

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						5	5	2	5	/	0	6	Signature	

Paper Reference(s)

**5525/06**

# Edexcel GCSE

## Mathematics A – 1387

Paper 6 (Calculator)

# Higher Tier

Friday 10 November 2006 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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### 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 23 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  $\pi$  button, take the value of  $\pi$  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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*Turn over*

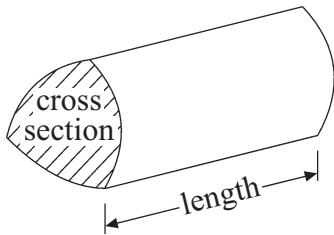
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# GCSE Mathematics 1387/8

## Formulae: Higher Tier

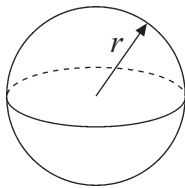
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

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



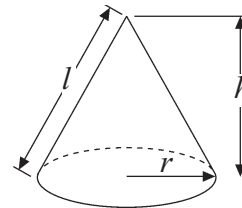
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

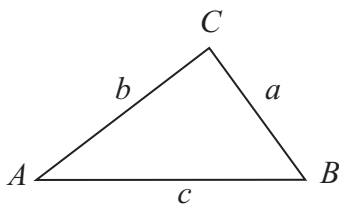


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**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 THREE questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

1. (a) Use your calculator to work out  $\frac{\sqrt{19.2 + 2.6^2}}{2.7 \times 1.5}$

Write down all the figures on your calculator display.

.....  
(2)

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

.....  
(1)

**(Total 3 marks)**

Q1

2. (a) Simplify  $p^7 \times p^2$

.....  
(1)

- (b) Simplify  $\frac{q^8}{q^3}$

.....  
(1)

- (c) Simplify  $(t^3)^4$

.....  
(1)

- (d) Expand and simplify  $2(3m + 4) + 3(m - 5)$

.....  
(2)

**(Total 5 marks)**

Q2



3.

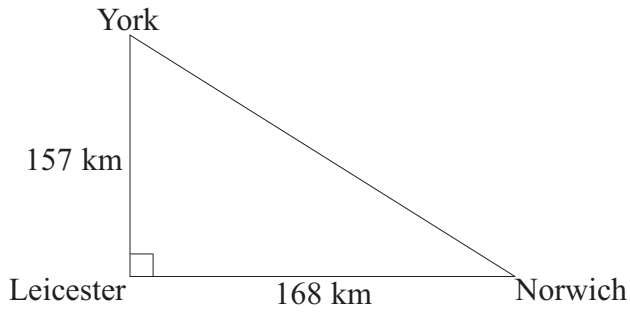


Diagram **NOT** accurately drawn

The diagram shows three cities.  
Norwich is 168 km due East of Leicester.  
York is 157 km due North of Leicester.

Calculate the distance between Norwich and York.  
Give your answer correct to the nearest kilometre.

..... km

**(Total 3 marks)**

**Q3**



4. A DIY store bought 1750 boxes of nails.  
 Barry took 25 of these boxes and counted the number of nails in each.  
 The table shows his results.

Number of nails	Number of boxes
14	2
15	9
16	8
17	4
18	2

The numbers of nails in the 25 boxes are typical of the numbers of nails in the 1750 boxes.

Work out an estimate for how many of the 1750 boxes contain 16 nails.

.....

**(Total 3 marks)**

**Q4**



5. (a) The equation

$$x^3 + 4x^2 = 100$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show **ALL** your working.

$x = \dots\dots\dots$   
(4)

The diagram shows a cuboid.

The base of the cuboid is a square of side  $x$  cm.

The height of the cuboid is  $(x + 4)$  cm.

The volume of the cuboid is  $100 \text{ cm}^3$ .

