

Centre No					
Candidate No					

Paper reference							
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Surname	Initial(s)
Signature	

Paper References(s)

5505/05

Edexcel GCSE

Mathematics A – 1387

Paper 5 (Non-Calculator)

Higher Tier

Friday 5 November 2004 – Morning
Time: 2 hours

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
 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 in the spaces provided in this question paper.

You must NOT write on the formulae page or any blank pages. Anything you write on these pages will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The total mark for this paper is 100. This paper has 23 questions. There is one blank page.

The marks for individual questions and parts of questions are shown in round brackets: e.g. (2).

Calculators must not be used.

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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N17483RA

Turn over

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Rosa prepares the ingredients for pizzas.

She uses cheese, topping and dough in the ratio 2 : 3 : 5

Rose uses 70 grams of dough.

Work out the number of grams of cheese and the number of grams of topping Rosa uses.

Cheese.....g

Toppingg
(Total 3 marks)

-
2. Work out

$$12\frac{1}{2} \div \frac{5}{8}$$

.....
(Total 3 marks)

3. (a) Expand the brackets $p(q - p^2)$

.....
(1)

(b) Expand and simplify $5(3p + 2) - 2(5p - 3)$

.....
(2)
(Total 3 marks)

4. (a) (i) Write 40 000 000 in standard form.

.....

(ii) Write 3×10^{-5} as an ordinary number

.....
(2)

(b) Work out the value of

$$3 \times 10^{-5} \times 40\,000\,000$$

Give your answer in standard form.

.....
(2)
(Total 4 marks)

5. ABC is an isosceles triangle.

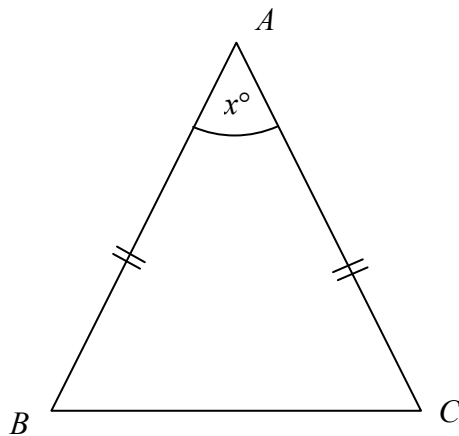


Diagram **NOT** accurately drawn

$$AB = AC$$

$$\text{Angle } A = x^\circ$$

- (a) Find an expression, in terms of x , for the size of angle B .

.....
(2)

- (b) Solve the simultaneous equations

$$3p + q = 11$$

$$p + q = 3$$

$$p = \text{.....}$$

$$q = \text{.....}$$

(3)
(Total 5 marks)

6.

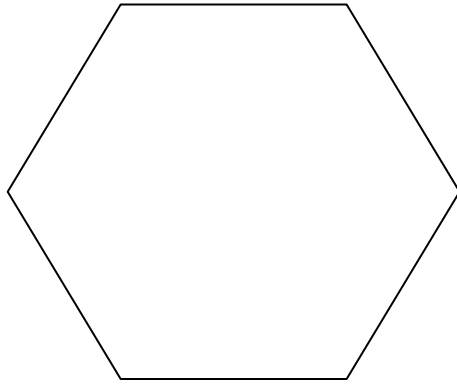


Diagram **NOT**
accurately drawn

Calculate the size of the exterior angle of a regular hexagon.

.....°
(2)
(Total 2 marks)

7. Use ruler and compasses to **construct** an angle of 45° at A .
You must show **all** construction lines.

A _____

(Total 3 marks)

8.

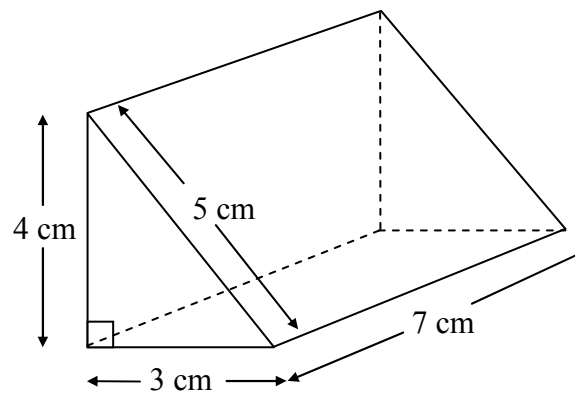


Diagram **NOT**
accurately drawn

Calculate the volume of the triangular prism.

