

✓ Q1. Which of the following could not be a unit of speed?

- a) km/h
- ✓ b) s/m
- c) m/s
- d) mm s⁻¹

✓ Q2. One of the following is not a scalar quantity. This one is:

- ✓ a) displacement
- b) distance
- c) mass
- d) work

✓ Q3. Which of the following is correct?

- a) magnitude of displacement may be greater than distance
- ✓ b) Distance is always greater than or equal to the magnitude of displacement
- c) Distance is always greater than the magnitude of displacement
- d) both are scalar quantity

Q4. A body starts from rest and travels for (t) second with uniform acceleration of 2 m/s^2 . If the displacement made by it is (16 m), the time of travel t is

- ✓ a) 4 s
- b) 3 s
- c) 6 s
- d) 8 s

$v_i = 0$ a

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

$$16 = \frac{1}{2} (2) t^2$$

$$\sqrt{16} = \sqrt{t^2}$$

$$t = 4$$

Q5. A student drops a pebble from the edge of a vertical cliff. The pebble hits the ground (4s) after it was dropped. What is the height of the cliff? ($g = -10 \text{ m/s}^2$)

- a) 20 m
- b) 40 m
- c) 60 m
- ✓ d) 80 m

$v_i = 0$

$$\Delta y = v_i t + \frac{1}{2} g t^2$$

$$y_f - y_i = 0 + \frac{1}{2} (-10) (4)^2$$

$$0 - h = -80$$

$$h = 80 \text{ m}$$

Q6. the angle between two vectors ($\vec{A} = i + j - 2k$) and ($\vec{B} = -i + 2j - k$) is:

- a) 15°
- b) 41°
- ✓ c) 60°
- d) 35°

$$|\vec{A}| = \sqrt{1+1+4} = \sqrt{6}$$

$$|\vec{B}| = \sqrt{1+2+1} = \sqrt{6}$$

$$\vec{A} \cdot \vec{B} = -1 + 2 + 2 = 3$$

$$\vec{A} \cdot \vec{B} = |\vec{A}| |\vec{B}| \cos \theta$$

$$\cos \theta = \frac{3}{6} \rightarrow \theta = \cos^{-1} \left(\frac{1}{2} \right)$$

$$\theta = 60^\circ$$

Q7. force of 10N is making angle of 30 degree with the x-axis its vertical component is:

a) 5 N

b) 8.7 N

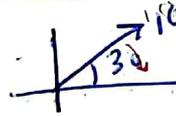
c) 10 N

d) 13 N

$$F_y = 10 \sin 30$$

$$= 10 \left(\frac{1}{2}\right)$$

$$= 5 \text{ N}$$



Q8. A 2.0 kg ball rotates at a constant speed of 3m/s on the end of 1.2m long string. The string describes a horizontal circle, the centripetal acceleration of the object is:

a) 1.2 m/s²

b) 3.0 m/s²

c) 7.5 m/s²

d) 3.2 m/s²

$$a_c = \frac{v^2}{r}$$

$$= \frac{(3)^2}{1.2} = \frac{9}{1.2} \quad a_c = 7.5 \text{ m/s}^2$$

Q9. given two vectors ($\vec{A} = 2i + 3j + 4k$) and ($\vec{B} = 3i - 2j + k$), the value of $\vec{A} - \vec{B}$ is:

a) $-i + 5j + 3k$

b) $i - 5j + 3k$

c) $-i + j + 5k$

d) $-i + j - 5k$

$$= 2i + 3j + 4k - 3i + 2j - k$$

$$= -i + 5j + 3k$$

Q10. for an object is projected at 45° to horizontal, the maximum height (H) and horizontal range (R) are related as:

a) $R = 16 H$

b) $R = 8 H$

c) $R = 4 H$

d) $R = 2 H$

$$H = \frac{v_i^2 \sin^2 \theta}{2g} \rightarrow \frac{v_i^2 (\sin 45)^2}{2g} \rightarrow \frac{v_i^2}{4g}$$

$$R = \frac{v_i^2 \sin 2\theta}{g} \rightarrow \frac{v_i^2 \sin 2(45)}{g} \rightarrow \frac{v_i^2}{g}$$

$$H = \frac{R}{4}$$

$$R = 4H$$

Q11. a body is moving with a constant acceleration of $(11i + 2j) \text{ m/s}^2$, starting from the origin. What will be the position of the body after 10s?

