AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

FSMQ
SHAPE AND SPACE
Level 2

Friday 20 May 2016 Morning Time allowed: 1 hour 15 minutes

Materials
For this paper you must have:
- a clean copy of the Data Sheet (enclosed)
- a calculator
- mathematical instruments.

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer each question in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- You may **not** refer to the copy of the Data Sheet that was available prior to this examination. A clean copy is enclosed for your use.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 50.
- You are expected to use a calculator where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

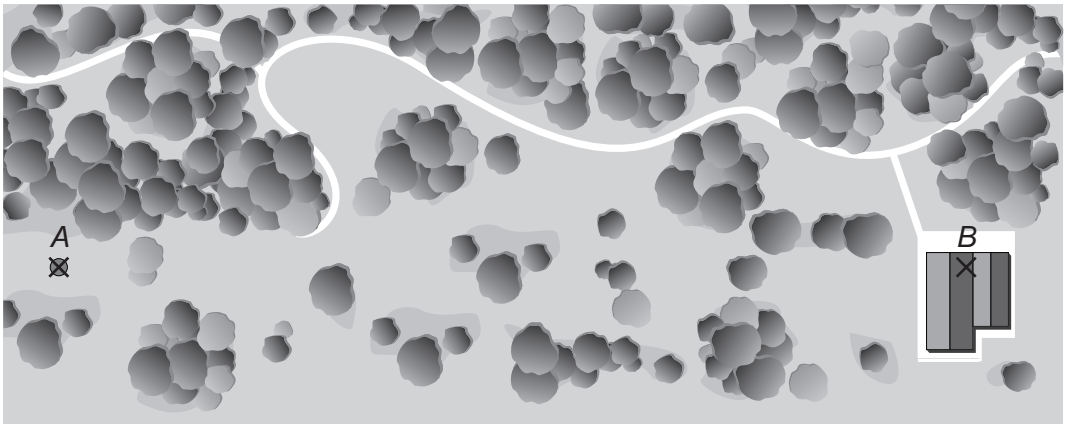
SECTION A

Answer all questions.

Answer each question in the space provided for that question.

Use **Mobile phone masts** *on page 2 of the Data Sheet*.

1



The map shows the positions of a mobile phone mast at *A*, and a house at *B*.
The scale of the map is 1 : 40 000

What is the real distance *AB*?
Give your answer in kilometres.

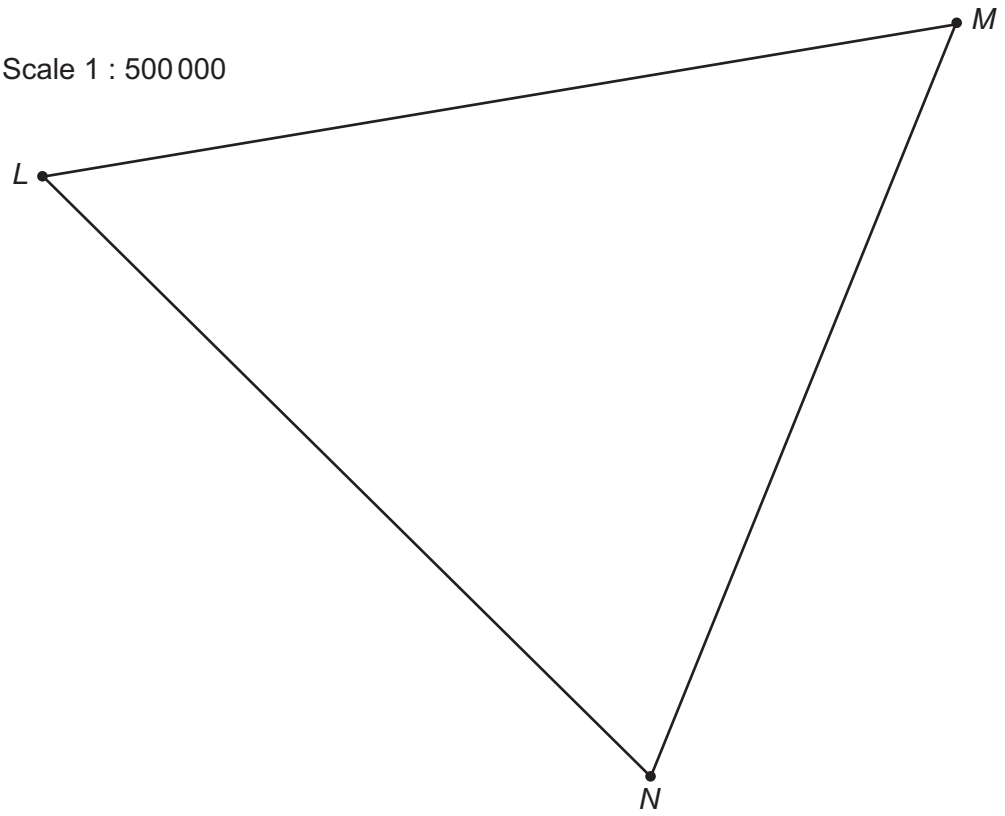
[3 marks]

