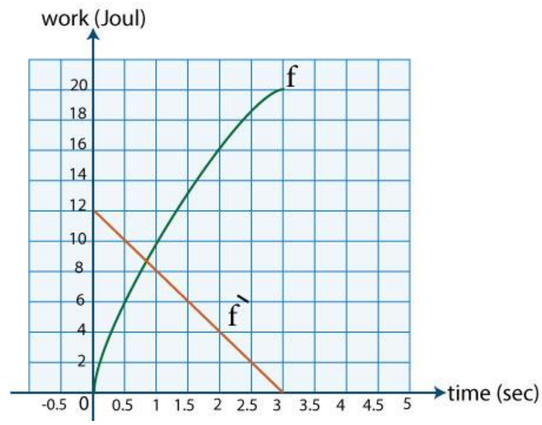
1) The figure shown:



represents the graph of the two functions f and its derivative f\
if the curve of the function f represents the work done by the force during the time interval [0 , 3],
where the work in joule, w=f(t), then the power of the force at t = 2 sec equals……….watt

(A) 8

(B) 16

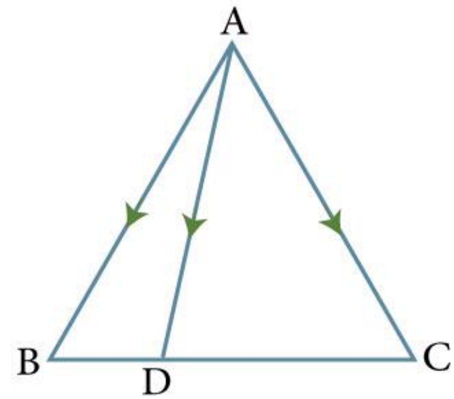
(C) 4

(D) 12

2) In the figure shown:

Δ ABC in which D$\in \overline{BC}$ such that

BD : DC = 3 : 5. A force of constant magnitude acts on a body placed at the point A, if the work done by this force to move the body from A to B is W_1, the work done by the force to move the body from A to C is W_2



and the work done by the force to move the body from A to D is W_3, then: $5W_1 + 3W_2 =$ ……. W_3

(A) 8

(B) 5

(C) 4

(D) 2

3) A force acted on a body of mass 200 gram to change its velocity from 90 km/h to 15 m/sec in the same direction of its motion ,

, then the magnitude of the impulse of this force=…….Newton.sec

(A) -2

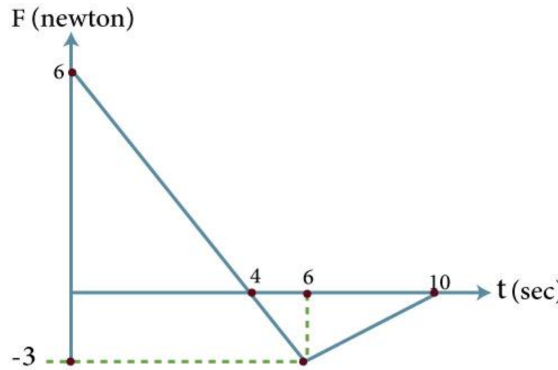
(B) 8

(C) 2

(D) 800

4) The opposite figure:

represents the (force – time)graph of a body moves in a straight line, then the change in the momentum of the body during the first six seconds equals………Newton.sec



(A) 3

(B) 9

(C) 21

(D) 15

5) A body of mass 4 kg. moves with a uniform velocity upwards a rough inclined plane which inclined to the horizontal at an angle of measured 30° ,if the coefficient of the kinetic friction between the body and the plane is $\frac{\sqrt{3}}{3}$, the body moves under the effect of the forces $\overrightarrow{F_1} = a\vec{i} + 3\vec{j}$, $\overrightarrow{F_2} = 4\vec{i} + \sqrt{3}a\,\vec{j}$ and $\overrightarrow{F_3} = -3\vec{i} - 3\vec{j}$, where $\vec{i}$ and $\vec{j}$ are unit vectors in the direction up each of the line of greatest slope of the plane and the perpendicular to it, and the forces in kg.wt.,
then a =………

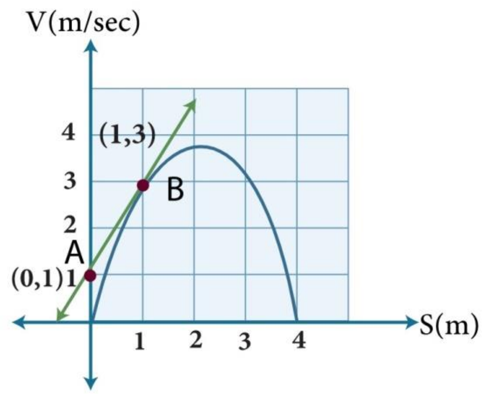
(A) $\frac{3}{2}$

(B) -2

(C) 1

(D) 4

6) The opposite figure:
represents the (velocity - displacement) curve for a particle moves in a straight line where the velocity v(m/sec) and displacement s(meter) and straight line $\overleftrightarrow{AB}$ is a tangent to the curve at B,
then: the acceleration of the particle at s = 1 meter equals……….. m/sec^2



