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F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

APPLICATIONS OF MATHEMATICS

A381/01

Applications of Mathematics 1 (Foundation Tier)

A315580611

Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:
- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

Monday 6 June 2011
Afternoon

Duration: 1 hour

A381101

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. Pencil may be used for graphs and diagrams only.
- 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).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

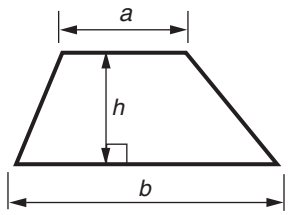
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*****).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

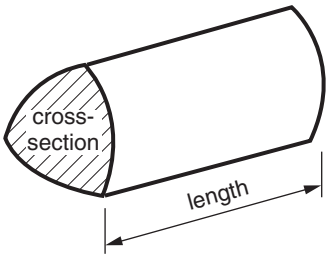
This paper has been pre modified for carrier language

Formulae Sheet: Foundation Tier

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



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



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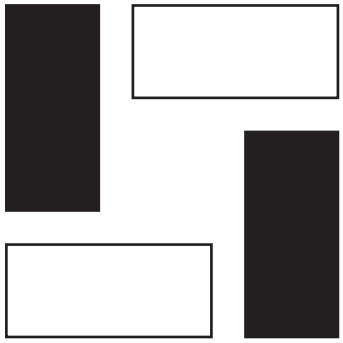
1 **(a)** Under each logo write down the number of lines of reflection symmetry **and** the order of rotation symmetry.



_____ lines of reflection symmetry and rotation symmetry order _____	_____ lines of reflection symmetry and rotation symmetry order _____	_____ lines of reflection symmetry and rotation symmetry order _____

[4]

(b) The READY MIX cement logo is one of the world's largest logos and can be seen from space!

(i) The "I" of READY MIX is a rectangle measuring 260 m by 30 m.

What is the area of the "I"?

(b)(i) _____ m^2 **[1]**

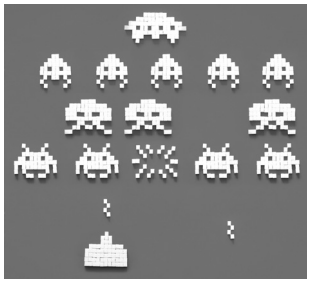
(ii) The two words READY MIX are about 3000 m long.

What is 3000 m in kilometres?

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

2 **(a)** This table shows when some of the most popular computer games over the last 50 years were released. The very first one was *Space War*.

Date	Computer game
1962	*Space War*
1977	*Space Invaders*
1980	*Pacman*
1982	*Donkey Kong*
1983	*Mario*
1991	*Sonic the Hedgehog*
2005	*Resident Evil*
2008	*Grand Theft Auto 4*



How many years after *Space War* was *Grand Theft Auto 4* released?

(a) _____ **[1]**

(b) Here are the scores for some players on an online computer game.

Gamertag	Score
Bounty Bob	321920
Fleeting	312360
runamOk	239180
Zazuum	211950
FatBoysOnTour	97250

(i) How many more did Bounty Bob score than Fleeting?

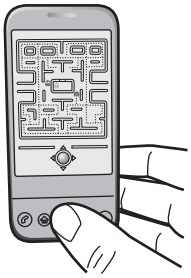
(b)(i) _____ **[1]**

(ii) Write FatBoysOnTour's score correct to the nearest 1000.

(ii) _____ **[1]**

(c) Aijaz is an online games player.
One week he played 32 games. He won 18 of these.

What fraction of his games did he win?
Give your answer in its simplest form.



(c) _____ **[2]**

(d) In a game of *Space Invaders*:

- zapping an alien is worth 1 point
- zapping a UFO is worth 10 points
- zapping a mother ship is worth 100 points.

(i) Write down a formula for the total, T, scored by zapping a aliens, u UFOs and m mother ships.

(d)(i) $T =$ _____ **[2]**

(ii) Find two different ways of getting a total score of 19 points.

(ii) _____ aliens _____ UFOs _____ mother ships

_____ aliens _____ UFOs _____ mother ships **[2]**

(e) Aijaz is loading a game onto his computer.
The shading shows how much has been loaded.

Loading "Star Ship Trooper"

Estimated time left: 30 seconds

(i) What percentage of the game has been loaded?

(e)(i) _____ % **[1]**

(ii) Estimate the total time to load the game from start to finish.

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

3 Here is a photo of a wheelchair athlete and their racing wheelchair.

(a) The diameter of the small front wheel is 30 cm.