Answer _____

3

2

Scale 1 : 500 000



The diagram shows the positions of three mobile phone masts at *L*, *M* and *N*.
The diagram is drawn to a scale of 1 : 500 000

The ranges of the masts are as follows:

range of *L* = 40 km
range of *M* = 30 km
range of *N* = 20 km

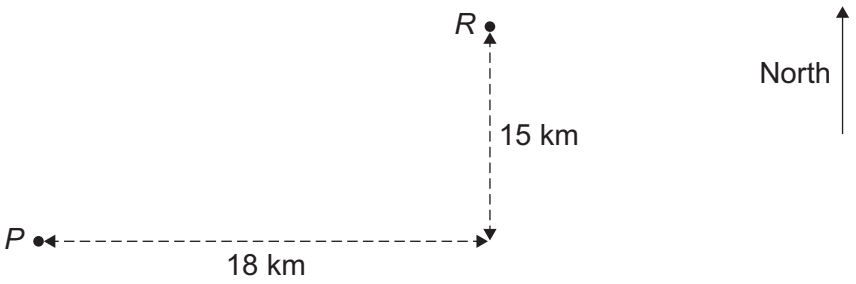
By drawing suitable arcs on the diagram, shade the area inside triangle *LMN* where there is no phone signal from any of the masts.

[3 marks]

3

Turn over ▶

3



The diagram is **not to scale**.

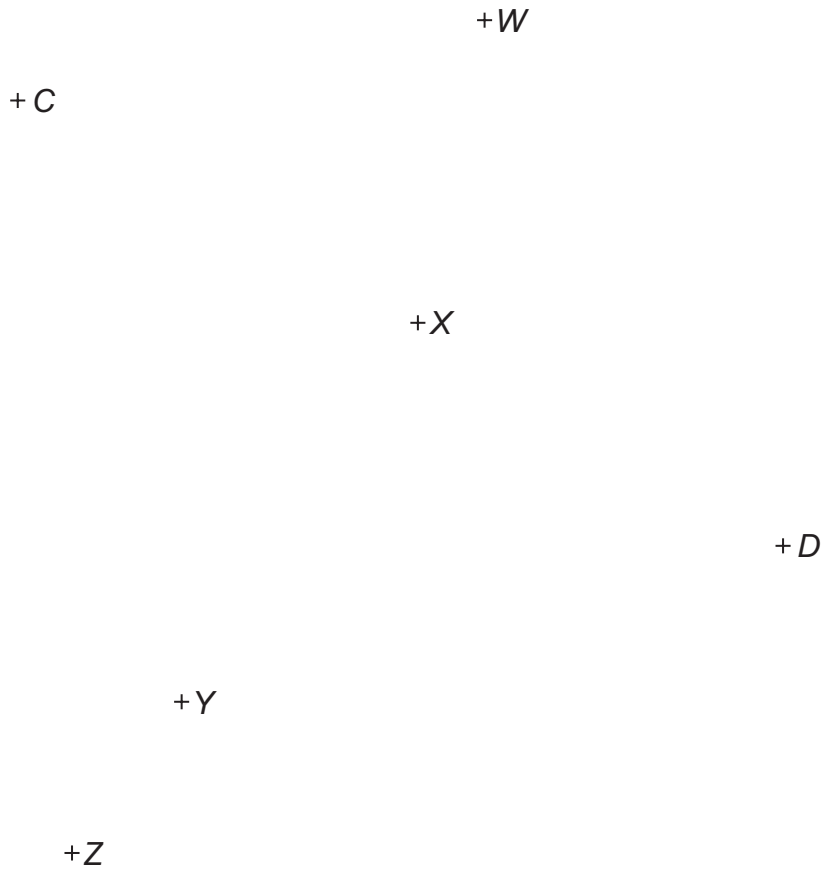
P is the position of a mobile phone mast with a range of 23 km
Ruth is at point *R*.
Point *R* is 18 km east of *P* and 15 km north of *P*.

