

Centre No.						Paper Reference					Surname	Initial(s)		
Candidate No.						5	5	2	5	/	0	5	Signature	

Paper Reference(s)

**5525/05**

**Edexcel GCSE  
Mathematics A – 1387  
Paper 5 (Non-Calculator)**



Examiner's use only

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Team Leader's use only

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ND001772341

**Higher Tier**

Tuesday 8 November 2005 – 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. 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 24 questions in this question paper. The total mark for this paper is 100. There are 20 pages in this question paper. Any blank pages are indicated. **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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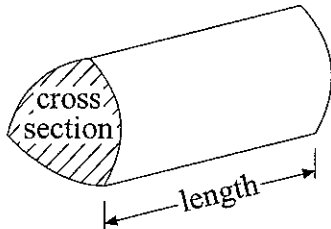
**edexcel**

# GCSE Mathematics 1387/8

## Formulae: Higher Tier

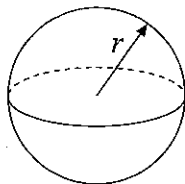
**You must not write on this formulae page.**  
**Anything you write on this formulae page will gain NO credit.**

**Volume of a prism = area of cross section  $\times$  length**



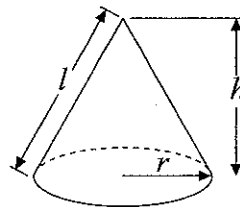
**Volume of sphere =  $\frac{4}{3}\pi r^3$**

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

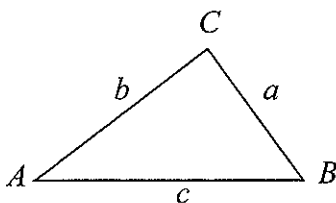


**Volume of cone =  $\frac{1}{3}\pi r^2 h$**

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



**In any triangle ABC**



**The Quadratic Equation**

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

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

**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 =  $\frac{1}{2}ab \sin C$**



**Answer ALL TWENTY FOUR 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 school snack bar offers a choice of four snacks.  
The four snacks are burgers, pizza, pasta and salad.  
Students can choose **one** of these four snacks.

The table shows the probability that a student will choose burger or pizza or salad.

Snack	burger	pizza	pasta	salad
Probability	0.35	0.15		0.2

300 students used the snack bar on Tuesday.

Work out an estimate for the number of students who chose pizza.

.....

**Q1**

**(Total 2 marks)**

2. Emma repairs bicycles.  
She keeps records of the cost of the repairs.

The table gives information about the costs of all repairs which she carried out in one week.

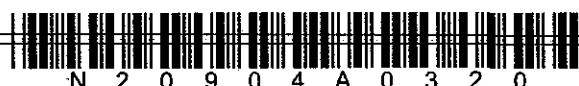
Cost (£C)	Frequency
$0 < C \leq 10$	3
$10 < C \leq 20$	7
$20 < C \leq 30$	6
$30 < C \leq 40$	8
$40 < C \leq 50$	9

Find the class interval in which the median lies.

.....

**Q2**

**(Total 2 marks)**



3.

**Canal boat for hire  
£1785.00  
for 14 days**

Jenny and Kath hire the canal boat for 14 days.  
They share the hire cost of £1785.00 in the ratio 2:3

Work out the smaller share.

£.....

**(Total 2 marks)**

Q3

4. (a) Expand and simplify

$$(x - y)^2$$

.....  
(2)

(b) Rearrange  $a(q - c) = d$  to make  $q$  the subject.

$q =$  .....  
(3)

**(Total 5 marks)**

Q4



5.

A  
X

B  
X

X  
C

Jill rolls a ball from point C.  
At any point on its path, the ball is the same distance from point A and point B.

- (a) On the diagram above, draw accurately the path that the ball will take. (2)
- (b) On the diagram, shade the region that contains all the points that are no more than 3 cm from point B. (2)

(Total 4 marks)

Q5

6. Work out an estimate for the value of

$$\frac{5.79 \times 312}{0.523}$$

.....

