

Edexcel

Award in Algebra

Level 3

Practice Paper

Time: 2 hours



You must have:

Ruler graduated in centimetres and millimetres, pen, HB pencil, eraser, pair of compasses.

Instructions

- Use **black** ink or ball-point pen.
- Answer **all** questions.
- Answer the questions in the shaded boxes provided.
– *there may be more space than you need.*
- Write your answer on the answer line where shown.

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.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages of your working.

1 (a) Simplify $(p^4)^{-3}$

.....
(1)

(b) Simplify $t^{\frac{3}{2}} \times t$

.....
(1)

(c) $2x^{-2}(3x^2 - x) = a + bx^n$ for all values of x .

Find the value of a , the value of b and the value of n .

$a =$

$b =$

$n =$

(3)

(Total for Question 1 is 5 marks)

2 (a) Expand and simplify $(4x - 1)(4x + 1)$

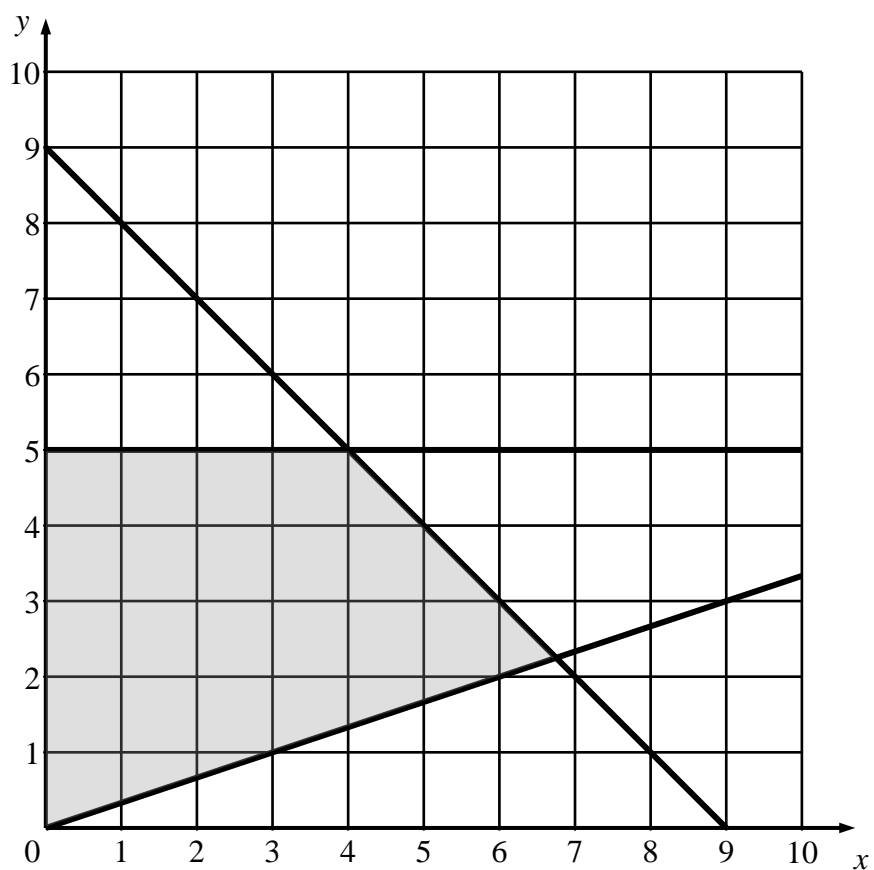
.....
(2)

(b) Solve the equation $(5x - 1)^2 = 4$

.....
(3)

