Candidate forename		Candidate surname	

Centre number					Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION
A501/02
MATHEMATICS A
Unit A (Higher Tier)

MONDAY 17 JANUARY 2011: Afternoon
DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

<u>**OCR SUPPLIED MATERIALS:**</u>
None

<u>**OTHER MATERIALS REQUIRED:**</u>

Scientific or graphical calculator
Geometrical instruments
Tracing paper (optional)

> ## You are permitted to use a calculator for this paper.

This paper has been pre modified for carrier language.

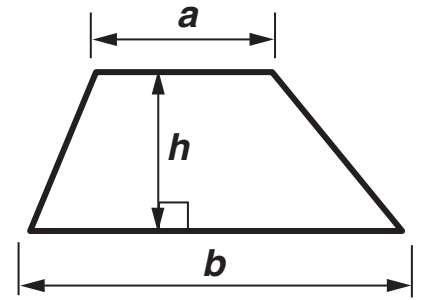<u>**READ INSTRUCTIONS OVERLEAF**</u>

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. 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).

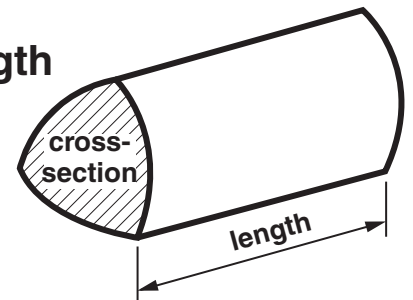- Answer <u>ALL</u> the questions.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.

- The total number of marks for this paper is <u>60</u>.

FORMULAE SHEET: HIGHER TIER

Area of trapezium $= \frac{1}{2}(a + b)h$
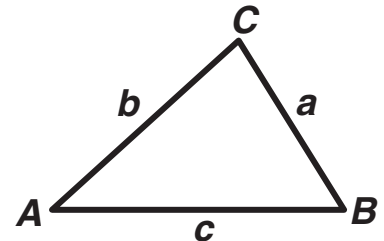
Volume of prism = (area of cross-section) × length

In any triangle *ABC*

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
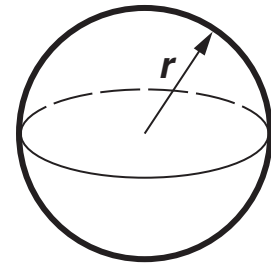
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

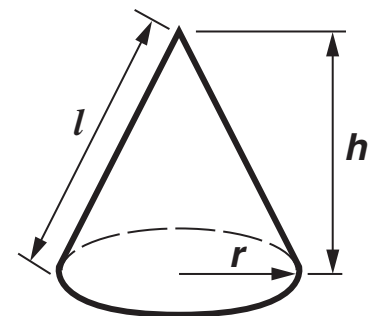**Area of triangle** $= \frac{1}{2}ab\sin C$

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 $= \pi r l$

The Quadratic Equation

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

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

3

1　(a)　In a sale, the ratio of the sale price to the normal price is 3 : 5.
Mary buys a jacket in the sale.
Its normal price is £45.

What is the sale price of the jacket?

(a) £ _____ [2]

(b)　On the final day of the sale, prices are reduced further.
The price of a rucksack on the final day is £12; its normal price is £32.

Write the ratio of the final price to the normal price.
Give your answer in its simplest form.

(b) _____ [2]

2 **(a)** **Simplify.**

$3a^2 \times 4a$

(a) _____ [2]

(b) **Work out the value of $4b^2$ when $b = {}^-2.5$.**

(b) _____ [2]

(c) **Solve.**

$5(2x - 7) = 3$

(c) _____ [3]

(d) Factorise.

$12x^2 + 8xy$

(d)_____[2]

3   **Calculate.**

$$\frac{6.26 - 0.82}{1.55}$$

Give your answer correct to 2 decimal places.

_____ [2]

4 (a) Write 420 as a product of its prime factors.

(a) _____ [2]

(b) Find the highest common factor (HCF) and the least common multiple (LCM) of 420 and 18.

