Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						5	5	4	0	H	/	4	H	Signature	

Paper Reference(s)

5540H/4H

Examiner's use only

Team Leader's use only

Edexcel GCSE

Mathematics A (Linear) – 2540

Paper 4 (Calculator)

Higher Tier

Wednesday 12 November 2008 – Morning

Time: 1 hour 45 minutes

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 27 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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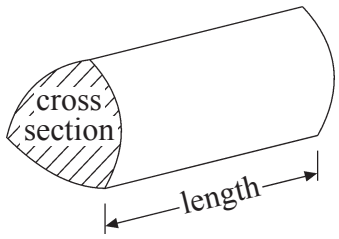
GCSE Mathematics (Linear) 2540

Formulae: Higher Tier

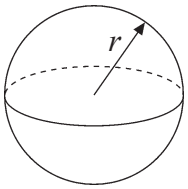
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



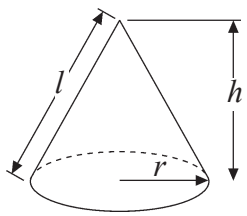
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

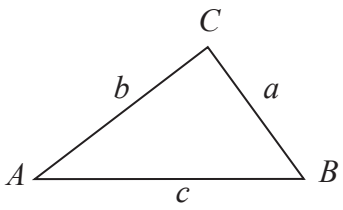


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle ABC



Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Leave blank

Answer ALL TWENTY SEVEN questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here are the ingredients for making cheese pie for 6 people.

Cheese pie for **6** people
180 g flour
240 g cheese
80 g butter
4 eggs
160 m*l* milk

Bill makes a cheese pie for 3 people.

(a) Work out how much flour he needs.

..... g
(2)

Jenny makes a cheese pie for 15 people.

(b) Work out how much milk she needs.

..... m*l*
(2)

Q1

(Total 4 marks)

Leave blank

2. Use a calculator to work out

$$\sqrt{\frac{21.6 \times 15.8}{3.8}}$$

(a) Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 3 significant figures.

.....

(1)

Q2

(Total 3 marks)

3. The cost of a radio is the list price plus VAT at $17\frac{1}{2}$ %.

The list price of a radio is £240

Work out the cost of the radio.

£ .....

Q3

(Total 3 marks)

Leave blank

4. (a) Expand $4(x - 3)$

.....

(1)

(b) Solve $4t + 1 = 19$

$t =$ .....

(2)

Q4

(Total 3 marks)

5. The nth term of a sequence is $n^2 + 4$

Alex says

"The nth term of the sequence is always a prime number when n is an odd number."

Alex is wrong.

Give an example to show that Alex is wrong.

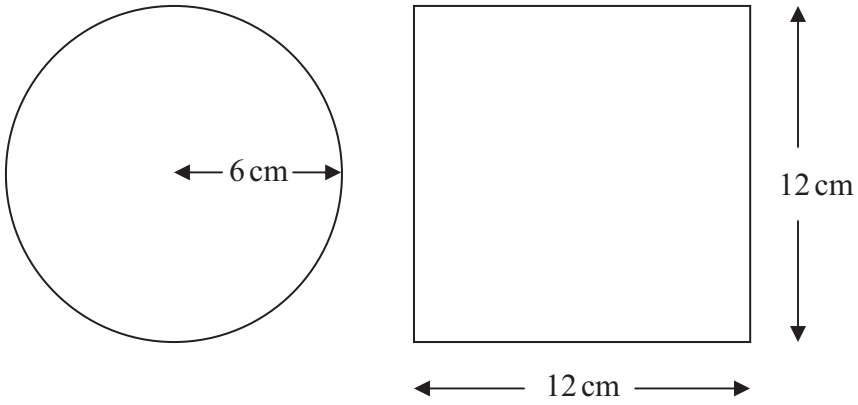
Q5

(Total 2 marks)

Leave blank

6.

Diagram **NOT** accurately drawn



A circle has a radius of 6 cm.

A square has a side of length 12 cm.

Work out the difference between the area of the circle and the area of the square.
Give your answer correct to one decimal place.