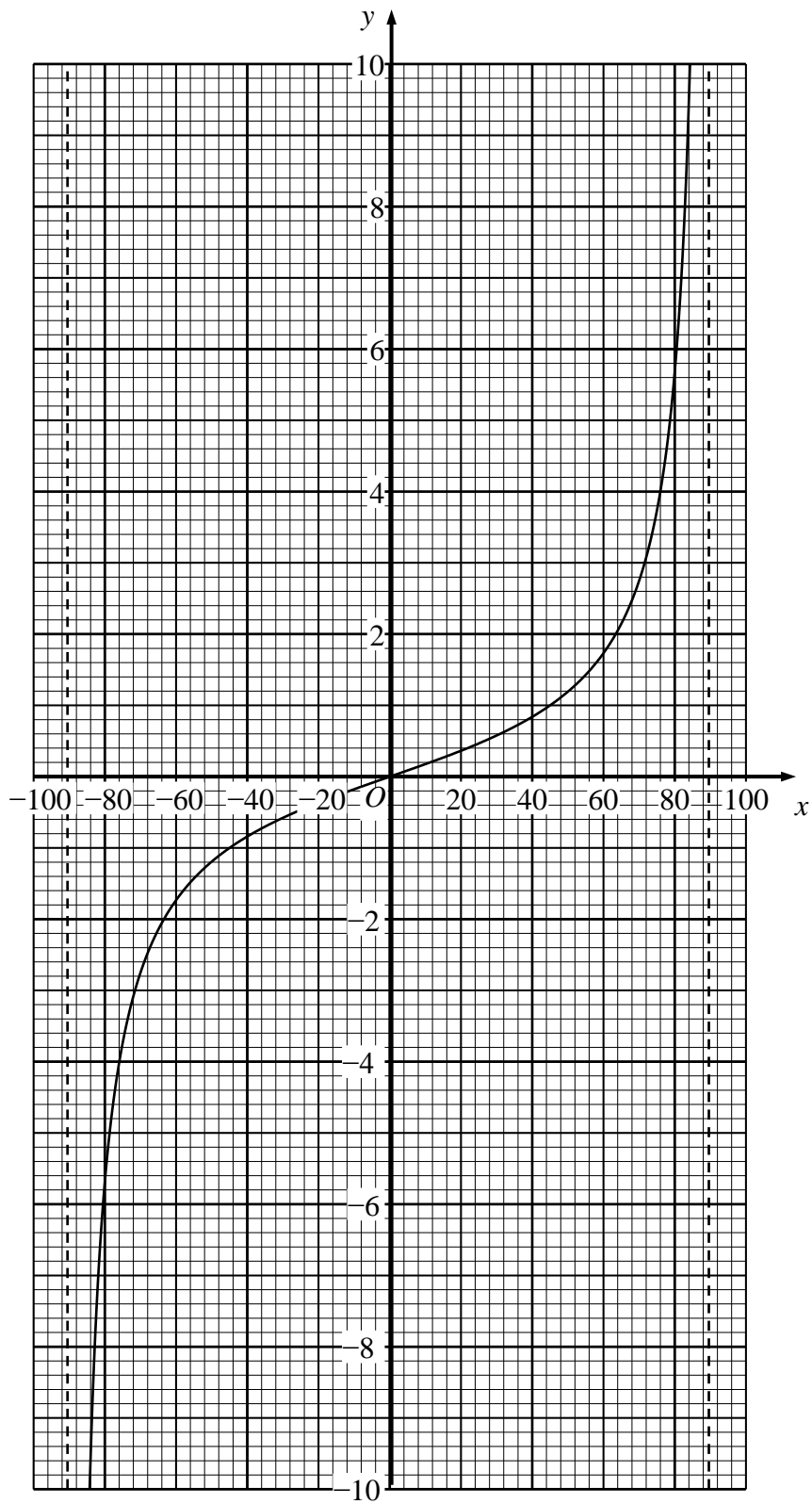
(Total for Question 2 is 5 marks)

3 Write down the 4 inequalities that are satisfied by all points in the shaded region.



(Total for Question 3 is 4 marks)

4 Here is part of the graph of $y = \tan x^\circ$.



Use the graph to find a solution of the equation $2 \tan x^\circ = 5$

.....

