OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

A503/02

MATHEMATICS A

Unit C (Higher Tier)

FRIDAY 14 JUNE 2013: Morning
DURATION: 2 hours
plus your additional time allowance

MODIFIED ENLARGED

Candidate forename		Candidate surname	

Centre number						Candidate number				

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Scientific or graphical calculator
Geometrical instruments
Tracing paper (optional)
A model is provided for question 7

You are permitted to use a calculator for this paper

READ INSTRUCTIONS OVERLEAF

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INSTRUCTIONS TO CANDIDATES

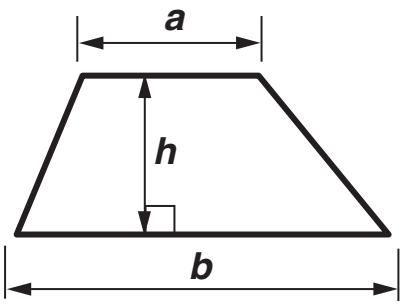
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you 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).**

INFORMATION FOR CANDIDATES

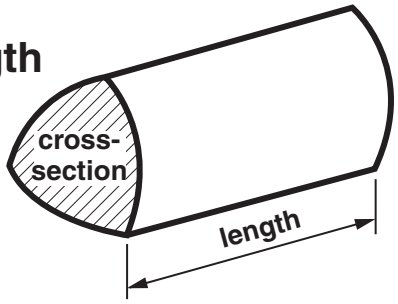
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **Your Quality of Written Communication is assessed in questions marked with an asterisk (*).**
- **Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.**
- **The total number of marks for this paper is 100.**
- **Any blank pages are indicated.**

FORMULAE SHEET: HIGHER TIER

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

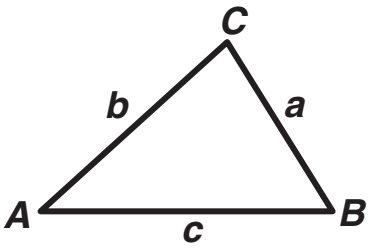


Volume of prism = (area of cross-section) × length



In any triangle ABC

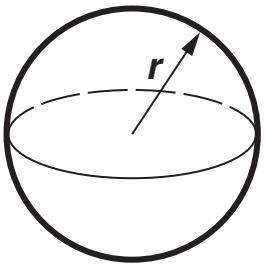
Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

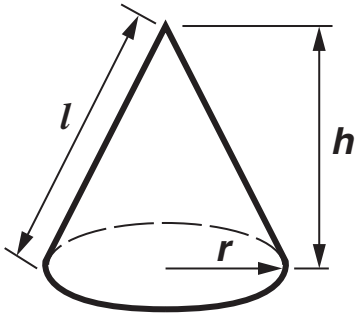
Volume of sphere $= \frac{4}{3}\pi r^3$



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

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

Curved surface area of cone $= \pi rl$



The Quadratic Equation

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

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

1 (a) Use your calculator to work these out.

(i) $\sqrt{6} + 1.2^3$

Give your answer correct to 2 decimal places.

(a)(i) _____ [2]

(ii) $\dfrac{3.7}{4.5 - 1.9}$

Give your answer correct to 2 significant figures.

(ii) _____ [2]

(iii) 2^{-4}

Give your answer as a decimal.

(iii) _____ [1]

(b) A newspaper recorded the attendance at a football match as 6500 correct to the nearest 100.

Write down the upper bound and lower bound of the attendance.

(b) Upper bound _____

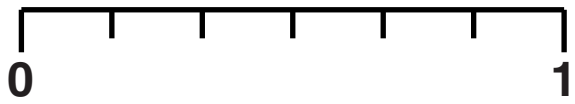
Lower bound _____ **[2]**

2 (a) A fair 6-sided dice is thrown once.

On the probability line below

(i) mark with an arrow labelled A the probability that the dice will show a number greater than 2,

(ii) mark with an arrow labelled B the probability that the dice will show an odd number.



[2]

(b) Tessa has a BIASED 6-sided dice.
She wants to find the probability of getting a 4 when this dice is thrown.