(Total 3 marks)

Q6



7.

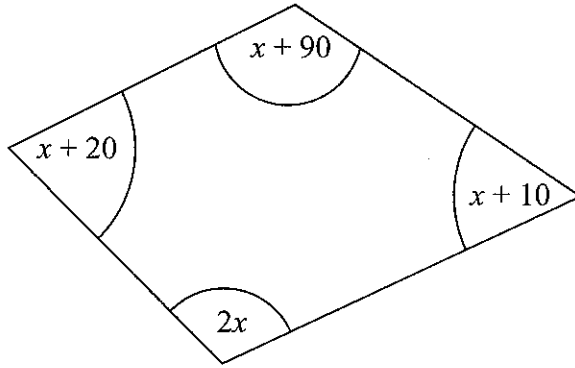


Diagram **NOT** accurately drawn

The sizes of the angles, in degrees, of the quadrilateral are

- $x + 10$
- $2x$
- $x + 90$
- $x + 20$

(a) Use this information to write down an equation in terms of  $x$ .

.....  
(2)

(b) Use your answer to part (a) to work out the size of the smallest angle of the quadrilateral.

.....  
(3)

(Total 5 marks)

Q7



8.

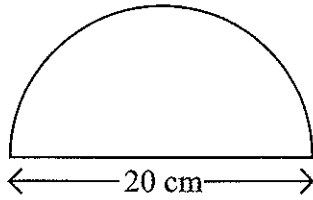


Diagram NOT accurately drawn

A semicircle has a diameter of 20 cm.

Work out the perimeter of the semicircle.  
Take the value of  $\pi$  to be 3.14

..... cm  
(Total 3 marks)

Q8

9. (a) Write the number 40 000 000 in standard form.

.....  
(1)

(b) Write  $1.4 \times 10^{-5}$  as an ordinary number.

.....  
(1)

(c) Work out

$$(5 \times 10^4) \times (6 \times 10^9)$$

Give your answer in standard form.

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

Q9



10.

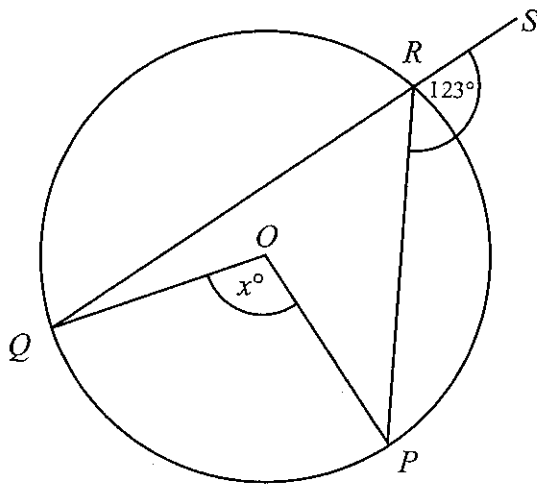


Diagram NOT accurately drawn

$QRS$  is a straight line.  
 $QR$  and  $PR$  are chords of a circle, centre  $O$ .  
 Angle  $PRS = 123^\circ$ .  
 Angle  $QOP = x^\circ$ .

Calculate the size of the angle marked  $x^\circ$ .  
 Give reasons for your answer.

.....<sup>o</sup>

Q10

(Total 3 marks)

11. Here are some expressions.

$\frac{\pi r^3}{x}$	$\frac{r^3}{\pi}$	$\pi x + r$	$\pi r^2 + rx$	$\pi(x+r)$	$\frac{\pi^3}{x^2}$
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The letters  $r$  and  $x$  represent lengths.  $\pi$  is a number that has no dimensions.

Tick (✓) the boxes underneath the **two** expressions that can represent areas.