(Total for Question 4 is 2 marks)

5 (a) Solve

$$x^2 - 2x - 4 = 0$$

Give your solutions in surd form.

.....
(2)

(b) Solve

$$x^2 - 2x - 4 \leq 0$$

Give your solutions in surd form.

.....
(2)

(Total for Question 5 is 4 marks)

6 (a) The equation $px^2 - 4px + 8 = 0$ has 2 equal roots.

(i) Find the value of p .

(ii) For this value of p , solve the equation.

(4)

(b) $qx^2 + 3qx + 12 = 0$ is 1.5

The product of the roots of this equation is 1.5

(i) Find the value of q .

(ii) Find the sum of the roots.

(3)

(Total for Question 6 is 7 marks)

7 (a) Factorise $x^2 - 4x - 12$

.....
(2)

(b) Simplify fully $\frac{3x - x^2}{x^2 - 9} \div \frac{2x + 6}{(x + 3)^2}$

.....
(4)

(Total for Question 7 is 6 marks)

- 8** The straight line L_1 passes through the points P and Q with coordinates $(1, 5)$ and $(3, 2)$ respectively.

The line L_2 is perpendicular to the line L_1 and passes through the point P .

Find the equation of the line L_2

Give your answer in the form $y = mx + c$

.....

(Total for Question 8 is 4 marks)

9

$$a = p + \sqrt{\frac{c}{n}}$$

(a) Make c the subject of the formula.

.....
(3)

$$y = \frac{x-1}{2x}$$

(b) Make x the subject of the formula.

.....
(3)

(Total for Question 9 is 6 marks)

10 (a) Simplify $\sqrt{5}\left(\sqrt{5}-\frac{1}{\sqrt{5}}\right)$

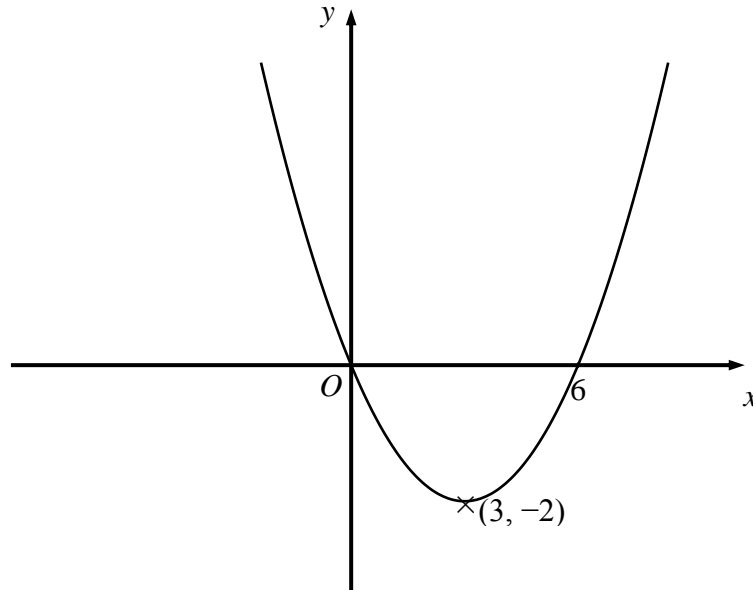
(2)

(b) Write $\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{8}}$ in the form $\frac{a}{b}\sqrt{2}$ where a and b are integers.

.....
(4)