(b) HCF = _____

LCM = _____ [3]

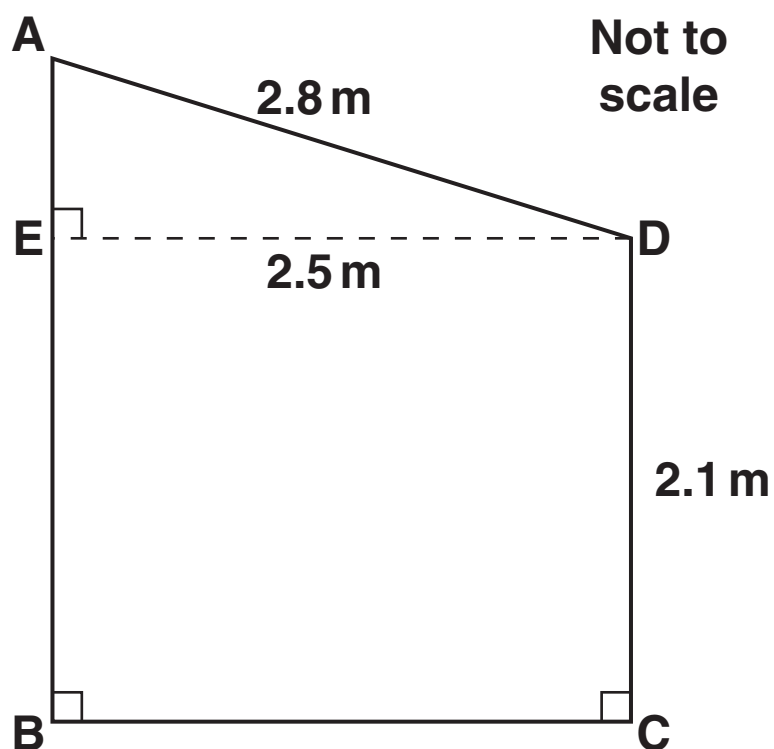**5**   The number of matches in each of 50 boxes is summarised in the table.

Number of matches	Frequency
46	7
47	18
48	14
49	10
50	1

Calculate the mean number of matches in a box.

_____ [3]

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6 Sean is building a shed.
This diagram shows the end view of his shed.

A

2.8 m

Not to scale

E

2.5 m

D

2.1 m

B

C

The width ED of the shed is 2.5 m.
The height CD of the front of the shed is 2.1 m.

(a) Sean makes the roof AD 2.8 m long.

Calculate the height AB of the back of the shed.

(a) _____ m [4]

(b) For a good run-off of water from a roof, the angle of slope with the horizontal ED should be at least 15°.

Calculate whether the roof of Sean's shed has a good run-off.
Show how you decide. [3]

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

The scale drawing, opposite, shows a coastline with two ports, A and B, and a lighthouse, L.
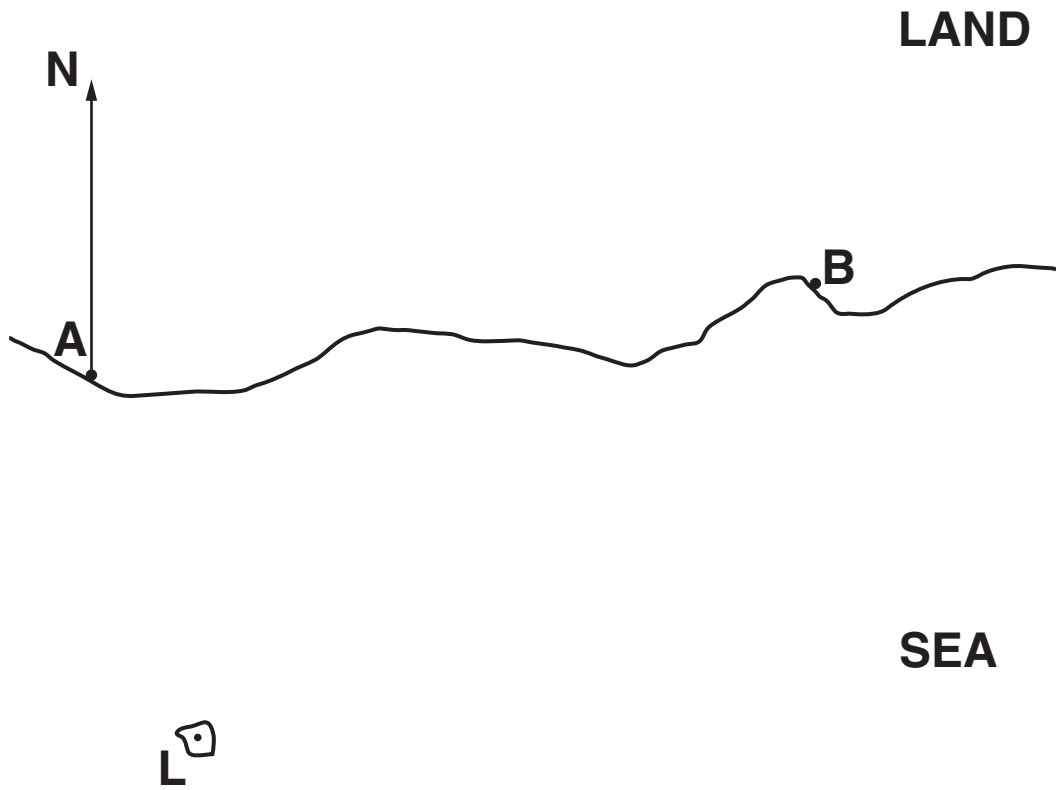The scale is 2 cm represents 1 km.
A boat travels on a bearing of 128° from port A.