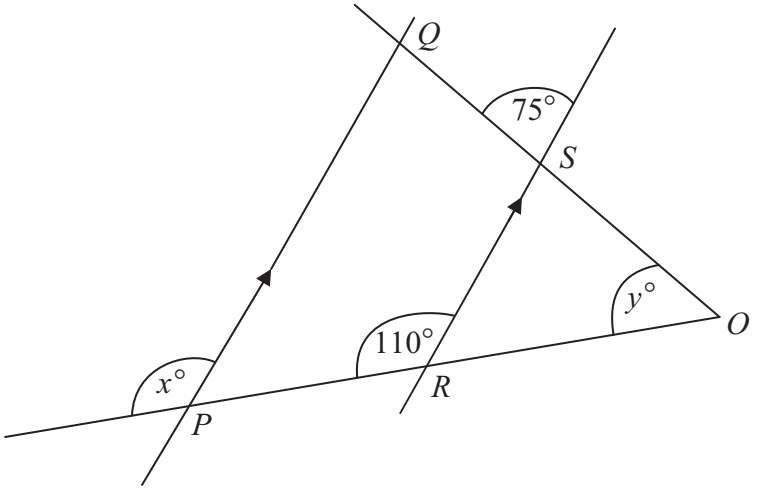
..... cm^2 **Q6**

(Total 4 marks)

Leave blank

7.

Diagram **NOT** accurately drawn



PQ is parallel to *RS*.

OSQ and *ORP* are straight lines.

(a) (i) Write down the value of *x*.

x = ...

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the value of *y*.

y = ...

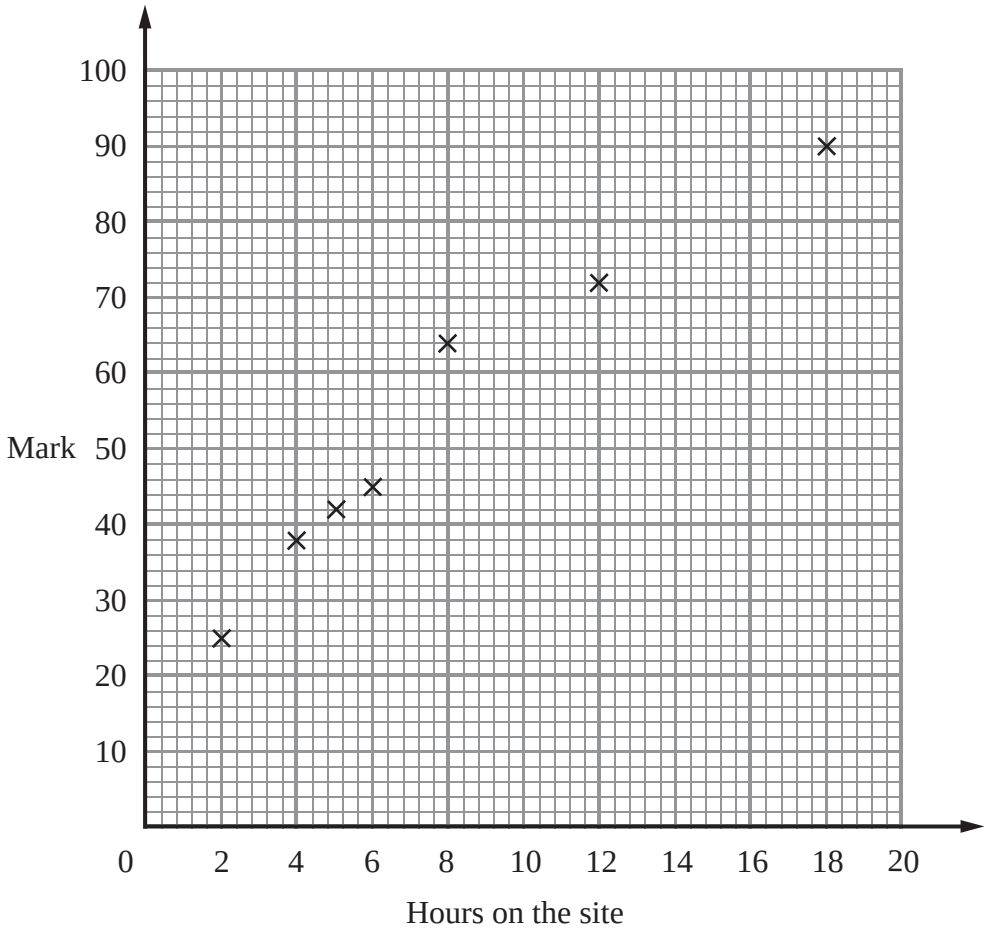
(2)