Describe an experiment she could perform, and how the results could be used, to estimate the probability of throwing a 4.

_____

_____

_____

_____ **[3]**

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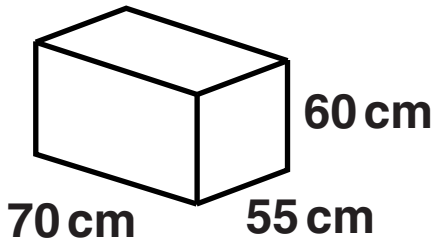
TURN OVER FOR QUESTION 3

3 A water tank is a closed cuboid measuring 70 cm by 55 cm by 60 cm.



(a) Work out the total surface area of the tank.

(a) _____ cm^2 [3]

(b) Show that the volume of the tank is 231 litres. [3]

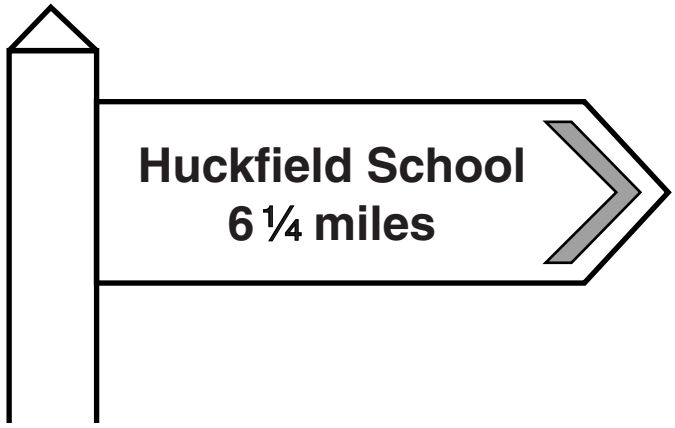
(c) The empty tank is filled with water at a rate of 0.6 litres per second.

How long will it take to fill the tank?
Give your answer in minutes and seconds.

(c) _____ minutes _____ seconds [3]

4 Phil catches the bus to Huckfield School and back each day.

(a) This sign is next to the bus stop.



(i) Calculate the total distance Phil travels to school and back during one week (Monday to Friday).

(a)(i) _____ miles [2]

(ii) The bus travels at an average speed of 20 mph.

How long will the bus take to get Phil to school?
Give your answer in minutes and seconds.

(ii) _____ minutes _____ seconds [4]

(b) One day 65 students catch the bus.
$\frac{2}{5}$ of these students are boys.

How many of these students are GIRLS?

(b) _____ **[3]**

(c) Phil did a survey about how students at Huckfield School get to school.
The table below shows the probability of how a student, chosen at random, gets to school.

(i) Complete the table by filling in the missing value.

	Bus	Walk	Car	Other
Probability	0.4	0.33	0.15	

[2]

(ii) What is the probability that a student, chosen at random, will use either the bus or a car to get to school?

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

(iii) There are 2500 students in the school.

How many of them would you expect to come to school by car?

(iii) _____ **[2]**

5 (a) Simplify fully.

$$\frac{40x^3}{5x}$$

(a) _____ **[2]**

(b) Multiply out and simplify fully.