(Total 2 marks)

Q11

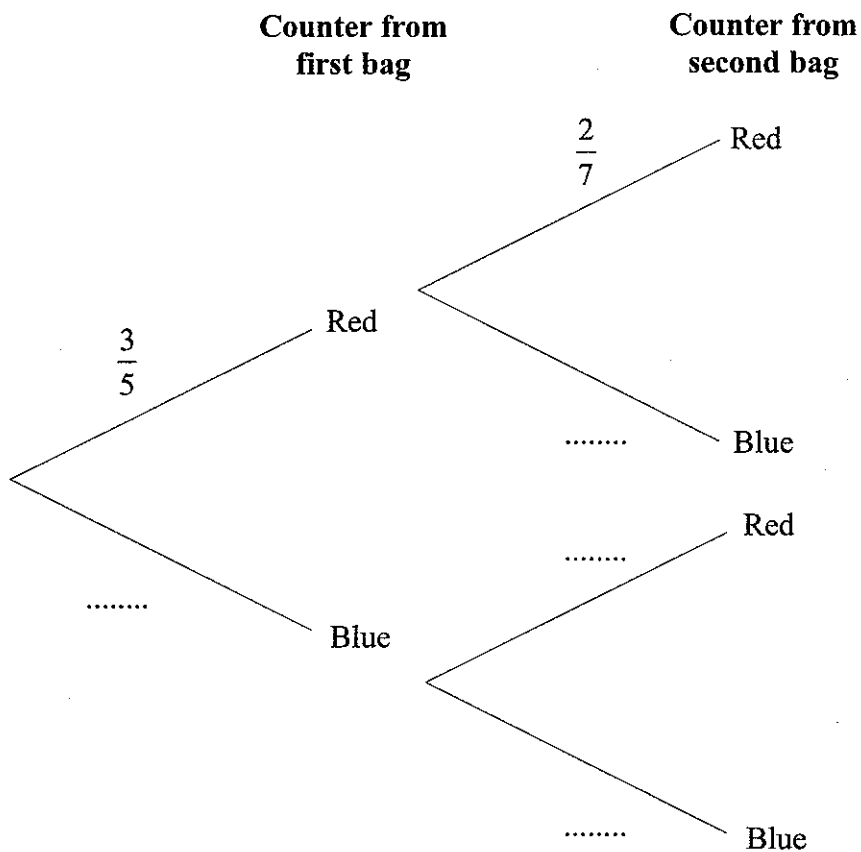




12. Loren has two bags.  
 The first bag contains 3 red counters and 2 blue counters.  
 The second bag contains 2 red counters and 5 blue counters.

Loren takes one counter at random from each bag.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Loren takes one counter of each colour.

(3)

(Total 5 marks)

Q12



13. Bill buys a new machine.  
The value of the machine depreciates by 20% each year.

- (a) Bill says 'after 5 years the machine will have no value'.  
Bill is **wrong**.  
Explain why.

.....  
.....  
.....

(1)

Bill wants to work out the value of the machine after 2 years.

- (b) By what single decimal number should Bill multiply the value of the machine when new?

.....  
(2)

(Total 3 marks)

Q13

14. 30 students took part in a National Science quiz.  
The quiz was in two parts.  
The cumulative frequency graph on the grid opposite gives information about the marks scored in Part One.  
The lowest mark was 5 and the highest mark was 47.

- (a) In the space provided on the grid, draw a box plot using the cumulative frequency graph for the results of Part One.

(3)

The diagram also shows a box plot for the results of Part Two.  
Use the box plots to compare the two distributions.

- (b) Give **two** differences between them.

First difference .....

.....