Q7

(Total 4 marks)

Leave blank

8. Some students revised for a mathematics exam.
They used an internet revision site.
The scatter graph shows the times seven students spent on the internet revision site and the marks the students got in the mathematics exam.



Here is the information for 3 more students.

Hours on the site	7	10	16
Mark	50	56	78

(a) Plot this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

.....

(1)

(c) Draw a line of best fit on the scatter graph.

(1)

Leave blank

A student spent 11 hours on the internet revision site.

(d) Use the line of best fit to estimate this student's mathematics exam mark.

.....

(1) **Q8**

(Total 4 marks)

9. Jack invests £3000 for 2 years at 4% per annum compound interest.

Work out the value of the investment at the end of 2 years.

£ **Q9**

(Total 3 marks)

10. Jason collected some information about the heights of 19 plants.

This information is shown in the stem and leaf diagram.

1	1	2	3	3		
2	3	3	5	9	9	
3	0	2	2	6	6	7
4	1	1	4	8		

Key 4|8 means 48 mm

Find the median.

..... mm **Q10**

(Total 2 marks)

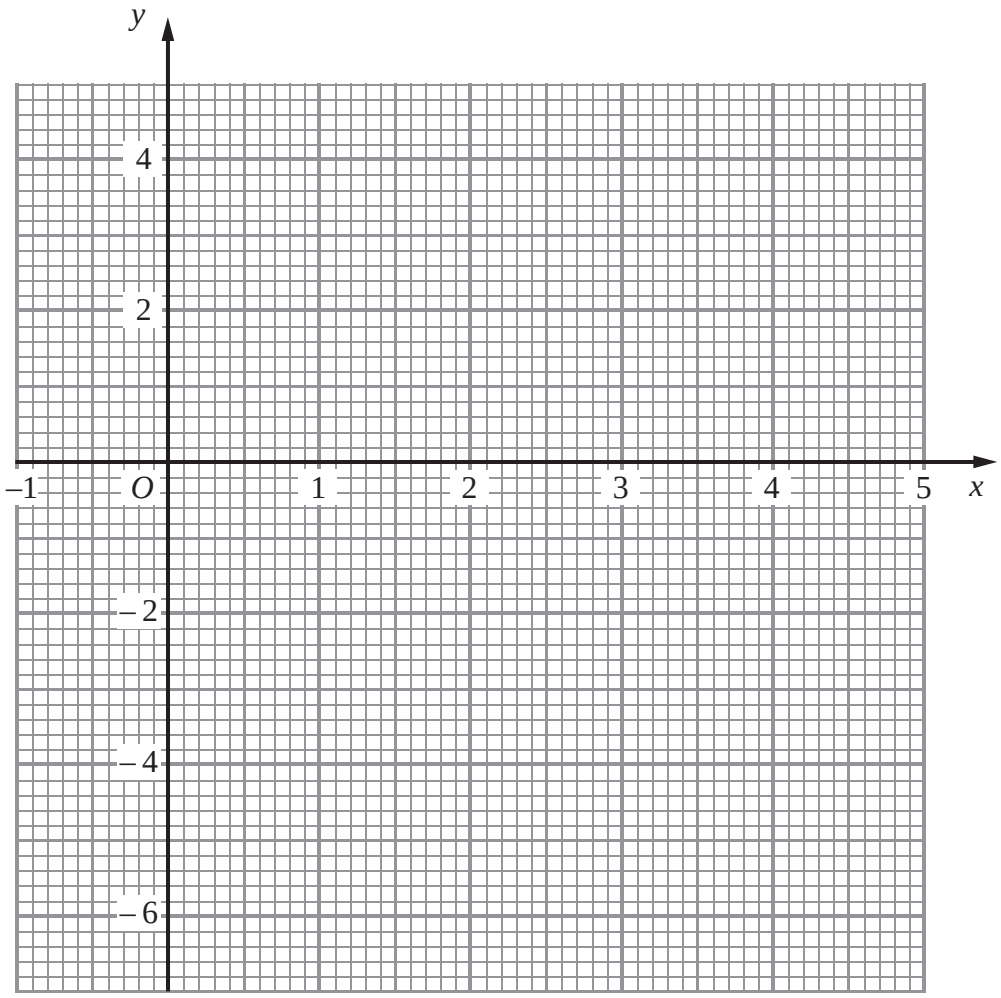
Leave blank

11. (a) Complete the table of values for $y = x^2 - 4x - 2$

x	–1	0	1	2	3	4	5
y		–2	–5			–2	3

(2)

(b) On the grid, draw the graph of $y = x^2 - 4x - 2$



(2)

(c) Use your graph to estimate the values of x when $y = –3$

$x =$ .....

$x =$ .....

