

# Points of intersection

## Difficulty: Medium

### Question Paper 1

Level	AS & A Level
Subject	Maths - Pure
Exam Board	Edexcel
Topic	Graphs and transformations
Sub-Topic	Points of intersection
Difficulty	Medium
Booklet	Question Paper 1

**Time allowed:** 42 minutes

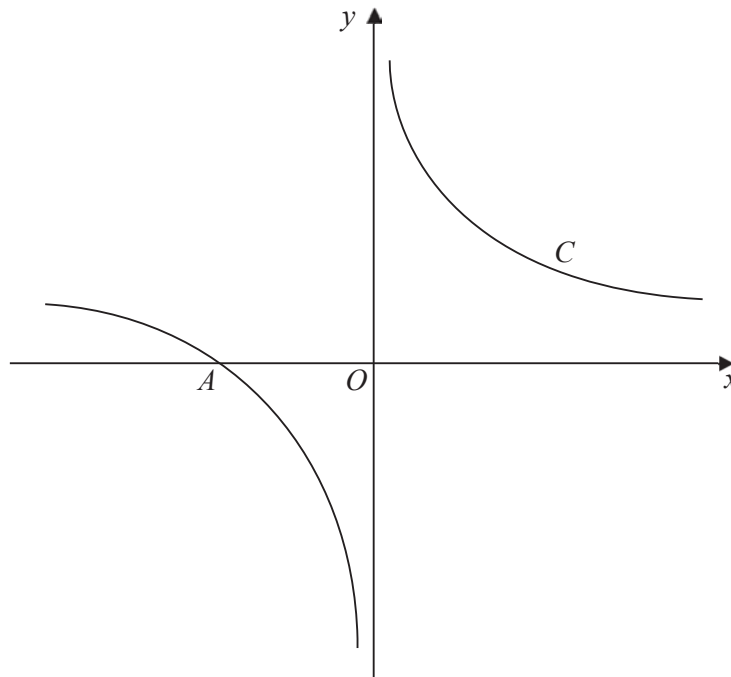
**Score:** /35

**Percentage:** /100

#### Grade Boundaries:

A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

## Question 1



**Figure 1**

Figure 1 shows a sketch of the curve  $C$  with equation

$$y = \frac{1}{x} + 1, \quad x \neq 0$$

The curve  $C$  crosses the  $x$ -axis at the point  $A$ .

- (a) State the  $x$  coordinate of the point  $A$ . (1)

The curve  $D$  has equation  $y = x^2(x - 2)$ , for all real values of  $x$ .

- (b) Sketch, on the same axes, graphs of curve  $C$  and curve  $D$ .

Show on the sketch the coordinates of each point where the curve  $D$  crosses the coordinate axes. (3)

- (c) Using your sketch, state, giving a reason, the number of real solutions to the equation (1)

$$x^2(x - 2) = \frac{1}{x} + 1$$

**(Total 5 marks)**

## Question 2

The point  $P(1, a)$  lies on the curve with equation  $y = (x + 1)^2(2 - x)$ .

(a) Find the value of  $a$ . (1)

(b) On the axes below sketch the curves with the following equations:

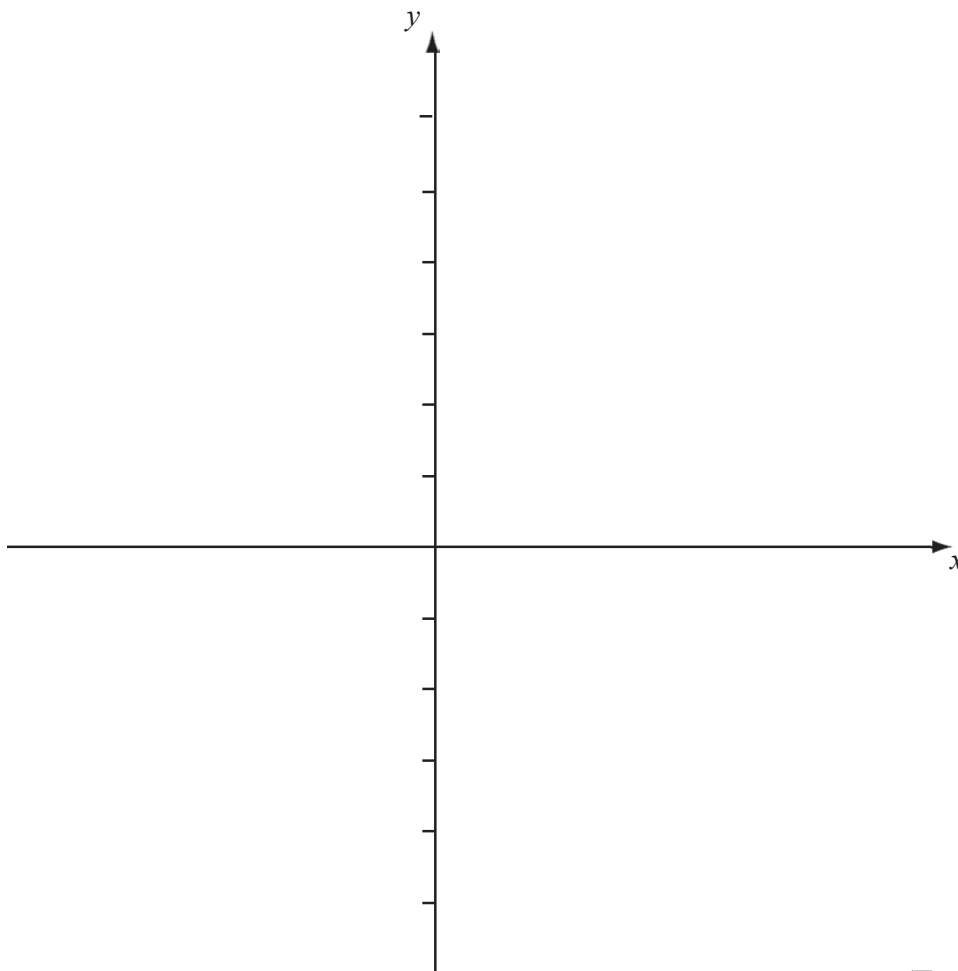
(i)  $y = (x + 1)^2(2 - x)$ ,

(ii)  $y = \frac{2}{x}$ .

On your diagram show clearly the coordinates of any points at which the curves meet the axes. (5)

(c) With reference to your diagram in part (b) state the number of real solutions to the equation

$$(x + 1)^2(2 - x) = \frac{2}{x}. \quad (1)$$



**(Total 7 marks)**

### Question 3

(a) On the axes below sketch the graphs of

(i)  $y = x(4-x)$

(ii)  $y = x^2(7-x)$

showing clearly the coordinates of the points where the curves cross the coordinate axes. (5)