.....
(Total 4 marks)

9. (a) Simplify

(i) $\frac{x^6}{x^2}$

.....

(ii) $(y^4)^3$

.....

(2)

(b) Expand and simplify $(t + 4)(t - 2)$

.....

(2)

(c) Write down the integer values of x that satisfy the inequality

$$-2 \leq x < 4$$

.....

(2)

(d) Find the value of

(i) $36^{-\frac{1}{2}}$

.....

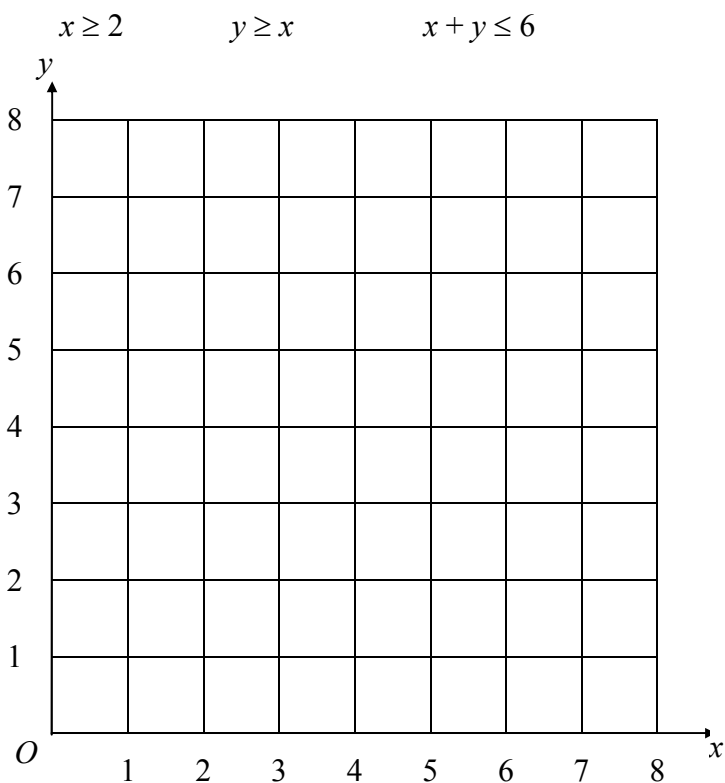
(ii) $27^{\frac{2}{3}}$

.....

(2)

(Total 8 marks)

10. (a) On the grid below, draw straight lines and use shading to show the region **R** that satisfies the inequalities



(3)

The point P with coordinates (x, y) lies inside the region **R**.
 x and y are **integers**.

- (b) Write down the coordinates of **all** points of **R** whose coordinates are both integers.

.....
(2)

(Total 5 marks)

11. Make u the subject of the formula

$$D = ut + kt^2$$

$u =$
 (Total 2 marks)

12. The table gives information about the ages of 160 employees of an IT company.

Age (A) in years	Frequency
$15 < A \leq 25$	44
$25 < A \leq 35$	56
$35 < A \leq 45$	34
$45 < A \leq 55$	19
$55 < A \leq 65$	7

(a) Complete the cumulative frequency table.

Age (A) in years	Cumulative Frequency
$15 < A \leq 25$	
$15 < A \leq 35$	
$15 < A \leq 45$	
$15 < A \leq 55$	
$15 < A \leq 65$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for

(i) the median age of the employees,

..... years

(i) the interquartile range of the ages of the employees.

..... years

(3)

Another IT company has 80 employees.

The age of the youngest employee is 24 years.

The age of the oldest employee is 54 years.

The median age is 38 years.

The lower quartile is 30 years.

The lower quartile is 44 years.

(d) On the grid opposite, draw a box plot to show information about the ages of the employees.