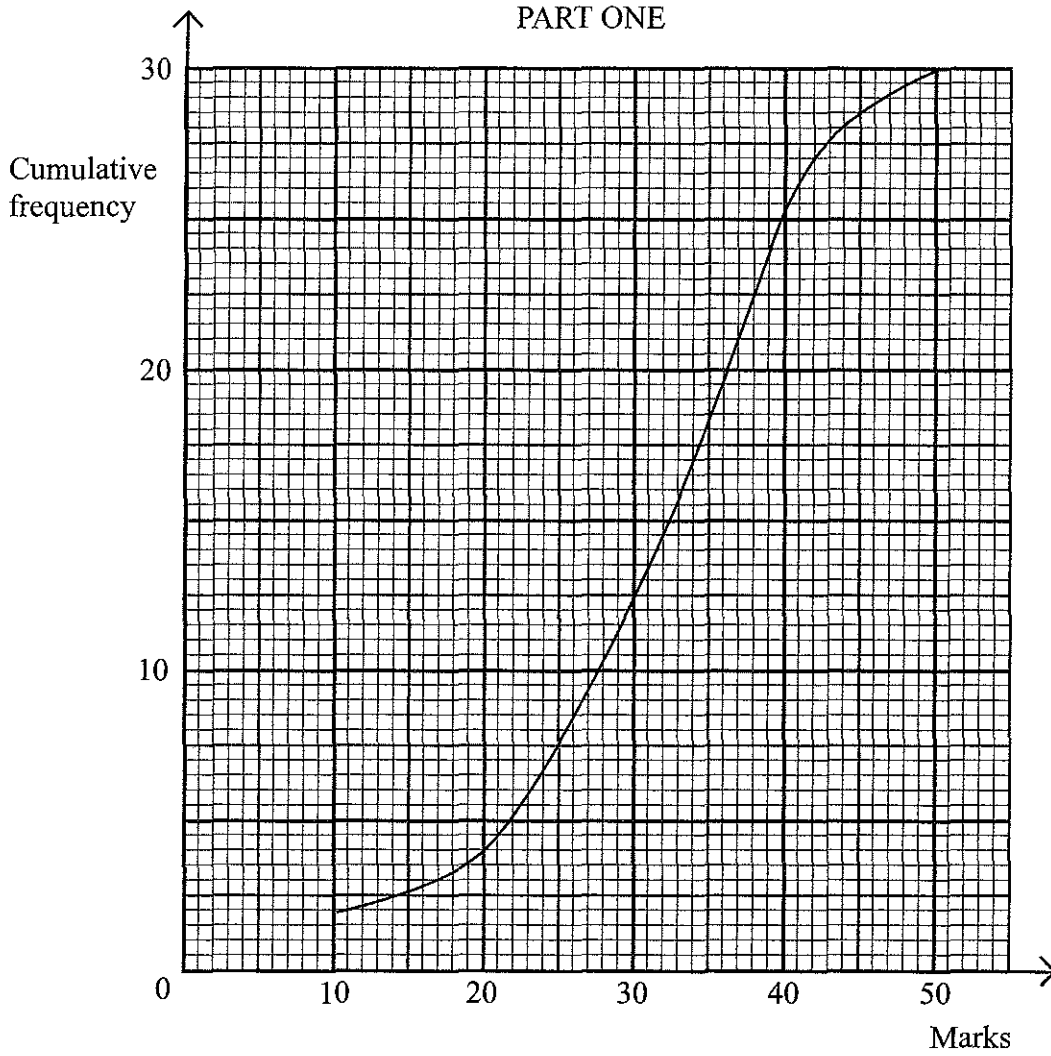
Second difference .....

.....

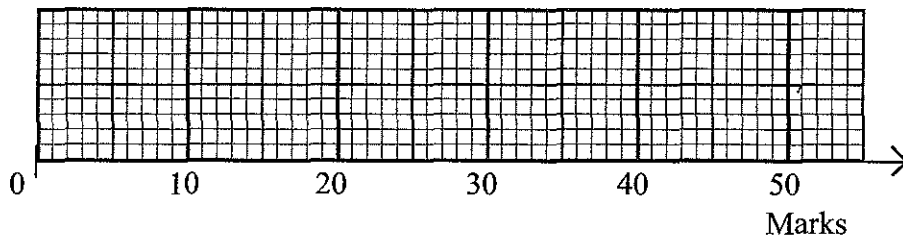
(2)



