OCR
RECOGNISING ACHIEVEMENT

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Wednesday 11 January 2012 – Morning

GCSE APPLICATIONS OF MATHEMATICS

A381/01 Applications of Mathematics 1 (Foundation Tier)

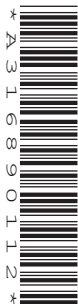| Candidates answer on the Question Paper. |
|---|
| **OCR supplied materials:**
 None |
| **Other materials required:**
 • Scientific or graphical calculator
 • Geometrical instruments
 • Tracing paper (optional) |

Duration: 1 hour

Candidate forename		Candidate surname	

Centre number					Candidate number				

INSTRUCTIONS TO CANDIDATES

* Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
* Use black ink. HB pencil may be used for graphs and diagrams only.
* Answer **all** the questions.
* Read each question carefully. Make sure you know what you have to do before starting your answer.
* Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
* Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
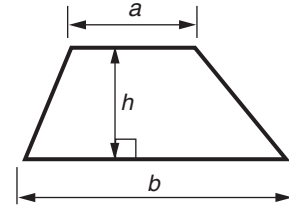* Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

* The number of marks is given in brackets **[ ]** at the end of each question or part question.
* Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
* The total number of marks for this paper is **60**.
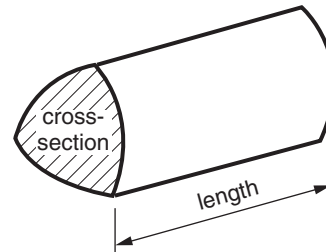* This document consists of **20** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper
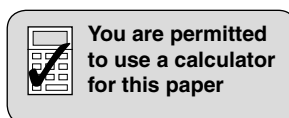
This paper has been pre modified for carrier language

OCR is an exempt Charity

Turn over

Formulae Sheet: Foundation Tier

Area of trapezium $= \frac{1}{2}(a + b)h$

Volume of prism = (area of cross-section) × length

1 Lin found this in a book.

Draw this right-angled triangle full size.
It makes a 40° angle
without using a protractor.

5 cm

Not to scale

40°

6 cm

Does the method work?
Support your answer with a drawing and measurements.

_____

_____ **[3]**

Turn over
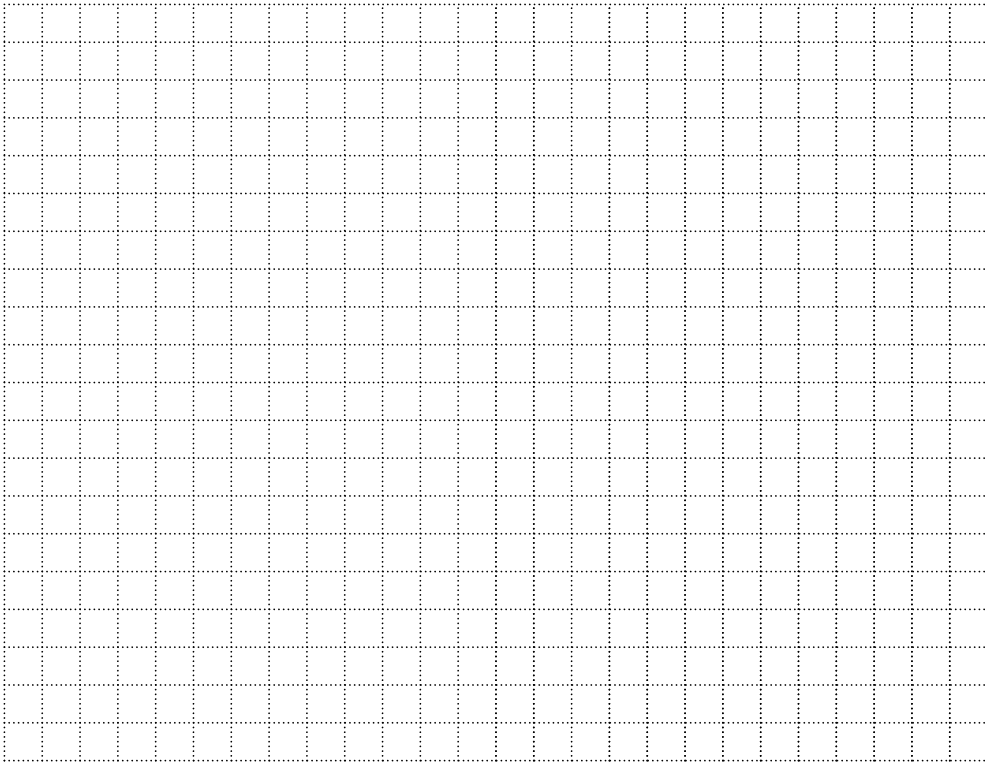
2 (a)