a) $(55i + 101j) \text{ m}$

b) $(550i + 100j) \text{ m}$

c) $(100i - 550j) \text{ m}$

d) $(550i - 550j) \text{ m}$

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

$$x_f - x_i = \frac{1}{2} (11i + 2j) (10)^2$$

$$x_f = (5.5i + j) (100)$$

$$x_f = 550i + 100j$$

Q12. A body of mass 5 kg, projected at an angle of 60° from the ground with an initial velocity of 25 m/s, acceleration due to gravity is ($g = -10 \text{ m/s}^2$), what is the maximum horizontal range covered?

- a) 60m
- b) 49 m
- c) 49.16 m
- d) 54.13 m

$$R = \frac{v_i^2 \sin 2\theta}{g}$$

$$R = \frac{(25)^2 \sin 120}{-10} = 54.13$$

Q13. A particle has a position function $r(t) = (10t - t^2) i + 5t j + 5t k$ m, the velocity vector at $t = 2$ s. is:

- a) $(6i + 5j + 5k) \text{ m/s}$
- b) $(16i + 10j + 10k) \text{ m/s}$
- c) $(6i - 5j - 5k) \text{ m/s}$
- d) $(16i - 10j + 10k) \text{ m/s}$

$$v = \frac{dr}{dt} = (10 - 2t)i + 5j + 5k$$

$$v|_{t=2} = 6i + 5j + 5k$$

Q14. the polar coordinates of the point given in Cartesian coordinates $(\frac{1}{3}, \frac{\sqrt{3}}{3})$ is:

- a) $(0.33, 30^\circ)$
- b) $(0.67, 60^\circ)$
- c) $(0.67, 30^\circ)$
- d) $(0.67, 150^\circ)$

$$r = \sqrt{(\frac{1}{3})^2 + (\frac{\sqrt{3}}{3})^2} = \sqrt{\frac{1}{9} + \frac{3}{9}} = \sqrt{\frac{4}{9}} = 0.67$$

$$\theta = \tan^{-1}\left(\frac{\frac{\sqrt{3}}{3}}{\frac{1}{3}}\right) = \tan^{-1}(\sqrt{3}) = 60$$

Q15. consider the motion of the object whose velocity-time graph is given in the diagram. The displacement of the object between ($t = 20$ s) and ($t = 30$ s):

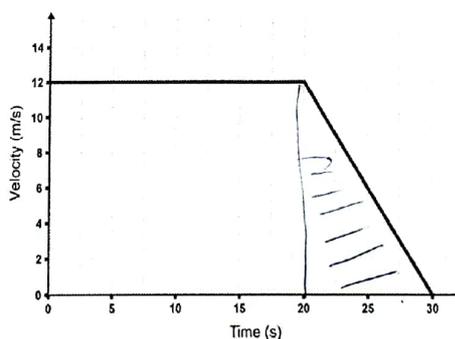
- a) 20 m
- b) 300 m
- c) 60 m
- d) 240 m

area under the curve

$$\frac{1}{2} (10)(12)$$

$$5(12)$$

$$60 \text{ m}$$



Q1. Which of the following could not be a unit of acceleration?

- a) km/s^2
- b) cm s^{-2}
- c) km/s
- d) m/s^2

Q2. One of the following is not a vector quantity. This one is:

- a) displacement
- b) speed
- c) acceleration
- d) velocity

Q3. which of the following is correct?