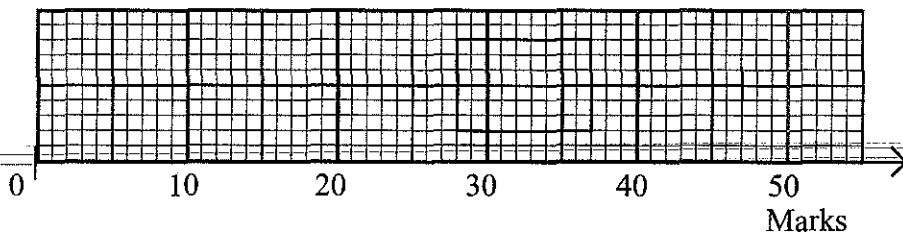
PART ONE



PART ONE



PART TWO



(Total 5 marks)

Q14



15. A straight line has equation  $y = 2x - 3$   
 The point  $P$  lies on the straight line.  
 The  $y$  coordinate of  $P$  is  $-4$

(a) Find the  $x$  coordinate of  $P$ .

.....  
 (2)

A straight line  $L$  is parallel to  $y = 2x - 3$  and passes through the point  $(3, 4)$ .

(b) Find the equation of line  $L$ .

.....  
 (3)

$y = 2x - 3$	$y = 3 - 2x$	$y = \frac{1}{2}x - 3$	$y = 3 - \frac{1}{2}x$	$y = 2x + 3$

(c) Put a tick (✓) underneath the equation which is the equation of a straight line that is perpendicular to the line with equation  $y = 2x - 3$

(1)

(Total 6 marks)

Q15



16. The table shows the number of students in each year group at a school.

Year group	7	8	9	10	11
Number of students	190	145	145	140	130

Jenny is carrying out a survey for her GCSE Mathematics project. She uses a stratified sample of 60 students according to year group.

Calculate the number of Year 11 students that should be in her sample.

.....  
 (Total 3 marks) Q16

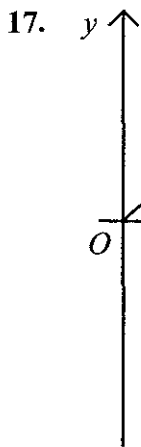


Diagram NOT accurately drawn

The diagram shows a sketch of part of the curve  $y = \sin x^\circ$ .

(a) Write down the coordinates of point A.

( ..... , ..... )  
 (1)

(b) On the same diagram, sketch the graph of  $y = \sin 2x^\circ$ .

(2)  
 (Total 3 marks)

Q17



18.

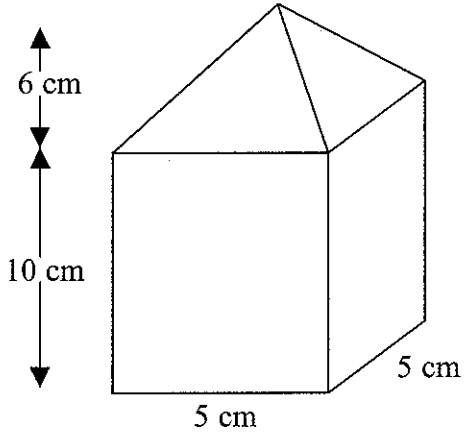


Diagram NOT accurately drawn

The diagram shows a model.  
 The model is a cuboid with a pyramid on top.  
 The base of the model is a square with sides of length 5 cm.  
 The height of the cuboid in the model is 10 cm.  
 The height of the pyramid in the model is 6 cm.

(a) Calculate the volume of the model.

..... cm<sup>3</sup>  
(3)

The model represents a concrete post.  
 The model is built to a scale of 1:30  
 The surface area of the model is 290 cm<sup>2</sup>.

(b) Calculate the surface area of the post.  
Give your answer in square metres.

