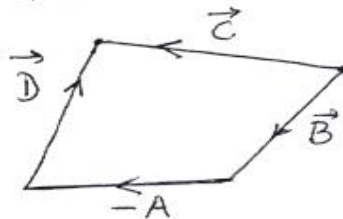
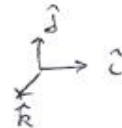


Fig (2) shows four vectors A, B, C, D. Which of the following statements is correct:



- 1 C = D + B - A
- 2 C = A + B + D
- 3 C = -D - B + A
- 4 C = A - B + D
- 5 C = -A - B - D

Unit vectors i, j, k have magnitudes of unity and are directed in the positive directions of the x, y, z axes. The value of k.(k x i) is:



$$\hat{k} \times \hat{i} = \hat{j}$$

$$\hat{k} \cdot \hat{j} = 0 \quad (\hat{k} \cdot \hat{j} = |\hat{k}| |\hat{j}| \cos 90^\circ = 0)$$

If we have two vectors A = (a i - 2 j) and B = (2 i + 3 j) such that A.B = 4, find the value of a.

$$\vec{A} \cdot \vec{B} = 2a - 6 = 4 \Rightarrow \boxed{a = 5}$$

A particle starts from the origin at t=0 with a velocity of (8j) m/s and moves in the xy plane with constant acceleration of (4i - 2j) m/s**2. At the instant the x coordinate of the particle is 32 m, what is the value of its y coordinate?

$$\vec{v}_0 = 0\hat{i} + 8\hat{j} \text{ (m/s)}$$

$$\vec{a} = 4\hat{i} - 2\hat{j} \text{ (m/s}^2\text{)}$$

$$\vec{r} - \vec{r}_0 = \vec{v}_0 t + \frac{1}{2} \vec{a} t^2$$

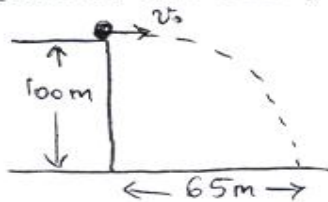
$$\begin{cases} x = v_{0x} t + \frac{1}{2} a_x t^2 & \text{--- (1)} \\ y = v_{0y} t + \frac{1}{2} a_y t^2 & \text{--- (2)} \end{cases}$$

- 1 16 m
- 2 35 m
- 3 45 m
- 4 32 m
- 5 12 m

$$(1) \Rightarrow 32 = 0 \times t + \frac{1}{2} \times 4 \times t^2 \Rightarrow t = 4 \text{ s}$$

$$(2) \Rightarrow y = 8 \times 4 - \frac{1}{2} \times 2 \times 16 = \boxed{16 \text{ m}}$$

A ball is thrown horizontally from the top of a building 100 m high. The ball strikes the ground at a point 65 m horizontally away from the base of the building (Fig 3). What is the speed of the ball just before it strikes the ground?



$$y - y_0 = v_{0y} \sin \theta_0 t - \frac{1}{2} g t^2$$

$$-100 = -4.9 t^2 \Rightarrow t = 4.5 \text{ sec}$$

$$x - x_0 = v_{0x} \cos \theta_0 t = v_0 t \Rightarrow v_0 = \frac{65}{4.5} = 14.4 \text{ m/s}$$

$$v_y = -gt = -9.8 \times 4.5 = -44.1 \text{ m/s}$$

$$v = \sqrt{v_x^2 + v_y^2} = 46.4 \text{ m/s}$$

A particle moves at a constant speed in a circular path with a radius of 2.0 cm. If the particle makes 4 revolutions each second, what is the magnitude of its acceleration?

$$f = 4 \frac{\text{rev}}{\text{s}} = \frac{1}{T} \Rightarrow T = \frac{1}{4} \text{ s/rev}$$

frequency period

$$2\pi r = vT \Rightarrow v = \frac{2\pi r}{T} = \frac{2\pi \times 0.02}{1/4} = 0.5 \text{ m/s}$$

$$a_r = \frac{v^2}{r} = 12.6 \text{ m/s}^2$$

- 1 13 m/s**2
- 2 20 m/s**2
- 3 15 m/s**2
- 4 18 m/s**2
- 5 24 m/s**2