(A) 2

(B) 9

(C) 3

(D) 6

7) A particle moves in a straight line such that the algebraic measure of its acceleration a (m/sec^2) is given as a function in the algebraic measure of its velocity (v) by the relation: $a = 2\sqrt{v}$, if v = 16 m/sec when t = 2 sec,
then v = ……..m/sec, when t = 3 sec.

(A) 25

(B) 20

(C) 5

(D) 30

8) A body at rest of mass (k) kg. is placed on a smooth horizontal plane, then a horizontal force of magnitude (k+1) Newton acts on it for a time (2k) sec. If the magnitude of the impulse on the body equals 40 N.sec, then the magnitude of the velocity of the body at the end of this time interval =……….m/sec

(A) 5

(B) 8

(C) 10

(D) 4

9) Two smooth balls of masses 4 kg and 2 kg move on a smooth horizontal plane towards each other, the magnitude of the velocity of the first ball is 2 m/sec. and the magnitude of the velocity of the second ball is 2.5 m/sec.

If the two balls collided and the first ball rebounded after collision with velocity of magnitude 1 m/sec, then the magnitude of the velocity of the second ball after collision =………m/sec

(A) 0.5

(B) 3.5

(C) 4.5

(D) 8.5

10) A body of variable mass (m) moves in a straight line such that its mass is given as a function in time by the relation m = 3t + 5 (gm), and algebraic measure of its velocity v = cos(2t) cm/sec ,where t is the time in seconds, then the magnitude of the acting force $\vec{F}$ at t = π sec equals……….dyne.

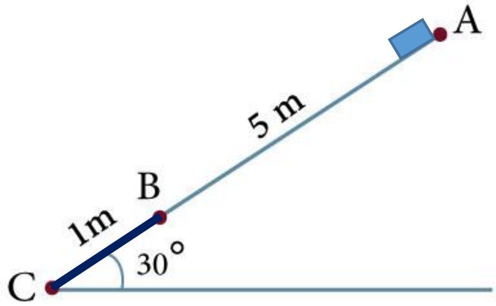
(A) 3

(B) 2π + 5

(C) 2π

(D) 4

11) The opposite figure represents the line of the greatest slope of a plane where:
A , B and C are three points lie on the line of the greatest slope of the plane that inclined by an angle of measure 30° to the horizontal, if the part $\overline{AB}$ is smooth and its length 5 m, the part $\overline{BC}$ is rough and its length 1 m,



when a body of mass 10 kg placed at the top of the plane at A it slides and hardly reached the bottom of the plane at C, then the magnitude of the resistance to the motion of the body in the rough part = ………kg.wt.

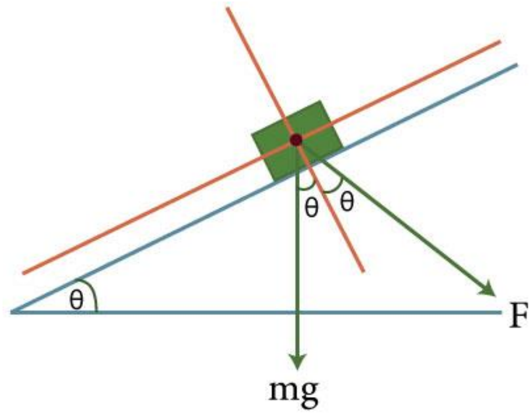
(A) 25

(B) 245

(C) 294

(D) 30

12) In the opposite figure:



A body of mass (m) kg is placed on a smooth plane inclined to the horizontal by an angle of measure θ

if a force F = mgt (newton) acts on it in a direction inclined to the line of greatest slope of the plane downward by an angle of measure $(\frac{\pi}{2} - \theta)$, where t is the time in second and “g” is the magnitude of the gravitational acceleration, then:

the body instantaneously rests at t = ……. sec

(A) $\frac{1}{2}$

(B) 1

(C) $1\frac{1}{2}$

(D) 2

13) A particle moves in a straight line such that its position vector $\vec{x}$ is given as a function in time (t) by the relation $\vec{x}$ = 4t(t+1) $\vec{i}$ +15t $\vec{j}$,

If v(t) m/sec is the magnitude of the velocity of the particle after t second, then v(2) = ……… m/sec