(2)

(Total 8 marks)

Cumulative frequency

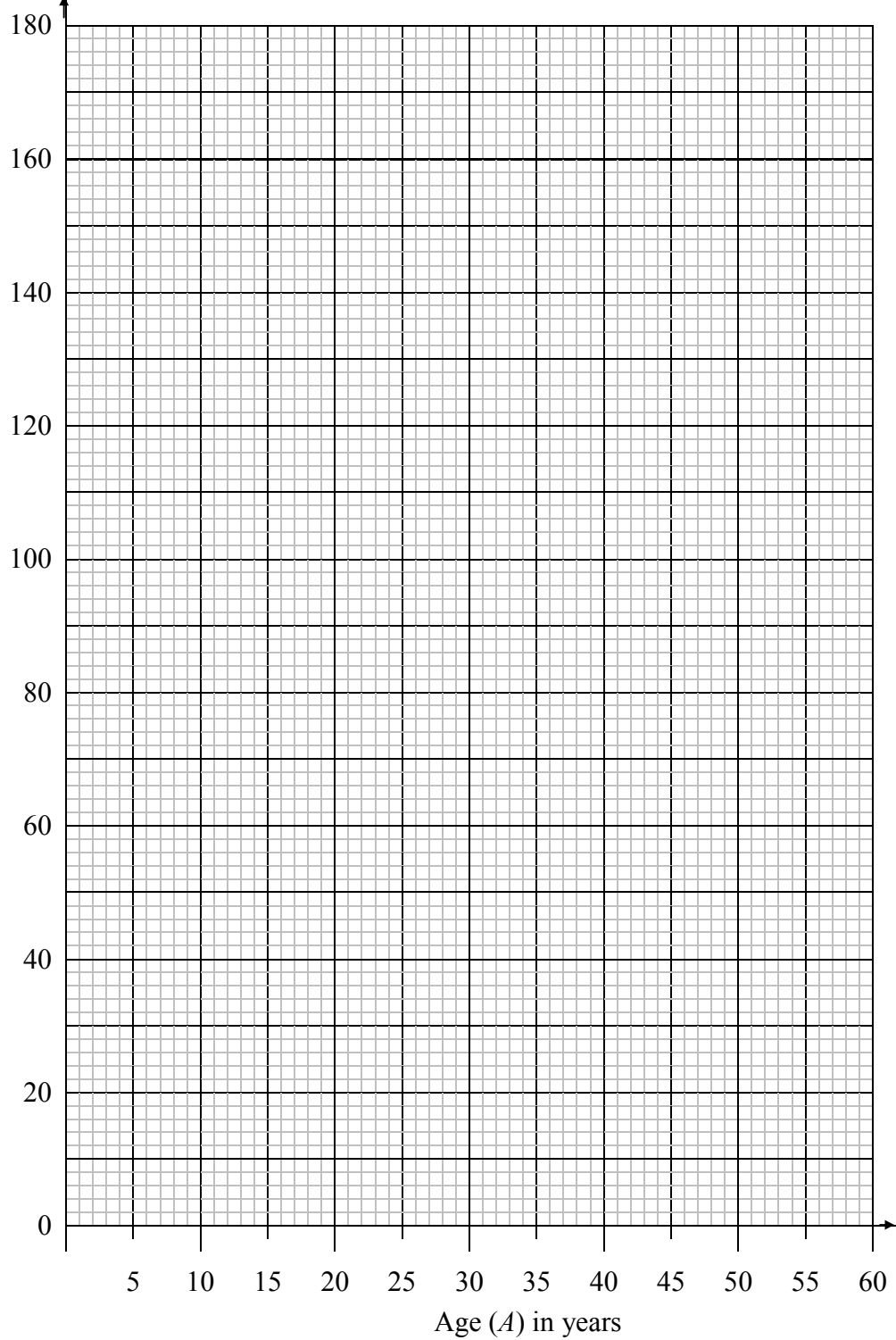
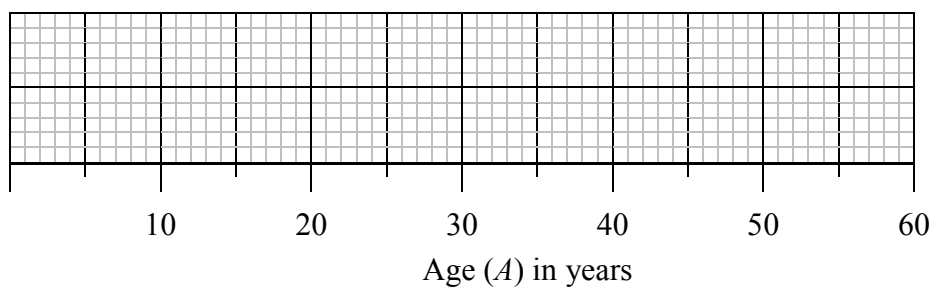


Diagram for part (d).



