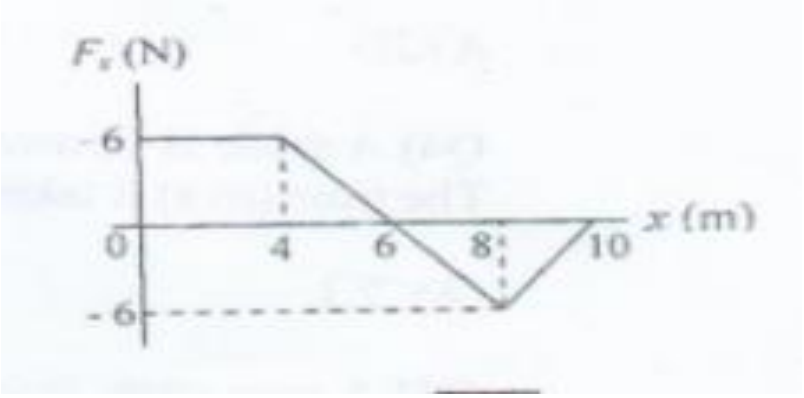
A) 7.1

B) 4.2

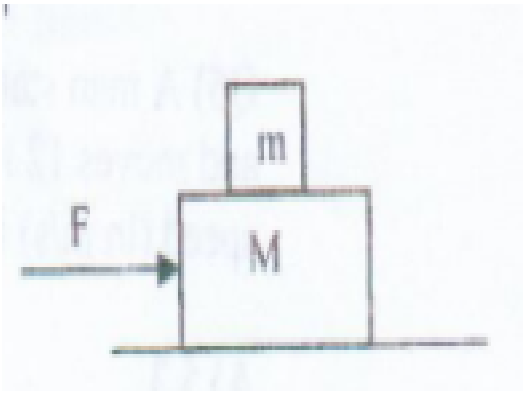
C) 0

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

First exam 2019

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:

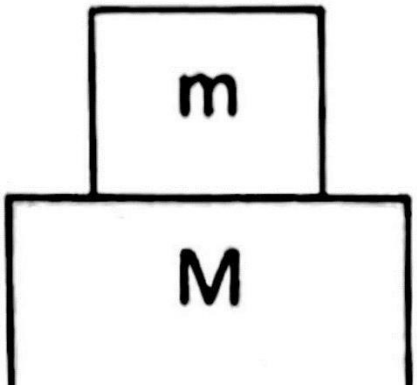
A) 14.0

B) 20.0

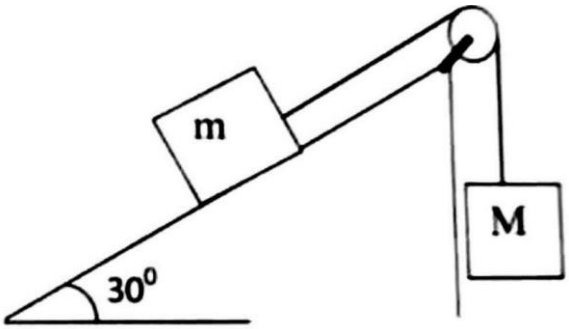
C) 25.6

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)



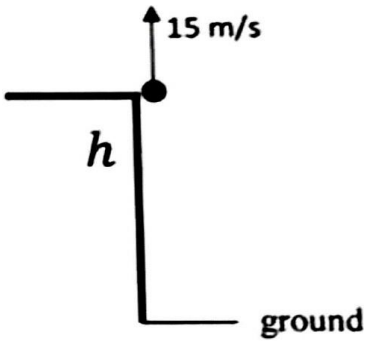
A) 7.1; downward

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?

