Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel Award

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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P68787A

N:1/1/1/1/

P 6 8 7 8 7 A 0 1 2 4

Pearson

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) Simplify $3t \times t^3$

.....

(1)

(b) Simplify $y^{-2} \times y^2$

.....

(2)

(c) Simplify $\left(\frac{1}{x}\right)^{-5}$

.....

(1)

(d) Expand and simplify $(2f - 4)^2$

.....

(2)

(Total for Question 1 is 6 marks)

2 (a) Factorise $3a^2 - 6ac$

.....

(1)

(b) Factorise $12xy - 9y + 20x - 15$

.....

(2)

(c) Factorise $25e^2 - 36h^2$

.....

(1)

(d) Simplify $\dfrac{(w + 2)(3w - 6)}{(2w + 4)(w - 2)}$

.....

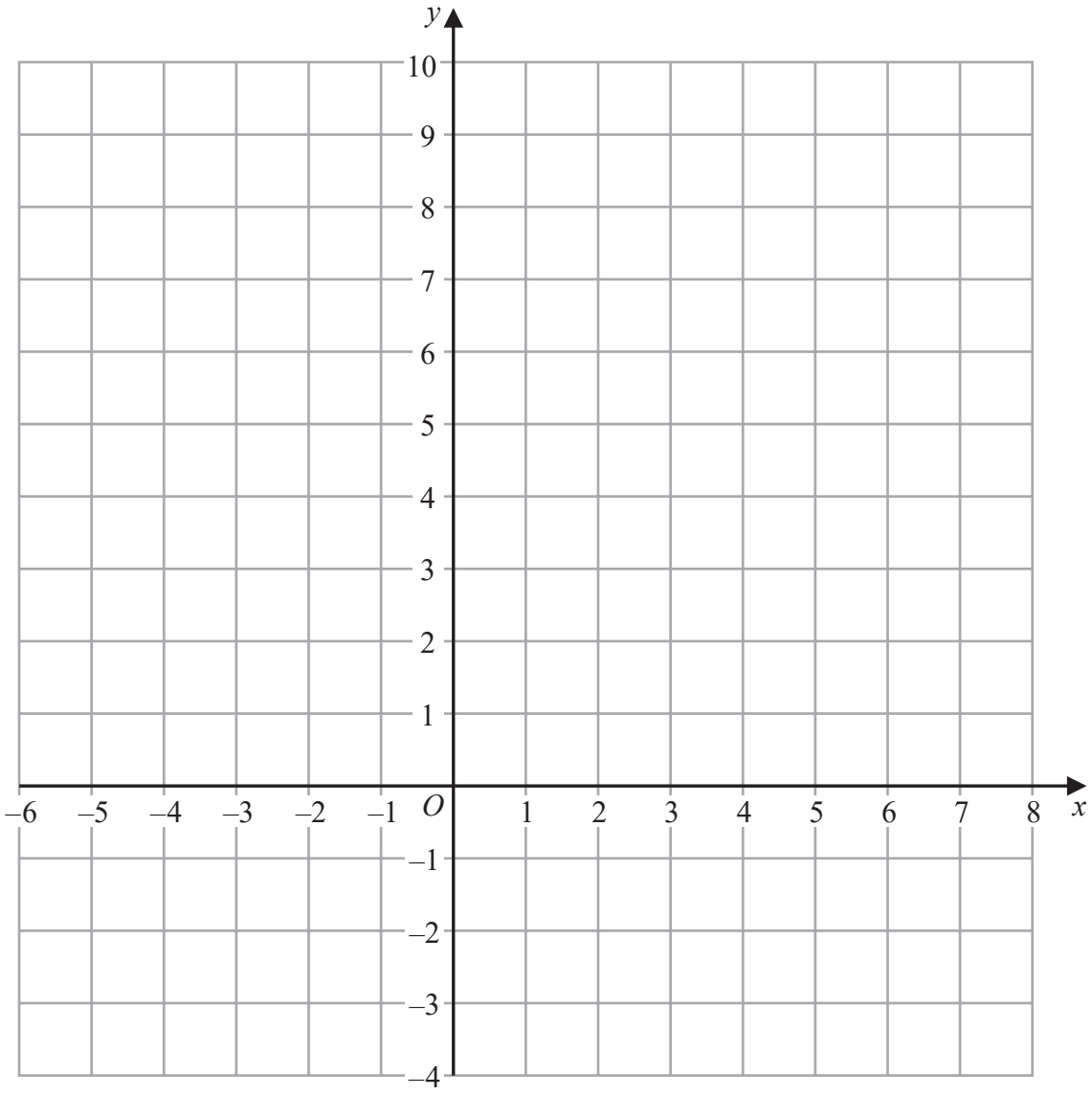
(2)

(Total for Question 2 is 6 marks)

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

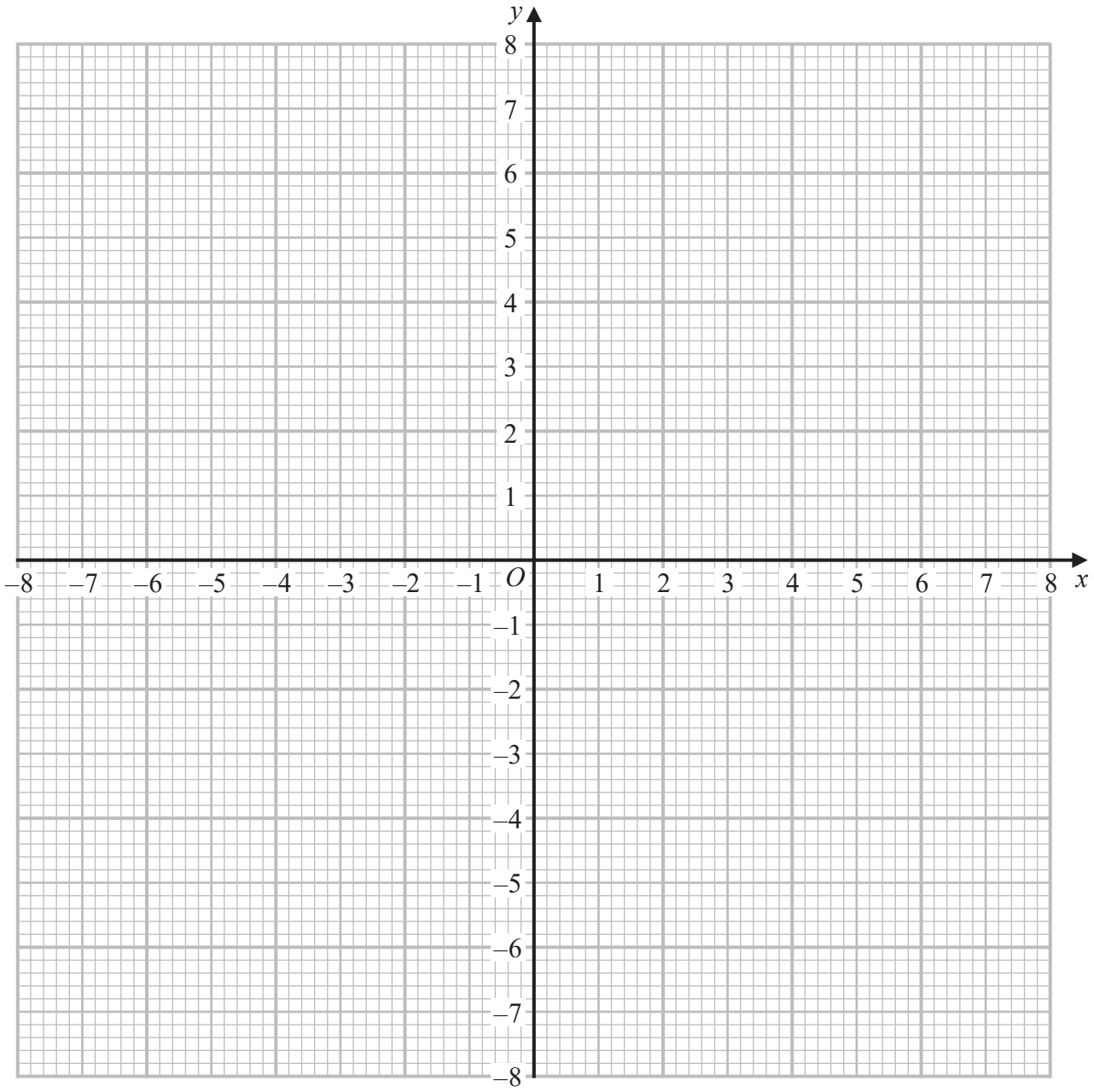
$x > -1$ $3x + 5y < 15$ $y > 2x - 1$

Label the region **R**



(Total for Question 3 is 5 marks)

4 On the grid, construct the graph of $x^2 + y^2 = 16$



(Total for Question 4 is 2 marks)

5 The straight line **L** has gradient $\frac{2}{3}$

The line passes through the point with coordinates (0, 4)

(a) Find an equation for **L**
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

.....

(3)

The point A has coordinates (–2, –5)

(b) Find an equation of the straight line which passes through A and is perpendicular to **L**
Give your answer in the form $y = mx + c$

.....

(3)

(Total for Question 5 is 6 marks)

6 y is directly proportional to x.

When $x = 8$, $y = 32$

(a) Find a formula for y in terms of x.

.....

(2)

p^2 is inversely proportional to r^3 for $p > 0$

When $p = 3$, $r = 2$

(b) Work out the value of p when $r = 3^{\frac{1}{3}}$
Give your answer in the form $\sqrt{a}$ where a is an integer.

.....

(4)

(Total for Question 6 is 6 marks)

7 The quadratic equation $4x^2 + 12x + c = 0$ has two equal roots.

(a) Find the value of c.

$c =$ .....

(2)

Here is another quadratic equation $ax^2 + bx - 5 = 0$

The sum of the roots of this equation is $\frac{2}{5}$

The product of the roots of the equation is $-\frac{2}{3}$

(b) Find the value of a and the value of b.

$a =$ .....

$b =$ .....

(3)

(Total for Question 7 is 5 marks)

8 (a) Solve $2x + 4 < 2 - x$

.....

(2)

(b) Solve $x^2 < 12 - x$

.....

(3)

(Total for Question 8 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

9 The first term of an arithmetic series is 4
The common difference of this series is 10

(a) Work out the 100th term of this series.

.....

(2)

(b) Work out the sum of the first 100 terms of this series.

.....

(2)

The first term of a different arithmetic series is 3
The 10th term is 102

(c) Work out the common difference of this series.

.....

(2)

(Total for Question 9 is 6 marks)

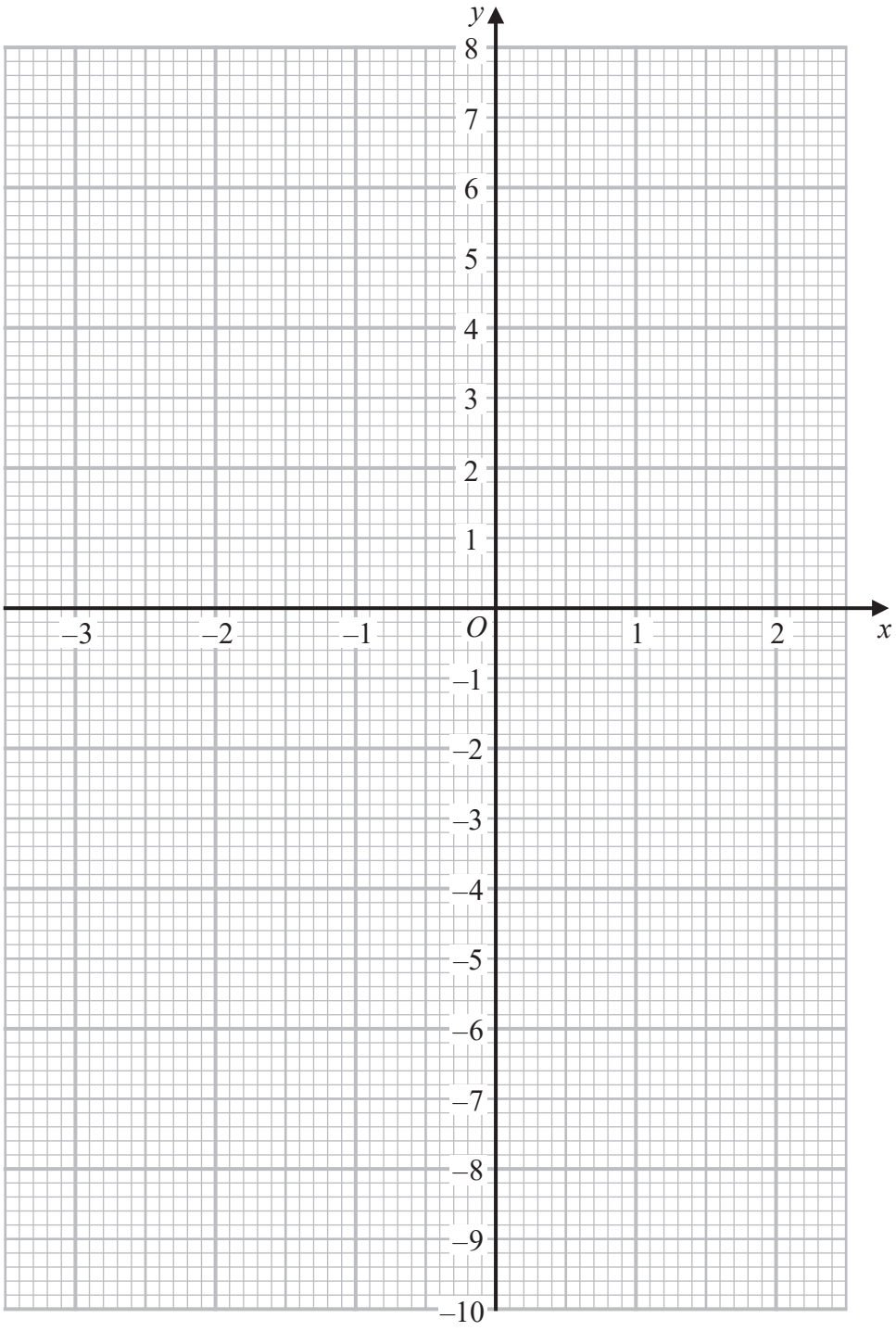
10 Solve, algebraically, the simultaneous equations

$$2x^2 + 4y^2 = 18$$
$$2y - x = 3$$

.....

(Total for Question 10 is 5 marks)

11 (a) On the grid below, draw the graph of $y = x^3 - 5x + 3$ for values of x from –3 to 2



(4)

(b) Use your graph to find an estimate for one of the solutions of $x^3 - 5x + 1 = 0$

.....

(2)

(Total for Question 11 is 6 marks)

12 Here is a formula $B = \dfrac{2w^2 - wt}{4t}$

(a) Find the value of B when $w = 5$ and $t = 2$

$B =$ .....

(2)

(b) Make t the subject of the formula $B = \dfrac{2w^2 - wt}{4t}$

.....

(3)

(Total for Question 12 is 5 marks)

13 (a) Use the quadratic formula to solve the equation $3x^2 - 4x - 2 = 0$

Give your answer in the form $\frac{p \pm \sqrt{q}}{3}$ where p and q are integers.

.....

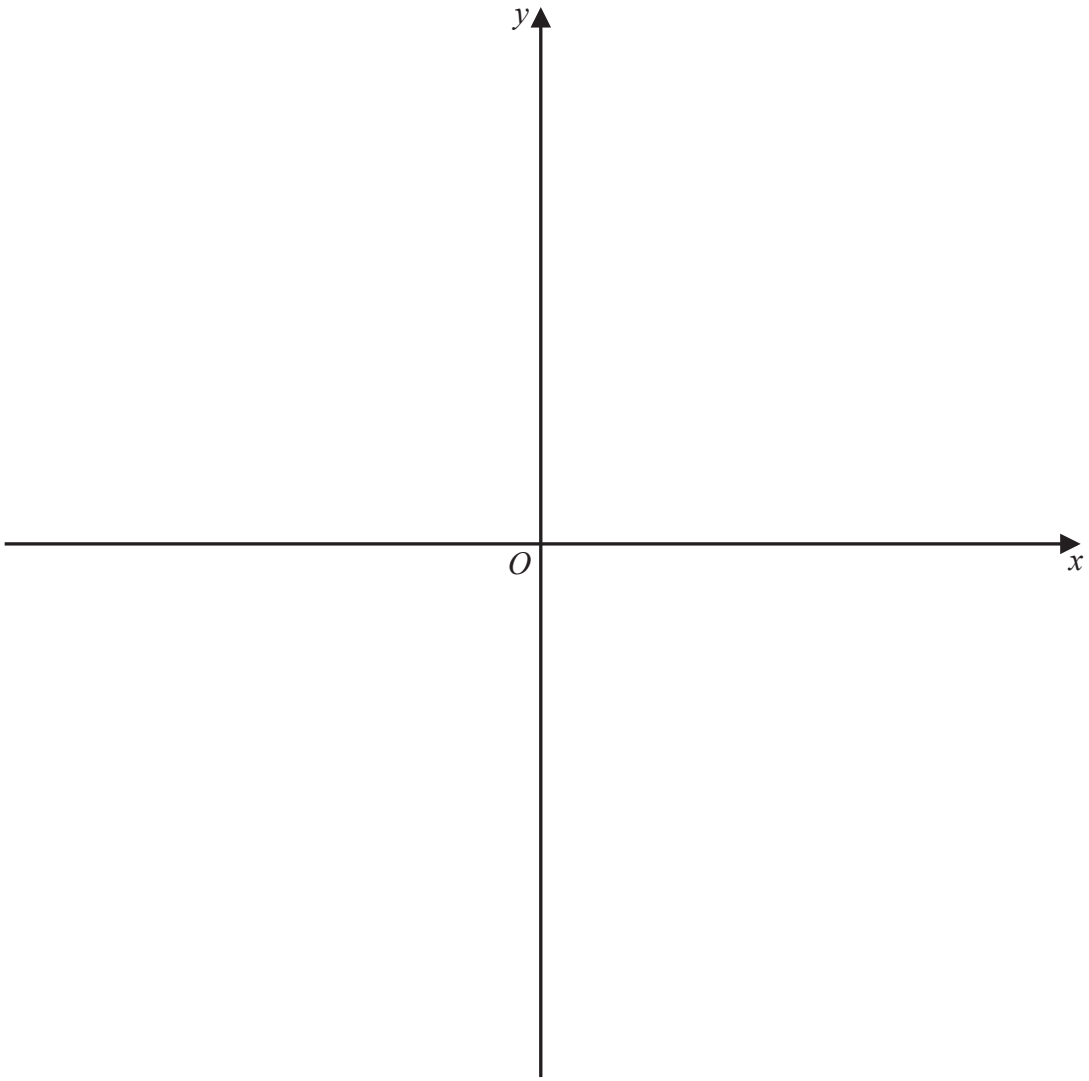
(3)

(b) (i) Write the quadratic expression $4x^2 - 12x + 10$ in the form $(ax + m)^2 + n$ where a, m and n are integers.

.....

(3)

(ii) Hence sketch the graph of $y = 4x^2 - 12x + 10$
Mark on your sketch the coordinates of the turning point of the graph and the coordinates of the point where the graph intersects the y-axis.



(3)

(Total for Question 13 is 9 marks)

14 (a) Rationalise the denominator of $\frac{1}{7\sqrt{5}}$

.....

(2)

(b) Simplify $\frac{1}{1+\sqrt{2}} + \frac{1}{-1+\sqrt{2}}$

Give your answer in the form $a\sqrt{2}$ where a is an integer.

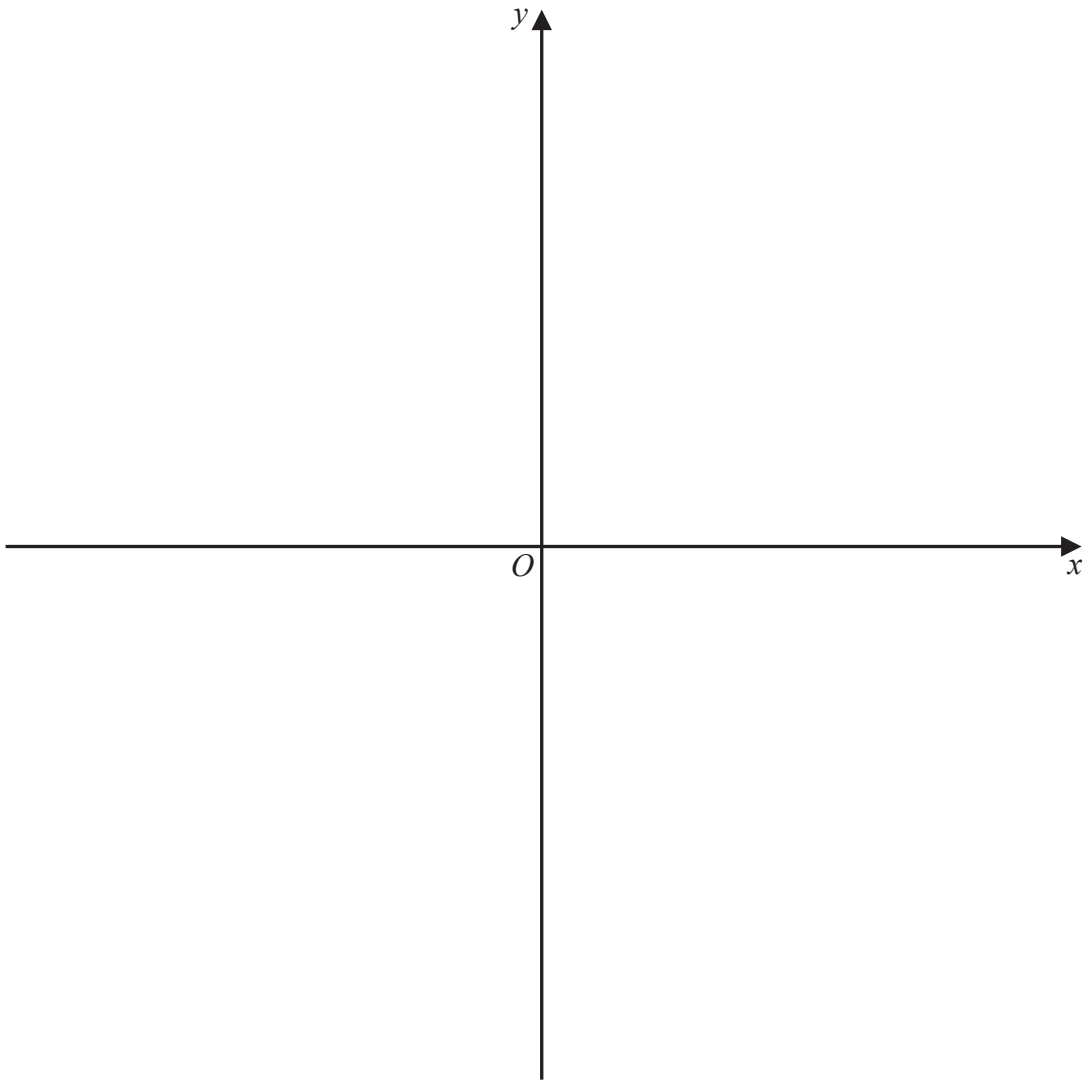
.....

(3)

(Total for Question 14 is 5 marks)

15 Using the axes below, sketch the graph of $y = \frac{1}{x-2} + 3$

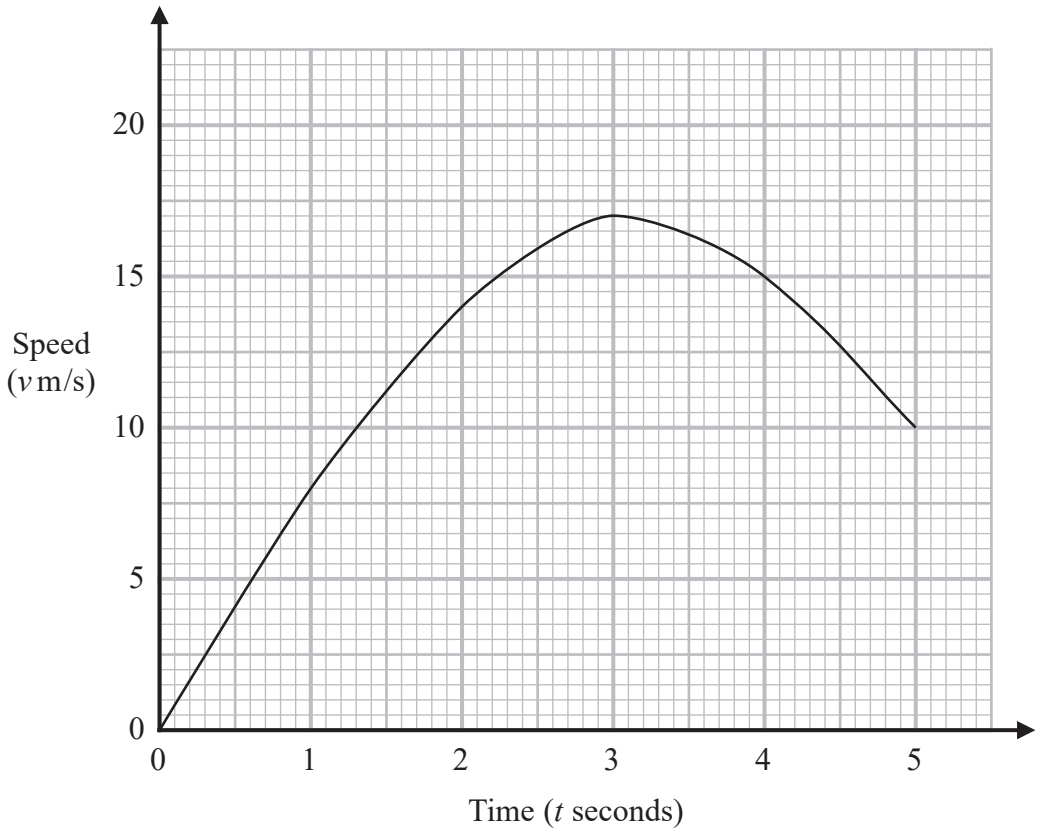
Show clearly any asymptotes and the coordinates of any points of intersection of the graph with the y-axis.



(Total for Question 15 is 4 marks)

16 A car moves with speed v m/s at time t seconds after starting from rest.

Here is a speed-time graph for the first 5 seconds of the car's journey.



At time T seconds the acceleration of the car is zero.

(a) Write down the value of T.

.....

(1)

(b) Use the trapezium rule to find an estimate of the area of the region under the curve and between $t = 1$, $t = 5$ and the time axis.
Use 4 strips of equal width.

.....

(3)

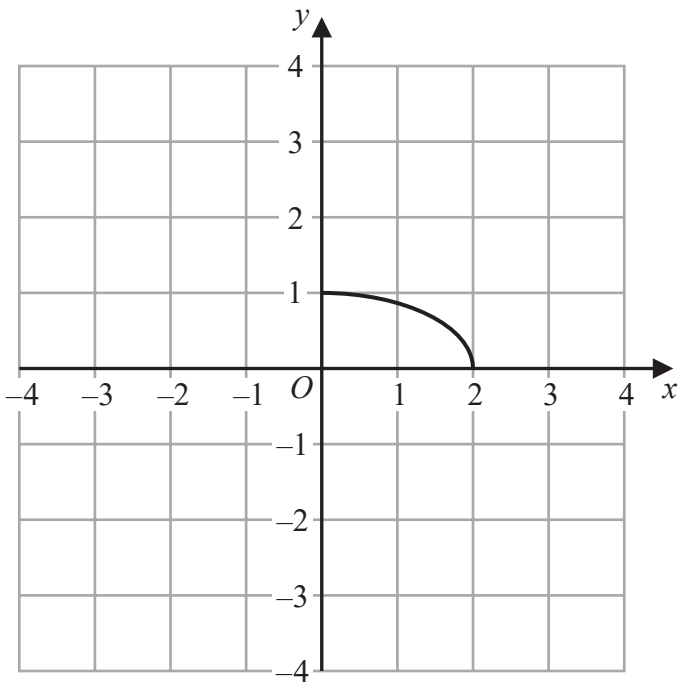
(c) What does this area represent?

.....

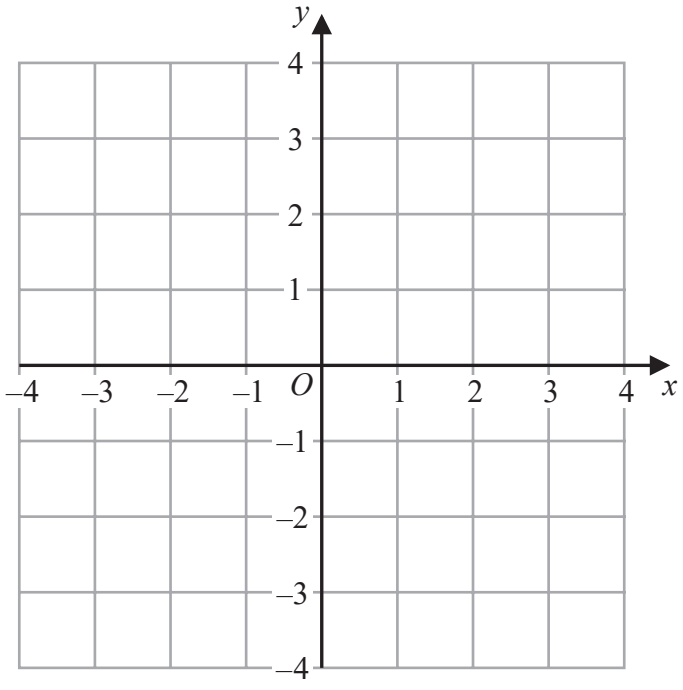
(1)

(Total for Question 16 is 5 marks)

17 Here is the graph of $y = f(x)$

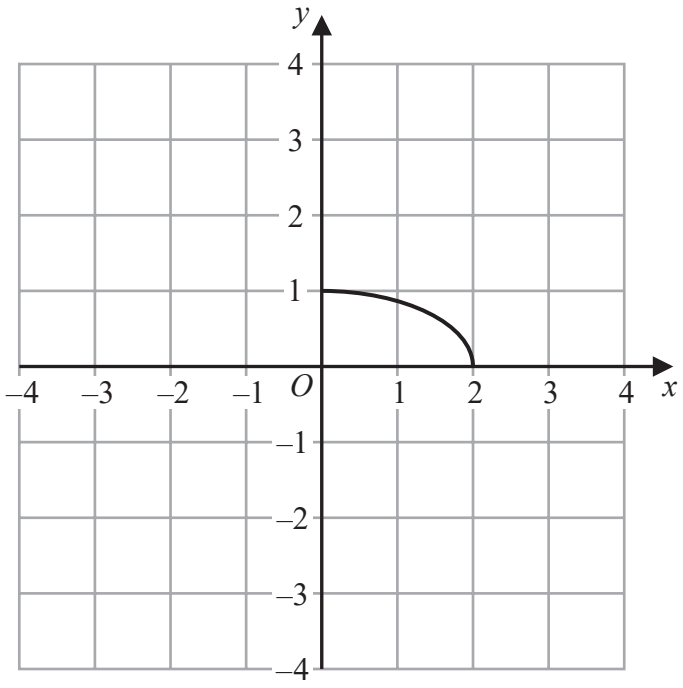


(a) On the grid below, draw the graph of $y = -2f(x)$

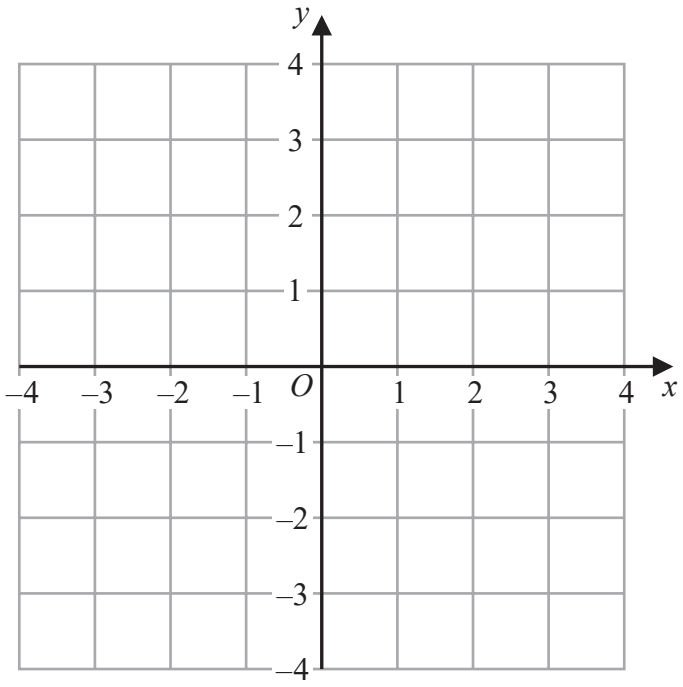


(2)

Here is the graph of $y = f(x)$



(b) On the grid below, draw the graph of $y = f\left(\frac{1}{2}x\right)$



(2)

(Total for Question 17 is 4 marks)

TOTAL FOR PAPER IS 90 MARKS

BLANK PAGE

BLANK PAGE

BLANK PAGE