13.

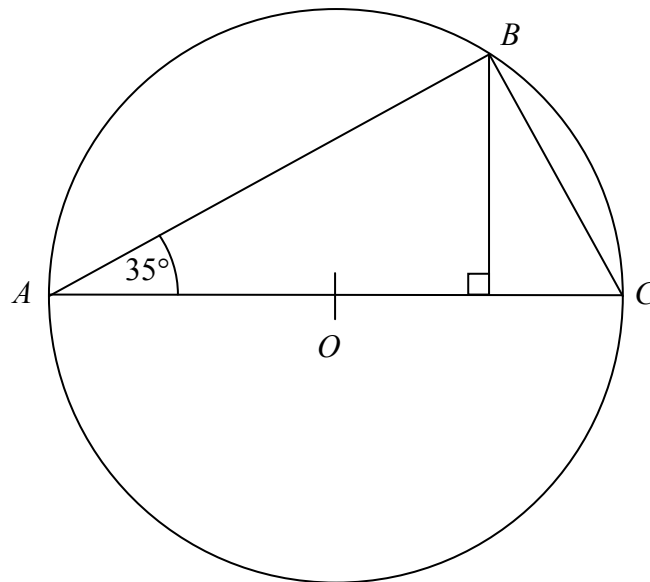


Diagram **NOT** accurately drawn

The diagram shows a circle, centre O .

AC is a diameter.

Angle $BAC = 35^\circ$.

D is the point on AC such that angle BDA is a right angle.

- (a) Work out the size of angle BCA .
Give reasons for your answer.

.....^o
(2)

- (b) Calculate the size of angle DBC .

.....^o
(1)

- (c) Calculate the size of angle BOA .

.....^o
(2)

(Total 5 marks)

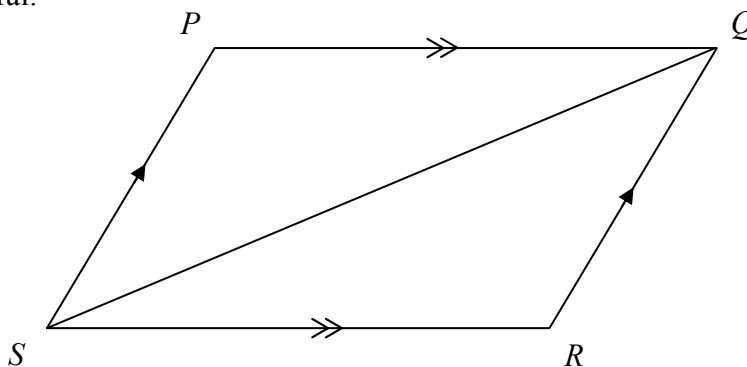
14. The length of a rectangle is twice the width of the rectangle.
The length of a diagonal of the rectangle is 25 cm.

Work out the area of the rectangle.
Give your answer as an integer.



..... cm^2
(Total 3 marks)

15. $PQRS$ is a quadrilateral.



PQ is parallel to SR .
 SP is parallel to RQ .

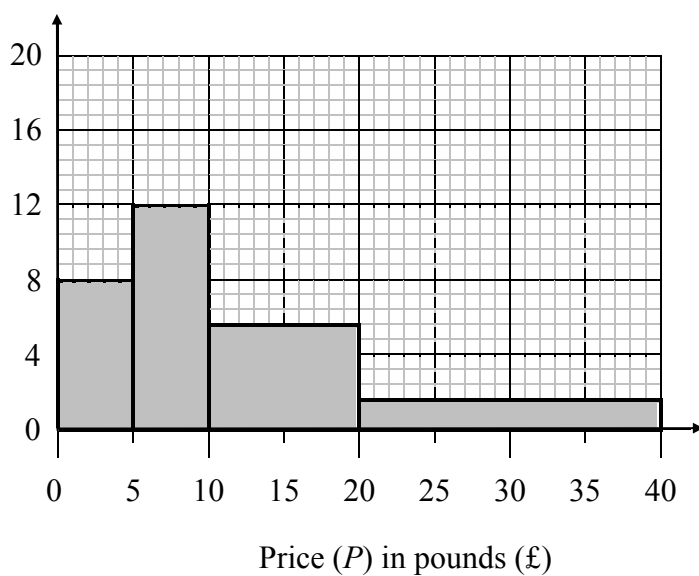
- (a) Prove that triangle PQS is congruent to triangle RSQ .