- a) the average speed is always equal to the average velocity
- b) the magnitude of average velocity is always less than or equal to the average speed
- c) the magnitude of average velocity is always greater than or equal to the average speed
- d) there is no difference between the average speed and the average velocity

Q4. A body starts from rest and travels with an acceleration of 2 m/s^2 . After (t) seconds its velocity is 10 m/s . Then t is:

- a) 10 s
- b) 6 s
- c) 20 s
- d) 5 s

$$v_f = v_i + at$$

$$10 = 0 + 2t$$

$$t = 5 \text{ s}$$

Q5. A student drops a pebble from the edge of a vertical cliff. The pebble hits the ground (4s) after it was dropped. What is the speed of the particle just before it hits the ground? ($g = -10 \text{ m/s}^2$)

- a) 40 m/s
- b) 20 m/s
- c) 60 m/s
- d) 80 m/s

$$v_f = v_i + gt$$

$$= 0 + (-10)(4)$$

$$v_f = -40 \rightarrow \text{Speed (40)}$$

Q6. the angle between two vectors ($\vec{A} = -2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$) and ($\vec{B} = \mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$)

- a) 0°
- b) 45°
- c) 180°
- d) 90°

$$|A| = \sqrt{4+9+1} = \sqrt{14}$$

$$|B| = \sqrt{1+4+16} = \sqrt{21}$$

$$\vec{A} \cdot \vec{B} = -2 + 6 - 4 = 0$$

$$\vec{A} \cdot \vec{B} = AB \cos \theta$$

$$\theta = \cos^{-1} \left(\frac{\vec{A} \cdot \vec{B}}{AB} \right) = \cos^{-1}(0) = 90^\circ$$

Q7. force of 10N is making angle of 30° degree with the x -axis its horizontal component is:

- ~~a) 15 N~~
b) 10 N
c) 8.7 N
d) 13 N

$$F_x = F \cos 30^\circ = 8.7$$



Q8. a 2.0 kg ball rotates at a constant speed of 3m/s on the end of 1.2m long string. The string describes a horizontal circle, the centripetal acceleration of the object is:

- a) 1.2 m/s^2
b) 3.0 m/s^2
c) 7.5 m/s^2
d) 3.2 m/s^2

$$a_c = \frac{v^2}{r} = \frac{(3)^2}{1.2} = \frac{9}{1.2}$$

$$a_c = 7.5\text{ m/s}^2$$

Q9. given two vectors ($\vec{A} = 2\vec{i} + 3\vec{j} + 4\vec{k}$) and ($\vec{B} = 3\vec{i} - 2\vec{j} + \vec{k}$) the value of $\vec{A} + \vec{B}$ is:

- a) $5\vec{i} + \vec{j} + 5\vec{k}$
b) $5\vec{i} - \vec{j} + 5\vec{k}$
c) $\vec{i} + \vec{j} + 5\vec{k}$
d) $\vec{i} + \vec{j} - 5\vec{k}$

$$\vec{A} + \vec{B} = 2\vec{i} + 3\vec{j} + 4\vec{k} + 3\vec{i} - 2\vec{j} + \vec{k}$$

$$\vec{A} + \vec{B} = 5\vec{i} + \vec{j} + 5\vec{k}$$

Q10. the angle of projection, for which the horizontal range and the maximum height of projection are equal, is:

- a) 45°
b) 30°
c) 76°
d) 60°

$$R = H$$

$$\frac{v_i^2 \sin 2\theta}{g} = \frac{v_i^2 \sin^2 \theta}{2g}$$

$$2 \sin \theta \cos \theta = \sin^2 \theta$$

$$2 \cos \theta = \frac{\sin \theta}{2}$$

$$\frac{4 \cos \theta}{\sin \theta} = \frac{\sin \theta}{\cos \theta}$$

$$4 = \tan \theta$$

$$\theta = \tan^{-1}(4)$$

$$\theta = 76^\circ$$

Q11. a body is moving with a constant acceleration of $(4\vec{i} + 3\vec{j})\text{m/s}^2$, starting from the origin. What will be the position of the body after 5s ?