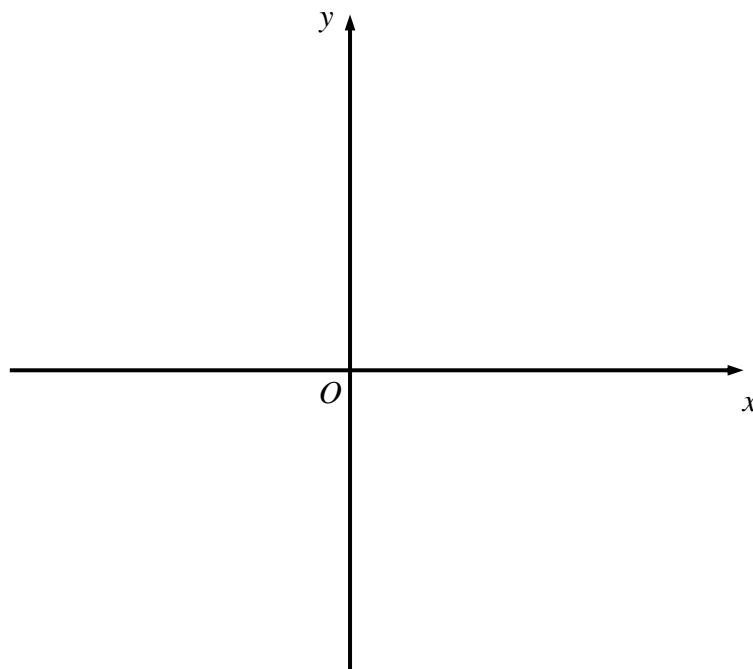
(Total for Question 10 is 6 marks)

11 Here is a sketch graph of $y = f(x)$.



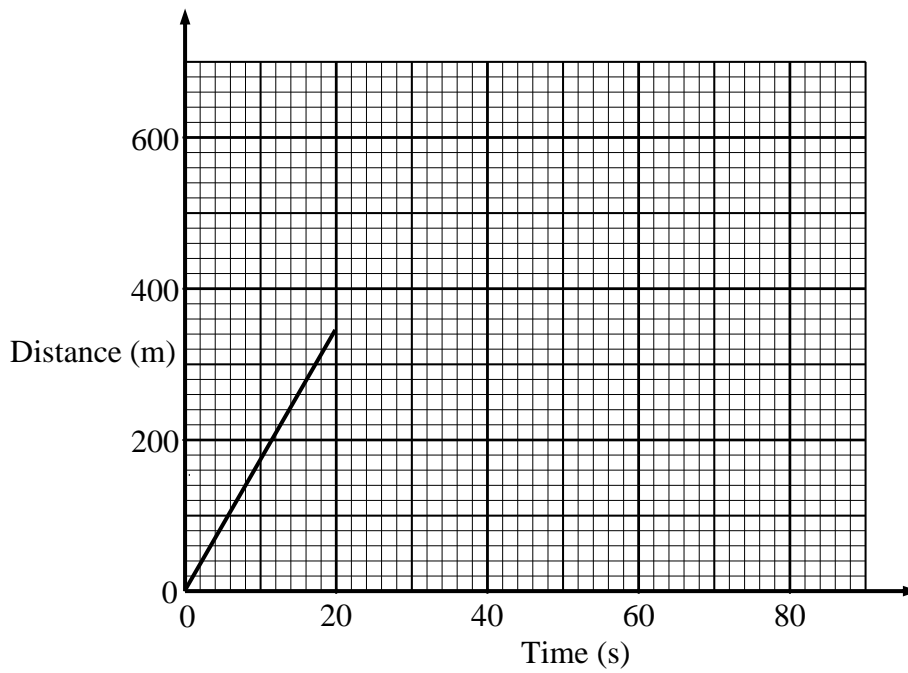
On the axes below, sketch the graph of $y = -2f(x)$.

On your sketch, show the coordinates of any points where the curve intersects the x -axis and of any turning points.



(Total for Question 11 is 3 marks)

12 Here is part of a distance–time graph of a bus.



(a) Calculate the speed of the bus during the first 20 seconds.

..... m/s
(2)

After 20 seconds the bus travels at a speed of 5.5 m/s for a further 40 seconds.

(b) Show this information on the distance–time graph.

(2)

(Total for Question 12 is 4 marks)

13 The first term of an arithmetic series is 5
The common difference of the same series is 2.5

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

.....
(2)

The common difference of a different arithmetic series is -5
The sum of the first 40 terms of this arithmetic series is 6100

(b) Work out the first term of this series.