(i) Each year a total of £20 billion is spent on advertising in the UK.
One quarter of this amount is spent on TV, radio and cinema advertising.

How much money is spent on TV, radio and cinema advertising?

(a)(i) £ _____ billion **[1]**

(ii) For every £1 spent on advertising, 23p is spent on internet advertising.

What percentage of the total amount is spent on internet advertising?

(ii) _____ % **[1]**

(iii) 40% of advertising is in newspapers and magazines.

Write 40% as a fraction.

(iii) _____ **[1]**

(b) A person sees about 600 adverts each day.

About how many adverts does a person see in a year?

(b) _____ **[2]**

Turn over

(c) Adverts may be towed by planes, printed on balloons or even written in the sky!
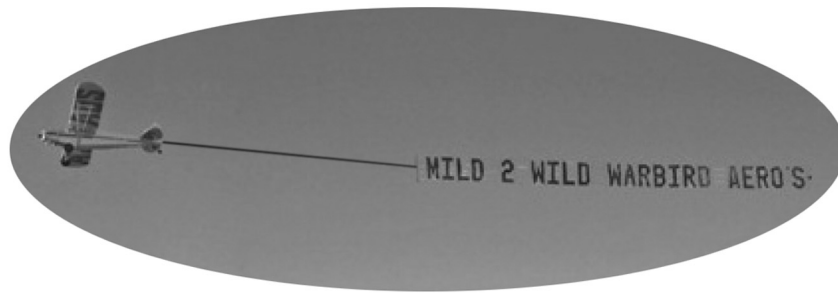

The letters in the sky must be big enough to be read from the ground.

This rule connects how tall the letters are and how high in the sky they can be.

How tall the letter is
(in any units) $\longrightarrow$ **× 200** $\longrightarrow$ Maximum height in the sky
(in the same units)

(i) The letters on a balloon are 2 m tall. They can be read from the ground.

What is the maximum height in the sky of the balloon?

(c)(i) _____ m **[1]**

(ii) In the book *From the Earth to the Moon* the heroes landed on the moon.
They planned to spell out a message to Earth using rocks!
The moon is 360 000 km from the Earth.
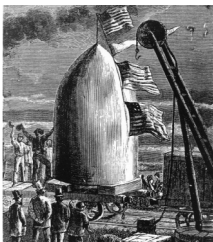
How tall would the letters need to be so that people on Earth could read them?

(ii) _____ **[2]**

(d)*

> When you advertise on the internet you have to pay for
>
> - the number of visits made to the internet page with your advert on,
>   **AND**
> - the number of times people click on your advert to visit your website.

Amy sells homemade candles on her website.
She wants to advertise her website on an internet page.

Amy first finds out about how much she will be charged.
The charge is 0.4p per visit to the internet page.
There is also a charge of 10p per visit to Amy's website.

Amy estimates that
- 6000 people will visit the internet page each day,
- 1% of these people will visit her website.

Then Amy thinks about the sales.
She estimates that
- 1 out of 5 people who visit her website will make a purchase,
- she will make a profit of £4 on each purchase.

Will the profit from the internet sales cover the cost of the internet advertising?
Show clearly, with supporting costing, how you arrived at your answer.

_____

_____

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_____

_____ **[4]**

Turn over

3 **(a)** The table shows the number of copies of five national newspapers sold one day.

