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 ▶

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P 6 6 1 2 8 R 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) Expand and simplify $(2c - 3d)(2c + 3d)$

.....

(2)

(b) Simplify $(y^{-\frac{1}{2}})^{-6}$

.....

(1)

(c) Simplify $(4p^2 + 5p^2)^{\frac{3}{2}}$

.....

(2)

(d) Express $\dfrac{x}{x+2} - \dfrac{x^2}{(x+2)^2}$ as a single fraction in its simplest form.

.....

(3)

(Total for Question 1 is 8 marks)

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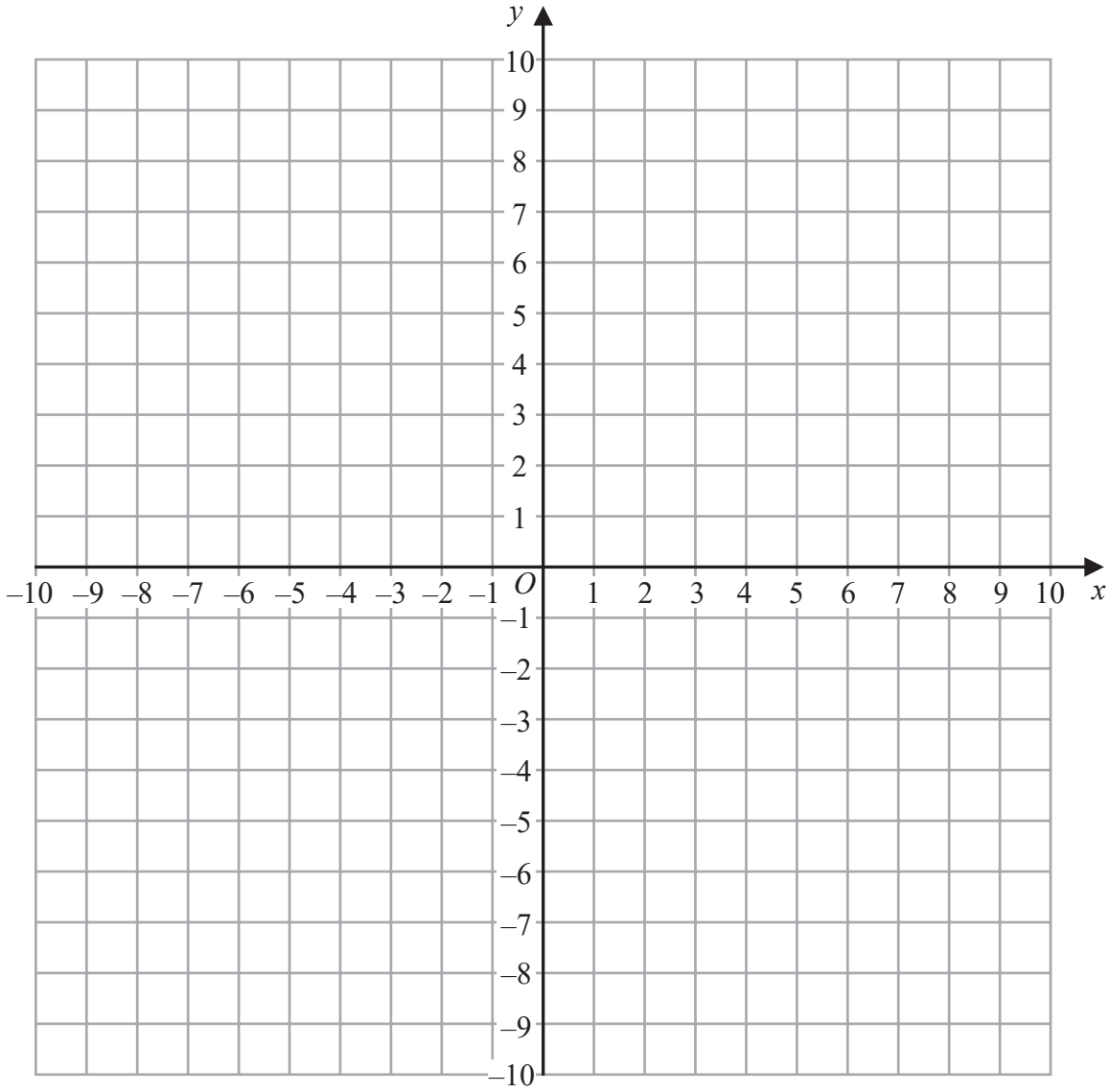
2 On the grid, construct the graph of $y^2 = 25 - x^2$



(Total for Question 2 is 2 marks)

3 (a) Factorise $2wt + 6w - 5t - 15$

.....

(2)

(b) Factorise $8gh^3 - 6g^3h^2$

.....

(2)

(Total for Question 3 is 4 marks)

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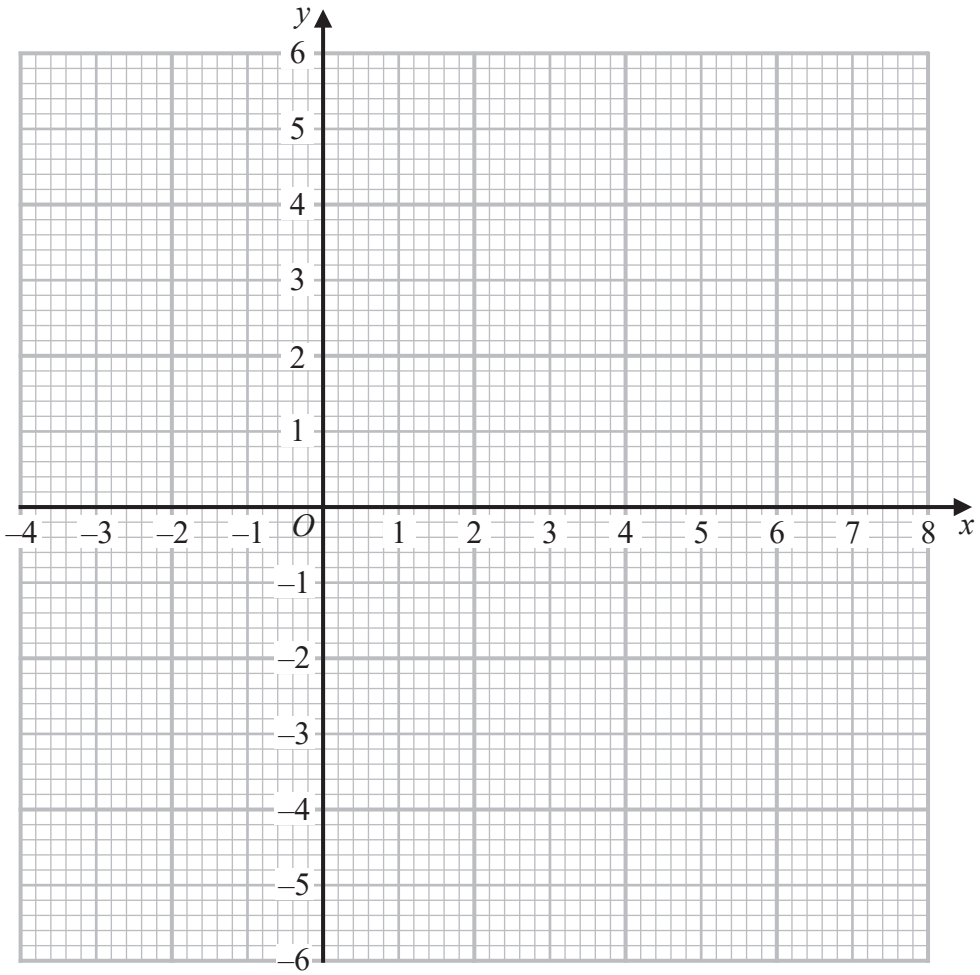
4 On the grid, shade the region that satisfies all these inequalities.

$x > -1$ $y > 2$ $y > x - 3$ $x + 2y > 4$

Label the region **R**



(Total for Question 4 is 5 marks)

5 Solve $\frac{2x}{x-4} = \frac{x}{x+2}$

.....

(Total for Question 5 is 3 marks)

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6 A straight line passes through the points with coordinates (3, 1) and (–2, 5)

(a) Find the gradient of this line.

.....

(2)

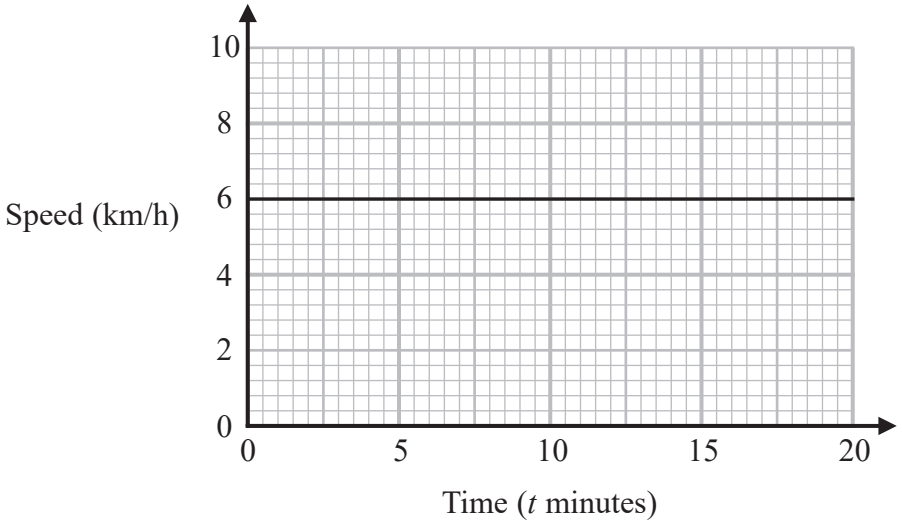
(b) Find an equation for this line.
Give your answer in the form $y = mx + c$

.....

(3)

(Total for Question 6 is 5 marks)

7 Here is part of a speed-time graph for a walker.



(a) Write down the acceleration of the walker for values of t between $t = 0$ and $t = 20$

.....

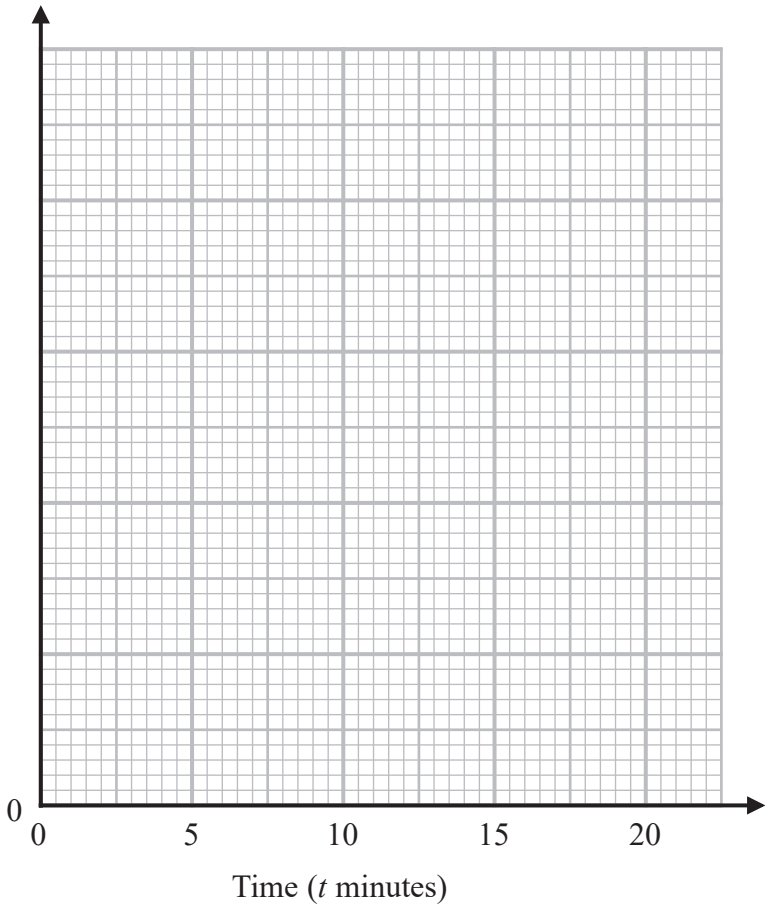
(1)

(b) Find the distance walked between $t = 0$ and $t = 20$

..... km

(2)

(c) On the grid below, draw a distance–time graph for the walker for values of t between $t = 0$ and $t = 20$



(2)

(Total for Question 7 is 5 marks)

8 (a) Find the sum and the product of the roots of the equation $\frac{1}{2}x^2 + x + 1 = 0$

sum = ...

product = ...

(2)

Here is a different quadratic equation.

$$x^2 + \frac{1}{2}x + c = 0$$

This equation has two equal roots.

(b) Find the value of c.

.....

(2)

(Total for Question 8 is 4 marks)

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9 f is inversely proportional to d.
$f = 20$ when $d = 0.25$

(a) Find a formula for f in terms of d.

.....

(3)

$$w = \frac{3}{(2-u)^2}$$

(b) Make u the subject of the formula.

.....

(3)

(Total for Question 9 is 6 marks)

10 Solve $6k^2 + 5k - 6 < 0$

.....

(Total for Question 10 is 3 marks)

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11 Here are the first five terms of an arithmetic series.

$$-2 \quad -6 \quad -10 \quad -14 \quad -18$$

(a) Find the 51st term of this series.

.....

(2)

(b) Find the sum of the first 51 terms of this series.

.....

(3)

(Total for Question 11 is 5 marks)

12 (a) Complete the table of values for $y = \left(\frac{2-x}{2}\right)^3$

x	−2	−1	0	1	2	3	4
y		3.375					−1

(2)

(b) On the grid opposite, draw the graph of $y = \left(\frac{2-x}{2}\right)^3$ for values of x from −2 to 4

(3)

(c) (i) Use your graph to find an estimate for the solution of $\left(\frac{2-x}{2}\right)^3 = 2$

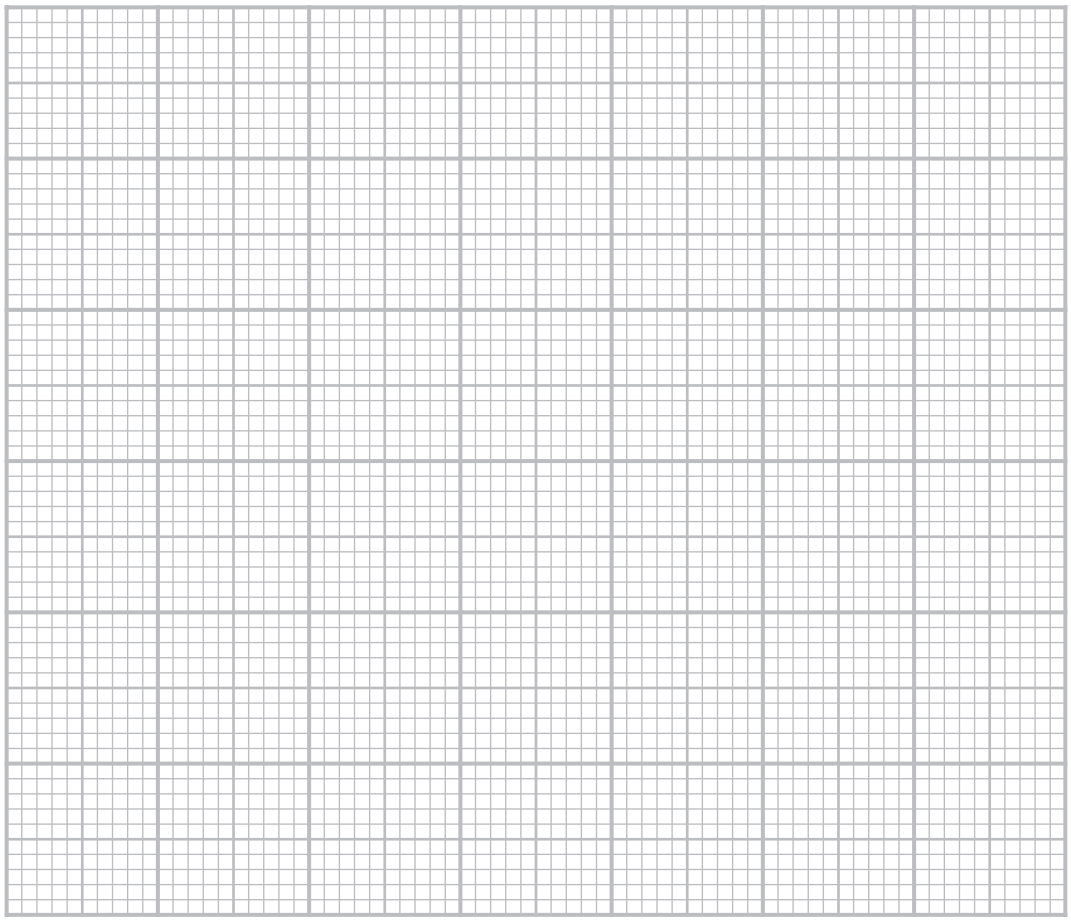
.....

(1)

(ii) Use your graph to find an estimate for the solution of $(2-x)^3 = 48$

.....

(2)



(Total for Question 12 is 8 marks)

13 The straight line **L** has equation $y = 4x + 1$

L is the tangent to a curve at the point P with coordinates (1, 5)

Find an equation of the normal to this curve at P.
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

.....

(Total for Question 13 is 4 marks)

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14 Here is a table of values for $y = 4^x$

x	0	0.5	1	1.5	2
y	1	2	4	8	16

Use the trapezium rule to find an estimate for the area of the region under the curve $y = 4^x$, between $x = 0$ and $x = 2$ and above $y = 0$
Use 4 strips of equal width.

.....

(Total for Question 14 is 2 marks)

15 (a) (i) Write the equation $\frac{(x-5)^2}{2} = x$ in the form $ax^2 + bx + c = 0$ where a, b and c are integers.

.....

(2)

(ii) Hence solve the equation $\frac{(x-5)^2}{2} = x$

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

.....

(3)

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(b) (i) Write $x^2 - 6x - 16$ in the form $(x + m)^2 + n$ where m and n are integers.

.....

(2)

(ii) Hence, using your answer to part (b)(i), solve the equation $x^2 - 6x - 16 = 0$

.....

(2)

(Total for Question 15 is 9 marks)

16 Solve, algebraically, the simultaneous equations

$$x^2 - y^2 = 1$$
$$x = 3y$$

Give each solution in the form $\frac{a}{\sqrt{b}}$ where a and b are integers.

.....

(Total for Question 16 is 4 marks)

17 (a) Simplify $\left(\sqrt{3}\right)+\left(\sqrt{3}\right)^2+\left(\sqrt{3}\right)^3+\left(\sqrt{3}\right)^4$

.....

(2)

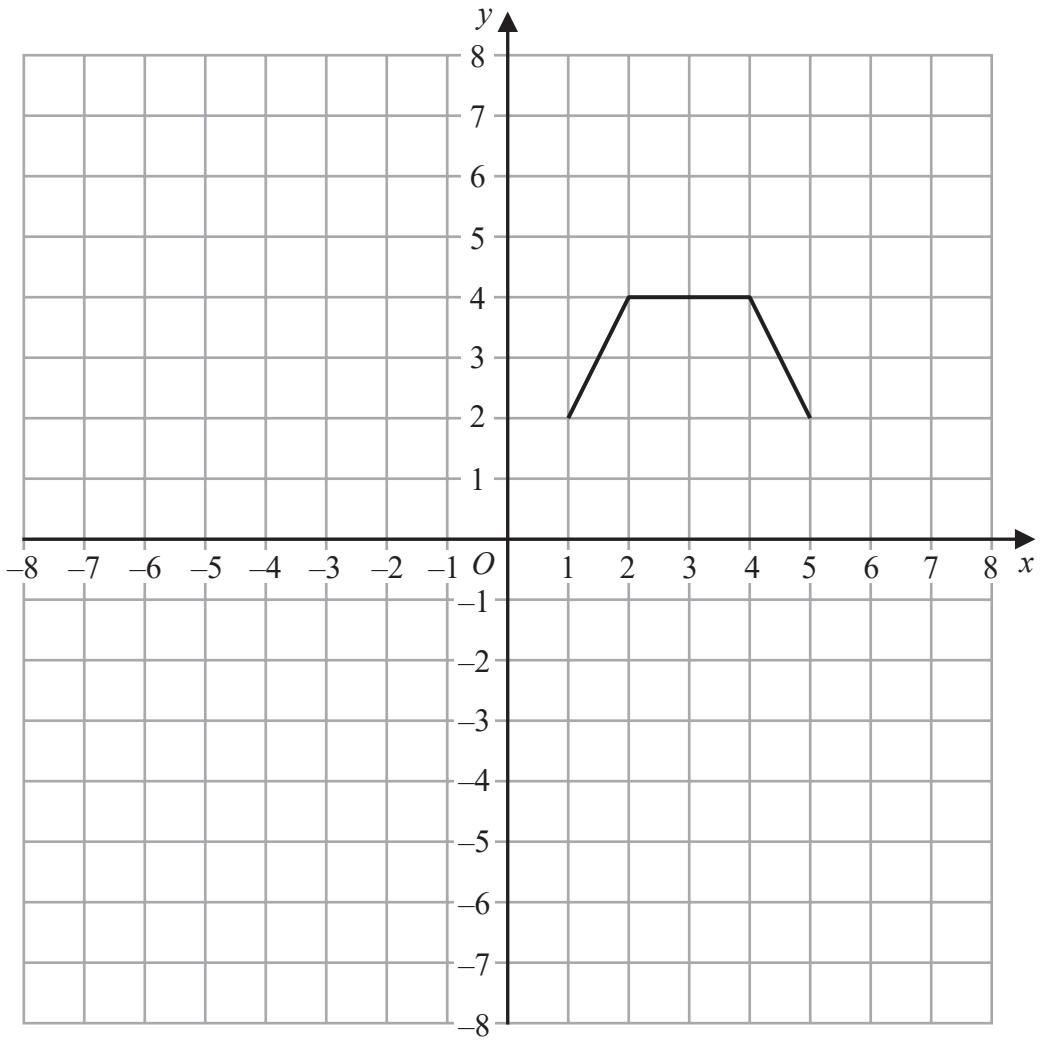
(b) Simplify $\dfrac{1}{2-\sqrt{5}}+\dfrac{1}{2+\sqrt{5}}$

.....

(3)

(Total for Question 17 is 5 marks)

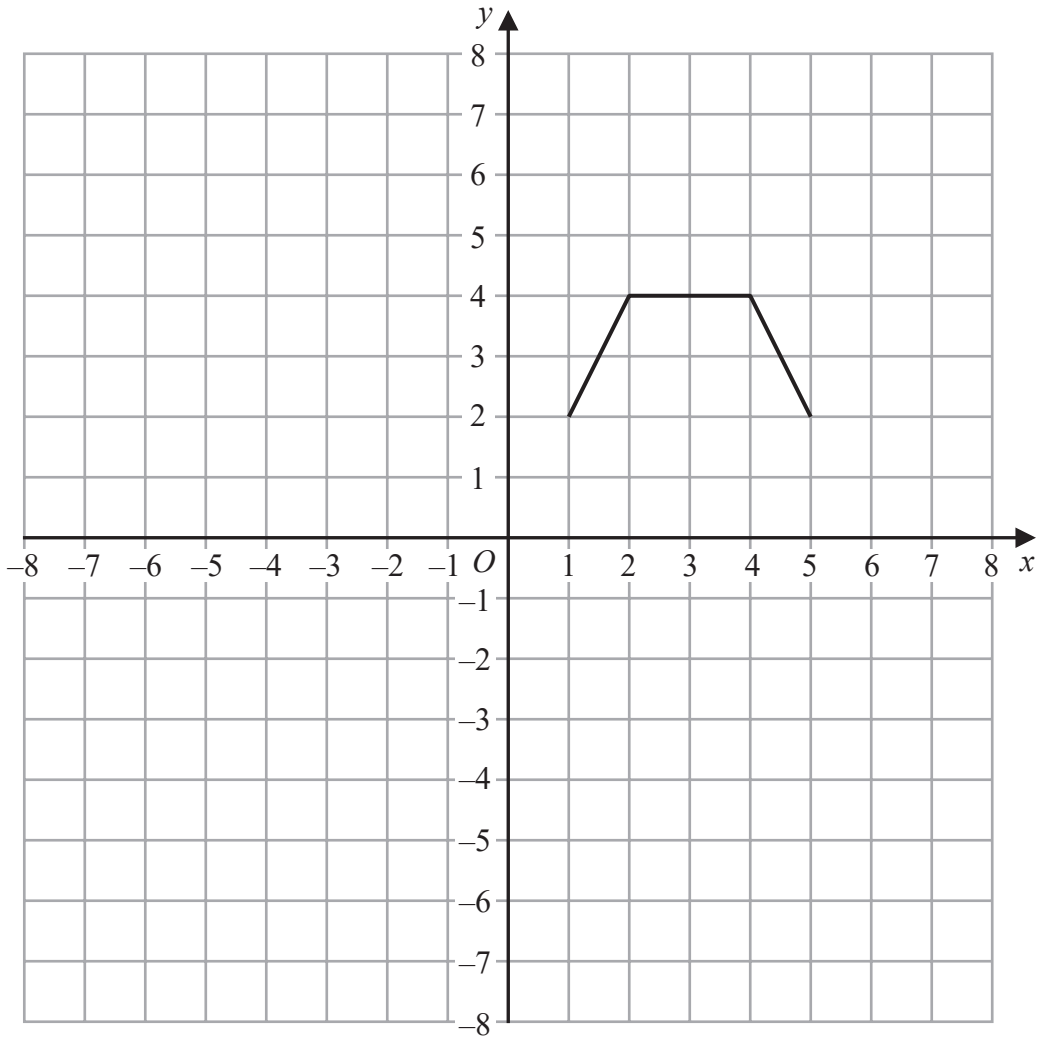
18 Here is the graph of $y = h(x)$



(a) On the grid above, draw the graph of $y = \frac{1}{2}h(x)$

(2)

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



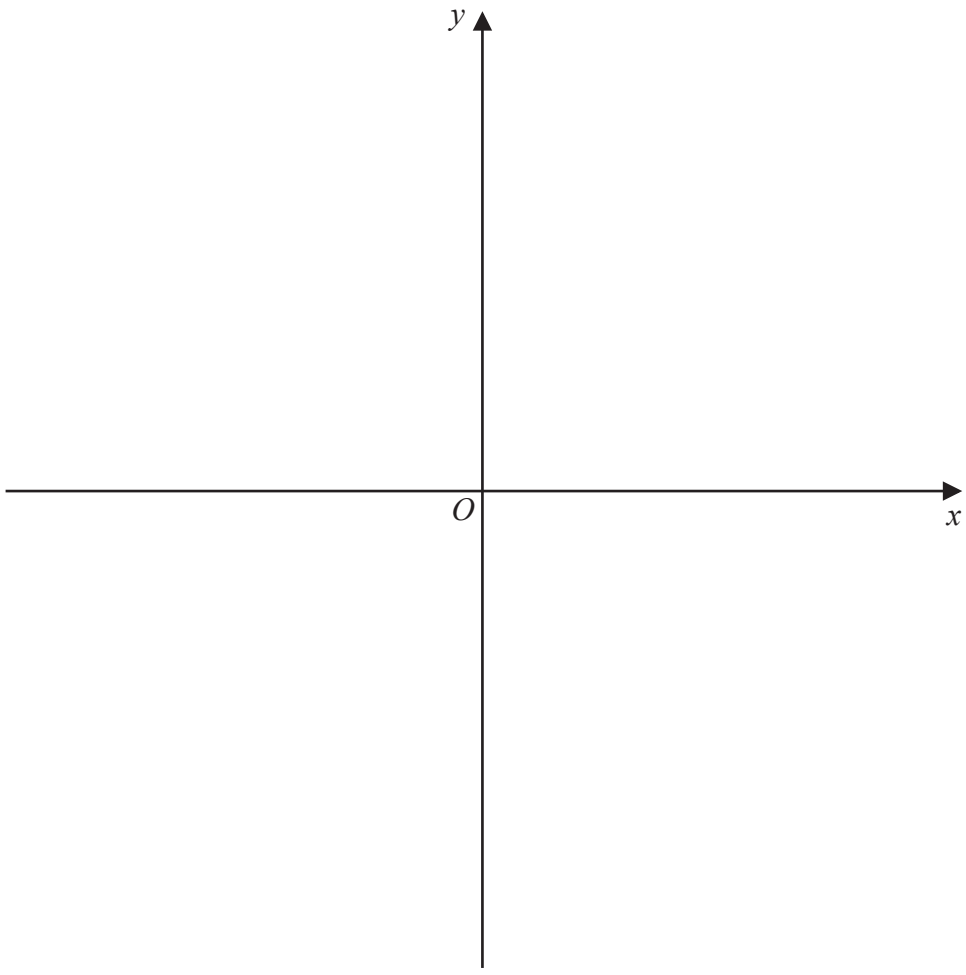
(b) On the grid above, draw the graph of $y = h(x + 2)$

(2)

(Total for Question 18 is 4 marks)

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

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



(Total for Question 19 is 4 marks)

TOTAL FOR PAPER IS 90 MARKS