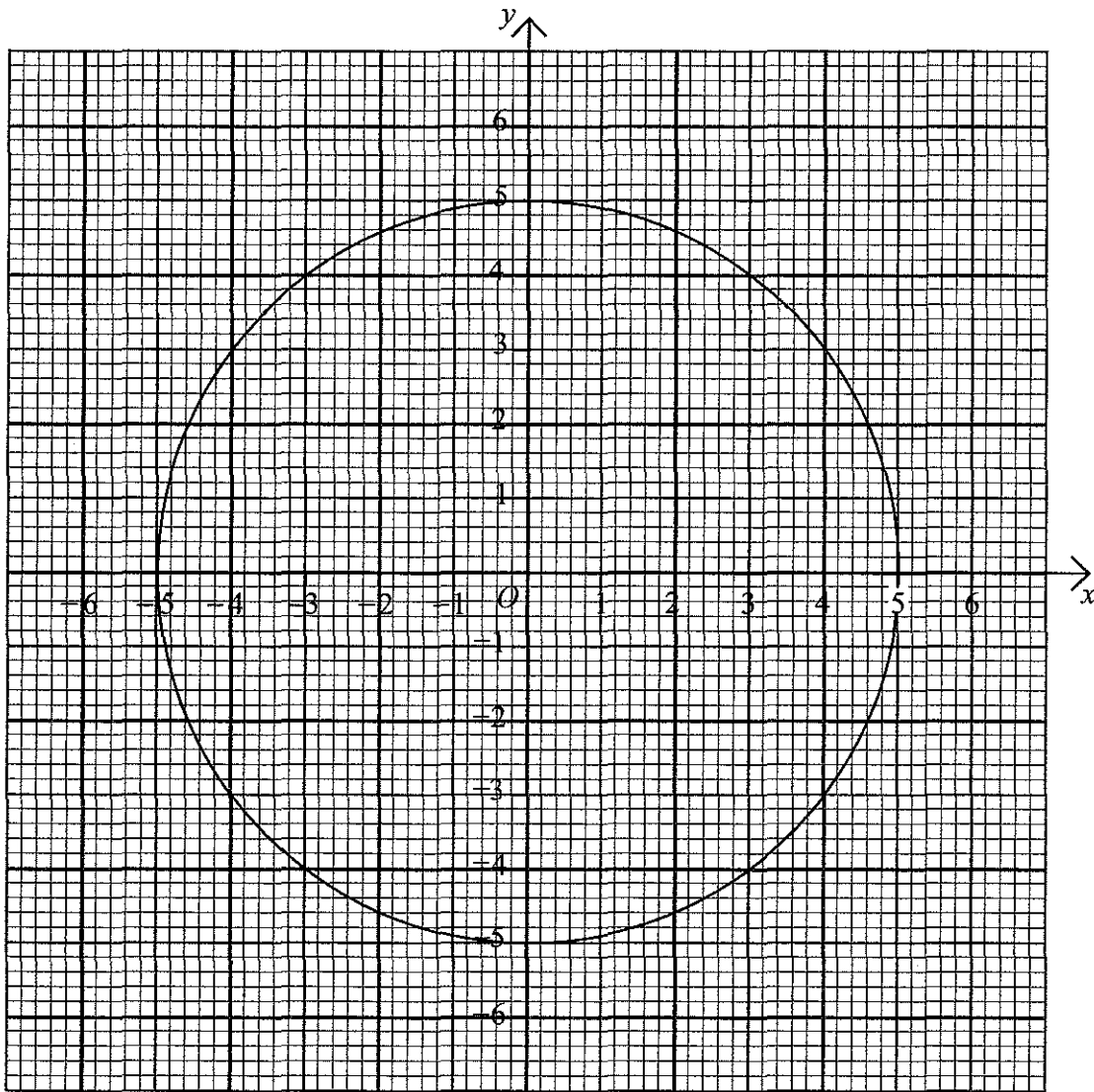
..... m<sup>2</sup>  
(3)

(Total 6 marks)

Q18



19.



The diagram shows a circle of radius 5 cm, centre the origin.