.....
(3)

(Total for Question 13 is 5 marks)

14 y is inversely proportional to the square root of x .

When $x = 64$, $y = 2$

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

(3)

(b) Calculate the value of x when $y = 80$

.....
(2)

(Total for Question 14 is 5 marks)

15 A curve has equation $y = \frac{1}{x-2}$.

(a) Find the coordinates of the point where the graph of $y = \frac{1}{x-2}$ intersects the y-axis.

.....
(1)

The graph of $y = \frac{1}{x-2}$ has two asymptotes.

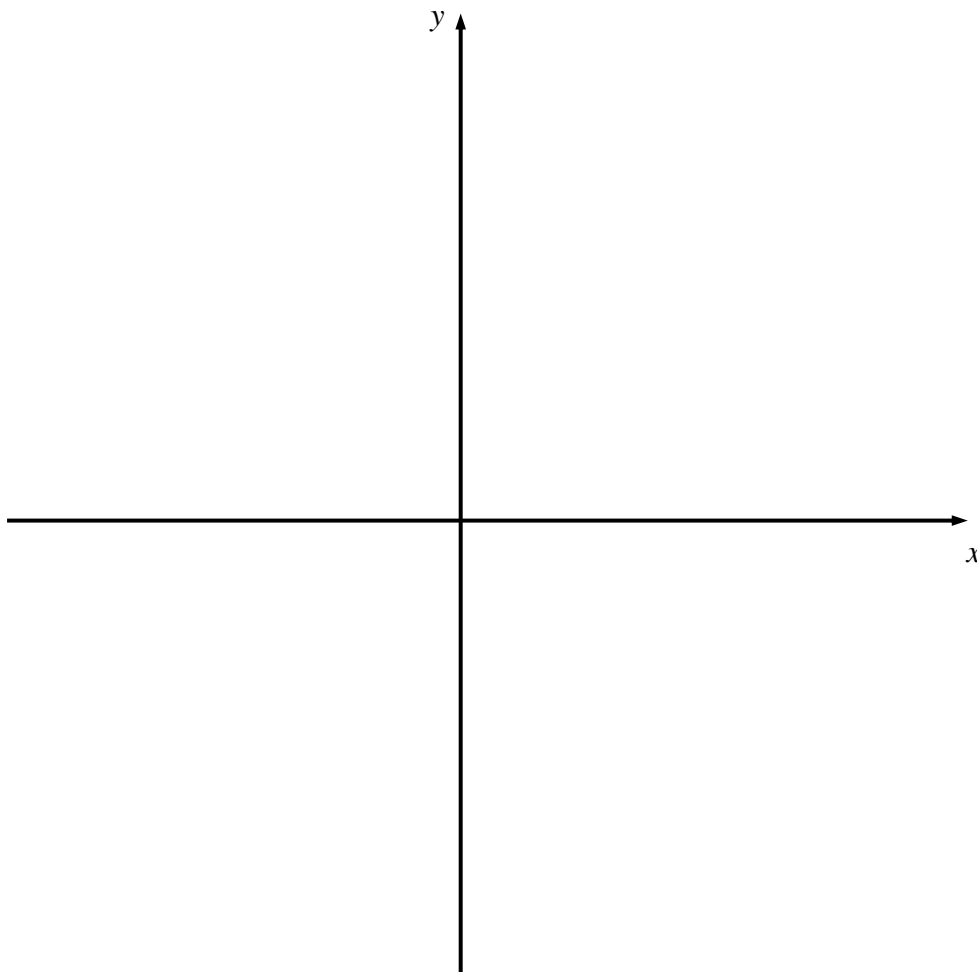
(b) Find an equation of the asymptote to the curve which is parallel to

- (i) the x-axis,
- (ii) the y-axis.

.....
.....
(2)

(c) On the axes below, sketch the graph of $y = \frac{1}{x-2}$.

