

Higher Block Test 1 Revision

Topics to be covered: **Functions and graphs, Straight Line, Recurrence Relations, Differentiation, Trig**

1) The vertices of a triangle are P(-1,-1), Q(2,1) and R(-6,2).

Find the equation of the altitude drawn from Q.

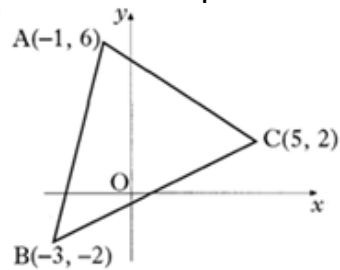
2) Triangle ABC has vertices A(-1,6) b (-3,-2) and C (5,2)

Find

a) The equation of the line p, the median from C of triangle ABC.

a) The equation of the line q, the perpendicular bisector of BC.

b) The coordinates of the point of intersection of the lines p and q.



3) Differentiate the following

a) $\frac{7}{3x^2}$ b) $3x + \frac{1}{3x}$ c) $\frac{2x+7}{x^3}$ d) $\sqrt{x}(x-x^3)$

4) $f(x) = \frac{(x+2)(x+1)}{\sqrt{x}}$ find $f'(4)$

5) a) Find the equation of the tangent to the curve

$$y = x^3 - 4x - 5 \text{ at } x = 1.$$

a) Find the angle which this tangent makes with the positive direction of the x axis.

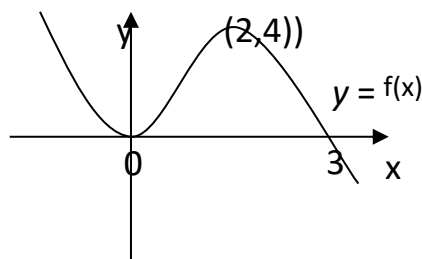
6) A function is defined by the formula $f(x) = 4x^2(x - 3)$.

a) Write down the coordinates of the points where the curve cuts the coordinate axis.

b) Find the stationary values and determine their nature.

c) Sketch the curve $y = f(x)$.

7) The diagram shows a sketch of a cubic function $y = f(x)$ with stationary values at the origin and $(2, 4)$. Sketch the graph of the derived function



8) The initial quantity of pollution in the loch is 25 tons, the Council remove 35% during the week and a factory discharges 8 tons into the loch each Sunday.

i) Find the amount of pollution after 1, 2, 3 and 4 weeks

ii) Establish a recurrence relation and hence find the long term state of the loch.

9) A sequence is defined by the recurrence relation

$$u_n = 0.9u_{n-1} + 2, \quad u_1 = 3$$

a) Calculate the value of u_2

b) What is the smallest value of n for which $u_n > 6$?

c) Find the limit of this sequence as $n \rightarrow \infty$

10) Sketch the graph $y = 2\cos(x - 20) = 0, 0^\circ < x < 360^\circ$.

11) Solve $2\sin(2x) = 1, 0 \leq x \leq 2\pi$