$3(x - 1) + 4(2x - 5)$

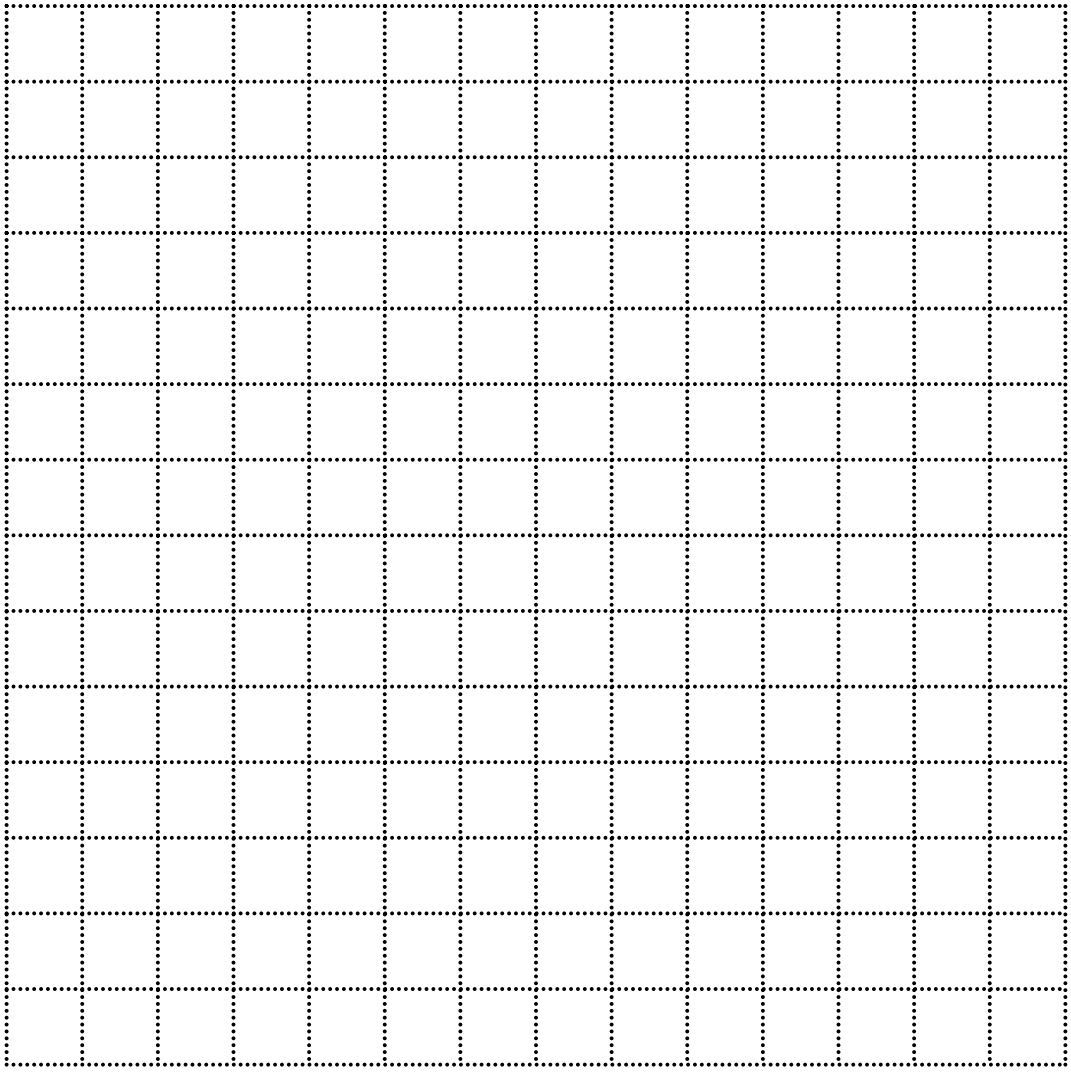
(b) _____ **[3]**

6 Show that a solution of $x^3 - x = 20$ lies between 2 and 3. [3]

7 ***In this question, use a ruler and a pair of compasses. Leave in your construction lines.***

A model of a square-based pyramid is provided for this question.

On the grid below, construct a net of the pyramid.



[5]

8 Write one of

Equation

Expression

Formula

Identity

as appropriate next to each of the following.

$2x + 9$ _____

$3x - 1 = 5$ _____

$3(2x - 1) = 6x - 3$ _____

[3]

9 (a) Factorise completely.

$4x^2 - 6xy$

(a) _____ **[2]**

(b) Multiply out and simplify.

