

Pure 4 - Graphs

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

1. (a) Express $\sqrt{108}$ in the form $a\sqrt{3}$, where a is an integer. (1)

(b) Express $(2 - \sqrt{3})^2$ in the form $b + c\sqrt{3}$, where b and c are integers to be found. (3)

2. (a) Find the value of $8^{\frac{4}{3}}$. (2)

(b) Simplify $\frac{15x^{\frac{4}{3}}}{3x}$. (2)

3. Solve the simultaneous equations

$$y = x - 2,$$

$$y^2 + x^2 = 10. \quad (7)$$

Section 2 – Consolidation of this week's topic. Please complete all questions.

1. Sketch the following graphs each one on a separate set of axes, showing clearly the coordinates of the intercepts with the x and y axis, and, for the first 3, the coordinates of the stationary points (minimum or maximum):

i) $y = 2(x - 1)^2 + 1$

ii) $y = 2 - x^2$

iii) $y = x(x - 7)$

iv) $y = (x - 1)(x - 2)(x - 3)$

v) $y = (x + 4)(x - 4)^2$

vi) $y = x^3 - 2x^2 - 3x$

2. Sketch the graphs of the following curves, clearly indicating if there are any asymptotes:

a $y = -x^4$

b $y = (x - 3)^4$

c $y = -(x + 2)^4$

d $y = (x - 1)(x - 2)(x - 3)(x - 4)$

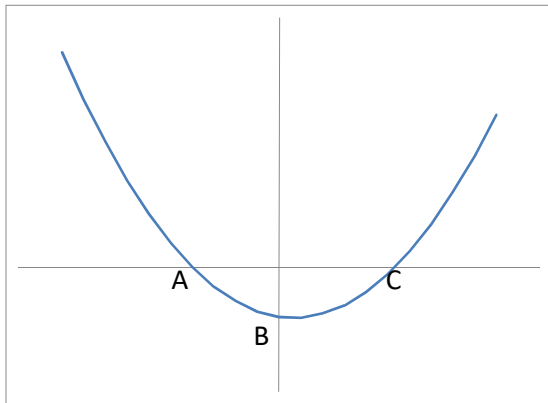
e $y = \frac{2}{x - 3} + 1$

f $y = 5 - \frac{1}{x + 1}$

g $y = 1/x^2 + 3$

h $y = 4 + 1/(x - 4)^2$

3. The graph of $y = 3x^2 - x - 4$ is shown below; find the co-ordinates of the points A, B and C.



[3]

4. By sketching the graphs of $y = 1/x^2$ and $y = -(x+1)(x+2)(x-1)(x-2)$ show that there are four solutions to the equation $x^2(x+1)(x+2)(x-1)(x-2) = -1$.

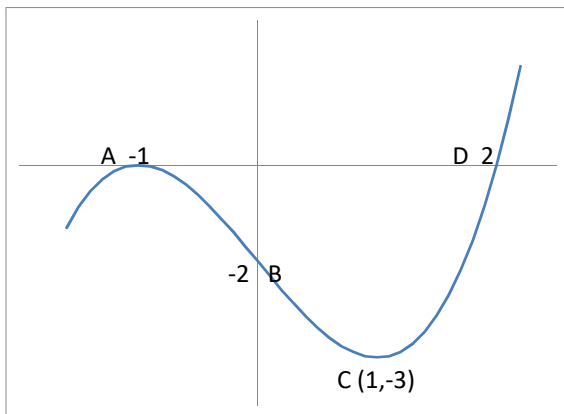
[5]

5. The diagram below shows the graph of $y = f(x)$ and the points :

A(-1, 0), B(0, -2), C(1, -3) and D(2, 0).

Sketch the following graphs showing the coordinates of points A, B, C, and D.

a) $y = f(x+1)$ b) $y = f(x) + 2$ c) $y = f(2x)$ d) $y = 2f(x)$ e) $y = 1 - f(0.5x)$ [11]



Total: 50 Marks

Section 3 – Extension questions. If you are aiming for a top grade, you should attempt these questions.

1. (a) On the same axes sketch the graphs of the curves with equations

(i) $y = x^2(x - 2)$, (3)

(ii) $y = x(6 - x)$, (3)

and indicate on your sketches the coordinates of all the points where the curves cross the x-axis.

(b) Use algebra to find the coordinates of the points where the graphs intersect. (7)

2.

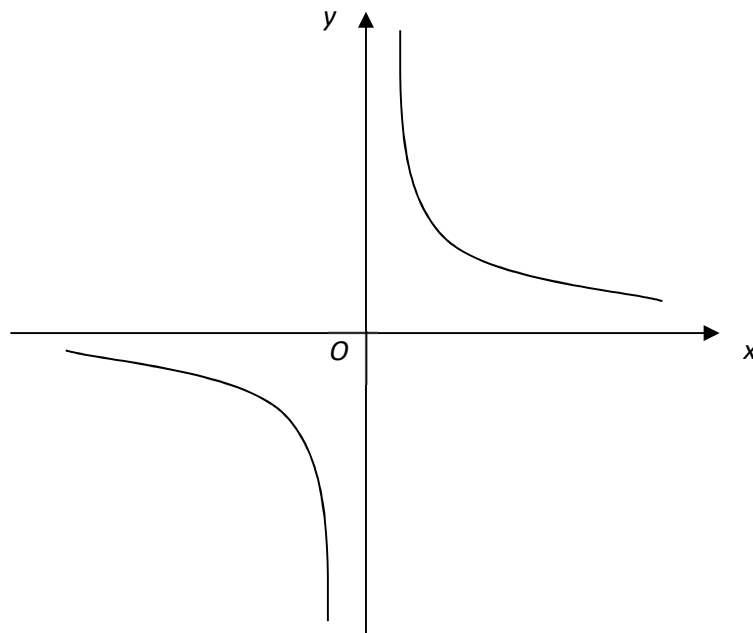


Figure 1

Figure 1 shows a sketch of the curve with equation $y = \frac{3}{x}$, $x \neq 0$.

(a) On a separate diagram, sketch the curve with equation $y = \frac{3}{x+2}$, $x \neq -2$, showing the coordinates of any point at which the curve crosses a coordinate axis.

(3)

(b) Write down the equations of the asymptotes of the curve in part (a).

(2)