Estimate the length of the wheelchair shown by the arrow.

(a) _____ **[2]**

(b) The rear wheels of racing wheelchairs are not at right-angles to the ground.
The drawing below shows a rear wheel of a racing wheelchair.

Measure the acute angle to the ground of this rear wheel.

(b) _____ ° **[1]**

(c) Here are the times, in seconds, for the women's 100 m wheelchair race at the Beijing Paralympics.

Athlete	Time (seconds)
Guilhermina	12.40
Hinton	13.18
Kantza	13.20
Santos	12.99
Suarez	13.21
Tottes	13.08
Wu	12.31

(i) The medals are awarded for the three fastest athletes.

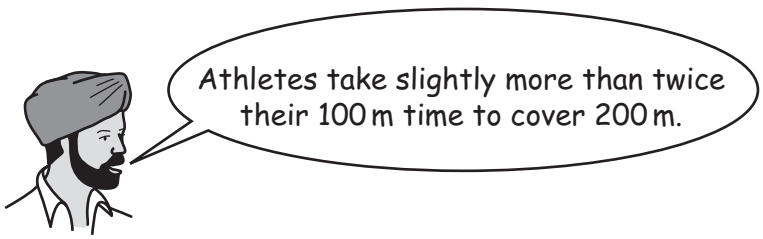
Write down who won the gold, silver and bronze medals.

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

Gold (1st) **Silver (2nd)** **Bronze (3rd)**

(ii) Some of these athletes were also in the 200 m wheelchair race.

Name	Santos	Hinton	Kantza	Suarez	Wu
200 m time (s)	26.99	26.68	26.87	27.61	25.40



Is Balvinder right?
Show clearly how you decided.

_____

_____

_____

_____

_____ **[3]**

(d) For the 100 m race this formula gives the average speed of an athlete in miles per hour (m) from their time in seconds (t).

$$m = \frac{223}{t}$$

Lucas Prado from Brazil won the men's 100 m wheelchair race in a time of 11.03 seconds.

What was his average speed?
Give your answer correct to the nearest whole number.

(d) _____ miles per hour **[2]**

(e)* Jezz is a top wheelchair athlete.
He needs a new racing wheelchair.
The one he would like costs £2346.

He can get a grant to pay some of the cost.
These are details about three possible grants.

A. A grant of 25% of the cost price. Jezz pays the rest.
B. A 50% grant for the first £1000 and a 5% grant for the rest of the cost. Jezz pays the rest.
C. A grant of one third of the cost price. Jezz borrows the rest from a bank. He repays the bank plus an extra 10% interest.

Which is the cheapest deal for Jezz?
Show clearly how you get your answer.

(e) _____ **[5]**

4 **(a)** Simplify.

$2x + 7 + 2x - 3$

(a) _____ **[1]**

(b) Solve.