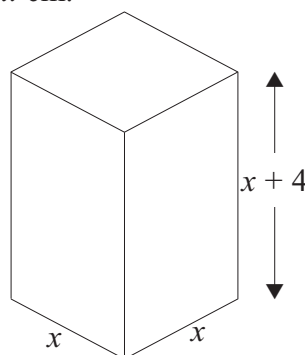


Diagram **NOT** accurately drawn



(b) (i) Show that  $x^3 + 4x^2 = 100$

(ii) Use your answer to part (a) to write down the height of the cuboid, correct to 1 decimal place.

..... cm  
(2)

(Total 6 marks)

Q5

6. The price of all rail season tickets to London increased by 4%.

(a) The price of a rail season ticket from Cambridge to London increased by £121.60  
Work out the price before this increase.

£ .....  
(2)

(b) After the increase, the price of a rail season ticket from Brighton to London was £2828.80  
Work out the price before this increase.

£ .....  
(3)

(Total 5 marks)

Q6



7. The table shows information about the ages of the 240 people at a club.

Age ( $t$ years)	Frequency
$15 \leq t < 20$	95
$20 \leq t < 25$	90
$25 \leq t < 30$	35
$30 \leq t < 35$	15
$35 \leq t < 40$	5

(a) Complete the cumulative frequency table.

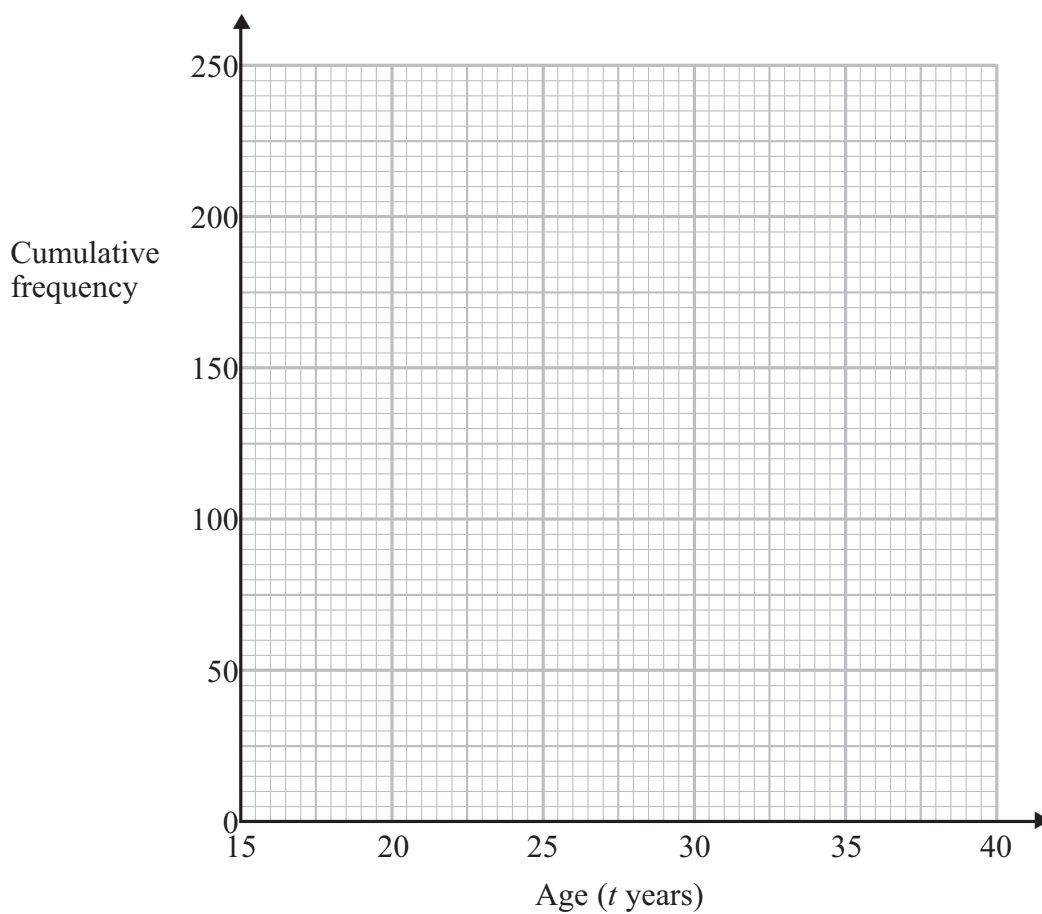
Age ( $t$ years)	Cumulative frequency
$15 \leq t < 20$	
$15 \leq t < 25$	
$15 \leq t < 30$	
$15 \leq t < 35$	
$15 \leq t < 40$	

(1)





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



(2)

(c) Use your graph to find an estimate for the median age of the people.