(2) **Q11**

(Total 6 marks)

Leave blank

12. (a) Draw the locus of all points which are equidistant from the points *A* and *B*.

(2)

(b) Draw the locus of all points that are exactly 3 cm from the line *PQ*.

(2) **Q12**

(Total 4 marks)

Leave blank

13. Find the Lowest Common Multiple (LCM) of 24 and 36

.....

Q13

(Total 2 marks)

14. (a) Expand and simplify $3(x + 4) + 5(2x + 1)$

.....

(2)

(b) Simplify $t^4 \times t^6$

.....

(1)

(c) Simplify $p^8 \div p^5$

.....

(1)

(d) Simplify $(x^4)^3$

.....

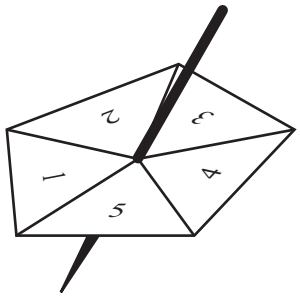
(1)

Q14

(Total 5 marks)

Leave blank

15. Here is a 5-sided spinner.



The sides of the spinner are labelled 1, 2, 3, 4 and 5
The spinner is biased.
The probability that the spinner will land on each of the numbers 1, 2, 3 and 4 is given in the table.

Number	1	2	3	4	5
Probability	0.15	0.05	0.2	0.25	x

Work out the value of x.

$x =$ .....

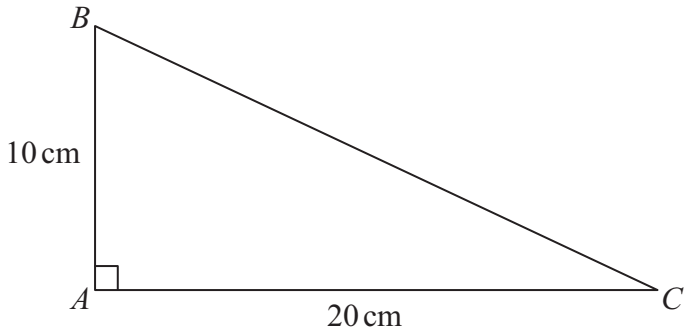
Q15

(Total 2 marks)

Leave blank

16.

Diagram **NOT** accurately drawn



In triangle *ABC*,

AB = 10 cm
AC = 20 cm
angle *BAC* = 90°

Work out the length of *BC*.
Give your answer correct to 3 significant figures.
You must state the units in your answer.

....

Q16

(Total 4 marks)

Leave blank

17. Majid carried out a survey of the number of school dinners 32 students had in one week.

The table shows this information.