Newspaper	Number of copies sold
Daily Mirror	1 215 081
Daily Star	793 487
Express	642 695
Mail	2 129 328
Sun	2 904 180

   (i) Which newspaper sold the smallest number of copies?

   (a)(i) _____ **[1]**

   (ii) Which newspapers sold more than a million copies?

   (ii) _____ **[2]**

(b) Newspapers are printed on a special kind of paper called **newsprint**.
Newsprint is produced in large rolls like giant toilet rolls.

   (i) Here is some information about newsprint.

   > Newsprint paper is 1.1 metres wide.
   >
   > The length of newsprint in a roll is 11 000 metres.
   >
   > Newsprint is about 0.1 mm thick.
   >
   > A square metre of newsprint weighs about 50 g.

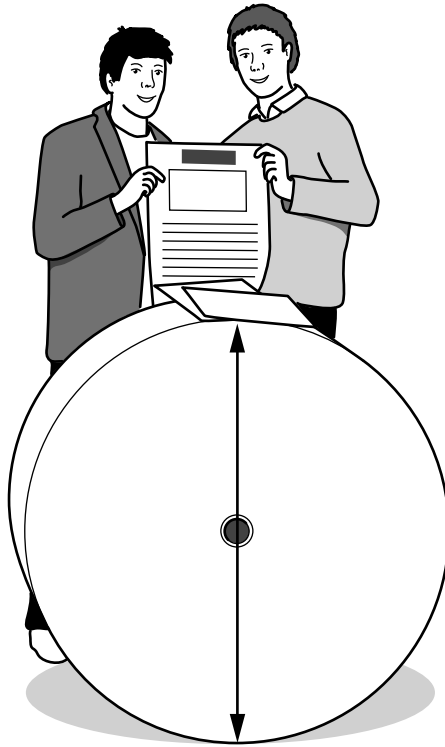   Use information from the box to calculate the weight of a roll of newsprint.
   Remember to include the units in your answer.

   (b)(i) _____ **[3]**

(ii) Estimate the diameter, in centimetres, of this roll of newsprint.

(ii) _____ cm **[1]**

(iii) Use your answer to part **(b)(ii)** to work out the radius of the roll of newsprint.

(iii) _____ cm **[1]**

Turn over

(c)

The price of this Sunday newspaper was £2 at the start of 2011,
20% of this was for the cost of newsprint.

(i) Work out the cost of the newsprint for this newspaper.

(c)(i) _____ p **[1]**

(ii) In 2011 the cost of newsprint increased by 25%.

What was the cost of the newsprint for this newspaper at the end of 2011?

(ii) _____ p **[1]**

(iii) The increase in the cost of the newsprint was passed on to the customer.
All the other costs stayed the same.

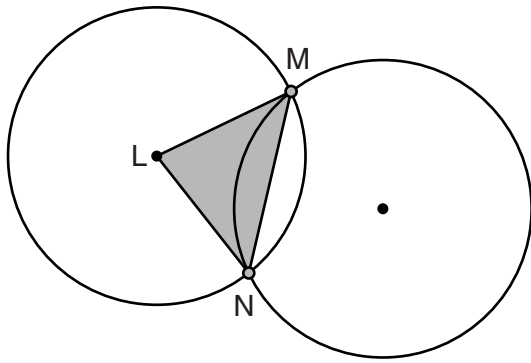What was the selling price of this newspaper at the end of 2011?

(iii) £ _____ **[1]**

4 Tom drew these triangles on circles which have the same radius.
The centres of the circles are marked with black dots.

Complete each of these sentences.
Choose from the words in the box.
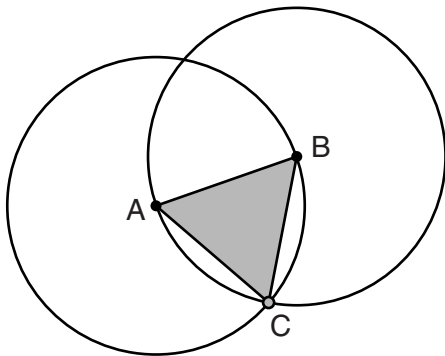
| equilateral | isosceles | right-angled | scalene |

(a)

Triangle LMN is _____

because _____

_____

_____

_____

_____ **[2]**

(b)

Triangle ABC is _____

because _____

_____

_____

_____

_____ **[2]**

Turn over

5 Jan wants to buy some fonts for her computer.
She wonders how many different fonts there are.

(a) She uses an encyclopaedia site on the internet.