..... years  
(1)

(Total 4 marks)

Q7

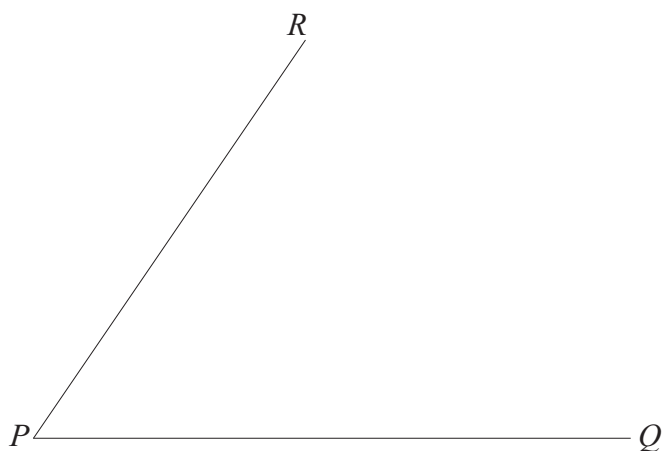


8. (a) Use ruler and compasses to construct the perpendicular bisector of the line  $AB$ .  
You must show all your construction lines.



(2)

- (b) Use ruler and compasses to construct the bisector of angle  $RPQ$ .  
You must show all your construction lines.



(2)

Q8

(Total 4 marks)



9. When you are  $h$  feet above sea level, you can see  $d$  miles to the horizon, where

$$d = \sqrt{\frac{3h}{2}}$$

- (a) Calculate the value of  $d$  when  $h = 8.4 \times 10^3$   
 Give your answer in standard form correct to 3 significant figures.

$d = \dots\dots\dots$  (2)

- (b) Make  $h$  the subject of the formula  $d = \sqrt{\frac{3h}{2}}$

$h = \dots\dots\dots$  (2)

**(Total 4 marks)**

Q9



10.

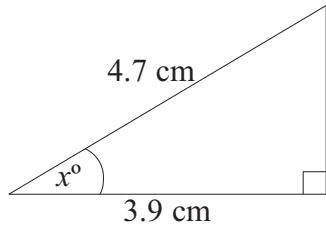


Diagram **NOT** accurately drawn

Work out the value of  $x$ .  
Give your answer correct to 1 decimal place.

$x = \dots\dots\dots$

Q10

(Total 3 marks)