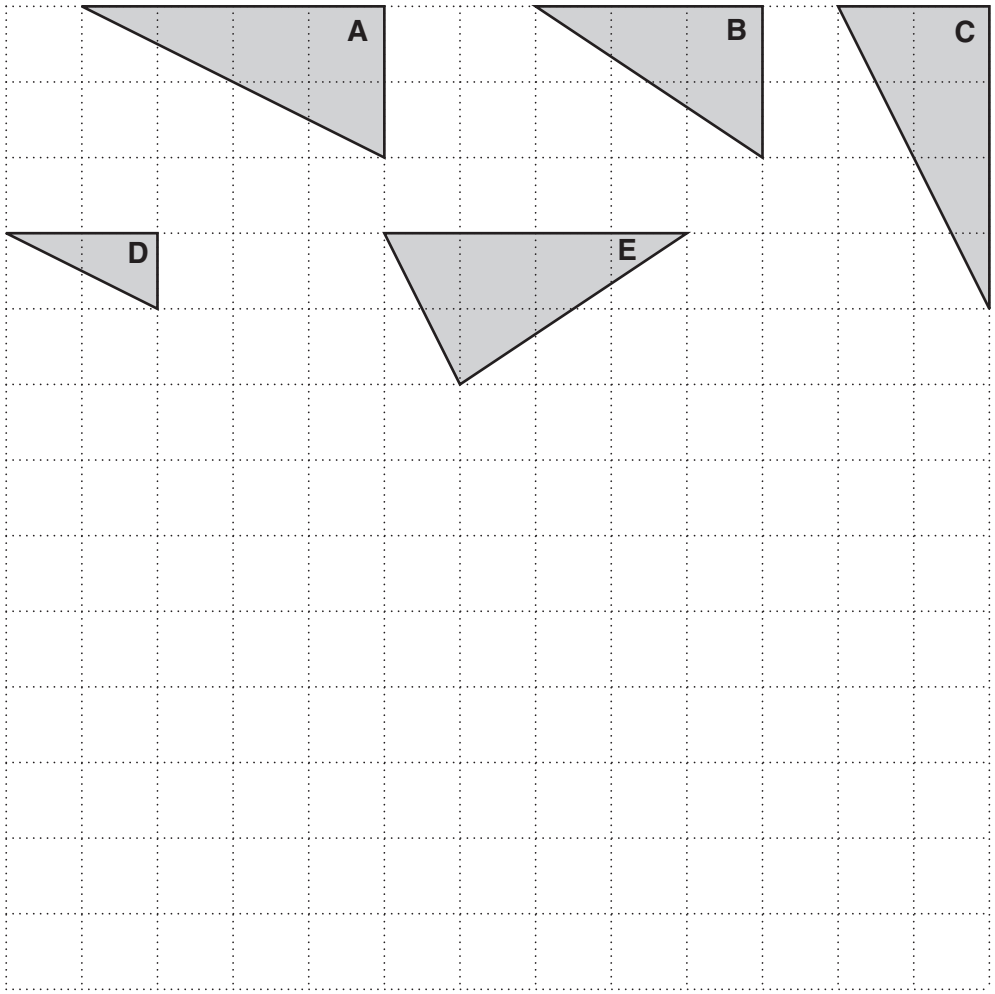
(i) $2x = 16$

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

(ii) $x + 4 = 10$

(ii) _____ **[1]**

5 These five triangles are drawn on a centimetre square grid.
Together they make up the parts of a puzzle.



(a) Which of the triangles is congruent to triangle **A**?

(a) _____ **[1]**

(b) Which of the triangles is similar to triangle **A** but **not** congruent to it?

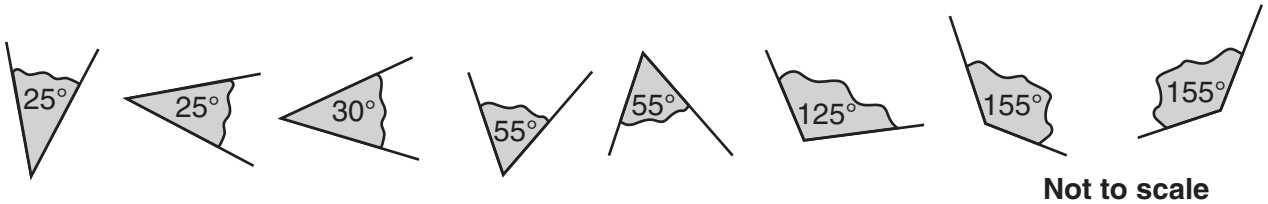
(b) _____ **[1]**

(c) To solve the puzzle the triangles have to be fitted together to make a square.

What is the length of the side of the square?

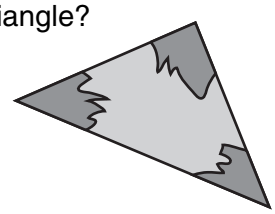
(c) _____ cm **[3]**

6 Here are eight angles.



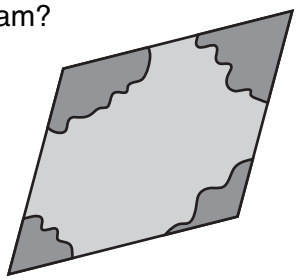
Not to scale

(a) Which three of the angles could be the vertices of one triangle?



(a) _____ _____ _____ **[2]**

(b) Which four of the angles could be the vertices of one parallelogram?



(b) _____ _____ _____ _____ **[2]**

7 Prime numbers are used in codes. Very large numbers are split into their prime factors.

Here are all the prime numbers less than 100.

2	3	5	7	11	13	17	19	23	29
31	37	41	43	47	53	59	61	67	71
73	79	83	89	97					

(a) Which two prime numbers have a product of 65?

(a) _____ **[1]**

(b) What are the two prime factors of 21?