Draw a suitable straight line on the diagram to find estimates of the solutions to the pair of equations

$$x^2 + y^2 = 25$$

$$y = 2x + 1$$

$x = \dots\dots\dots, y = \dots\dots\dots$

$x = \dots\dots\dots, y = \dots\dots\dots$

(Total 3 marks)

Q19



20. (a) Rationalise

$$\frac{1}{\sqrt{7}}$$

.....  
(2)

(b) (i) Expand and simplify

$$(\sqrt{3} + \sqrt{15})^2$$

Give your answer in the form  $n+m\sqrt{5}$ , where  $n$  and  $m$  are integers.

.....

(ii)

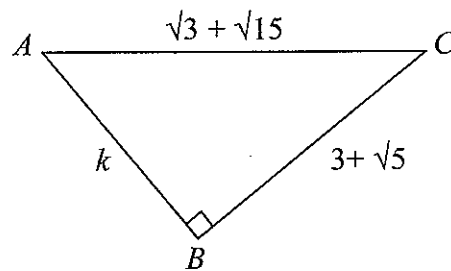


Diagram NOT accurately drawn

All measurements on the triangle are in centimetres.

$ABC$  is a right-angled triangle.

$k$  is a positive integer.

Find the value of  $k$ .

$k =$  .....  
(5)

(Total 7 marks)

Q20





21. (a) Simplify

(i)  $(3x^2y)^3$

.....

(ii)  $(2t^{-3})^{-2}$

.....

(4)

(b) Show that  $x^2 - 4x + 15$  can be written as  $(x + p)^2 + q$  for all values of  $x$ .  
State the values of  $p$  and  $q$ .

$p =$  .....

$q =$  .....

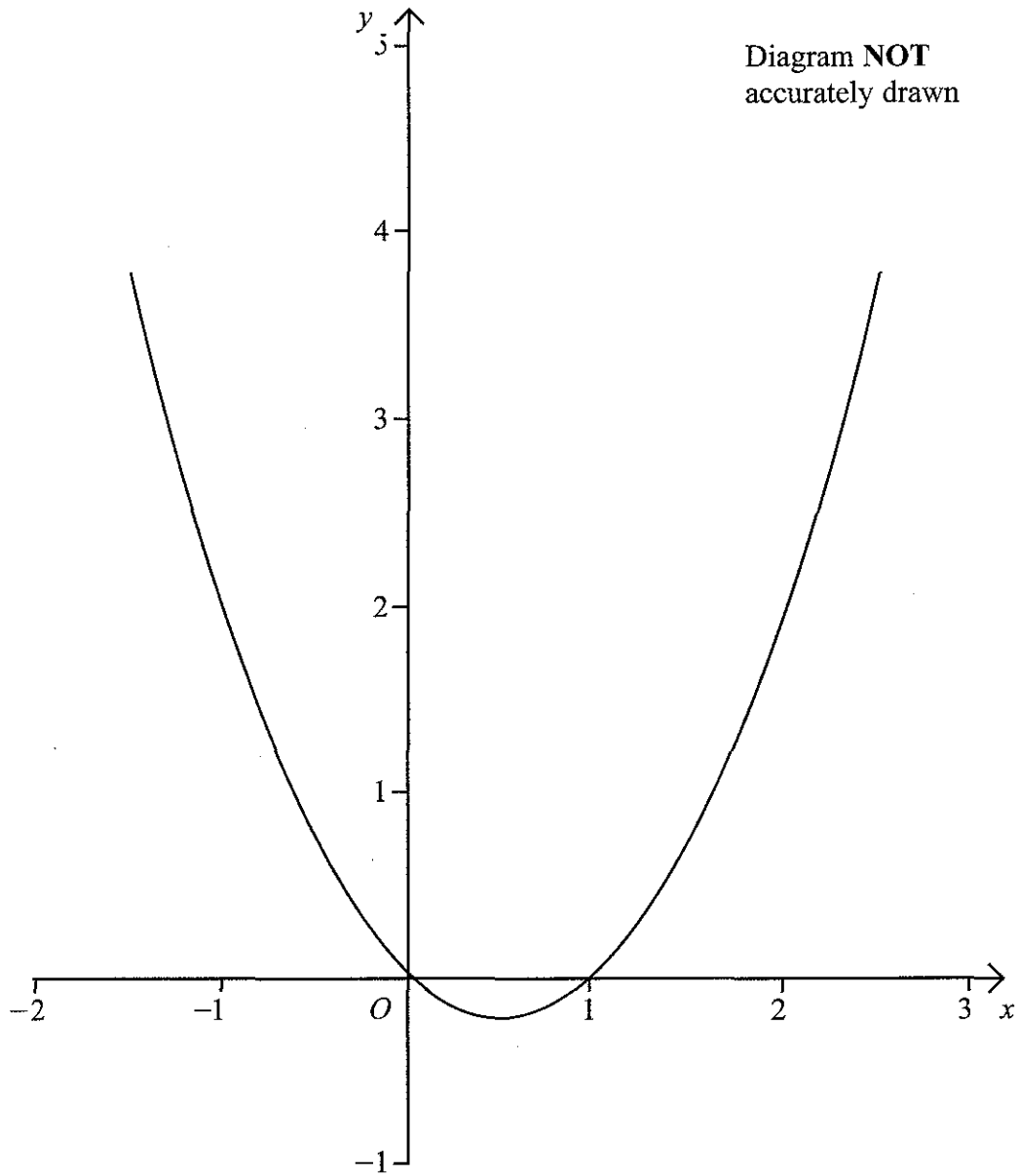
(3)