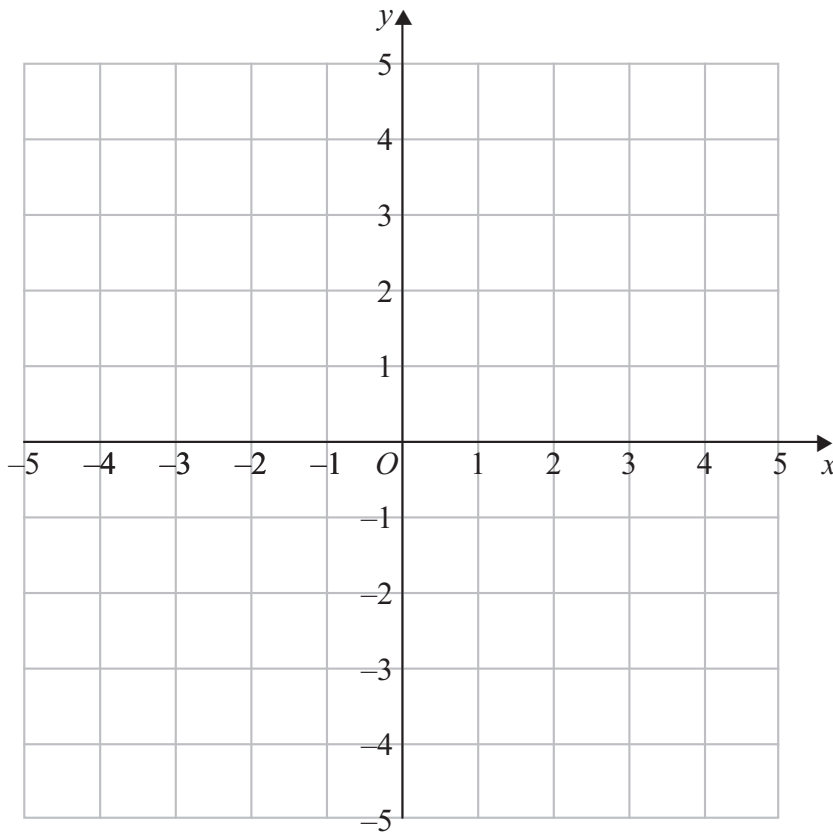
11. On the grid, show by shading, the region which satisfies all three of the inequalities.

$x < 3$

$y > -2$

$y < x$

Label the region **R**.



Q11

(Total 4 marks)



12.

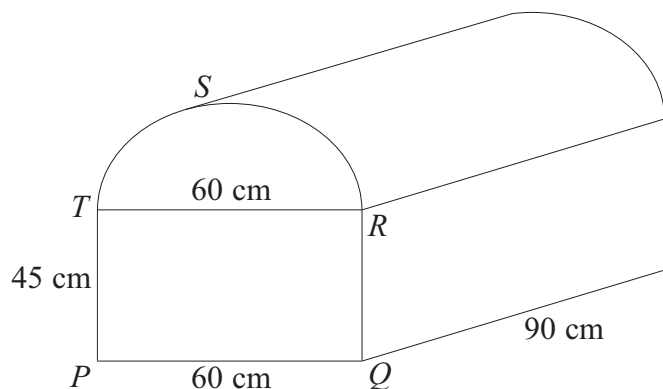


Diagram **NOT** accurately drawn

The diagram shows a prism of length  $90\text{ cm}$ .  
 The cross section,  $PQRST$ , of the prism is a semi-circle above a rectangle.  
 $PQRT$  is a rectangle.  
 $RST$  is a semi-circle with diameter  $RT$ .  
 $PQ = RT = 60\text{ cm}$ .  
 $PT = QR = 45\text{ cm}$ .

Calculate the volume of the prism.  
 Give your answer correct to 3 significant figures.  
 State the units of your answer.

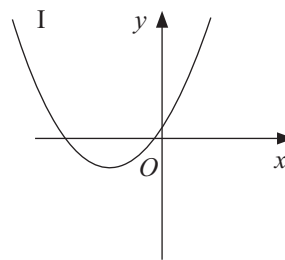
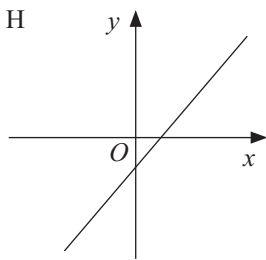
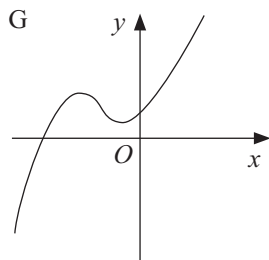
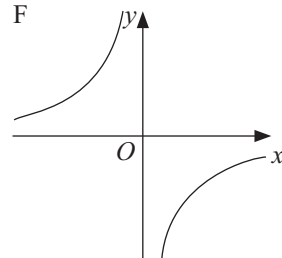
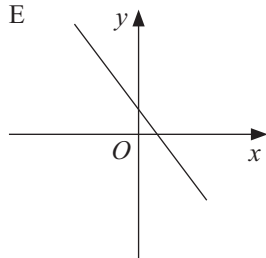
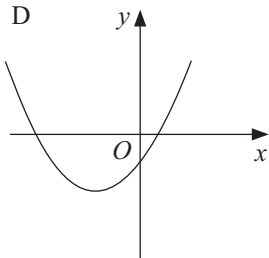
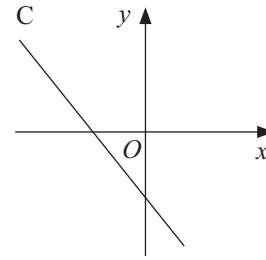
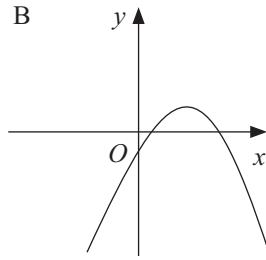
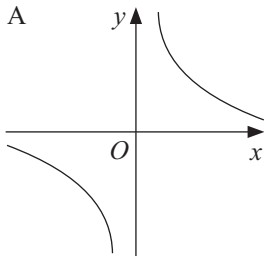
.....