(A) 40

(B) 35

(C) 25

(D) 20

14) Forces: $\overrightarrow{F_1} = a\vec{i} + 3\vec{j}$, $\overrightarrow{F_2} = 4\vec{i} + b\vec{j}$ and $\overrightarrow{F_3} = -3\vec{i} - 4\vec{j}$ act on a body to move it with uniform velocity, the magnitude of the forces is measured in Newton, if the action of $\overrightarrow{F_3}$ is ceased, then the magnitude of the impulse produced by $\overrightarrow{F_1}$ and $\overrightarrow{F_2}$ during one second from the instant of ceasing $\overrightarrow{F_3}$ =………Newton.sec

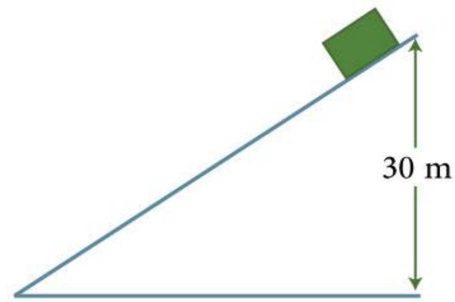
(A) Zero

(B) 5

(C) $\sqrt{17}$

(D) $\sqrt{10}$

15) In the opposite figure:
A body of mass 3 kg is placed at the top of a smooth inclined plane of height 30 meter, if the body slides downwards in the direction of the line of the greatest slope, and its kinetic energy equals three times its potential energy at a certain instant, then its velocity at this instant =…….m/sec



(A) 7

(B) 28

(C) 14

(D) 21

16) A body of mass 400 gram is projected with velocity 3 m/sec from the top of an inclined rough plane of height 5 m above the ground surface in the direction of the line of greatest slope downward to hardly reached the bottom of the plane, then:
the work done against the resistance=……..joule

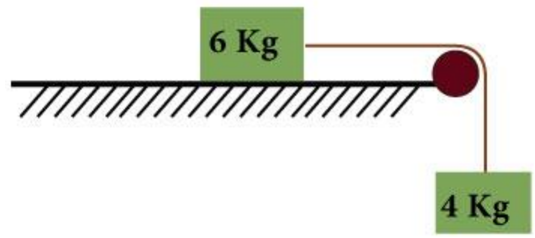
(A) 21.4

(B) -21.4

(C) 19.6

(D) -19.6

17) In the opposite figure:



A body of mass 6 kg is placed on a rough horizontal plane and it is tied by an inelastic light string passing over a smooth pulley fixed at the edge of the plane, the other end of the string connected to another body of mass 4 kg hanged vertically, if the system starts its motion from rest with an acceleration a (m/sec^2) and the pressure on the pulley = $29.4\sqrt{2}$ Newton, then the coefficient of kinetic friction between the body and the plane(μ_k)=……….

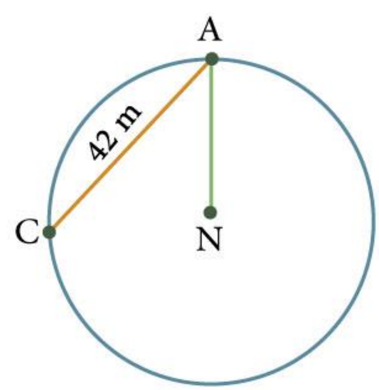
(A) $\frac{1}{4}$

(B) $\frac{2}{3}$

(C) $\frac{1}{2}$

(D) $\frac{1}{3}$

18) In the opposite figure: $\overline{\mathrm{AN}}$ is a vertical radius in the circle N whose radius 35 meter, the chord $\overline{\mathrm{AC}}$ represents a rough inclined plane whose resistance R(Newton), where AC=42 meter, if a body of mass 15 kg slides from rest from the point A on the inclined plane $\overline{\mathrm{AC}}$ with uniform acceleration of magnitude 1.4 (m/sec^2), then R=………Newton



(A) 67.2

(B) 76.2

(C) 96.6

(D) 101.5

19) A body moves under the action of a force $\vec{f}$ where:

$\vec{f} = (2t+1)\,\vec{i} + (t+3)\,\vec{j}$, $\|\vec{f}\|$ is measured by Newton and its displacement vector is given by the relation: $\vec{s} = (3t^2)\,\vec{i} + (4t)\,\vec{j}$, s is measured by meters and t is the time in seconds, find the average power during the first 5 seconds.

20) In the opposite figure:

The inclined plane is smooth, the pulley is smooth and the measure angle of inclination of the plane to the horizontal = 30°, the system is moving up with acceleration of magnitude $\frac{1}{2}$ g where "g" is the magnitude of the gravitational acceleration, m_1 and m_2 are in kilograms. Find $m_1 : m_2$