(Total 7 marks)

Q21



22.



The diagram shows a sketch of the graph of  $y = x^2 - x$

- (a) On the same diagram, sketch and label the graph of  $y = (x - 1)^2 - (x - 1)$   
 Show clearly where this graph crosses the  $x$ -axis and where it crosses the  $y$ -axis.

(3)

- (b) On the same diagram, sketch and label the graph of  $y = 3(x^2 - x)$

(1)



The line  $y = 4 - 4x$  intersects the curve  $y = 3(x^2 - x)$  at the points  $A$  and  $B$ .

(c) Use an algebraic method to find the coordinates of  $A$  and  $B$ .

(....., .....)

(....., .....)

(5)

Q22

(Total 9 marks)

23. Prove algebraically that the sum of the squares of any two odd numbers leaves a remainder of 2 when divided by 4.

Q23

(Total 3 marks)



24.

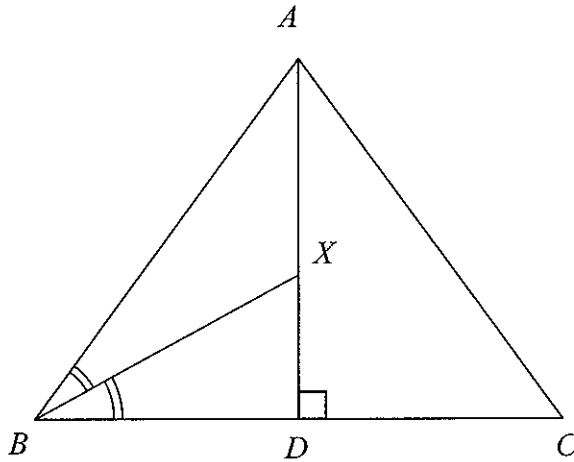


Diagram NOT accurately drawn

$ABC$  is an equilateral triangle.  
 $AD$  is the perpendicular bisector of  $BC$ .  
 $BX$  is the angle bisector of angle  $ABC$ .

(a) Show that triangle  $BXD$  is similar to triangle  $ACD$ .

(2)

In triangle  $ACD$ ,  
 $AC = 2$  cm,  
 $AD = \sqrt{3}$  cm.

(b) Show that  $XD = \frac{1}{\sqrt{3}}$  cm.

(3)

Q24

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END