Q: How many different fonts are there?

A: There are probaby at least ten to the power five fonts. New ones are created every day.

✉ E-mail this answer
🔗 Link to this answer

(i) Write "ten to the power five" using index notation.

(a)(i) _____ **[1]**

(ii) Work out the value of "ten to the power five".

(ii) _____ **[1]**

(b) Jan chooses these three fonts.

Rodi de Asis   Buttons the Bear

extrafine

She writes down the cost of each font and the postage.

£3.03 + £4.99 + £9.92 + £1.85

Jan has a limit of £20.

Write down a rough calculation and its answer that Jan could do in her head to check that she will not spend more than £20.

_____ **[1]**

(c) Letters from the same font but of different size are similar.
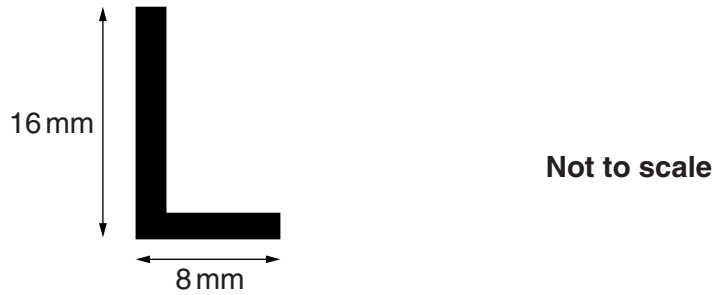These letter Rs are all similar to each other.

R Я R R ꓤ

(i) Put rings round the two letters in the box that are **not similar** to the other letters.   **[1]**

ᴟ E ⊔ E Ǝ e ∃

Turn over

(ii) Jan wants to print some large letters for a poster.

This diagram shows the dimensions of an L on her computer screen.
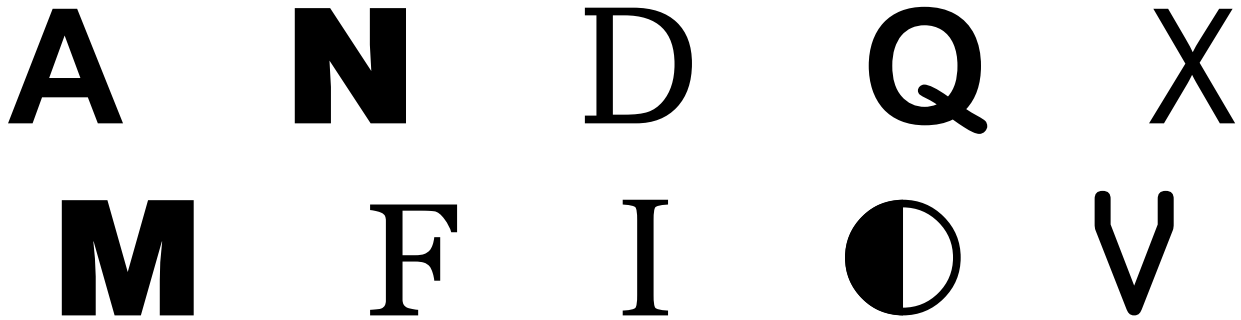
16 mm

8 mm

Not to scale

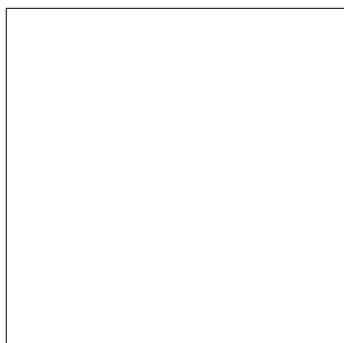On the poster the height of an L will be 10 cm.

How wide will the L be?