(Total 5 marks)

Q12



13.



Write down the letter of the graph which could have the equation

(i)  $y = 1 - 3x$

.....

(ii)  $y = \frac{1}{x}$

.....

(iii)  $y = 2x^2 + 7x + 3$

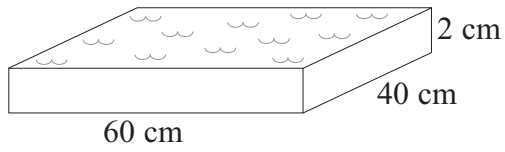
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**(Total 3 marks)**

**Q13**



14.



Diagrams **NOT** accurately drawn

A rectangular tray has length 60 cm, width 40 cm and depth 2 cm.  
It is full of water.  
The water is poured into an empty cylinder of diameter 8 cm.

Calculate the depth, in cm, of water in the cylinder.  
Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

Q14



15. A school has 450 students.  
 Each student studies one of Greek or Spanish or German or French.  
 The table shows the number of students who study each of these languages.

Language	Number of students
Greek	45
Spanish	121
German	98
French	186

An inspector wants to look at the work of a stratified sample of 70 of these students.

Find the number of students studying each of these languages that should be in the sample.

Greek .....

Spanish .....

German .....

French .....

(Total 3 marks)

Q15





16. A ball falls vertically after being dropped.  
The ball falls a distance  $d$  metres in a time of  $t$  seconds.  
 $d$  is directly proportional to the square of  $t$ .

The ball falls 20 metres in a time of 2 seconds.

(a) Find a formula for  $d$  in terms of  $t$ .

$d = \dots\dots\dots$   
**(3)**

(b) Calculate the distance the ball falls in 3 seconds.

$\dots\dots\dots$  m  
**(1)**

(c) Calculate the time the ball takes to fall 605 m.

$\dots\dots\dots$  seconds  
**(3)**

**(Total 7 marks)**

**Q16**



17. Gwen bought a new car.  
Each year, the value of her car depreciated by 9%.

Calculate the number of years after which the value of her car was 47% of its value when new.

.....

Q17

(Total 3 marks)

- 18.

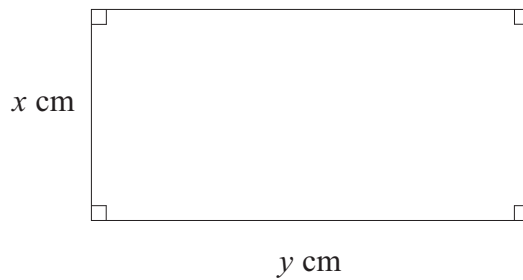


Diagram **NOT** accurately drawn

The diagram shows a rectangle.  
The width of the rectangle is  $x$  cm and its length is  $y$  cm.

The perimeter of the rectangle is 10 cm.

- (a) Show that  $x + y = 5$

(1)



The length of a diagonal of the rectangle is 4 cm.