$x_i = 0$
 $y_i = 0$

- a) $(50\vec{i} + 37.5\vec{j})\text{ m}$
b) $(37.5\vec{i} + 50\vec{j})\text{ m}$
c) $(37.5\vec{i} - 50\vec{j})\text{ m}$
d) $(50\vec{i} - 37.5\vec{j})\text{ m}$

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

$$x_f - x_i = \frac{1}{2} (4\vec{i} + 3\vec{j}) (5)^2$$

$$x_f = (2\vec{i} + 1.5\vec{j}) (25)$$

$$x_f = 50\vec{i} + 37.5\vec{j}$$

6

Q12. A body of mass 10 kg, projected at an angle of 30° from the ground with an initial velocity of 5 m/s, acceleration due to gravity is ($g = -10 \text{ m/s}^2$), what is the time of flight?

- a) 0.50 s
- b) 3.92 s
- c) 1.96 s
- d) 1 s

$$v_f = v_i + gt$$

$$0 = 5 \sin 30^\circ - 10 t_h$$

$$t_h = \frac{2.5}{10} = 0.25$$

$$T = 2 t_h$$

$$= 2 (0.25)$$

$$T = 0.5 \text{ s}$$

Q13. A particle has a velocity of $v(t) = 4t \mathbf{i} + t^2 \mathbf{j} + 2t^3 \mathbf{k}$ m/s, the acceleration vector at $t = 2$ s. is:

- a) $(4\mathbf{i} + 4\mathbf{j} - 24\mathbf{k}) \text{ m/s}^2$
- b) $(10\mathbf{i} + 4\mathbf{j} - 16\mathbf{k}) \text{ m/s}^2$
- c) $(4\mathbf{i} + 4\mathbf{j} + 24\mathbf{k}) \text{ m/s}^2$
- d) $(5\mathbf{i} - 4\mathbf{j} - 24\mathbf{k}) \text{ m/s}^2$

$$a = \frac{dv}{dt} = 4\mathbf{i} + 2t\mathbf{j} + 6t^2\mathbf{k}$$

$$a|_{t=2} = 4\mathbf{i} + 4\mathbf{j} + 24\mathbf{k}$$

Q14. the polar coordinates of the point given in Cartesian coordinates $(\sqrt{2}, -\sqrt{2})$ is:

- a) $(\sqrt{2}, 315^\circ)$
- b) $(4, 225^\circ)$
- c) $(2, 315^\circ)$
- d) $(2, 225^\circ)$

$$r = \sqrt{(\sqrt{2})^2 + (-\sqrt{2})^2} = \sqrt{2+2} = 2$$

$$r = 2$$

$$\theta = \tan^{-1}\left(\frac{-\sqrt{2}}{\sqrt{2}}\right) = -45^\circ \rightarrow 315^\circ$$

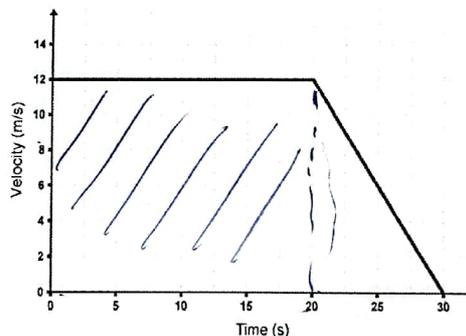
Q15. consider the motion of the object whose velocity- time graph is given in the diagram. The displacement of the object between ($t = 0$) and ($t = 20$ s):

- a) 20 m
- b) 300 m
- c) 60 m
- d) 240 m

area under the curve

$$12 \times 20$$

$$240 \text{ m}$$



Q1. Which of the following could not be a unit of speed?

- a) km/h
- b) mm s⁻¹
- c) s/m
- d) m/s

Q2. One of the following is not a scalar quantity. This one is:

- a) work
- b) mass
- c) displacement
- d) distance

Q3. Which of the following is correct?