A plane flies out to sea so that its distance from A is always the same as its distance from B.
At one point, the plane is directly over the boat.

At this point, what is the distance of the boat from the lighthouse, L?

SCALE: 2 cm REPRESENTS 1 km

LAND

N

B

A

SEA

L

_____ km [5]

8 **(a) Rearrange this formula to make *a* the subject.**

$P = 2a + c$

(a) _____ [2]

(b) Rearrange this formula to make *V* the subject.

$A = \sqrt[3]{36\,V^2}$

(b) _____ [3]

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9 This cumulative frequency table summarises the times taken by the 95 competitors who completed the men's 15 km cross-country skiing event in the Winter Olympics of 2010.
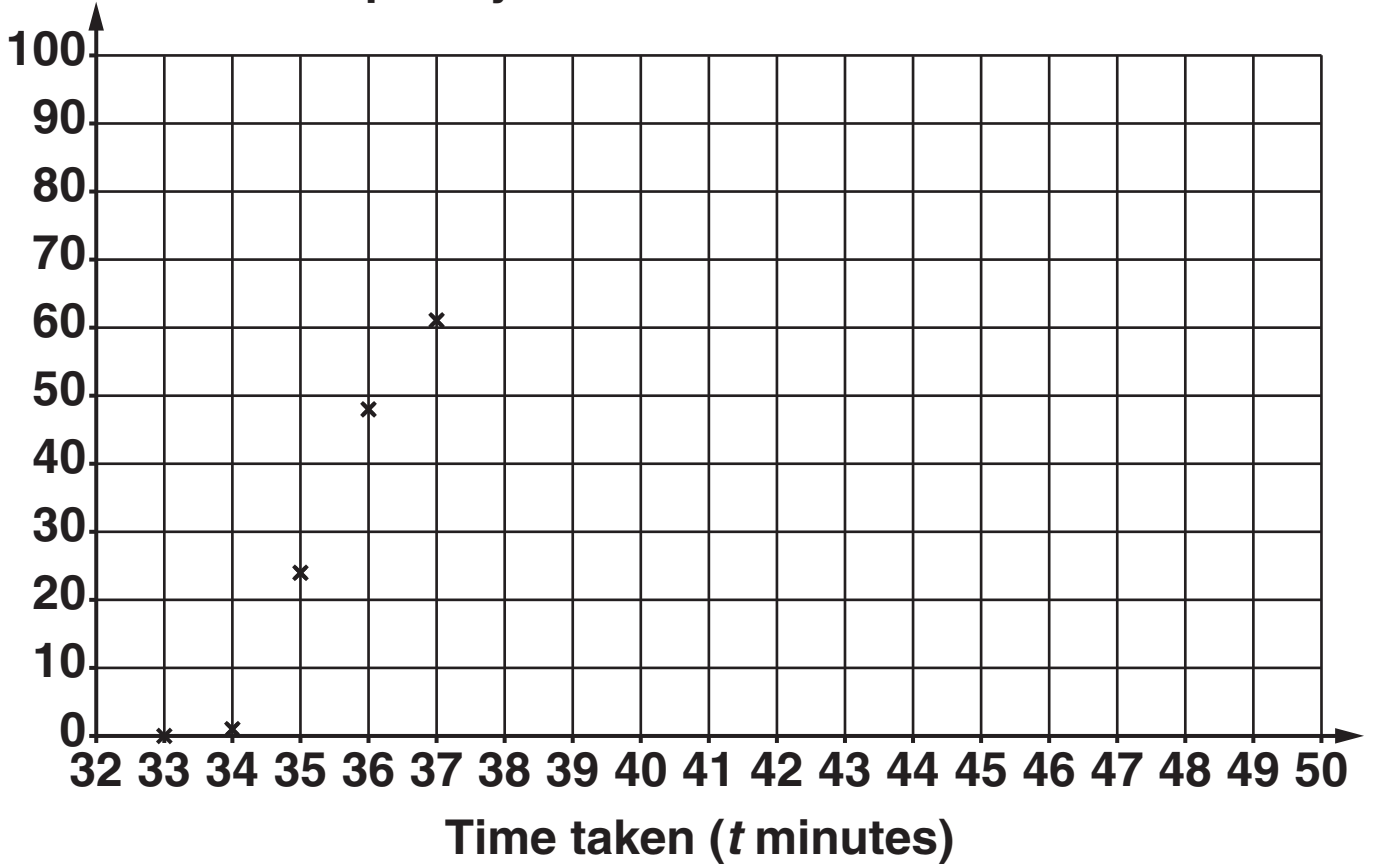
Time taken (t minutes)	$t \leqslant$ 33	$t \leqslant$ 34	$t \leqslant$ 35	$t \leqslant$ 36	$t \leqslant$ 37	$t \leqslant$ 38	$t \leqslant$ 39	$t \leqslant$ 40	$t \leqslant$ 41	$t \leqslant$ 42	$t \leqslant$ 45	$t \leqslant$ 50
Cumulative frequency	0	1	24	48	61	70	75	79	80	85	92	95

(a) How many competitors took more than 38 minutes but no more than 39 minutes?

(a) _____ [1]

(b) Draw a cumulative frequency diagram to represent this information.
The first five points have been plotted for you.

Cumulative frequency

Time taken (*t* minutes)

[2]

(c) Use your diagram to find an estimate of

(i) the median time taken,

(c)(i) _____ minutes [1]

(ii) the interquartile range of the times taken.