(3)

- (b) In quadrilateral $PQRS$, angle SPQ is obtuse.
Explain why $PQRS$ cannot be a cyclic quadrilateral.

(2)
(Total 5 marks)

16. This histogram gives information about the books sold in a bookshop one Saturday.



(a) Use the histogram to complete the table.

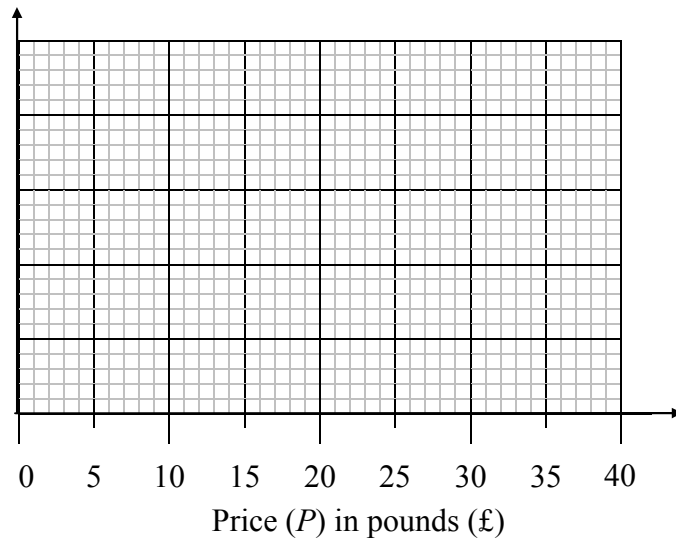
Price (P) in pounds (£)	Frequency
$0 < P \leq 5$	
$5 < P \leq 10$	
$10 < P \leq 20$	
$20 < P \leq 40$	

(2)

The frequency table below gives information about the books sold in a second bookshop on the same Saturday.

Price (P) in pounds (£)	Frequency
$0 < P \leq 5$	80
$5 < P \leq 10$	20
$10 < P \leq 20$	24
$20 < P \leq 40$	96

(b) On the grid below, draw a histogram to represent the information about the books sold in the second bookshop.



(3)
(Total 5 marks)

17. (a) Express $\frac{6}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are positive integers.

.....
(2)

The diagram shows a right-angled isosceles triangle.

The length of each of its equal sides is $\frac{6}{\sqrt{2}}$ cm.

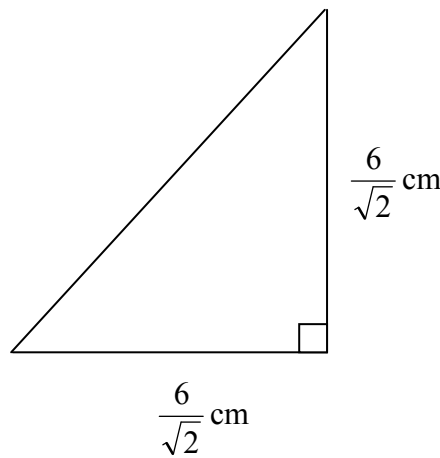
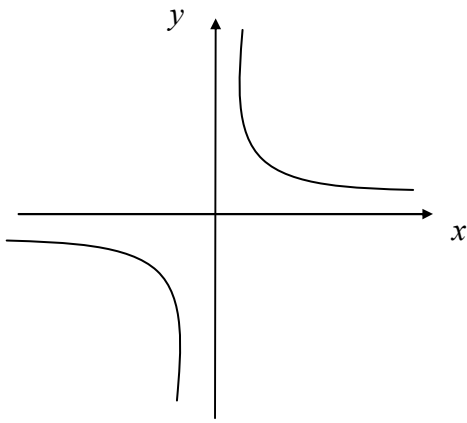


Diagram **NOT**
accurately drawn

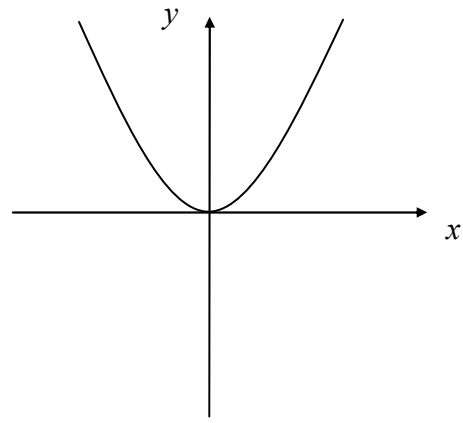
(b) Find the area of the triangle.
Give your answer as an integer.