(b) Show that the  $x$ -coordinates of the points of intersection of

$$y = x(4-x) \quad \text{and} \quad y = x^2(7-x)$$

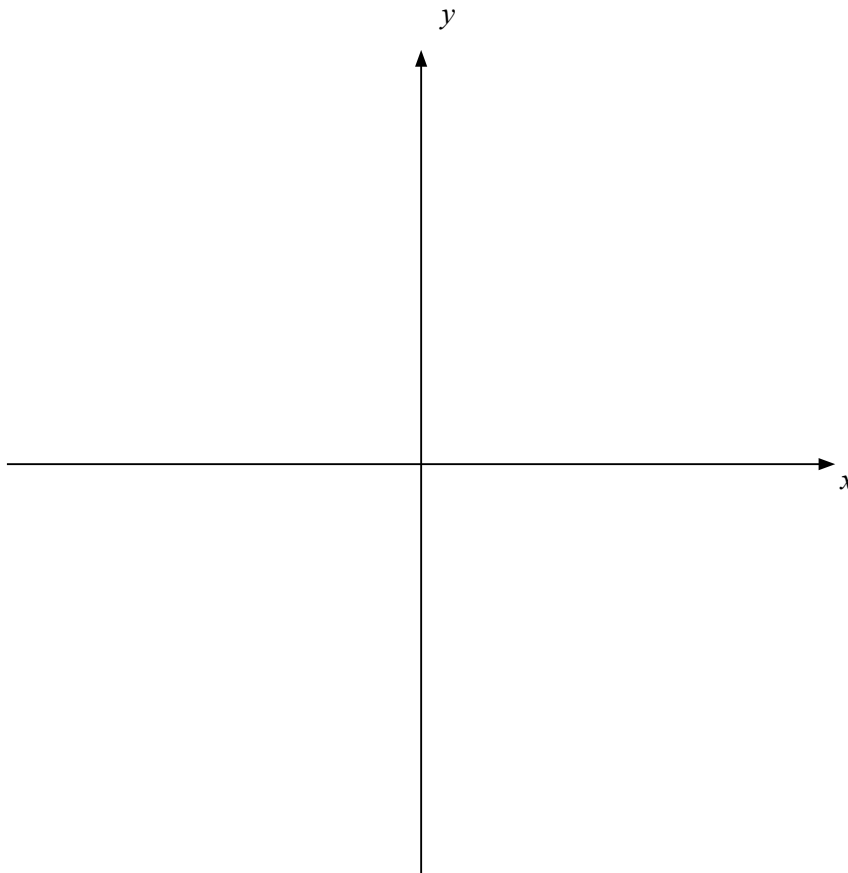
are given by the solutions to the equation  $x(x^2 - 8x + 4) = 0$

(3)

The point  $A$  lies on both of the curves and the  $x$  and  $y$  coordinates of  $A$  are both positive.

(c) Find the exact coordinates of  $A$ , leaving your answer in the form  $(p + q\sqrt{3}, r + s\sqrt{3})$ , where  $p, q, r$  and  $s$  are integers.

(7)



(Total 15 marks)

## Question 4

(a) On the axes below, sketch the graphs of

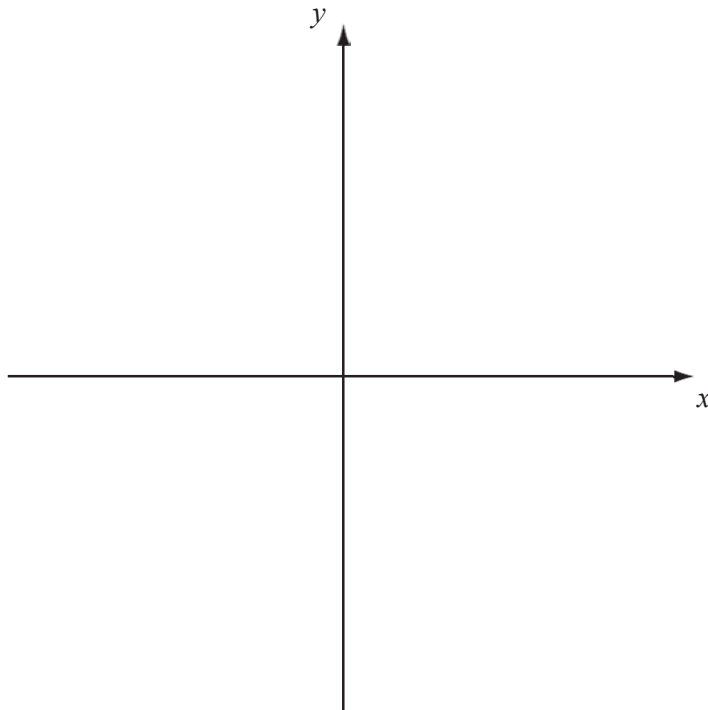
(i)  $y = x(x + 2)(3 - x)$

(ii)  $y = -\frac{2}{x}$

showing clearly the coordinates of all the points where the curves cross the coordinate axes. **(6)**

(b) Using your sketch state, giving a reason, the number of real solutions to the equation

$$x(x + 2)(3 - x) + \frac{2}{x} = 0 \quad \mathbf{(2)}$$



**(Total 8 marks)**