Number of school dinners	Frequency	
0	0	
1	8	
2	12	
3	6	
4	4	
5	2	

Calculate the mean.

.....

Q17

(Total 3 marks)

18. The value of a car depreciates by 35% each year.

At the end of 2007 the value of the car was £5460

Work out the value of the car at the end of 2006

£ .....

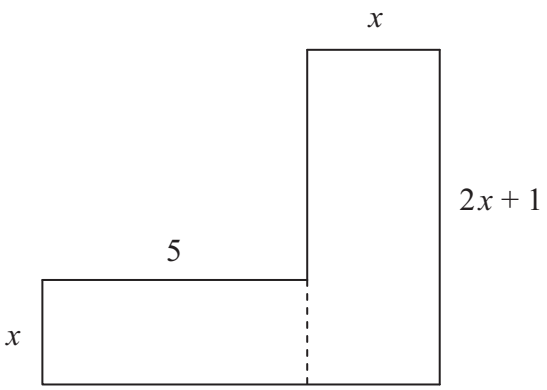
Q18

(Total 3 marks)

Leave blank

19. The diagram below shows a 6-sided shape.
All the corners are right angles.
All the measurements are given in centimetres.

Diagram **NOT** accurately drawn



The area of the shape is 95 cm^2.

(a) Show that $2x^2 + 6x - 95 = 0$

(3)

(b) Solve the equation

$$2x^2 + 6x - 95 = 0$$

Give your solutions correct to 3 significant figures.

x = ... or x = ...

(3) **Q19**

(Total 6 marks)

Leave blank

20. The nth even number is $2n$.

The next even number after $2n$ is $2n + 2$

(a) Explain why.

.....

.....

(1)

(b) Write down an expression, in terms of n, for the next even number after $2n + 2$

.....

(1)

(c) Show algebraically that the sum of any 3 consecutive even numbers is always a multiple of 6

(3)

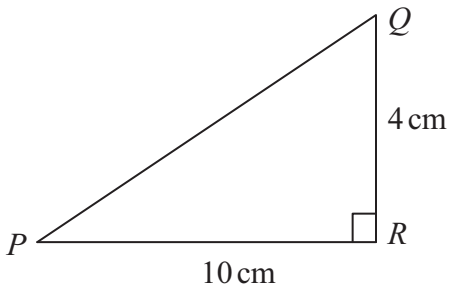
Q20

(Total 5 marks)

Leave blank

21.

Diagram **NOT** accurately drawn



PQR is a right-angled triangle.

QR = 4 cm
PR = 10 cm

Work out the size of angle *RPQ*.
Give your answer correct to 3 significant figures.

..... °

Q21

(Total 3 marks)

22. *D* is proportional to S^2.

D = 900 when *S* = 20

Calculate the value of *D* when *S* = 25

D = ...

Q22

(Total 4 marks)

Leave blank

23. A ball is thrown vertically upwards with a speed V metres per second.

The height, H metres, to which it rises is given by

$$H = \frac{V^2}{2g}$$

where g m/s^2 is the acceleration due to gravity.

V = 24.4 correct to 3 significant figures.
g = 9.8 correct to 2 significant figures.

(i) Write down the lower bound of g.

.....

(ii) Calculate the upper bound of H.
Give your answer correct to 3 significant figures.

.....

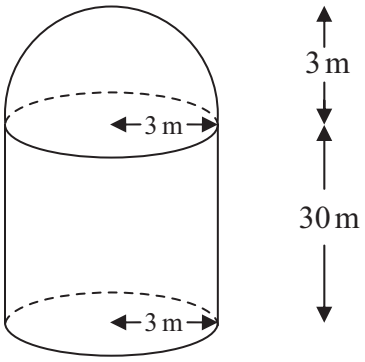
Q23

(Total 3 marks)

Leave blank

24. The diagram shows a storage tank.

Diagram **NOT** accurately drawn



The storage tank consists of a hemisphere on top of a cylinder.

The height of the cylinder is 30 metres.
The radius of the cylinder is 3 metres.
The radius of the hemisphere is 3 metres.

