

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson
Edexcel Award

Centre Number

Candidate Number

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Thursday 10 January 2019

Morning (Time: 2 hours)

Paper Reference **AAL30/01**

Algebra

Level 3

(Calculator NOT allowed)

You must have: Ruler graduated in centimetres and millimetres,
pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- **Calculators are not allowed.**



Information

- The total mark for this paper is 90
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

You must NOT use a calculator.

1 (a) Factorise $ab + bc - cd - ad$

.....
(2)

(b) Factorise $12r^2t - 9r^2t^3$

.....
(2)

(Total for Question 1 is 4 marks)

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2 On the grid, shade the region that satisfies all these inequalities.

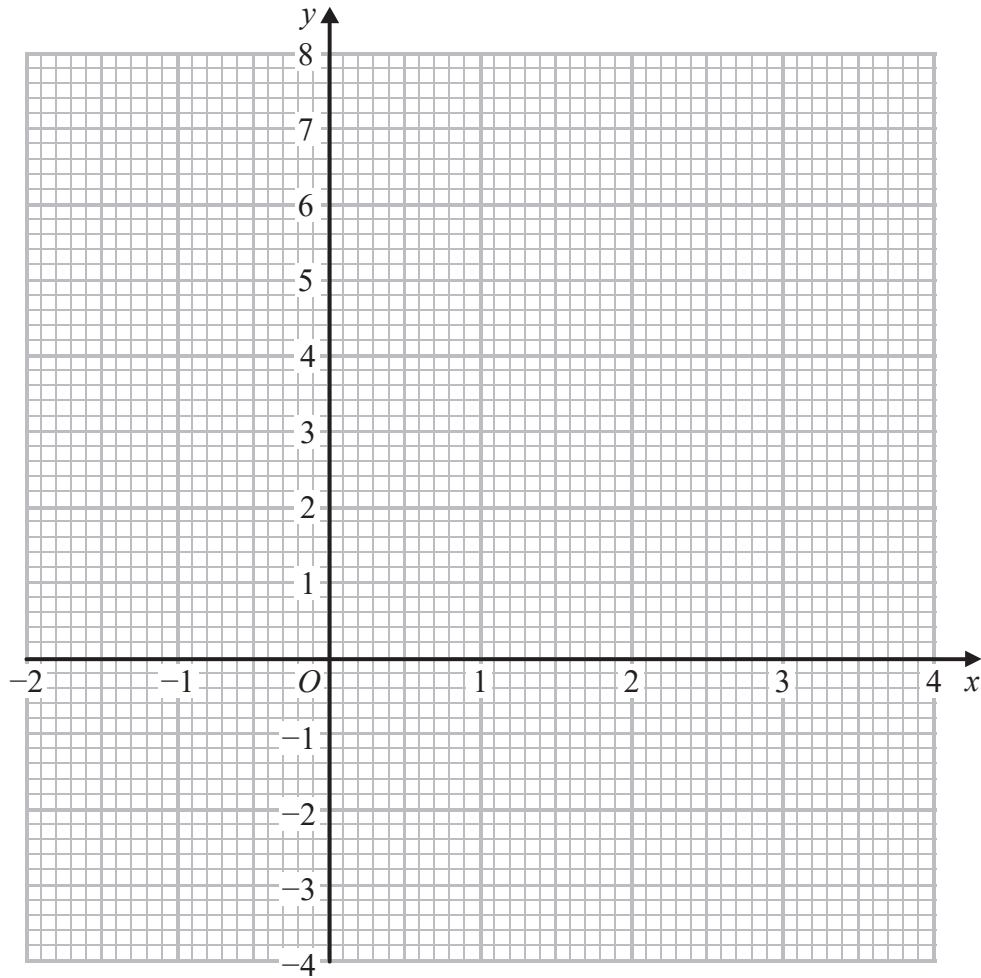
$$y < 2$$

$$y < 3x$$

$$5x + 3y < 15$$

$$2y - x > 1$$

Label the region **R**.



(Total for Question 2 is 5 marks)



3 Solve $\frac{x-3}{4} \geq \frac{1+2x}{6}$

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(Total for Question 3 is 3 marks)



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4 (a) Use the quadratic formula to solve the equation $x^2 - 2x - 1 = 0$

Give your answer in the form $\frac{p \pm \sqrt{q}}{r}$ where p, q and r are integers.