..... cm²
(2)
(Total 4 marks)

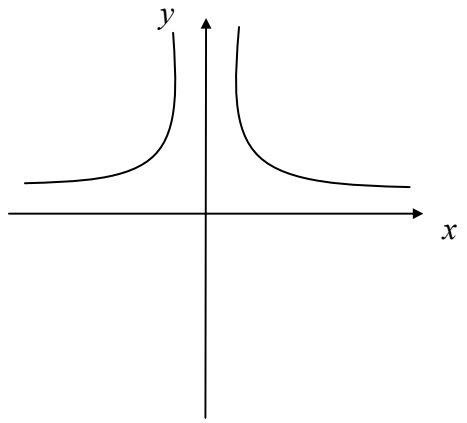
18.



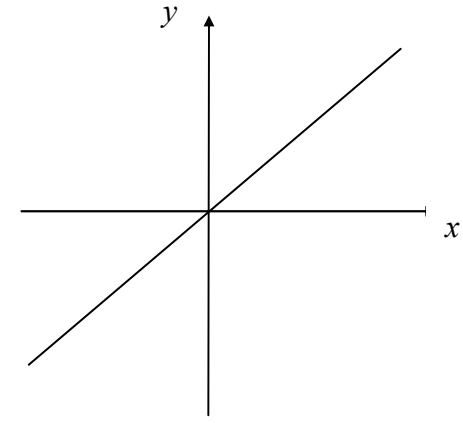
Graph A



Graph B



Graph C



Graph D

The graphs of y against x represent four different types of proportionality.

Write down the letter of the graph which represents the type of proportionality.

Type of proportionality	Graph letter
y is directly proportional to x
y is inversely proportional to x
y is proportional to the square of x
y is inversely proportional to the square of x

(Total 2 marks)

19. (a) Write down an expression, in terms of n , for the n th multiple of 5.

.....
(1)

(b) Hence or otherwise

(i) prove that the sum of two consecutive multiples of 5 is always an odd number,

(ii) prove that the product of two consecutive multiples of 5 is always an even number.

(5)
(Total 6 marks)

20.

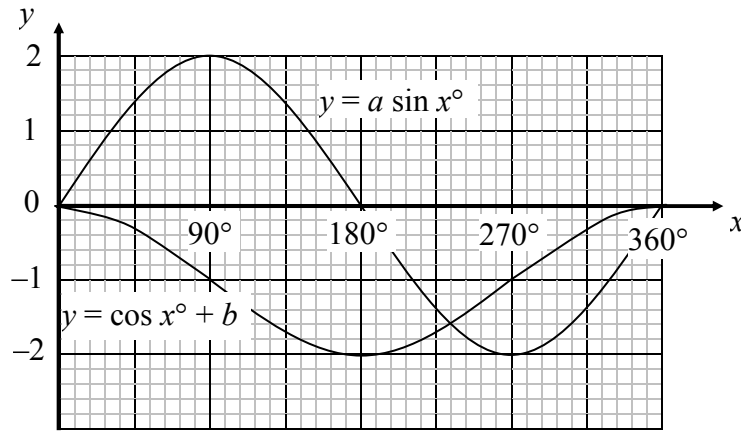


Diagram **NOT** accurately drawn

The diagram shows part of two graphs.

The equation of one graph is $y = a \sin x^\circ$

The equation of the other graph is $y = \cos x^\circ + b$

$a = \dots\dots\dots$

$b = \dots\dots\dots$

(2)

(b) Use the graphs to find the values of x in the range $0 \leq x \leq 720^\circ$ when $a \sin x^\circ = \cos x^\circ + b$.

$x = \dots\dots\dots$

(2)

(c) Use the graphs to find the value of $a \sin x^\circ - (\cos x^\circ + b)$ when $x = 450^\circ$.