(ii) _____ cm **[1]**

(d) Here are some letters in different fonts.
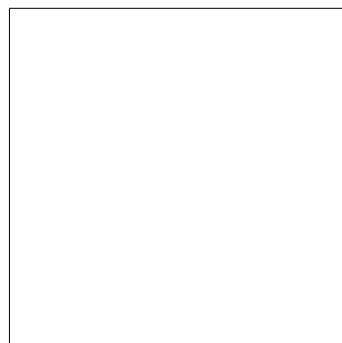Some have reflection symmetry and some have rotation symmetry.

Write the letters in the correct boxes.
Some may be written in both boxes and some in neither.
You do not need to copy the actual fonts!

A   N   D   Q   X

M   F   I   ◐   V

Reflection symmetry

Rotation symmetry

[4]

(e) This diagram shows a normal A and an italic A.

Not to scale
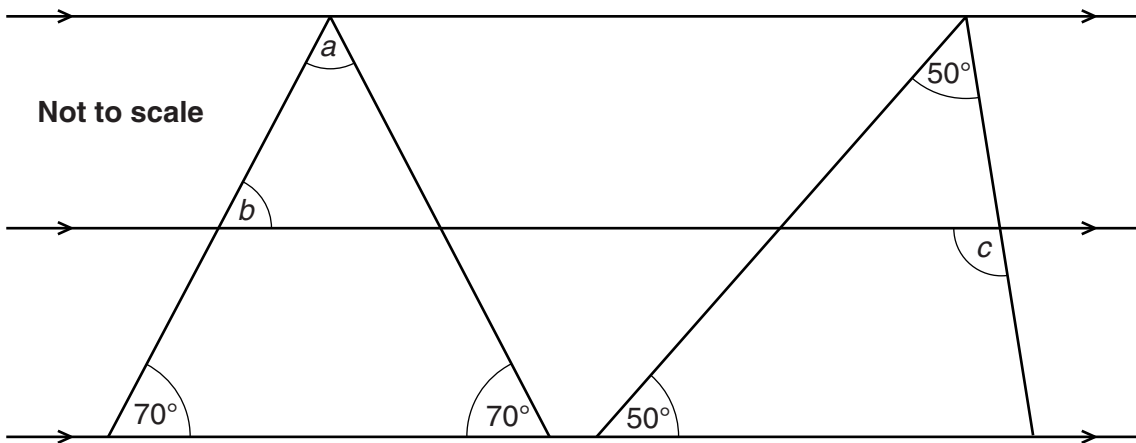
Find the sizes of the angles *a*, *b* and *c*.