Show the asymptotes and label the points where the curve crosses the y-axis.



(2)

(Total for Question 15 is 5 marks)

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

x	0	1	2	3	4	5
y						

(2)

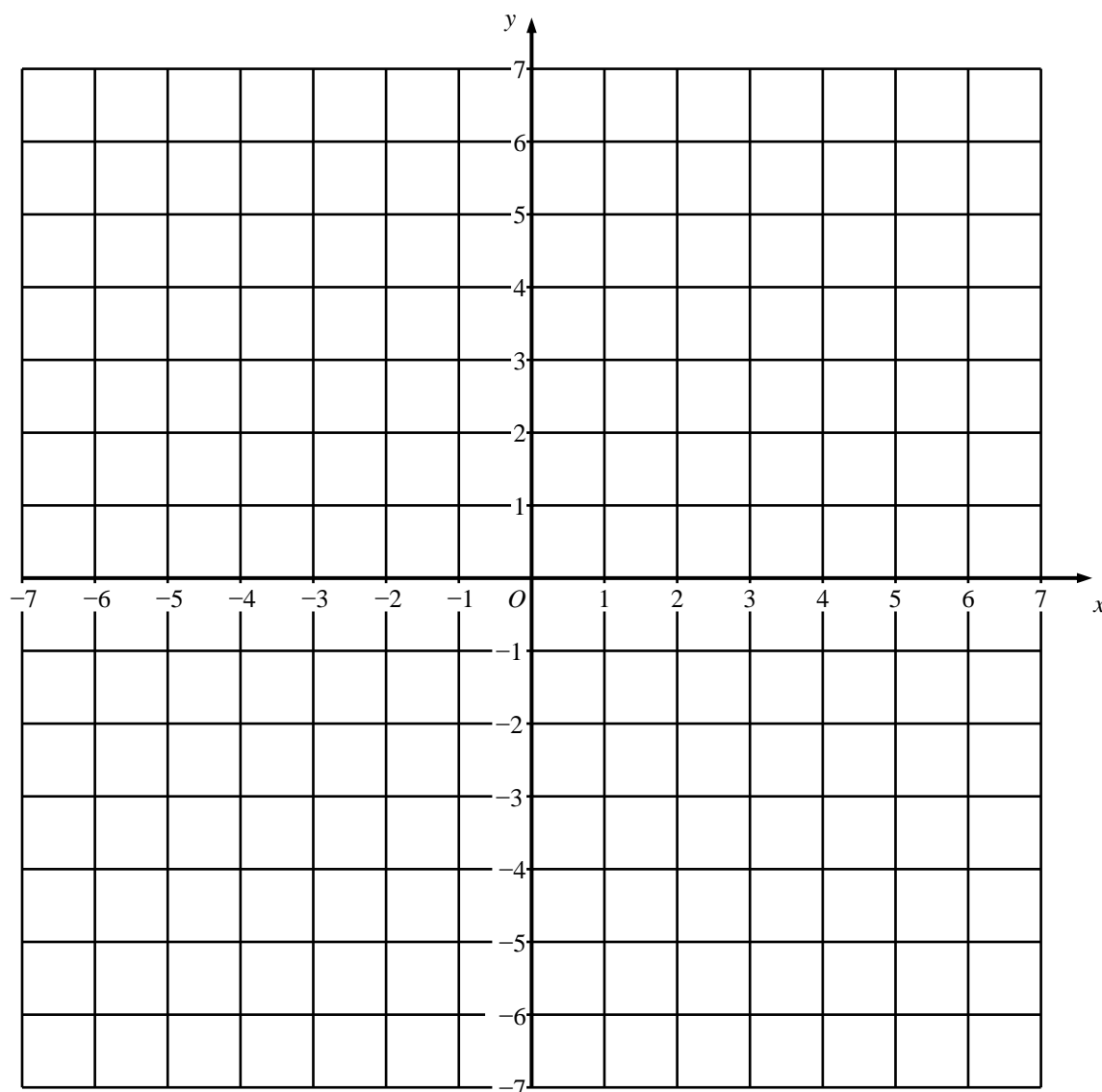
(b) Use the trapezium rule to find an estimate of the area of the region under the curve with equation $y = 2^x$ and between $x = 0$ and $x = 5$

Use 5 strips of equal width.