$(x + 7)(x + 2)$

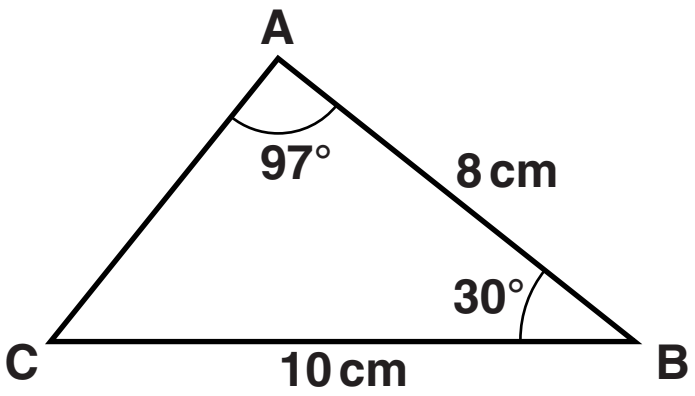
(b) _____ **[2]**

10 **In a sale, the price of all clothes is reduced by 15% and the price of all electrical goods is reduced by 20%.**
Rajesh makes a mistake and reduces the price of a coat by 20% instead of by 15%.
This gives a sale price of £104 for the coat.

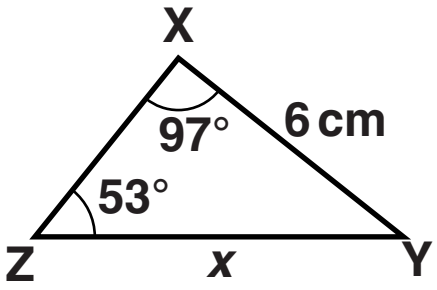
Calculate the correct sale price of the coat.
Show all your working clearly.

£ _____ [6]

11 Triangles ABC and XYZ are drawn below.



NOT TO SCALE



(a) Explain why the two triangles are mathematically similar.

_____

_____

_____ **[3]**

(b) Calculate length *x*.

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

12 Match one of these equations to each of the sketch graphs below.

$y = x^2$

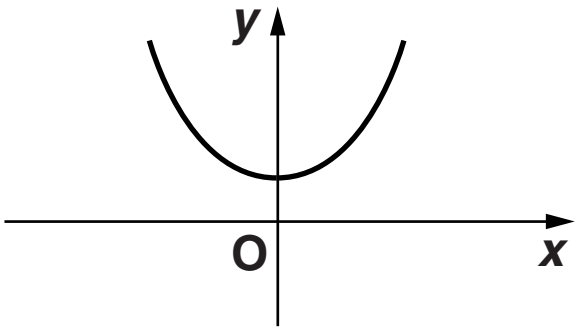
$y = \sin x$

$y = x^3$

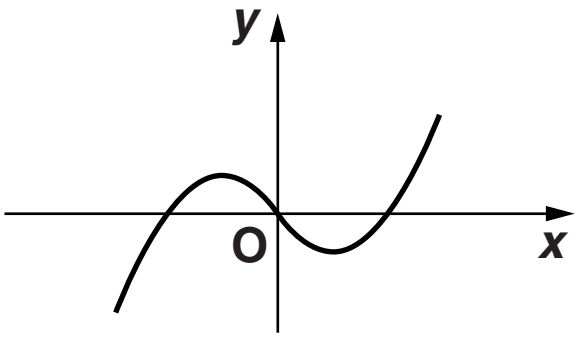
$y = x^3 - 2x$

$y = x^2 + 4$

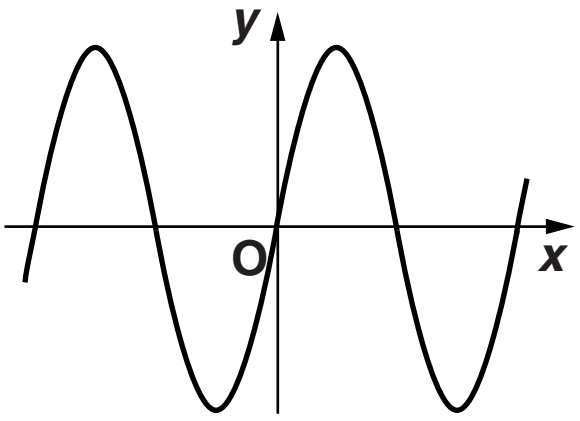
$y = \cos x$



Equation _____



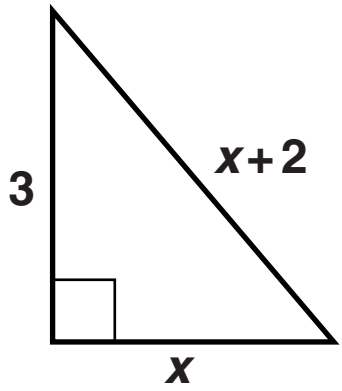
Equation _____



Equation _____

[3]

13 In the triangle below, all lengths are in centimetres.



NOT TO SCALE

Use Pythagoras' theorem to find *x*.