(b) Show that  $2x^2 - 10x + 9 = 0$

**(3)**

(c) Solve the equation  $2x^2 - 10x + 9 = 0$  to find the possible values of  $x$ .  
Give your answers correct to 3 significant figures.

.....  
**(3)**

**(Total 7 marks)**

**Q18**



19.

$$\frac{x}{x+c} = \frac{p}{q}$$

Make  $x$  the subject of the formula.

$x = \dots\dots\dots$

**(Total 4 marks)****Q19**

20.

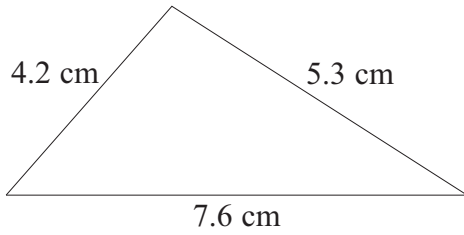


Diagram **NOT** accurately drawn

The lengths of the sides of a triangle are 4.2 cm, 5.3 cm and 7.6 cm.

- (a) Calculate the size of the largest angle of the triangle.  
Give your answer correct to 1 decimal place.

..... °  
**(3)**

- (b) Calculate the area of the triangle.  
Give your answer correct to 3 significant figures.

..... cm<sup>2</sup>  
**(3)**

**(Total 6 marks)**

**Q20**



21.

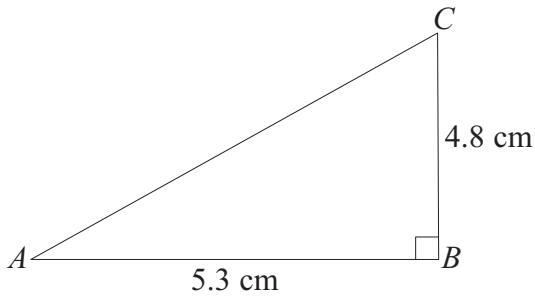


Diagram **NOT** accurately drawn

In triangle  $ABC$ , angle  $ABC = 90^\circ$ .  
 $AB = 5.3$  cm, correct to 2 significant figures.  
 $BC = 4.8$  cm, correct to 2 significant figures.  
 The base,  $AB$ , of the triangle is horizontal.

(a) (i) Calculate the lower bound for the gradient of the line  $AC$ .

.....

(ii) Calculate the upper bound for the gradient of the line  $AC$ .

.....

**(3)**

(b) Use your answers to part (a) to give the gradient of the line  $AC$  to an appropriate degree of accuracy.  
 You must explain your answer.

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

**(2)**

**(Total 5 marks)**

**Q21**



22. The probability that any piece of buttered toast will land buttered side down when it is dropped is 0.62  
Two pieces of buttered toast are to be dropped, one after the other.

Calculate the probability that exactly one piece of buttered toast will land buttered side down.

.....

**(Total 4 marks)**

**Q22**



23.

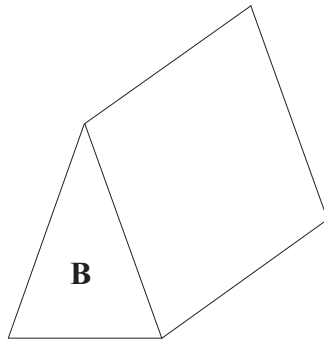
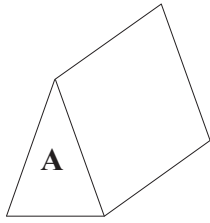


Diagram **NOT** accurately drawn

Two prisms, **A** and **B**, are mathematically similar.  
The volume of prism **A** is  $12\,000\text{ cm}^3$ .  
The volume of prism **B** is  $49\,152\text{ cm}^3$ .  
The total surface area of prism **B** is  $9728\text{ cm}^2$ .

Calculate the total surface area of prism **A**.

.....  $\text{cm}^2$

(Total 4 marks)

Q23

**TOTAL FOR PAPER: 100 MARKS**

**END**