.....
(2)

(b) Solve the equation $(x + 2)(x + 4) = (2x + 1)(2x + 3)$

.....
(4)

(c) Write down the sum of the roots of the equation $2x^2 - 6x + 3 = 0$

.....
(1)

(Total for Question 4 is 7 marks)



5 (a) Simplify $(16p^{-2})^{\frac{1}{4}}$

.....
(2)

(b) Simplify $\frac{u^2}{m^{\frac{1}{2}}} \div \frac{u^{\frac{1}{2}}}{m^3}$

.....
(2)

(c) Express $\frac{x-1}{x+3} - \frac{x}{x-3}$ as a single fraction.
Give your answer in its simplest form.

.....
(3)

(Total for Question 5 is 7 marks)



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6 The straight line **L** is the tangent to a curve at the point *P*.

The equation of **L** is $x + 2y = 5$

(a) Find the gradient of this tangent.

.....
(2)

(b) Find the gradient of the normal to the curve at *P*.

.....
(1)

(Total for Question 6 is 3 marks)



7 Here are the first 4 terms of an arithmetic series.

24 19 14 9

(a) Find the 100th term of this series.

.....
(2)

(b) Find the sum of the first 200 terms of this series.

.....
(2)

(Total for Question 7 is 4 marks)

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8 $c = 2\sqrt{5}$ $d = -\sqrt{5}$

Work out the exact value of

(a) $c^2 + d^2$

.....
(2)

(b) $(c + 2)(d + 3)$

.....
(2)

(c) $\frac{c + d}{c - d}$

.....
(2)

(Total for Question 8 is 6 marks)



9 $m = \sqrt{\frac{b}{c} - 1}$

(a) Find the value of m when $b = 61$ and $c = 25$

.....
(2)

(b) Make c the subject of $m = \sqrt{\frac{b}{c} - 1}$

.....
(4)

(Total for Question 9 is 6 marks)

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10 The straight line L_1 has gradient $\frac{4}{5}$ and passes through the point with coordinates $(2, -1)$

(a) Find an equation for L_1 in the form $px + qy + r = 0$ where p, q and r are integers.

.....
(3)

The straight line L_2 is parallel to L_1 and passes through the point with coordinates $(3, 4)$

(b) Find an equation for L_2 in the form $y = mx + c$

.....
(3)

(c) Show, by considering gradients, that the line with equation $3x + 2y = 4$ is perpendicular to the line with equation $2x - 3y = 6$

(2)

(Total for Question 10 is 8 marks)



11 T is inversely proportional to \sqrt{f}

When $f = 25$, $T = 2$

(a) Find a formula for T in terms of f

.....
(3)

(b) Calculate the value of T when $f = 400$

.....
(2)

(Total for Question 11 is 5 marks)

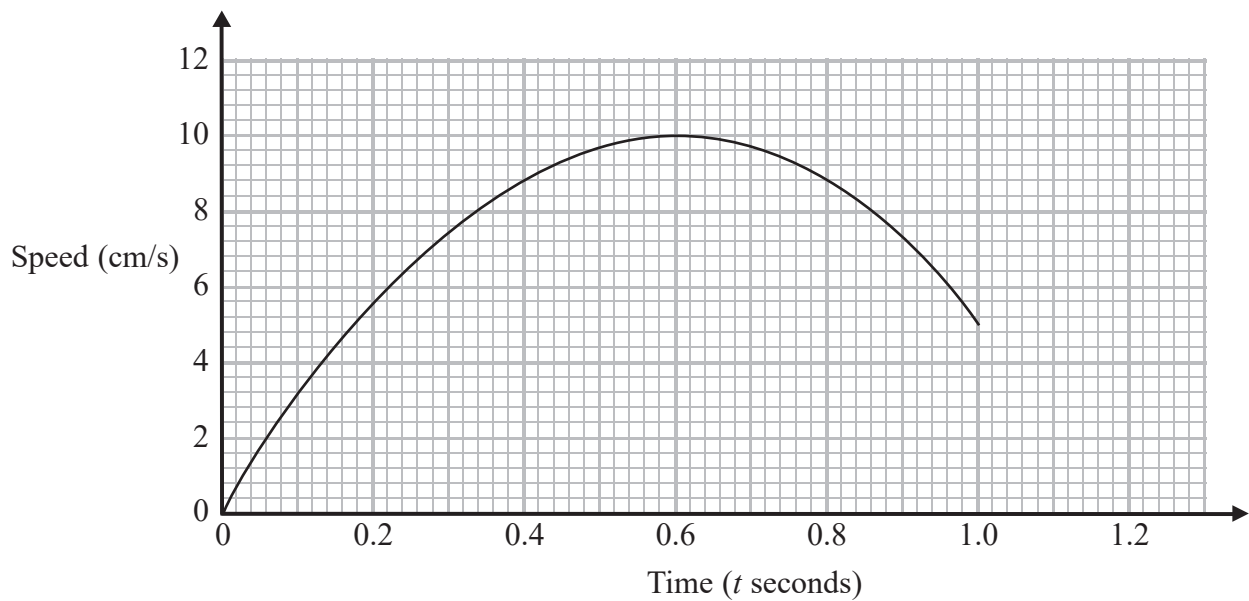
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12 Here is the speed-time graph for a point P that moves on a computer screen.