_____ **[5]**

14 You are given that f(x) = 3x + 2.

(a) Find f(4).

(a) _____ **[1]**

(b) Write each of these in the form $ax + b$.

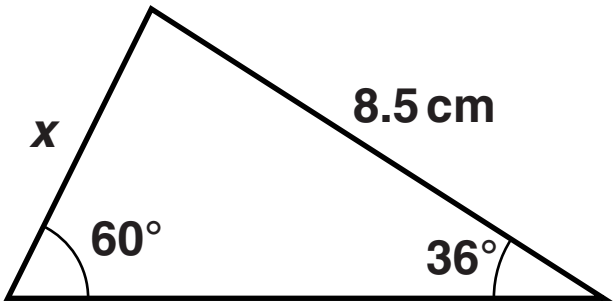
(i) 2f(x)

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

(ii) f(2x)

(ii) _____ **[1]**

15 Here is a triangle.



NOT TO SCALE

Calculate length *x*.

_____ **cm [3]**

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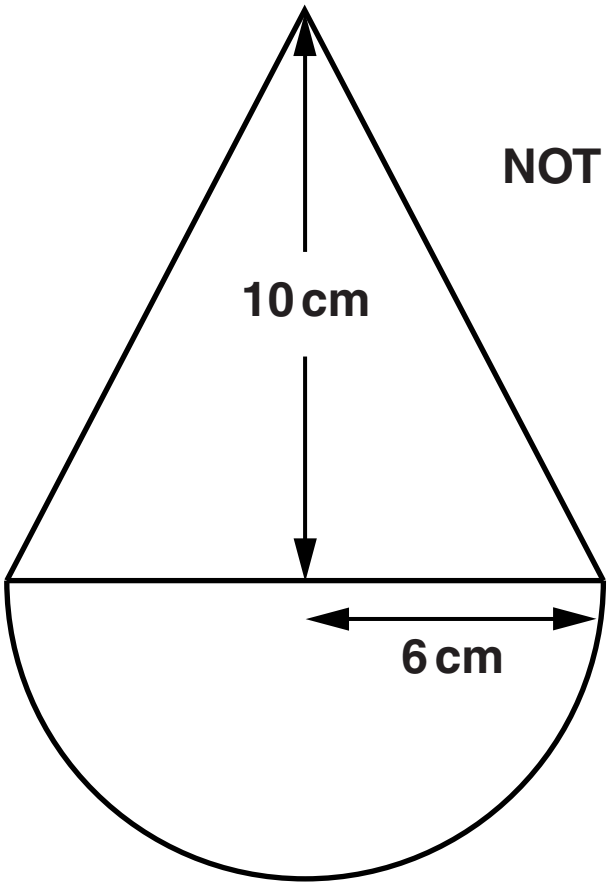
TURN OVER FOR QUESTION 16

16 A child's toy is made by attaching a hemisphere to a cone.
The following diagram shows a side view of the toy.



Calculate the total volume of the toy.
Give your answer as a multiple of π.

_____ **cm^3 [5]**

17 Solve these simultaneous equations algebraically.

$y = 2x^2 - 4x + 1$
$y = 6 - x$

$x =$ _____ $y =$ _____

$x =$ _____ $y =$ _____

[7]

18* A bag contains only 6 blue counters and 4 white counters.

George chooses one counter from the bag at random, and replaces it.
He then chooses another counter from the bag at random, and replaces it.

Alice then chooses one counter from the bag at random, and puts it to one side.
She then chooses another counter from the bag at random.

Who is more likely to have chosen two blue counters?
Show your working clearly. **[6]**

END OF QUESTION PAPER

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