Does Ruth have a signal from the mast at *P*?
You **must** show your working.

[3 marks]

3

4



The diagram shows the positions of two mobile phone masts, at *C* and *D*.
It also shows the positions of four houses at *W*, *X*, *Y* and *Z*.

The phone company wants to find out, for each house, which of the two masts is closer to the house.

4 (a) **Using pencil, ruler and a pair of compasses only**, construct the perpendicular bisector of *CD*.

[2 marks]

4 (b) Which house is the same distance from *C* as it is from *D*?
Circle your answer.

[1 mark]

W *X* *Y* *Z*

3

Turn over ▶

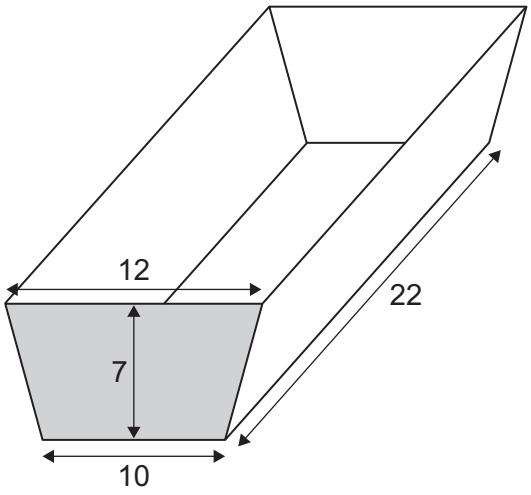
SECTION B

Answer all questions.

Answer each question in the space provided for that question.

Use **Cake tins** *on page 3 of the Data Sheet.*

5



Not to scale

All measurements in centimetres

The diagram shows a cake tin in the shape of a prism.

5 (a) Calculate the area of the end of the tin (shaded in the diagram).

[2 marks]

Answer _____

5 (b) Calculate the volume of the tin.
Give the units of your answer.

[3 marks]

Answer _____

5

Turn over for the next question

6 (a) Monica has a cylindrical cake tin with a diameter of 22 cm and a height of 6 cm

Calculate the volume of this tin.

[2 marks]

Answer _____

6 (b) Monica has a second cylindrical cake tin which is similar in shape to the tin in part **(a)**.

The height of the second tin is 4.5 cm

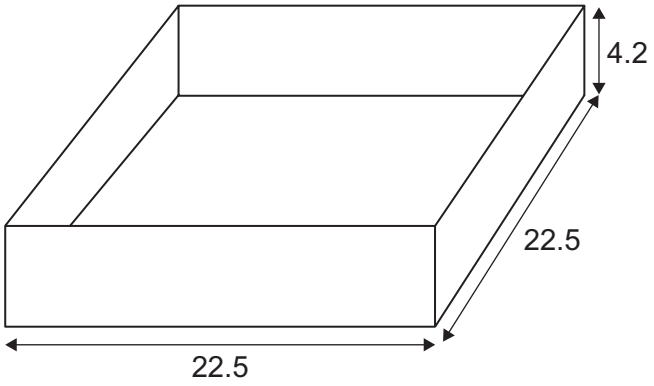
Calculate the volume of the second tin.