(ii) _____ minutes [2]

(d) Here are the results for the first three competitors to finish.

Name	Position and medal	Time for race (minutes : seconds)
COLOGNA Dario	1 Gold	33 : 36.3
PILLER COTTRER Pietro	2 Silver	34 : 00.9
BAUER Lukas	3 Bronze	34 : 12.0

How much longer did the bronze medallist take than the gold medallist?
Give the units of your answer.

(d) _____ [2]

10 **Mata's box for her art materials is a cuboid 35 cm by 28 cm by 15 cm.**
She has a thin paintbrush which is 48 cm long.

Will this paintbrush fit into Mata's box?
Show calculations to support your answer. [3]

11 **(a)** f(x) = 1 – 6x.

    (i) Solve f(x) = 0.

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

    (ii) f(2x) can be expressed in the form $a + bx$.

          Find the values of a and b.

                       (ii) a = _____

                             b = _____ **[2]**

(b) Write numbers in the boxes so that this is an identity.

    $4(x + 1) + 5x \equiv 7x + \boxed{}\,x + \boxed{}$

                                                [1]

12 **This histogram summarises the times that patients waited one morning in a hospital out-patients department.**

Frequency density (people per minute)

Waiting time (minutes)

The hospital's target is that fewer than $\frac{1}{3}$ of their patients wait for more than 30 minutes.

Show whether the hospital achieved the target on this morning. [4]

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