(3)

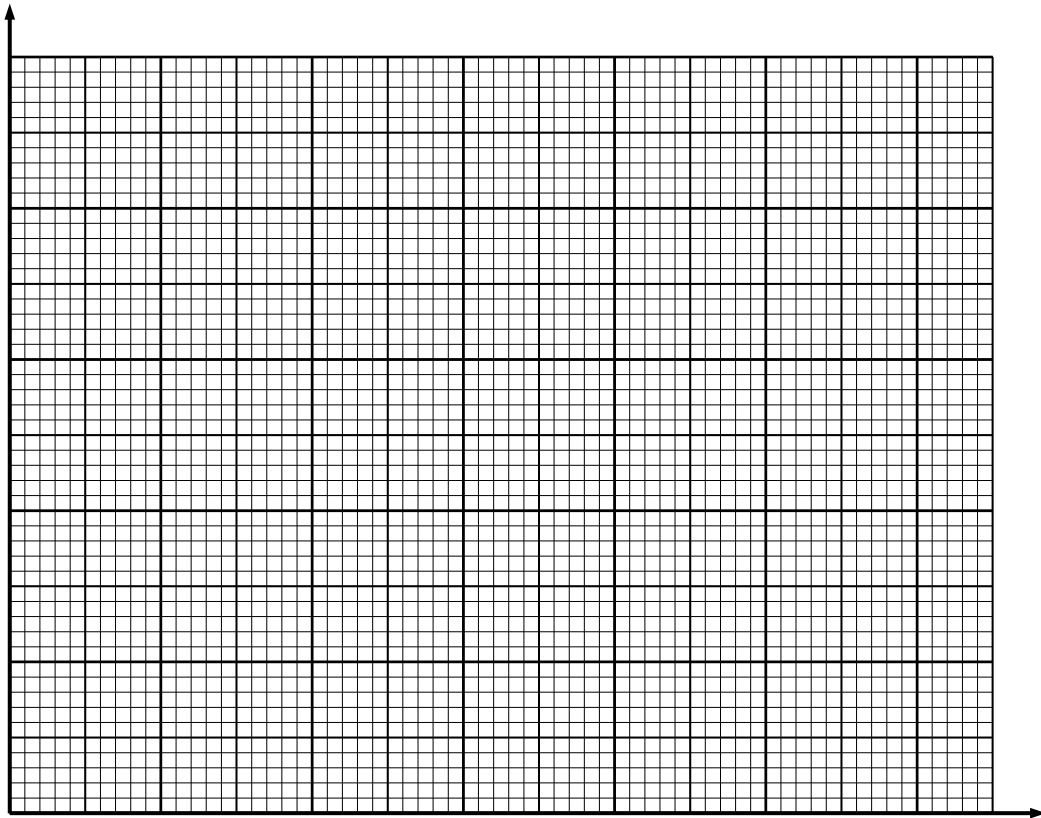
(Total for Question 16 is 5 marks)

17 On the grid, draw the graph of $(x - 2)^2 + (y + 1)^2 = 9$



(Total for Question 17 is 3 marks)

18 A car accelerates from rest at 5 m/s^2 for 3 seconds , travels with constant speed for 5 seconds and decelerates at 2 m/s^2 for 2 seconds.



(a) Draw a speed-time graph to show this information.

(3)

(b) Find the total distance travelled by the car in the 10 seconds.

.....
(3)

(Total for Question 18 is 6 marks)

19 Solve the simultaneous equations

$$x + y = 6$$

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

.....

(Total for Question 19 is 5 marks)

TOTAL FOR PAPER IS 90 MARKS