[3 marks]

Answer _____

5

7



Not to scale

All measurements in centimetres

Monica has a cake tin in the shape of a square-based cuboid.

The tin measures 22.5 cm by 22.5 cm by 4.2 cm

Monica pours 1.7 litres of cake mixture into the tin.
1 litre = 1000 cm^3

How deep is the cake mixture in the tin?
Give your answer to the nearest millimetre.

[4 marks]

Answer _____

4

SECTION C

Answer all questions.

Answer each question in the space provided for that question.

Use **Football pitches** *on page 4 of the Data Sheet.*

8 There is a pitch at the training ground that measures 115 yards by 74 yards.

8 (a) Convert these measurements to metres.

[2 marks]

115 yards = _____

74 yards = _____

8 (b) Find the area of the pitch in **square metres**.
Give your answer to three significant figures.

[2 marks]

Answer _____

8 (c) Neil needs to apply fertilizer to the pitch.

20 grams of fertilizer covers 1 m^2
A bag of fertilizer contains 22.7 kg

Calculate how many bags Neil will need to buy to cover the whole pitch.
You **must** show your working.

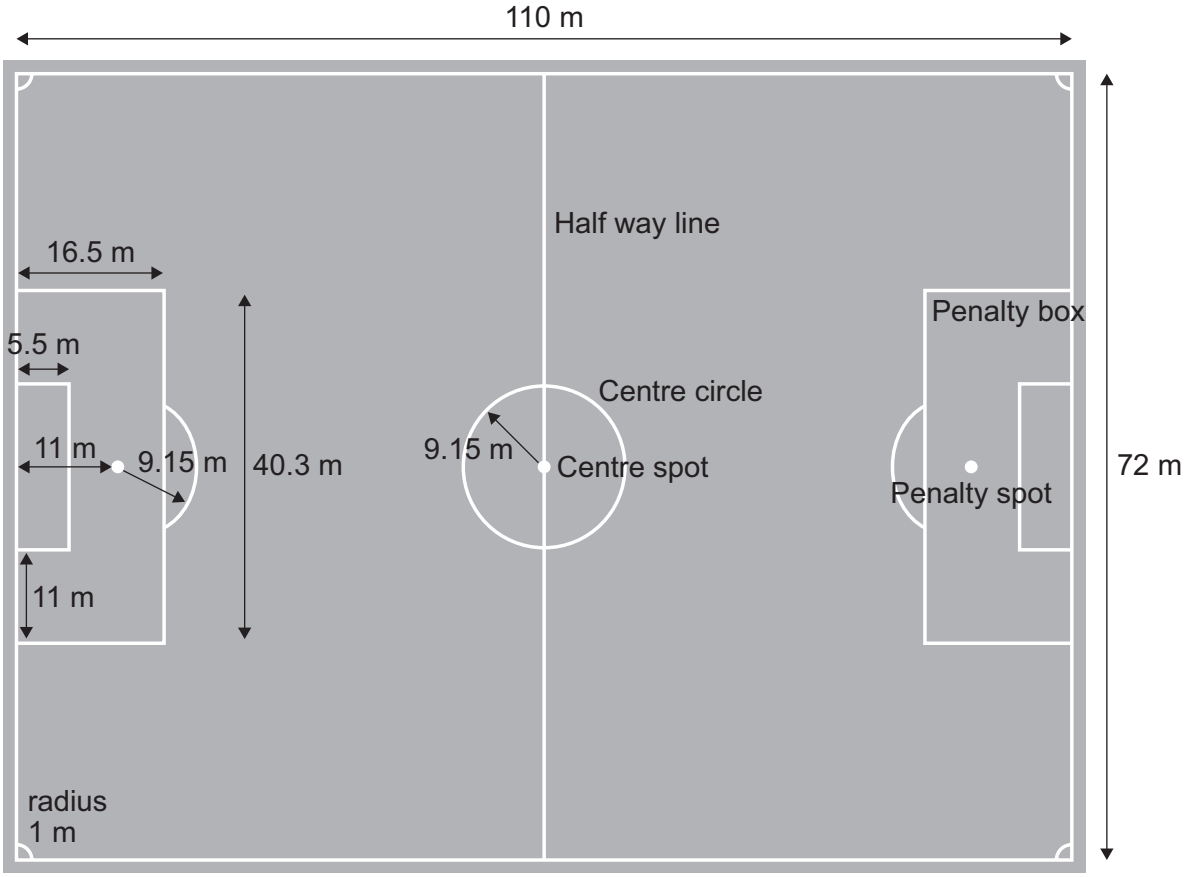
[4 marks]