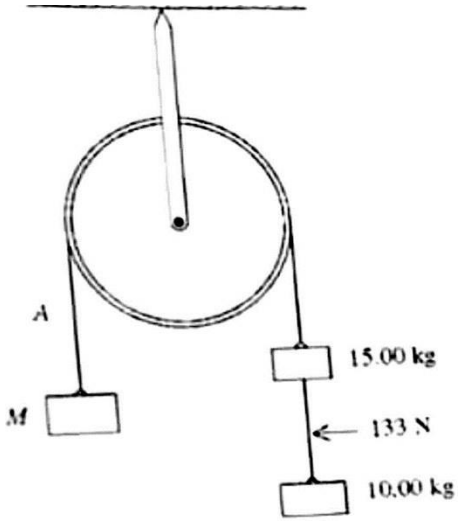
A) 8.33 kg

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:

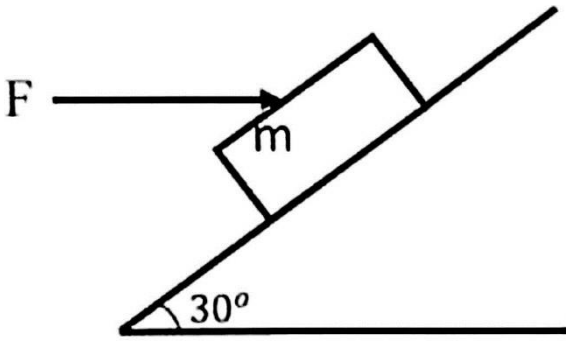
A) 24.42

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?

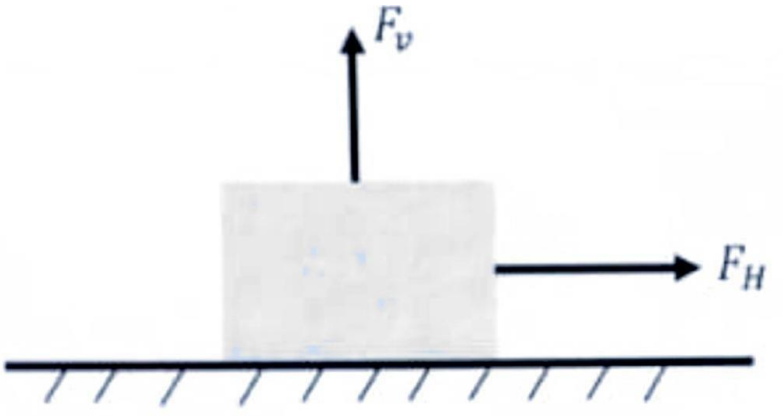
A) 87.5 N

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:

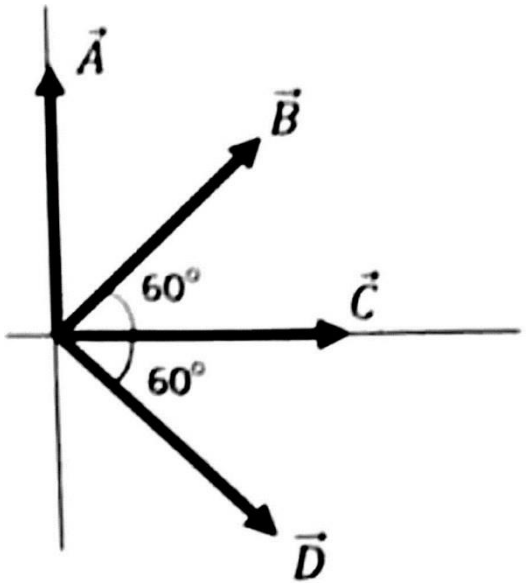
A) 5 units

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?