a = _____ ° **[1]**

b = _____ ° **[1]**

c = _____ ° **[1]**

6 The femur, shown shaded in the diagram, is a bone in the leg.
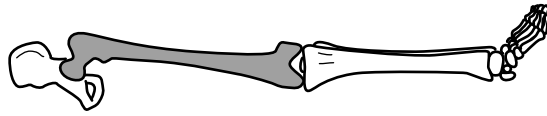
Forensic scientists use the length of the femur to estimate the height of a person.
They use the graph to estimate the height of a man.
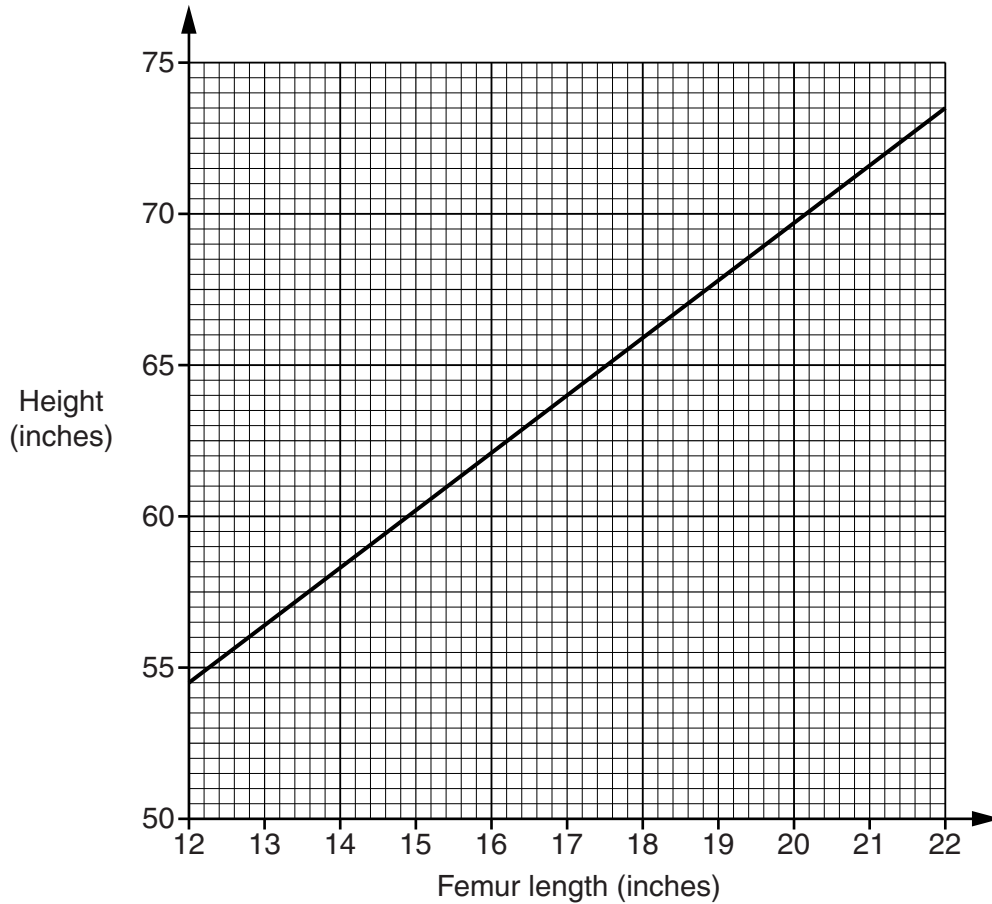
(a) A man's femur is 20 inches long.
Use the graph to estimate the height of this man.

(a) _____ inches **[1]**

(b) Forensic scientists use this formula to estimate the height of a woman.

$H = 2L + 29$

H is the height in inches

L is the length of the femur in inches

Draw the graph of $H = 2L + 29$ on the grid on the previous page.

You may use this table to help you.

L	12	16	22
H			

[3]

(c) A man and a woman are both 63 inches tall.

Using your graph, estimate the difference in the lengths of their femurs.

(c) _____ inches **[2]**

7 Write down two different equations whose solutions are $a = 3$.

_____ **[1]**

_____ **[1]**

8   Ben has bought a new calculator.

(a) He wants to work out the volume of a sphere.

To do this he has to calculate $\frac{4}{3} \times \pi \times 2.4^3$

to give the volume in cubic centimetres.

Calculate the volume

(i) correct to 2 decimal places,

(a)(i) _____ cm^3 **[2]**

(ii) to the nearest whole number.

(ii) _____ cm^3 **[1]**

(b) Ben's calculator also does fraction calculations,
but he does not know how it works.

Check this calculation without using a calculator.
If the calculation is wrong, work out the correct answer.
Show all your working.

$$\frac{1}{12} \div \frac{1}{2} = \frac{1}{24}$$

(b) _____ **[1]**

(c) Work out what Ben's calculator gives as the answer to this calculation.

$$(5 \div 23) \div (10 - 6)$$

(c) _____ **[2]**

Turn over

9* This method was used in Ancient Egypt and China over a thousand years ago.

To solve the equation $ax + b = 0$, where a and b are numbers.

- Write down the values of a and b in your equation.

- Guess any two numbers as solutions.
  Call these m and n.

- In the left-hand side of the equation replace x with m and then with n, so that

$$am + b = r \text{ and}$$
$$an + b = s$$

- Calculate $\dfrac{rn - sm}{r - s}$ to find the solution to the equation.

Use the method to solve the equation

$$4x + 10 = 0.$$

You must show all your working.

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_____ **[4]**