- (a) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 0$, $t = 1.0$ and the time axis.
Use 5 strips of equal width.

.....
(3)

- (b) What does this area represent?

.....
(1)

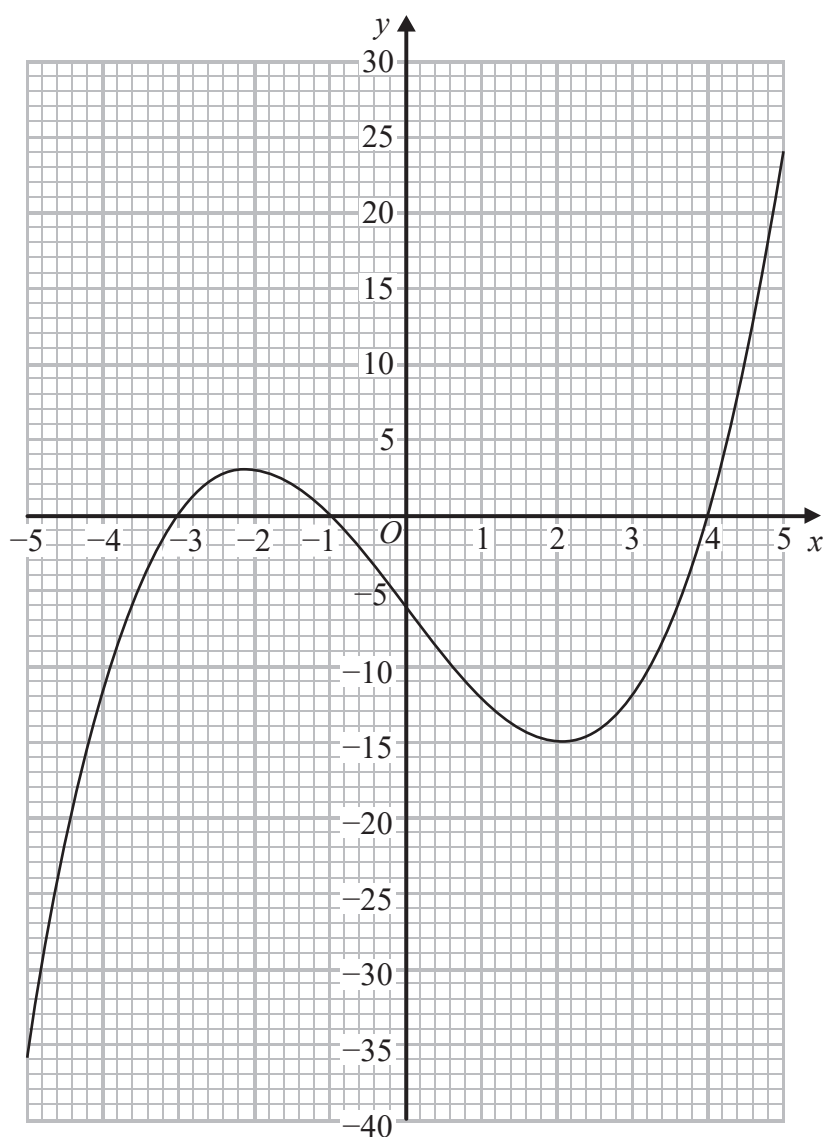
- (c) For what value of t is the acceleration of P zero?

.....
(1)

(Total for Question 12 is 5 marks)



13 Here is the graph of $y = 0.5x^3 - 6.5x - 6$ for $-5 \leq x \leq 5$



(a) Use the graph to solve the equation $0.5x^3 - 6.5x - 6 = 0$

.....
(2)

(b) Use the graph to find an estimate for the solution of $x^3 - 13x = 32$
Give your answer to 1 decimal place.

.....
(2)

(Total for Question 13 is 4 marks)



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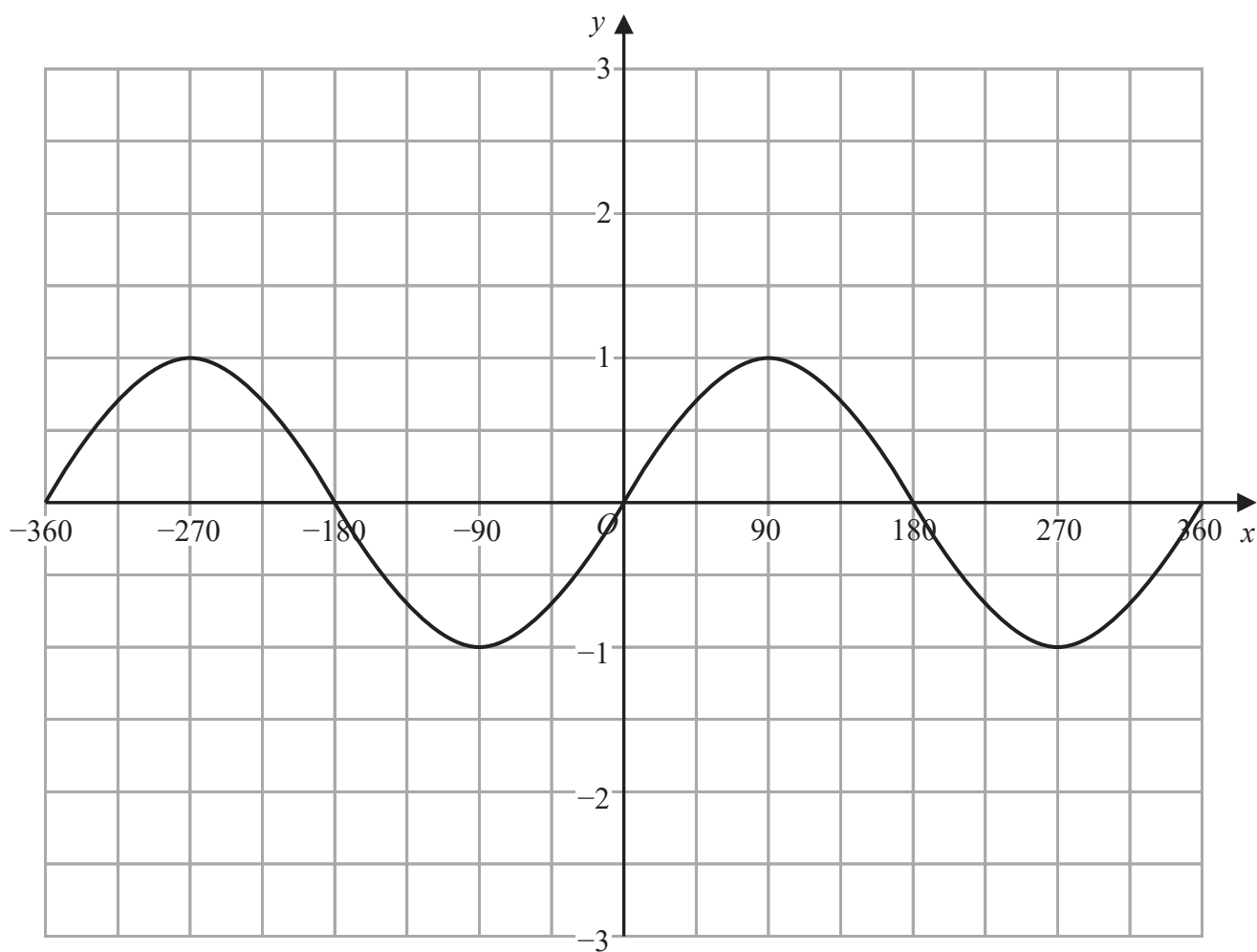
14 Solve, algebraically, the simultaneous equations

$$y = x^2 + 3x + 2$$
$$y = x + 2$$

.....
(Total for Question 14 is 4 marks)



15 Here is the graph of $y = \sin x^\circ$ for $-360 \leq x \leq 360$



(a) On the grid above, sketch the graph of $y = \sin(x + 45)^\circ$ for $-360 \leq x \leq 360$

(2)

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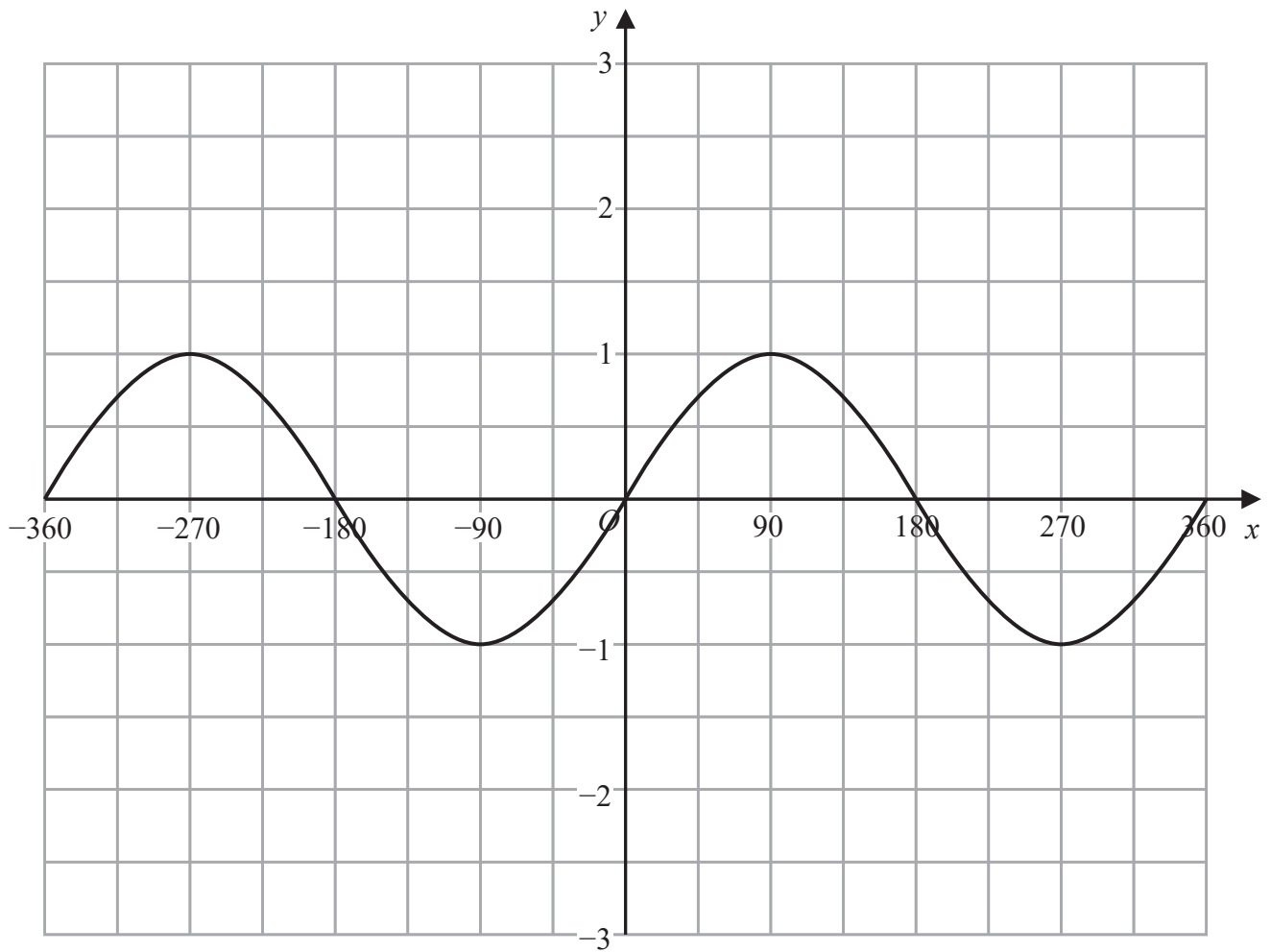
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(b) On the grid above, sketch the graph of $y = -2 + \sin x^\circ$ for $-360 \leq x \leq 360$

(2)

(Total for Question 15 is 4 marks)



16 (a) Solve $x^2 \geq 4x + 5$

.....
(3)

(b) For what range of values of b has the equation $25x^2 + bx + 16 = 0$ no real roots?

.....
(2)

(Total for Question 16 is 5 marks)

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17 (a) Write $4x^2 - 28x$ in the form $(2x - a)^2 - b$ where a and b are integers.

.....
(2)

The curve with equation $y = 4x^2 - 28x$ has a turning point at the point M .

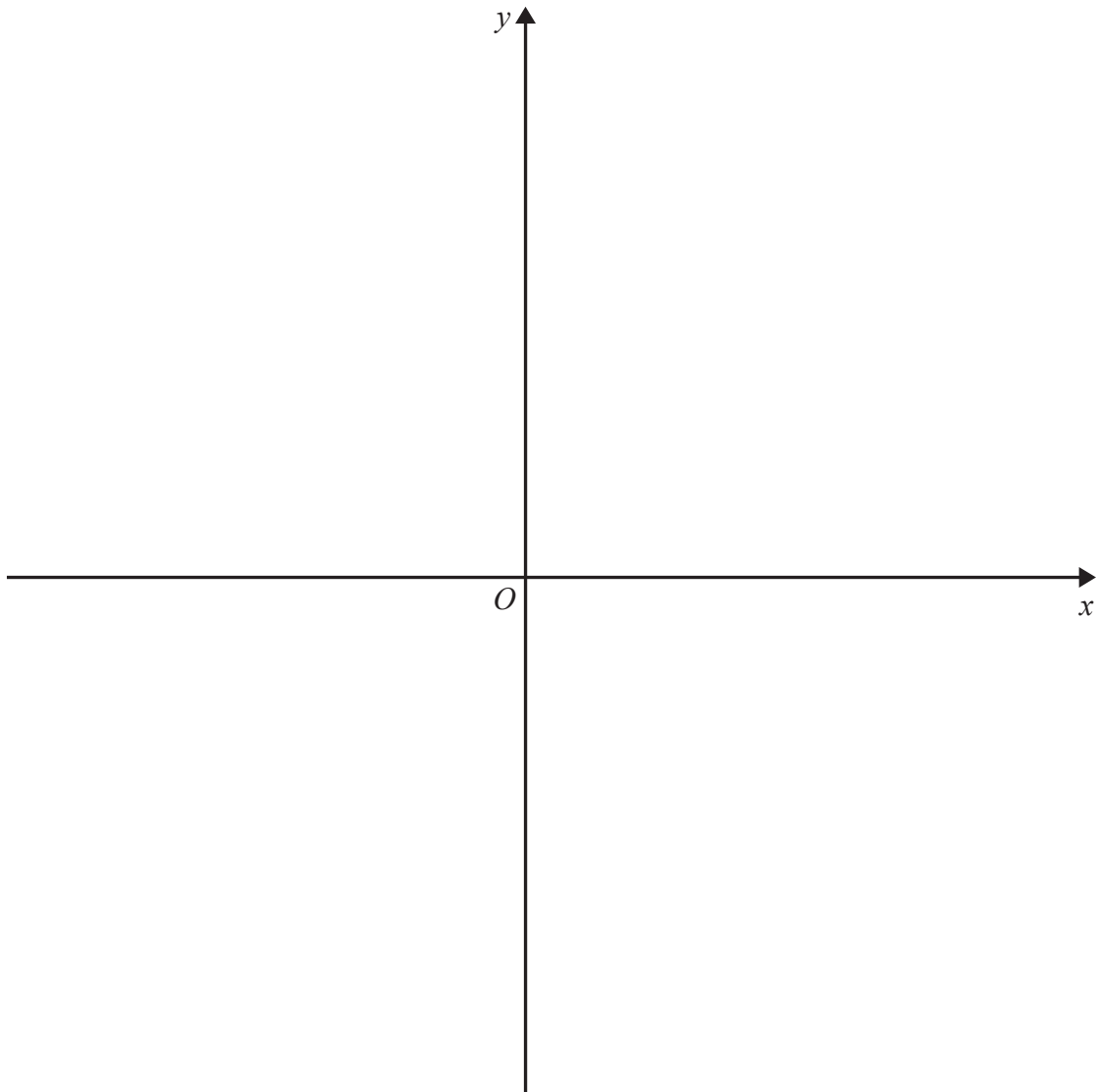
(b) Write down the coordinates of M .

.....
(1)

(Total for Question 17 is 3 marks)



- 18 (a) On the axes below, sketch the graph of $x = (y - 2)^2$
Show clearly the coordinates of any points of intersection of the graph with the axes.



(3)

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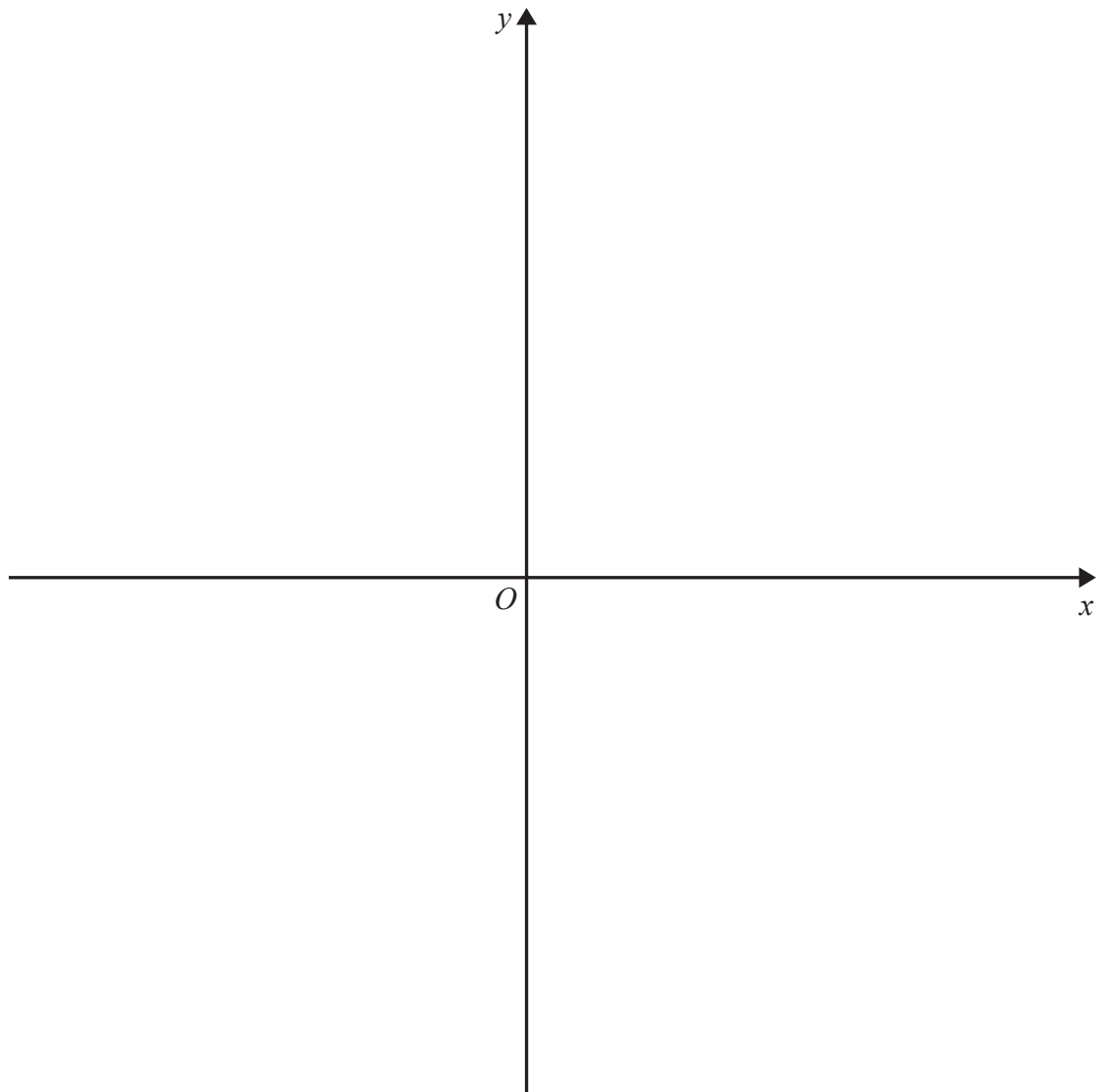
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(b) On the axes below, sketch the graph of $y = \frac{1}{x+5}$

Show clearly any asymptotes and the coordinates of any points of intersection of the graph with the axes.



(4)

(Total for Question 18 is 7 marks)

TOTAL FOR PAPER IS 90 MARKS



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