# Test - Graphs and transformations

Year: Year 12 · Duration: 60 minutes · /20

| Name: | Date: | **Mark: /20** |
|---|---|---|

| Question | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| marks | 4 | 4 | 4 | 3 | 5 | **20** |
| Mark | | | | | | |

Show your working.

## Question 1 (4 marks)

**Question 1 – Sketching a cubic**

Sketch $y = (x-1)^2(x+2)$ showing the coordinates of all intercepts and say where the curve touches the axis.

## Question 2 (4 marks)

**Question 2 – Transformations of a curve**

The point $P(3,-2)$ lies on $y = f(x)$. Write down the coordinates of its image on each curve.

a. $y = f(x+1)$ (1 mark)
b. $y = 3f(x)$ (1 mark)
c. $y = f(x/3)$ (1 mark)
d. $y = -f(x) + 2$ (1 mark)

## Question 3 (4 marks)

**Question 3 – Reciprocal graph**

Sketch $y = \dfrac{1}{x+2} - 3$. Give the equations of the asymptotes and the coordinates where it crosses the axes.

## Question 4 (3 marks)

**Question 4 – Describing transformations**

Describe the transformation that maps $y = f(x)$ to (a) $y = f(x-5)+1$ and (b) $y = f(2x)$.

## Question 5 (5 marks)

**Question 5 – Problem: number of solutions**

The curve $y = x^2(x-3)$ has a local maximum at $(0, 0)$ and a local minimum at $(2, -4)$.

a. Sketch the curve. (2 marks)
b. Write down the number of solutions of $x^2(x-3) = k$ for $k = -2$ and for $k = -4$. (2 marks)
c. Show that $x^3 - 3x^2 + 4 = (x+1)(x-2)^2$. (1 mark)