(Marks   4/   العلامة)   :(Q1   ¹س)
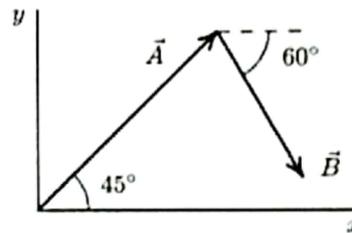
Find the dimensions of the constant a,b and c in the equation $x = a + bt^2 + ct^3$, where x is the position of a particle (in meter) and t is the time (in second).

(Marks   4/   العلامة)   :(Q2   ²س)

In the diagram, **A** has magnitude 12m and **B** has magnitude 8m. Find the x component of **A + B**

(Marks   4/   العلامة)   :(Q3   ³س)

Three displacement vectors are in the same plane. They are expressed as **A** = 4i – j, **B** = -3i+2j, **C** = -3j. the vector **R** is defined as R = A – B +2C . find the magnitude of the vector **R** and the angle it makes with the positive x-axis.

(Marks   5/   العلامة)   :(Q4   ⁴س)

The airplane shown is in level flight at an altitude of 0.50 km and a speed of 150 km/h. at
what distance d should it release a heavy bomb to hit the target X? take g = 10 m/s².
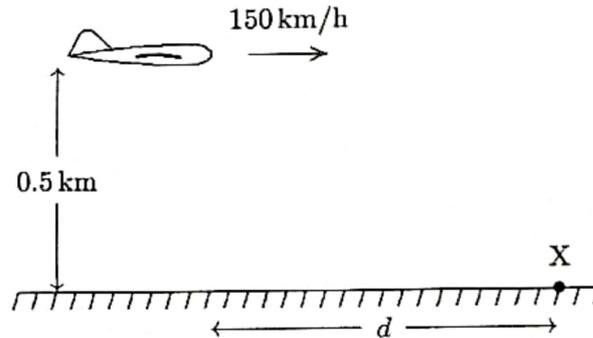
(Marks   4/   العلامة)   :(Q5   ⁵س)

A particle stars from the origin at t = 0 with a velocity of (16i − 12j) m/s moves in the xy
plane with a constant acceleration of a = (3i − 6j) m/s² . what is the speed of the particle at
t = 1s?

(Marks   4/   (العلامة)   :(Q6   6س)

Suppose the position vector for a particle is given as function of time by

$$\vec{r} = (t+1)i + (0.125t^2 + 1)j$$

a) Calculate the average velocity during the time interval from $t = 2s$ to $t = 4s$

b) Determine the velocity and the speed at $t = 2s$

(Marks   3/   (العلامة   :(Q1   ¹س)

The position of a particle moving under uniform acceleration is some function of time and acceleration. Suppose we write this position as $X = ka^m t^n$, where k is a dimensionless constant. Determine the values of m and n and write the simplest form of an equation for the position.

(Marks   5/   (العلامة   :(Q2   ²س)

If the two vectors, $\left(\vec{A} = 2i + 3bj - 3k\right)$ and $\left(\vec{B} = 3i + j - 6bk\right)$. Are perpendicular to each other. Find:

a)   the value of b.

b)   The value of $\vec{A} + 2\vec{B}$?

c)   The value of $\vec{A} \times \vec{B}$?

(**Marks** 5/ العلامة)

(س³ :(Q3

Suppose the position vector for a particle is given as function of time by

$$\vec{r} = (t+1)i + (0.125t^2 + 1)j$$

a) Calculate the average velocity during the time interval from $t = 2s$ to $t = 4s$
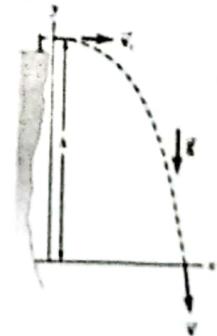
b) Determine the velocity and the speed at $t = 2s$

(**Marks** 12/ العلامة)

(س⁴ :(Q4

A student stands at the edge of a cliff and throws a stone horizontally over the edge with a speed of $v_i = 18\ m/s$. The cliff is $h = 50m$ above a body of water as shown in Figure

(a) What are the coordinates of the initial position of the stone?

(b) What are the components of the initial velocity of the stone?

(c) What is the appropriate analysis model for the vertical motion of the stone?

(d) What is the appropriate analysis model for the horizontal motion of the stone?

(e) Write symbolic equations for the x *and* y components of the velocity of the stone as a function of time.

(f) Write symbolic equations for the position of the stone as a function of time.

(g) How long after being released does the stone strike the water below the cliff?

(h) With what speed and angle of impact does the stone land?