Pure Mathematics   Date:………………

Cubic Graphs and Reciprocal Graphs

Exercise A

1 Sketch the following curves and indicate clearly the points of intersection with the axes:

a $y = (x - 3)(x - 2)(x + 1)$ **b** $y = (x - 1)(x + 2)(x + 3)$

c $y = (x + 1)(x + 2)(x + 3)$ **d** $y = (x + 1)(1 - x)(x + 3)$

e $y = (x - 2)(x - 3)(4 - x)$ **f** $y = x(x - 2)(x + 1)$

g $y = x(x + 1)(x - 1)$ **h** $y = x(x + 1)(1 - x)$

i $y = (x - 2)(2x - 1)(2x + 1)$ **j** $y = x(2x - 1)(x + 3)$

2 Sketch the curves with the following equations:

a $y = (x + 1)^2(x - 1)$ **b** $y = (x + 2)(x - 1)^2$

c $y = (2 - x)(x + 1)^2$ **d** $y = (x - 2)(x + 1)^2$

e $y = x^2(x + 2)$ **f** $y = (x - 1)^2 x$

g $y = (1 - x)^2(3 + x)$ **h** $y = (x - 1)^2(3 - x)$

i $y = x^2(2 - x)$ **j** $y = x^2(x - 2)$

3 Factorise the following equations and then sketch the curves:

a $y = x^3 + x^2 - 2x$ **b** $y = x^3 + 5x^2 + 4x$

c $y = x^3 + 2x^2 + x$ **d** $y = 3x + 2x^2 - x^3$

e $y = x^3 - x^2$ **f** $y = x - x^3$

g $y = 12x^3 - 3x$ **h** $y = x^3 - x^2 - 2x$

i $y = x^3 - 9x$ **j** $y = x^3 - 9x^2$

Exercise B

1 Sketch the following curves and show their positions relative to the curve $y = x^3$:

a $y = (x - 2)^3$ **b** $y = (2 - x)^3$ **c** $y = (x - 1)^3$

d $y = (x + 2)^3$ **e** $y = -(x + 2)^3$

2 Sketch the following and indicate the coordinates of the points where the curves cross the axes:

a $y = (x + 3)^3$ **b** $y = (x - 3)^3$ **c** $y = (1 - x)^3$

d $y = -(x - 2)^3$ **e** $y = -(x - \frac{1}{2})^3$

Exercise C

Use a separate diagram to sketch each pair of graphs.

1 $y = \dfrac{2}{x}$ and $y = \dfrac{4}{x}$ **2** $y = \dfrac{2}{x}$ and $y = -\dfrac{2}{x}$ **3** $y = -\dfrac{4}{x}$ and $y = -\dfrac{2}{x}$

4 $y = \dfrac{3}{x}$ and $y = \dfrac{8}{x}$ **5** $y = -\dfrac{3}{x}$ and $y = -\dfrac{8}{x}$