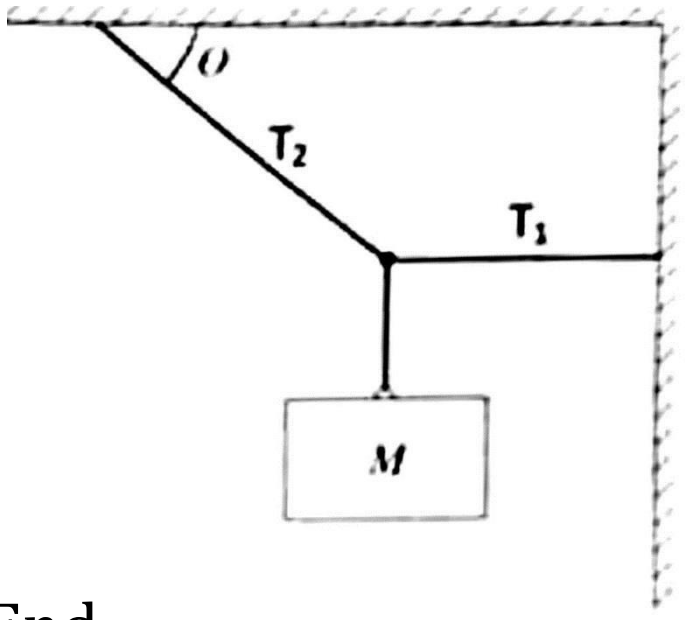
A) 7.6 kg

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

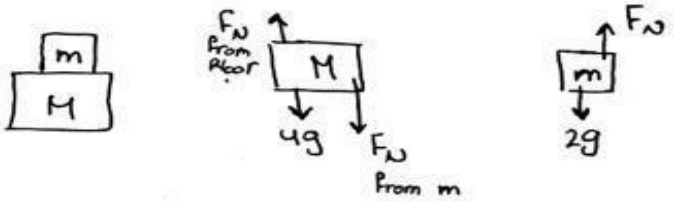
$0 \to 8$: $v_2^2 = 0 + 2*4*8$

$v_2 = 8$ m/s

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

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

Q2:



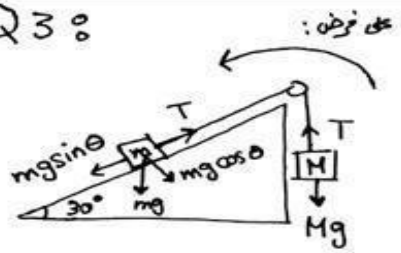
$\Sigma F = m*a$

$2g - F_N = 2*-3$

$F_N = 25.6$ 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

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

$h = 4.9 t_1^2$

$t_1 = \sqrt{0.2h}$

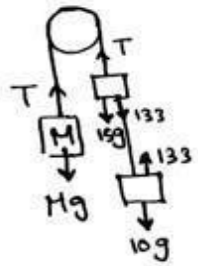
Stone B

$2h = 4.9 t_2^2$

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

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

Q6:



$Mg - T = Ma$ *

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

$133 - 10g = 10a$ *

$a = 3.5\ m/s^2$

$T - 133 - 147 = 52.5$

$T = 332.5\ N$

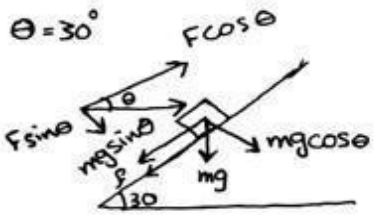
$M*9.8 - 332.5 = M*3.5$

$M = 52.8\ Kg$ (D)

Q7:

The object is accelerating to the right (B)

Q8:



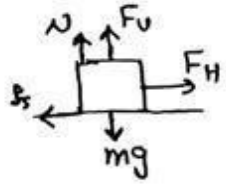
$F\cos\theta = mg\sin\theta + \mu_s(F\sin\theta + mg\cos\theta)$

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

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

$F = 105.1\ N$ (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 :

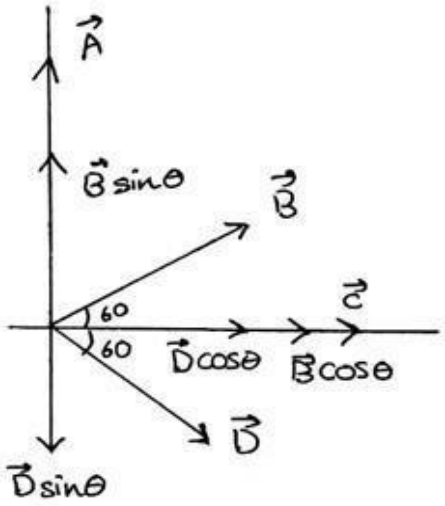
$$\vec{R} = \vec{A} + \vec{B} + \vec{C} + \vec{D}$$

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

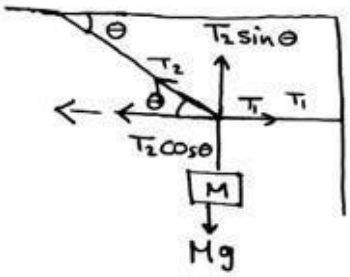
$$R_y = \vec{A} + \vec{B}\sin\theta - \vec{D}\sin\theta$$

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

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