- a) magnitude of displacement may be greater than distance
- b) Distance is always greater than or equal to the magnitude of displacement
- c) Distance is always greater than the magnitude of displacement
- d) both are scalar quantity

Q4. A body starts from rest and travels for t second with uniform acceleration of 4 m/s^2 . If the displacement made by it is 8 m , the time of travel t is

- a) 4 s
- b) 2 s
- c) 6 s
- d) 8 s

$$\Delta x = \frac{1}{2}at^2$$

$$8 = \frac{1}{2}(4)t^2$$

$$8 = 2t^2$$

$$t = 2$$

Q5. A student drops a pebble from the edge of a vertical cliff. The pebble hits the ground 3 s after it was dropped. What is the height of the cliff? ($g = -10 \text{ m/s}^2$)

- a) 20 m
- b) 40 m
- c) 45 m
- d) 80 m

$$\Delta y = \frac{1}{2}gt^2$$

$$\frac{1}{2}(-10)(3^2)$$

$$= 45$$

Q6. the angle between two vectors ($\vec{A} = i + j - 2k$) and ($\vec{B} = -i + 2j - k$) is:

- a) 15°
- b) 41°
- c) 60°
- d) 35°

$$A = \sqrt{6}$$

$$B = \sqrt{6}$$

$$A \cdot B = -1 + 2 + 2 = 3$$

$$A \cdot B = AB \cos \theta$$

$$\theta = \cos^{-1} \left(\frac{A \cdot B}{AB} \right)$$

$$= \cos^{-1} \left(\frac{3}{6} \right)$$

$$= \cos^{-1} \left(\frac{1}{2} \right)$$

$$\theta = 60$$

Q7. force of 20N is making angle of 60 degree with the x-axis its vertical component is:

- a) 5 N
- b) 8.7 N
- c) 10 N
- d) 17.3 N

$$F_y = 20 \sin 60 = 17.3$$



Q8. a 2.0 kg ball rotates at a constant speed of 3m/s on the end of 1m long string. The string describes a horizontal circle, the centripetal acceleration of the object is:

- a) 9 m/s²
- b) 3.0 m/s²
- c) 7.5 m/s²
- d) 1.2 m/s²

$$a_c = \frac{v^2}{r} = \frac{(3)^2}{1} = \frac{9}{1} = 9 \text{ m/s}^2$$

Q9. given two vectors ($\vec{A} = 2i + 3j + 4k$) and ($\vec{B} = i - 2j + k$), the value of $\vec{A} - \vec{B}$ is:

- a) $i + 5j + 3k$
- b) $i - 5j + 3k$
- c) $-i + j + 5k$
- d) $-i + j - 5k$

$$\vec{A} - \vec{B} = 2i + 3j + 4k - (i - 2j + k) = i + 5j + 3k$$

Q10. for an object is projected at 45° to horizontal, the maximum height (H) and horizontal range (R) are related as:

- a) R = 16 H
- b) R = 8 H
- c) R = 4 H
- d) R = 2 H

$$H = \frac{u^2 \sin^2 \theta}{2g} \rightarrow \frac{u^2 (\sin 45^\circ)^2}{2g} \rightarrow \frac{u^2}{4g}$$

$$R = \frac{u^2 \sin 2\theta}{g} = \frac{u^2 \sin 90^\circ}{g} = \frac{u^2}{g}$$

$$H = \frac{R}{4} \rightarrow R = 4H$$

Q11. a body is moving with a constant acceleration of $(11i + 2j) \text{ m/s}^2$, starting from the origin. What will be the position of the body after 5s?

- a) $(25i + 137.5j) \text{ m}$
- b) $(137.5i + 25j) \text{ m}$
- c) $(275i + 50j) \text{ m}$
- d) $(50i + 275j) \text{ m}$

$$s = ut + \frac{1}{2}at^2 = \frac{1}{2}(11i + 2j)(25) = 137.5i + 25j$$

Q12. A body of mass 5 kg, projected at an angle of 60° from the ground with an initial velocity of 20 m/s, acceleration due to gravity is $g = -10 \text{ m/s}^2$, what is the maximum horizontal range covered?