Answer _____

8

Turn over for the next question

9 Here is a diagram of a football pitch.
The radius of each arc at a corner is 1 m
The length of each arc near the penalty spot is 16.94 m



Not to scale

Neil plans to use a line marker to mark out a football pitch.
The pitch measures 110 metres by 72 metres.
The publicity for the line marker states:

> Ten litres of line-marking paint will mark all the lines on an average sized football pitch. The line markers mark approximately 100 m per litre.

If the line marker does mark 100 m per litre, show that 10 litres will be enough to mark out the whole pitch.

You **must** show your working.
(You should ignore the centre spot and penalty spots.)

[7 marks]

7

10 A football pitch measures 108 m by 70 m
These measurements are accurate to the nearest metre.

Find a lower bound for the perimeter of the pitch.

[3 marks]

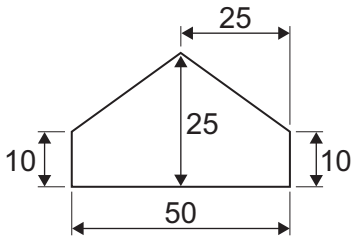
Answer _____

3

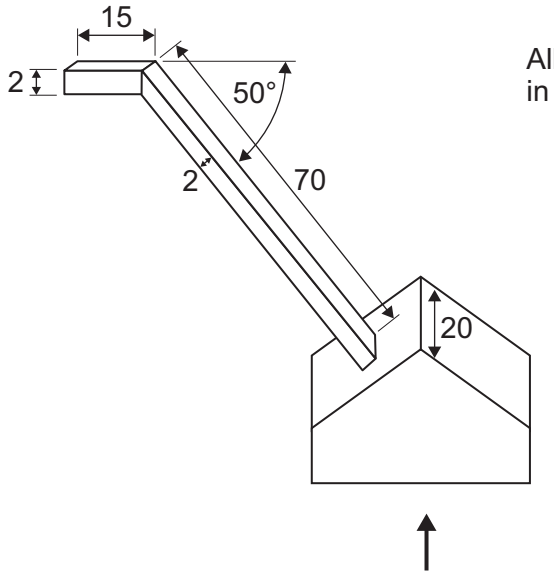
11 The diagram shows a line marker before the wheels are added.
It is a box with a handle.

The box is a pentagonal prism of height 25 cm and length 50 cm
The sides of the box are 10 cm high and its width is 20 cm
It has two vertical planes of symmetry.

The longer part of the handle is 70 cm long and inclined at 50° to the horizontal.
It joins the centre of the backward-facing top of the box.
The shorter part of the handle is horizontal and 15 cm long.
Both parts of the handle have a cross-section 2 cm square.



Dimensions of box



All measurements in centimetres

Not to scale

On the opposite page draw a side elevation of the line marker box and handle from the direction shown by the arrow.
Use a scale of 1 : 10

[6 marks]

6

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED