

Write your name here

Surname

Other names

**Pearson  
Edexcel Award**

Centre Number

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Candidate Number

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**Algebra  
Level 3  
Calculator NOT allowed**

Monday 12 May 2014 – Morning  
**Time: 2 hours**

Paper Reference

**AAL30/01**

**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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**PEARSON**



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Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1 (a) Expand and simplify  $(3x + 2)(x - 2)$

.....  
(2)

(b) Simplify  $(x^{-2})^3$

.....  
(1)

(c) Simplify  $(4y^2)^{\frac{1}{2}}$

.....  
(1)

(d) Simplify  $\frac{x^2 - 9}{x^2 - 4x + 3}$

.....  
(3)

(Total for Question 1 is 7 marks)



2 (a) Complete the table of values for  $y = x^3 - 3x - 2$

$x$	-2	-1	0	1	2	3
$y$			-2	-4		

(2)

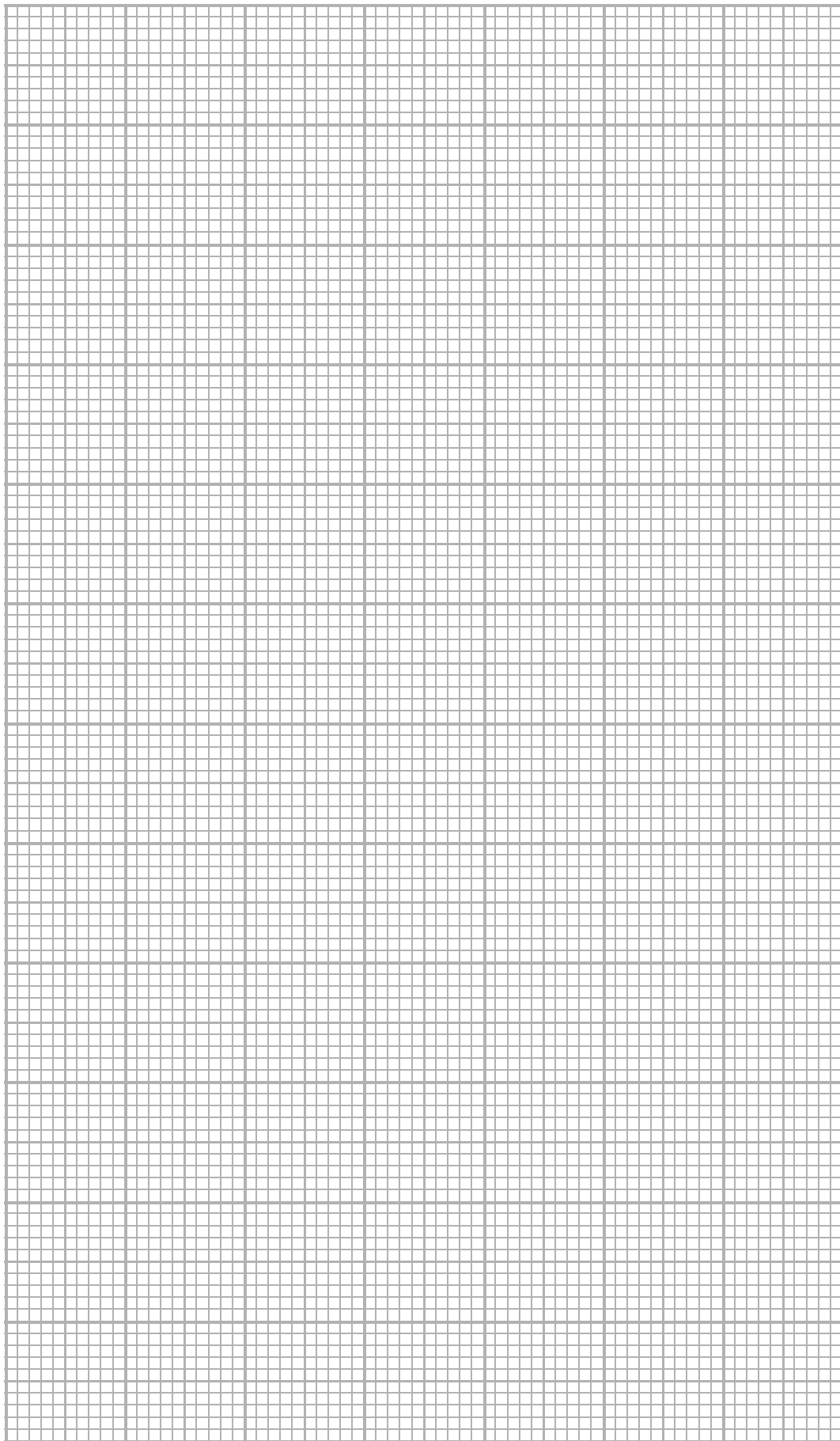
(b) On the grid opposite, draw the graph of  $y = x^3 - 3x - 2$  for values of  $x$  from -2 to 3

(2)

(c) Use your graph to find an estimate, to one decimal place, for the solution of  $x^3 - 3x = 5$

.....  
(2)





(Total for Question 2 is 6 marks)



3 The line **L** is given by the equation  $3y - 2x = 24$

(a) Write the equation for **L** in the form  $y = mx + c$

.....  
(2)

(b) Find an equation of the line parallel to line **L** and which passes through the point (3, 3).

.....  
(2)

**(Total for Question 3 is 4 marks)**

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4 Here is a formula

$$w = \frac{h(t^2 + 3t + 9)}{3}$$

(a) Find the value of  $w$  when  $h = 6$  and  $t = 3$

.....  
(2)

(b) Find the values of  $t$  when  $w = 36$  and  $h = 9$

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

.....  
(4)

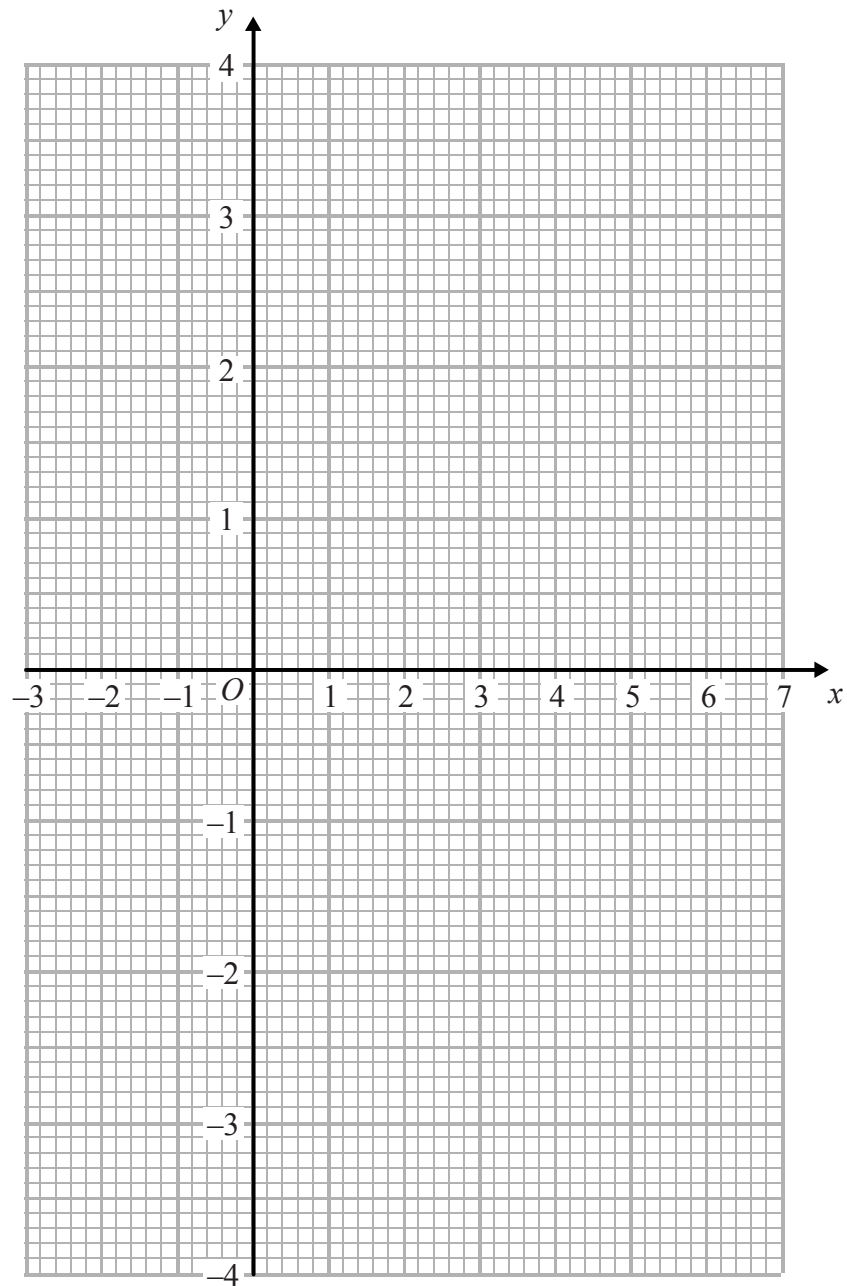
**(Total for Question 4 is 6 marks)**



5 On the grid, shade the region that satisfies all these inequalities

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

Label the region **R**.



(Total for Question 5 is 5 marks)





6 Here are the first four terms of an arithmetic sequence.

8      11      14      17

(a) Write an expression, in terms of  $n$ , for the  $n$ th term of this sequence.

.....  
(2)

(b) Find the difference between the 62nd term and the 63rd term of this sequence.

.....  
(1)

(c) Find the sum of the first 20 terms of this sequence.

.....  
(2)

**(Total for Question 6 is 5 marks)**

7 (a) Factorise  $14a^2b^3 - 21a^3b$

.....  
(2)

(b) Factorise  $xy - 2y + 5x - 10$

.....  
(2)

**(Total for Question 7 is 4 marks)**



8 Solve the simultaneous equations

$$x + 4y = 7$$

$$x^2 + 2y = 26$$

.....  
**(Total for Question 8 is 6 marks)**



9 Solve  $x^2 - 5x + 4 < 0$

.....  
(Total for Question 9 is 3 marks)

10 For a quadratic equation

the sum of its roots is  $-2.5$

the product of its roots is  $3.5$

Write the quadratic equation in the form  $ax^2 + bx + c = 0$  where  $a$ ,  $b$  and  $c$  are integers.

.....  
(Total for Question 10 is 3 marks)



11 (a) Write the quadratic expression  $x^2 - 7x + 6$  in the form  $(x + a)^2 + b$  where  $a$  and  $b$  are fractions.

.....  
(2)

(b) Sketch the graph of  $y = x^2 - 7x + 6$   
You must label, with coordinates, the points of intersection with the axes and any turning points.

(3)

(Total for Question 11 is 5 marks)



12 Make  $g$  the subject of the formula  $h = \frac{3g + 2}{g - 4}$

.....  
(Total for Question 12 is 4 marks)

13 (a) Work out the discriminant of  $3x^2 + 5x + 18 = 10$

.....  
(3)

(b) State what your answer tells you about the roots of  $3x^2 + 5x + 18 = 10$

(1)

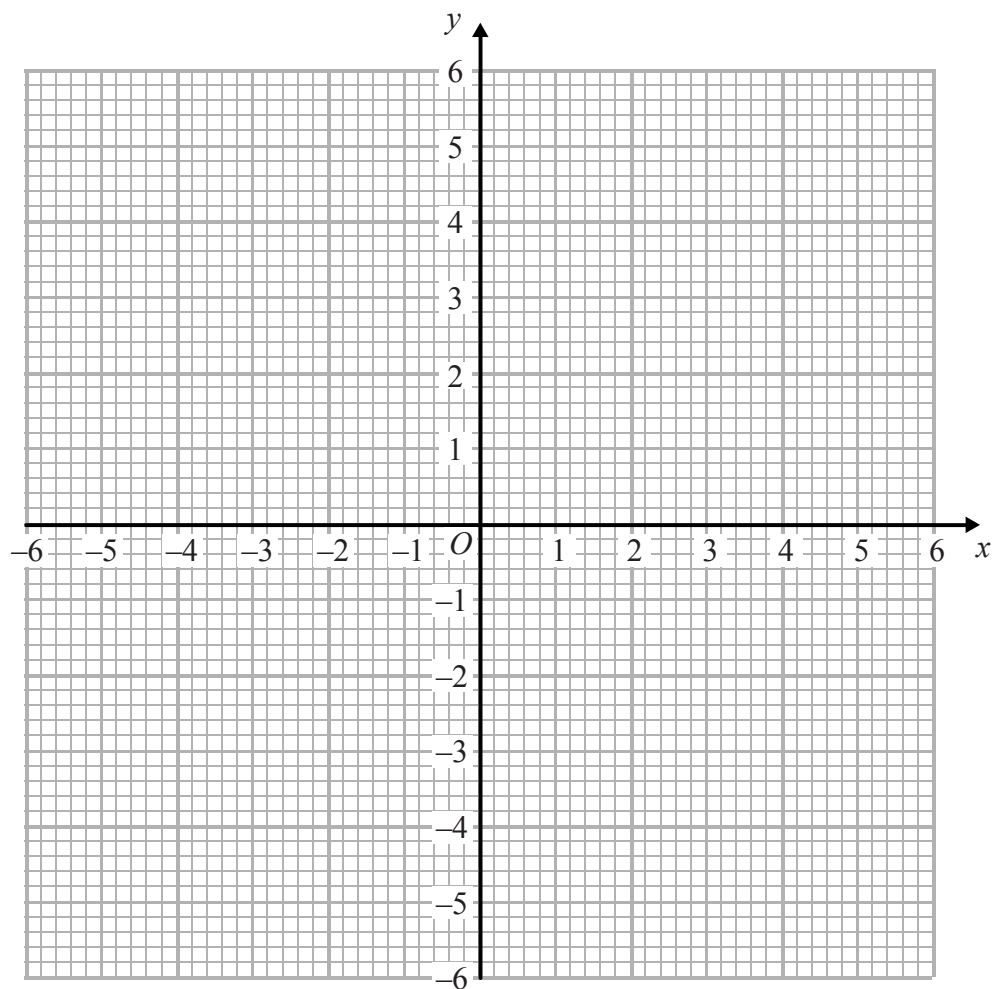
(Total for Question 13 is 4 marks)



- 14 The first term of an arithmetic series is 4  
The sum of the first 40 terms is 2500  
Work out the common difference of the series.

(Total for Question 14 is 3 marks)

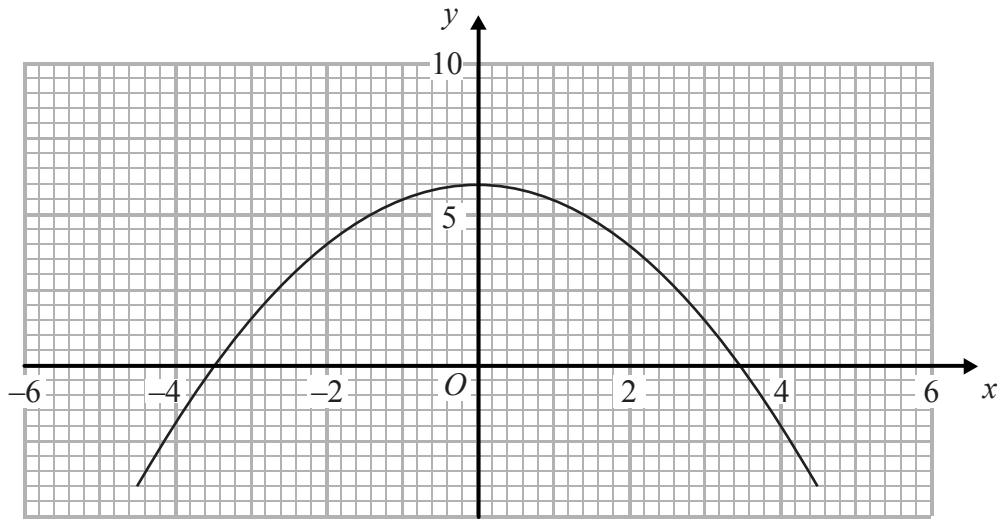
- 15 On the grid, construct the graph of  $x^2 = 9 - y^2$



(Total for Question 15 is 3 marks)



16



Use the trapezium rule to find the area of the region under the curve and between  $x = 0$ ,  $y = 0$  and  $x = 3$   
Use 3 strips of equal width.

.....  
(Total for Question 16 is 3 marks)



17 (a) Write  $1 + \frac{1}{\sqrt{5}}$  as a single fraction.

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

.....  
(3)

(b) Rationalise the denominator of  $\frac{20}{4 + \sqrt{6}}$

Give your answer in the form  $m + k\sqrt{n}$  where  $m$ ,  $k$  and  $n$  are integers.

.....  
(3)

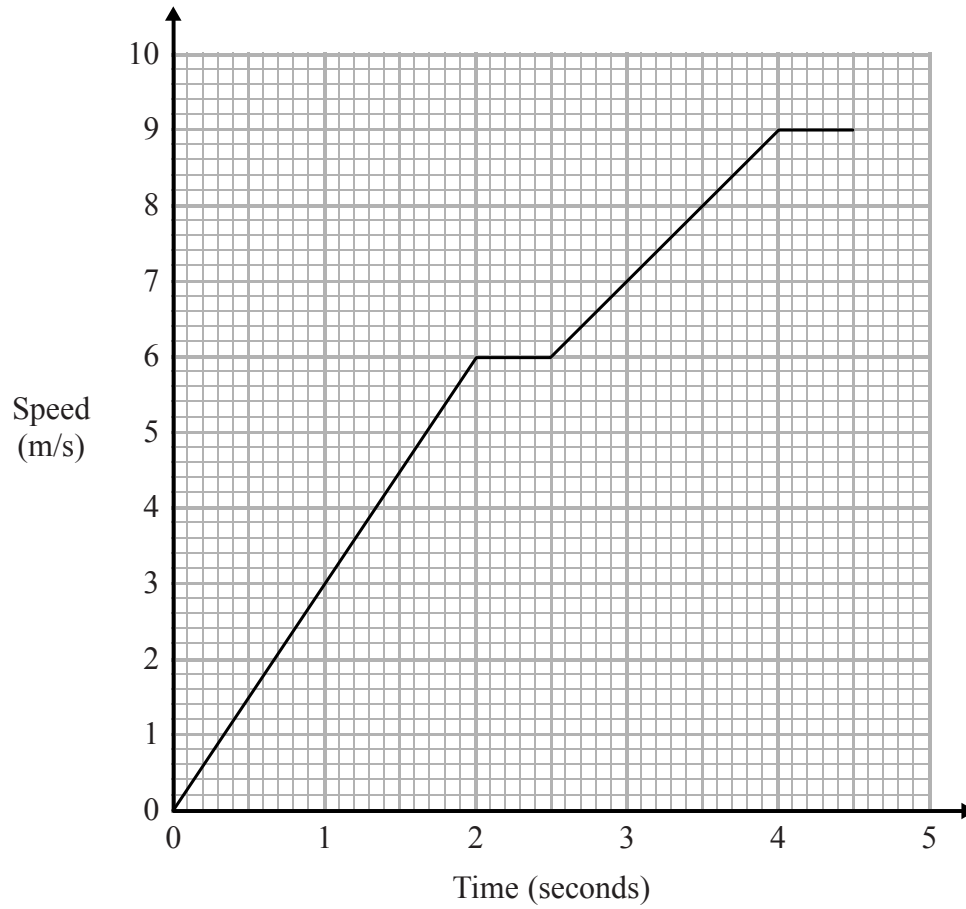
**(Total for Question 17 is 6 marks)**

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18 Here is a speed-time graph.



(a) Work out the acceleration during the first 2 seconds.

..... m/s<sup>2</sup>  
(2)

(b) Work out the total distance travelled in the first 3 seconds.

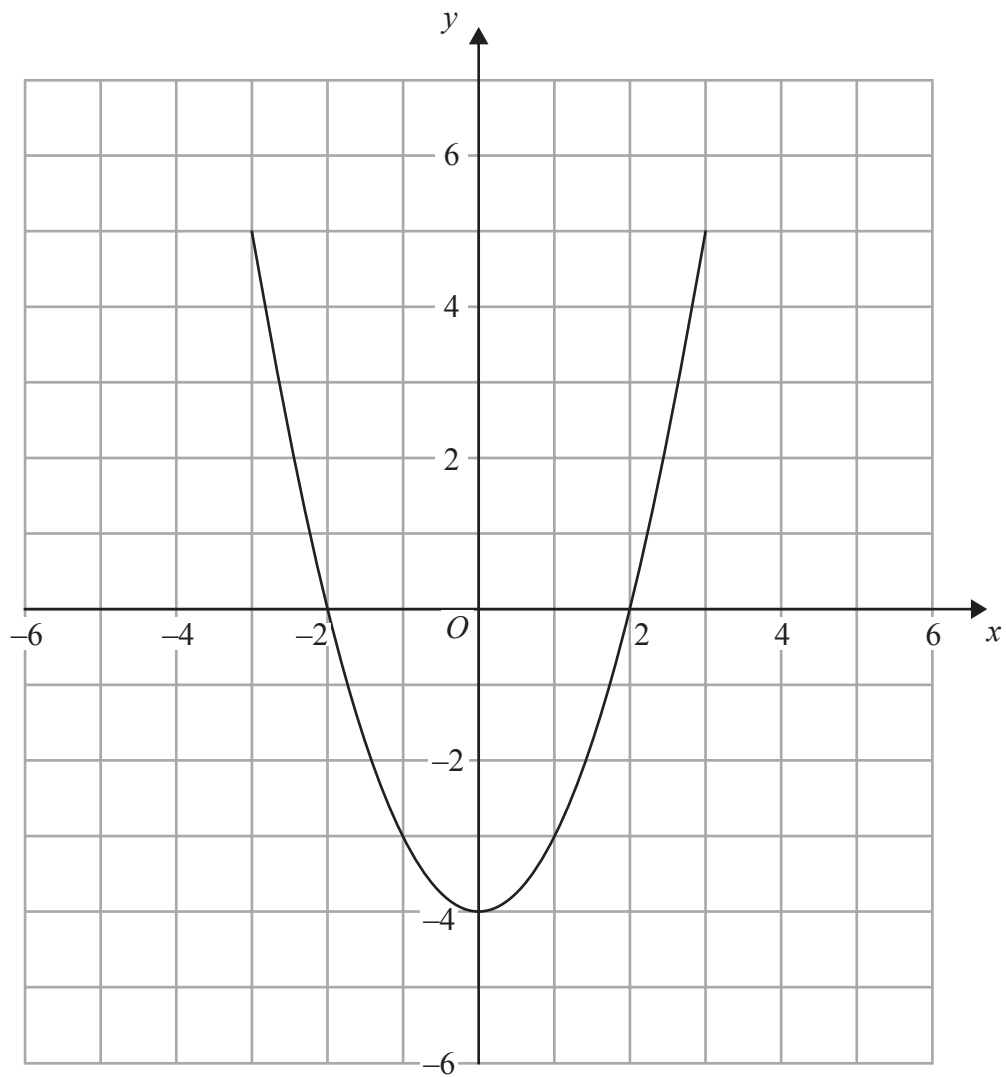
..... m  
(3)

(Total for Question 18 is 5 marks)



19 The graph of  $y = f(x)$  is shown on the grid.

(a) On the grid, sketch the graph of  $y = f(x) + 2$

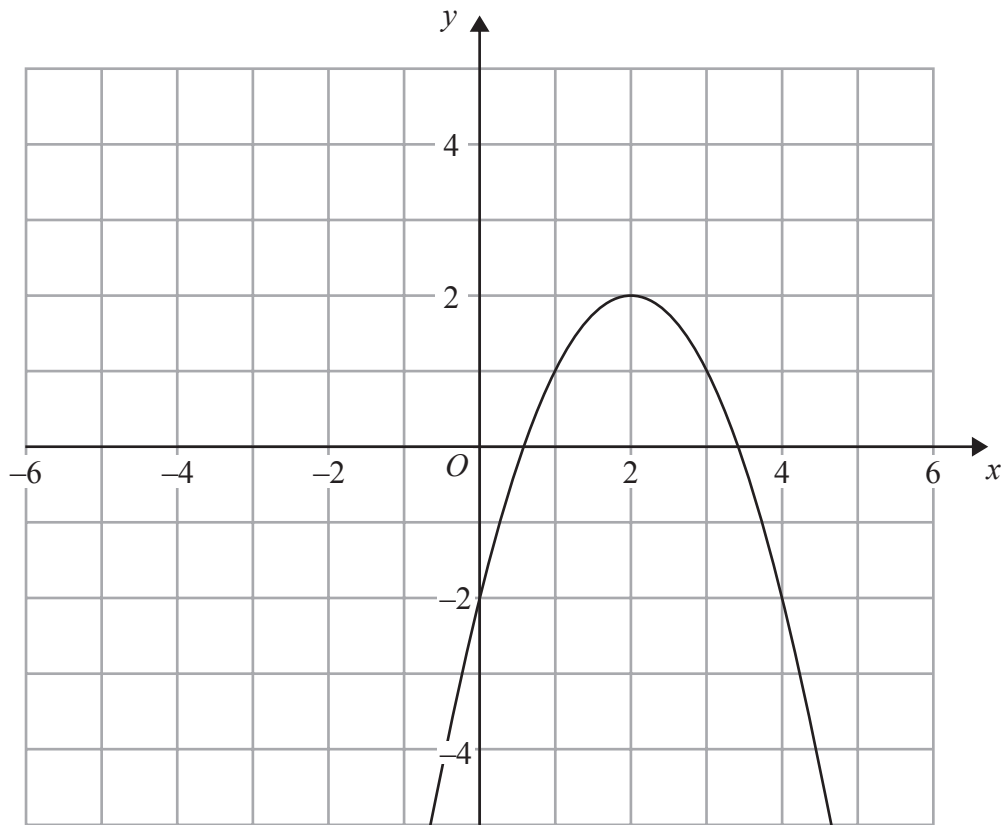


(2)



The graph of  $y = g(x)$  is shown on the grid below.

(b) On the grid, sketch the graph of  $y = g(-x)$



(2)

(Total for Question 19 is 4 marks)



20 Given that  $y \propto \frac{1}{x^2}$ , complete the table of values.

$x$	1	2	3	4
$y$				0.75

(Total for Question 20 is 4 marks)

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**TOTAL FOR PAPER IS 90 MARKS**