- a) 60m
- b) 30 m
- c) 34.64 m
- d) 54.13 m

$$R = \frac{u^2 \sin 2\theta}{g} = \frac{(20)^2 \sin 120^\circ}{-10} = 34.64 \text{ m}$$

Q13. A particle has a position function $r(t) = (10t - t^2) i + 5t j + 5t k$ m, the velocity vector at $t = 3$ s. is:

- a) $(21i + 15j + 15k)$ m/s
- b) $(4i + 5j + 5k)$ m/s
- c) $(4i - 5j - 5k)$ m/s
- d) $(21i - 10j + 10k)$ m/s

$$v = \frac{dr}{dt} = (10 - 2t)i + 5j + 5k$$

$$v|_{t=3} = 4i + 5j + 5k$$

Q14. the polar coordinates of the point given in Cartesian coordinates $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ is:

- a) $(1, 60^\circ)$
- b) $(0.67, 60^\circ)$
- c) $(0.67, 30^\circ)$
- d) $(1, 30^\circ)$

$$R = \sqrt{(\frac{1}{2})^2 + (\frac{\sqrt{3}}{2})^2} = \sqrt{\frac{1}{4} + \frac{3}{4}} = \sqrt{1} = 1$$

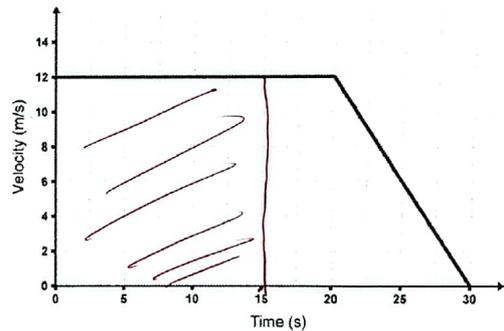
$$\theta = \tan^{-1}\left(\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}\right) = \tan^{-1}\sqrt{3} = 60^\circ$$

Q15. consider the motion of the object whose velocity- time graph is given in the diagram. The displacement of the object between $(t = 0s)$ and $(t = 15s)$:

- a) 80 m
- b) 240 m
- c) 60 m
- d) 180 m

area under the curve

$$15 \times 12$$



Q1. Which of the following could not be a unit of acceleration?

- a) km/s^2
- b) cm s^{-2}
- c) km/s
- d) m/s^2

Q2. One of the following is not a vector quantity. This one is:

- a) displacement
- b) speed
- c) acceleration
- d) velocity

Q3. Which of the following is correct?

- a) the average speed is always equal to the average velocity
- b) the magnitude of average velocity is always less than or equal to the average speed
- c) the magnitude of average velocity is always greater than or equal to the average speed
- d) there is no difference between the average speed and the average velocity

Q4. A body starts from rest and travels with an acceleration of 4 m/s^2 . After t seconds its velocity is 16 m/s . Then t is :

- a) 10 s
- b) 6 s
- c) 4 s
- d) 5 s

$v_f = v_i + at$
 $16 = 0 + 4t$
 $16 = 4t$
 $t = 4$

$v = v_i + at$

Q5. A student drops a pebble from the edge of a vertical cliff. The pebble hits the ground 6 s after it was dropped. What is the speed of the particle just before it hits the ground? ($g = -10 \text{ m/s}^2$)

- a) 40 m/s
- b) 60 m/s
- c) 20 m/s
- d) 80 m/s

$v_f = v_i + gt$
 $= 0 + (-10)6$
 $v_f = -60$
 Speed $\rightarrow 60$

Q6. the angle between two vectors ($\vec{A} = -2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$) and ($\vec{B} = \mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$) is

- a) 0°
- b) 45°
- c) 180°
- d) 90°

$A = \sqrt{4+9+1} = \sqrt{14}$ $B = \sqrt{1+4+16} = \sqrt{21}$

$A \cdot B = -2 + 6 - 4 = 0$

$A \cdot B = AB \cos \theta$

$\theta = \cos^{-1} \left(\frac{A \cdot B}{AB} \right) = \cos^{-1}(0)$

$\theta = 90^\circ$

Q7. force of 20N is making angle of 60 degree with the x-axis its horizontal component is:

- a) 5 N
- b) 10 N
- c) 8.7 N
- d) 13 N



Q8. a 2.0 kg ball rotates at a constant speed of 3m/s on the end of 1.5m long string. The string describes a horizontal circle, the centripetal acceleration of the object is:

- a) 6 m/s²
- b) 2.0 m/s²
- c) 7.5 m/s²
- d) 3.2 m/s²

$$a_c = \frac{v^2}{r} = \frac{9}{1.5} = 6$$

Q9. given two vectors ($\vec{A} = 2i + 3j + 4k$) and ($\vec{B} = i - 2j + k$) the value of $\vec{A} + \vec{B}$ is:

- a) $3i + j + 5k$
- b) $3i - j + 5k$
- c) $i + j + 5k$
- d) $i + j - 5k$

$$2i + 3j + 4k + i - 2j + k = 3i + j + 5k$$

Q10. the angle of projection, for which the horizontal range and the maximum height of projection are equal, is:

- a) 45°
- b) 76°
- c) 26.6°
- d) 60°

$$R = H$$

$$\frac{-u^2 \sin 2\theta}{g} = \frac{-u^2 \sin^2 \theta}{2g}$$

$$2 \cos \theta = \frac{\sin \theta}{2}$$

$$\frac{\sin \theta}{\cos \theta} = \frac{u \cos \theta}{\cos \theta}$$

$$\tan \theta = u$$

$$\theta = \tan^{-1}(u)$$

Q11. a body is moving with a constant acceleration of $(4i + 3j) \text{ m/s}^2$, starting from the origin. What will be the position of the body after 10s?

- a) $(400i + 300j) \text{ m}$
- b) $(150i + 200j) \text{ m}$
- c) $(200i + 150j) \text{ m}$
- d) $(300i + 400j) \text{ m}$

$$\Delta x = ut + \frac{1}{2} at^2$$

$$x_f - 0 = \frac{1}{2} (4i + 3j) (10)^2$$

$$= (2i + 1.5j) \times 100 = 200i + 150j$$

Q12. A body of mass 10 kg, projected at an angle of 30° from the ground with an initial velocity of 10 m/s, acceleration due to gravity is $g = -10 \text{ m/s}^2$, what is the time of flight?

- a) 0.50 s
- b) 3.92 s
- c) 1.96 s
- d) 1 s

$$v_f = v_i + gt$$

$$0 = 10 \sin 30 - 10t_h$$

$$-5 = -10t_h$$

$$t_h = \frac{1}{2}$$

$$T = 2t_h$$

$$2\left(\frac{1}{2}\right)$$

$$= 1$$

Q13. A particle has a velocity of $v(t) = 4t i + t^2 j + 2t^3 k$ m/s, the acceleration vector at $t = 3$ s. is:

- a) $(12i + 9j + 54k)$ m/s²
- b) $(10i + 4j - 16k)$ m/s²
- c) $(4i + 4j + 24k)$ m/s²
- d) $(4i + 6j + 54k)$ m/s²

$$a = \frac{dv}{dt} = 4i + 2tj + 6t^2k$$

$$a|_{t=3} = 4i + 6j + 54k$$

Q14. the polar coordinates of the point given in Cartesian coordinates $(\sqrt{3}, -\sqrt{3})$ is:

- a) $(3, 315^\circ)$
- b) $(4, 225^\circ)$
- c) $(9, 225^\circ)$
- d) $(\sqrt{6}, 315^\circ)$

$$r = \sqrt{(\sqrt{3})^2 + (-\sqrt{3})^2} = \sqrt{3+3} = \sqrt{6}$$

$$\theta = \tan^{-1}\left(\frac{-\sqrt{3}}{\sqrt{3}}\right) = \tan^{-1}(-1) = -45^\circ$$

↓
315

Q15. consider the motion of the object whose velocity- time graph is given in the diagram. The displacement of the object between $(t = 0)$ and $(t = 10)$ s:

- a) 20 m
- b) 120 m
- c) 60 m
- d) 240 m

↓
area under the curve
 10×12
120.