(b) _____ **[1]**

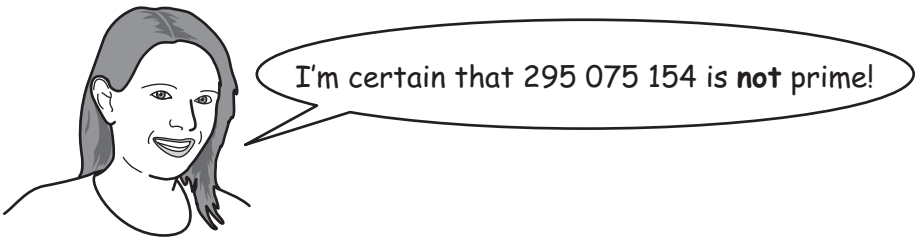
(c) Which prime number gives an answer of 27 when it is cubed?

(c) _____ **[1]**

(d) Which prime number gives an answer of 169 when it is squared?

(d) _____ **[1]**

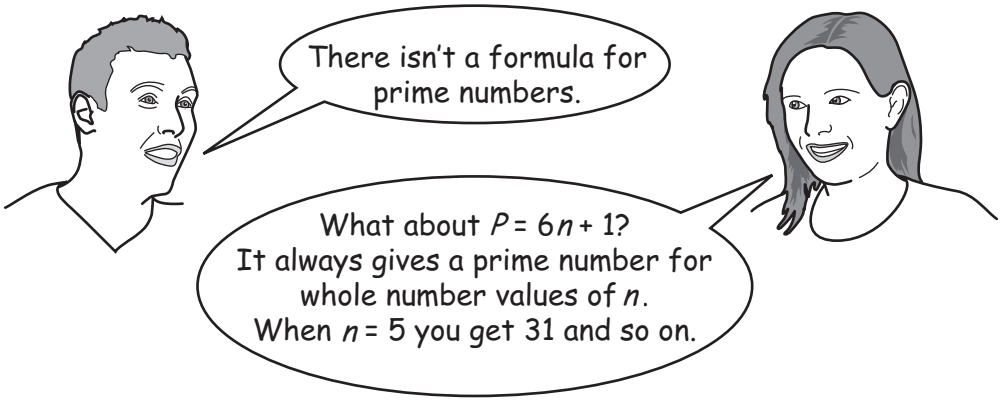
(e)



How do you know that Anna is correct?

_____ **[1]**

(f) Bruce and Anna are arguing.



Is Anna correct?
Explain carefully how you decided and give some numbers to support your answer.

_____

_____

_____

_____

_____ **[3]**

(g) In the box there are four calculations involving large prime numbers.

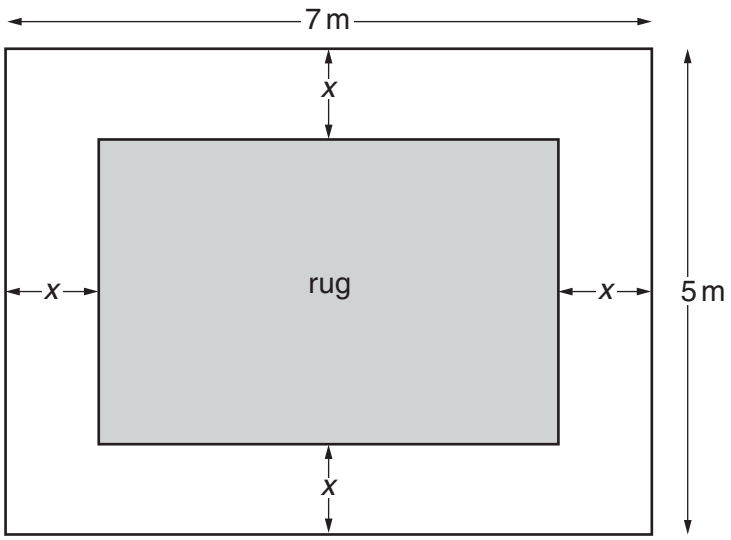
426 389 × 9 369 319 = 3 994 974 559 091
3 994 974 559 091 ÷ 9 369 319 = 426 389
9 369 319 × 269 987 = 2 529 594 328 853
115 119 486 943 ÷ 426 389 = 269 987

Use the calculations in the box to find the missing answers.

(g) (i) 2 529 594 328 853 ÷ 269 987 = _____ **[1]**

(ii) 426 389 × 269 987 = _____ **[1]**

8 The sketch shows the floor plan of a room partially covered by a rug.
The room measures 7 m by 5 m.
The border around the rug is x metres wide.



Not to scale

(a) (i) Find, in terms of x, an expression for the length of the rug.

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

(ii) Find, and simplify, an expression for the perimeter of the rug.

(ii) _____ **[2]**

(b) The perimeter of the rug is 20 m.

Find the length and width of the rug.

(b) _____ m by _____ m **[3]**

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