**Higher Homework 13**

1) Express each of the following in the form $(x + a)^2 + b$

a) $x^2 + 14x + 32$ b) $x^2 - 11x - 13$

2) Find the coordinates of the point(s) where the straight line $y = x - 1$ meets the parabola $y = x^2 - 6x + 5$.

3) For what values of $x$ is the function $f(x) = x^3 - 6x^2 - 15x - 12$ decreasing ?

4) Solve the equation $\sin x^\circ - \sin 2x^\circ = 0$ in the interval $0 \leq x^\circ \leq 360$.

5) $f(x) = \frac{7}{3x^2} + 5x^3$

Find the equation of the tangent to the curve where $x = 2$.

6) Find the equation of the line through the point (-1,4) which is parallel to the line with equation $3x - y + 2 = 0$.

7) Find the range of values for $k$ such that the equation $kx^2 - x - 1 = 0$ has no real roots.

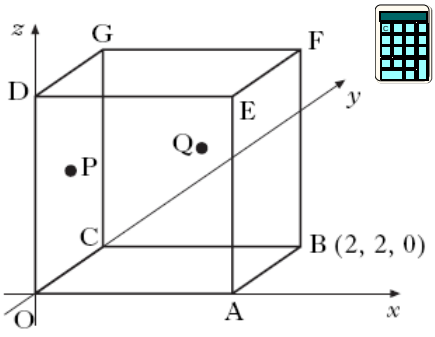
8) Three points A, B and C have coordinates (6, 0, 7) , (0, 5, 6) and (4, 5, 0) respectively. Find the size of angle ABC.

9) OABCDEFG is a cube with side 2 units, as shown in the diagram. B has coordinates (2, 2, 0).
P is the centre of face OCGD and Q is the centre of face CBFG.

a) Write down the coordinates of G.

b) Find **p** and **q**, the position vectors of points P and Q.

c) Find the size of angle POQ.




10) With reference to a suitable set of coordinate axes, A, B and C are the points (-8, 10, 20) , (-2, 1, 8) and (0, -2, 4) respectively.

Show that A, B and C are collinear and find the ratio AB : BC.

11) $f(x) = 5x^2 - 1$ and $g(x) = x + 7$ . State the function $f(g(x))$ .