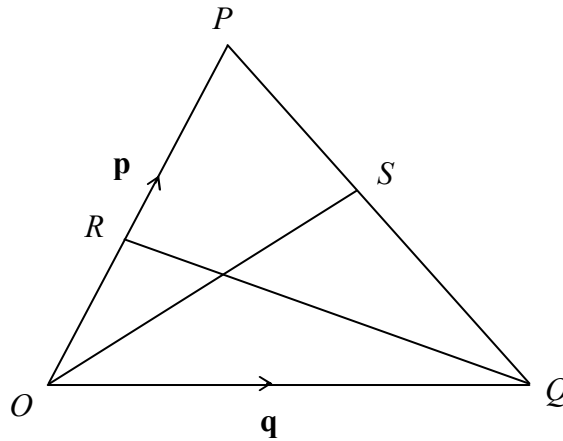
$\dots\dots\dots$

(2)

(Total 6 marks)

21.

Diagram **NOT**
accurately drawn



OPQ is a triangle.
 R is the midpoint of OP .
 S is the midpoint of PQ .
 $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$

(i) Find \overrightarrow{OS} in terms of \mathbf{p} and \mathbf{q} .

$\overrightarrow{OS} = \dots\dots\dots$

(ii) Show that RS is parallel to OQ .

(Total 5 marks)

22. Solve $\frac{2}{x+1} + \frac{3}{x-1} = \frac{5}{x^2-1}$

$x = \dots\dots\dots$

(Total 4 marks)

23. The diagram shows a sector of a circle with a radius of x cm and centre O .
 PQ is an arc of the circle.
Angle $POQ = 120^\circ$.

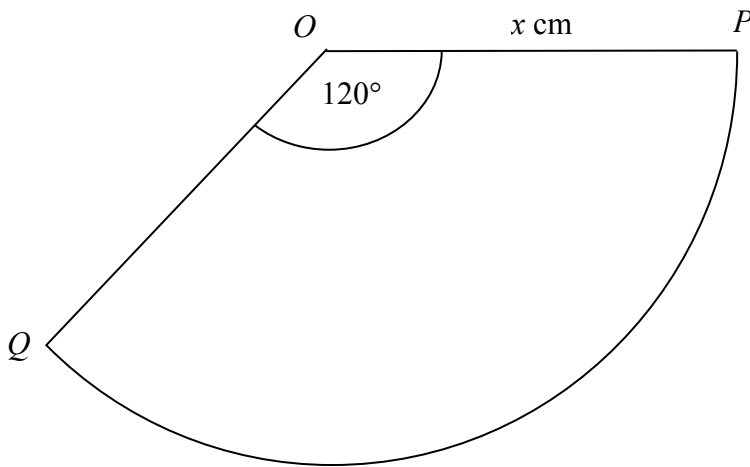


Diagram **NOT**
accurately drawn

(a) Write down an expression in terms of π and x for

(i) the area of this sector,

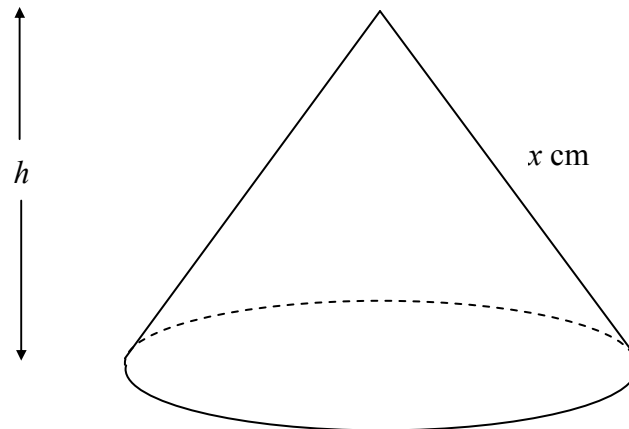
.....

(ii) the arc length of this sector

.....

(2)

The sector is the net of the curved surface of this cone.
Arc PQ forms the circumference of the circle that makes the base of the cone.



The curved surface area of the cone is A cm².
The volume of the cone is V cm³.
The height of the cone is h cm.

Given that $V = 3A$,

(b) find the value of h .

.....
(3)
(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END