(a) Calculate the total volume of the storage tank.
Give your answer correct to 3 significant figures.

..... m^3
(3)

A sphere has a volume of $500\,m^3$.

(b) Calculate the radius of the sphere.
Give your answer correct to 3 significant figures.

..... m
(3)
(Total 6 marks)

Q24

Leave blank

25.

	Male	Female
First year	399	602
Second year	252	198

The table gives information about the numbers of students in the two years of a college course.

Anna wants to interview some of these students.
She takes a random sample of 70 students stratified by year and by gender.

Work out the number of students in the sample who are male and in the first year.

.....

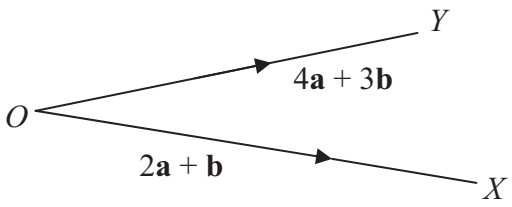
Q25

(Total 3 marks)

Leave blank

26.

Diagram **NOT** accurately drawn



$\overrightarrow{OX} = 2\mathbf{a} + \mathbf{b}$

$\overrightarrow{OY} = 4\mathbf{a} + 3\mathbf{b}$

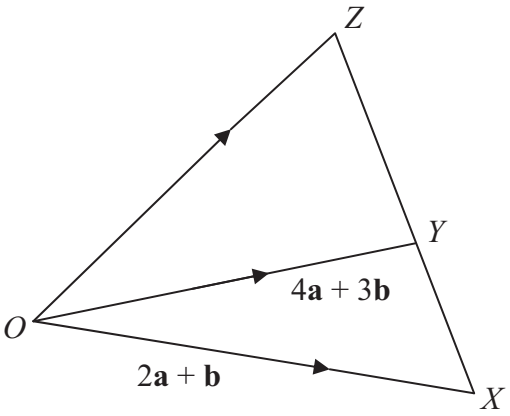
(a) Express the vector $\overrightarrow{XY}$ in terms of **a** and **b**
Give your answer in its simplest form.

.....

(2)

Leave blank

Diagram **NOT** accurately drawn



XYZ is a straight line.
XY : *YZ* = 2 : 3

(b) Express the vector $\overrightarrow{OZ}$ in terms of **a** and **b**
Give your answer in its simplest form.

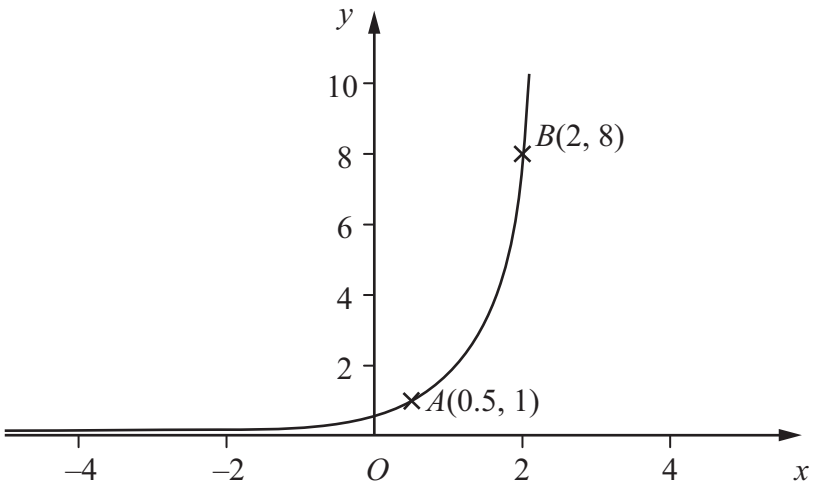
.....

(3) **Q26**

(Total 5 marks)

Leave blank

27.



The diagram shows a sketch of the graph $y = ab^x$
The curve passes through the points A (0.5, 1) and B (2, 8).

The point C (–0.5, k) lies on the curve.

Find the value of k.

.....

Q27

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

END