GCSE MATHEMATICS
Foundation Tier  Unit 3  Geometry and Algebra

Tuesday 14 June 2016  Morning  Time allowed: 1 hour 30 minutes

Materials
For this paper you must have:
• a calculator
• mathematical instruments.

Instructions
• Use black ink or black ball-point pen. Draw diagrams in pencil.
• Answer all questions.
• You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
• Do all rough work in this book.
• If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.14 unless another value is given in the question.

Information
• The marks for questions are shown in brackets.
• The maximum mark for this paper is 80.
• Quality of your written communication is specifically assessed in Questions 15 and 18. These questions are indicated with an asterisk (*).
• You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice
• In all calculations, show clearly how you work out your answer.
**Formulae Sheet: Foundation Tier**

**Area of trapezium**

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

**Volume of prism**

\[
\text{Volume of prism} = \text{area of cross-section} \times \text{length}
\]
1 Triangle $ABC$ is shown on this centimetre grid.

1 (a) Measure the length of the side $AC$. Give your answer in centimetres. [1 mark]

Answer __________________________ cm

1 (b) Work out the perimeter of the triangle. [2 marks]

________________________
________________________

Answer __________________________ cm
2 Here are five shapes.

A

B

C

D

E

2 (a) Which shape has the most vertices? Circle your answer.

[1 mark]

A B C D E

2 (b) Which two shapes are octagons? Circle your answers.

[1 mark]

A B C D E

2 (c) Which two shapes are congruent? Circle your answers.

[1 mark]

A B C D E
3. \(A, B, C, D\) and \(E\) are square grids. Some squares have been shaded in each grid.

\[
\begin{array}{cccc}
A & B & C & D \\
\end{array}
\]

3 (a) Which two grids have four lines of symmetry? [2 marks]

Answer _______________ and _______________

3 (b) Which three grids have rotational symmetry? [2 marks]

Answer __________ and __________ and __________

3 (c) Which grid has line symmetry but not rotational symmetry? [1 mark]

Answer ______________________
4  Here is a map.

Scale 1 cm represents 125 km

4 (a)  Which city on the map is South-West of Madrid?
Circle your answer.  

[1 mark]

Porto  Sevilla  Almeria  Valencia  Barcelona
4 (b) Which city on the map is North-East of Valencia?
Circle your answer. [1 mark]

Porto  Sevilla  Almeria  Madrid  Barcelona

4 (c) The scale of the map is 1 cm represents 125 km
Work out the actual distance between Barcelona and Madrid. [3 marks]

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Answer ___________________________________ km

Turn over for the next question
5 The diagram shows some flour on weighing scales.

5 (a) How much does the flour weigh? [1 mark]

Answer __________________________________ grams

5 (b) Gino needs 0.6 kilograms of flour.
The scales can weigh up to 400 grams.

How can he use the scales to weigh 0.6 kilograms of flour? [2 marks]

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
6 (a) What fraction of this square grid is shaded?

Circle the two correct answers. [2 marks]

\[
\begin{array}{cccc}
\frac{1}{7} & \frac{1}{8} & \frac{2}{14} & \frac{2}{16} & \frac{7}{8} & \frac{14}{16}
\end{array}
\]

6 (b) The diagram shows a square grid.

What percentage of this grid is shaded? [2 marks]

Answer ____________________________________ %
7 Paint is sold in 5-litre tins and 10-litre tins.

\[
\begin{align*}
5 \text{ litres} & \quad £26.00 \\
10 \text{ litres} & \quad £45.50
\end{align*}
\]

7 (a) A decorator buys four 10-litre tins.

How many 5-litre tins could she buy for the same amount?
You **must** show your working.

[3 marks]

\[
\begin{align*}
\text{Answer} & \quad \underline{\phantom{00000000000000}} \\
\end{align*}
\]
7 (b) Dan buys five tins of paint for £169

How many tins of each size does he buy? [2 marks]

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Answer __________________________ 5-litre tins

and __________________________ 10-litre tins

Turn over for the next question
ABCD is a rhombus.
AC is parallel to the x-axis.

8 (a) Work out the coordinates of A.

Answer (_________ , _________ )

8 (b) Work out the coordinates of B.

Answer (_________ , _________ )
The diagram shows a water tank in the shape of a cuboid.

The height of the water in the tank is 6 cm
Water leaks from the bottom of the tank at the rate of 30 cm$^3$ per minute.

How many minutes will it take the tank to empty?

Answer ____________________________ minutes
10 (a) Draw a conversion graph between square metres and square yards. [2 marks]

10 (b) How many square metres are equal to 18 square yards? Circle your answer. [1 mark]

15 16 21 22
10 (c) The value of a piece of land is worked out using the formula

\[ V = 25A \]

\( V \) is the value in £
\( A \) is the area of the land in square yards.

The area of a piece of land is 400 square metres.

Work out the value of the piece of land.  

[3 marks]

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Answer £ ______________________

Turn over for the next question
11 (a) Reflect this triangle in the line $y = 4$ 

[2 marks]
11 (b) Enlarge this shape by scale factor 3

[2 marks]
12 (a) Which angles are vertically opposite?
Circle your answer.
[1 mark]

- $a$ and $b$
- $a$ and $c$
- $b$ and $c$
- $b$ and $d$
- $c$ and $d$

12 (b) Which angles are alternate?
Circle your answer.
[1 mark]

- $a$ and $b$
- $a$ and $c$
- $b$ and $c$
- $b$ and $d$
- $c$ and $d$

12 (c) Which angles are corresponding?
Circle your answer.
[1 mark]

- $a$ and $b$
- $a$ and $c$
- $b$ and $c$
- $b$ and $d$
- $c$ and $d$
13 \(ABCD\) is a kite.

Using a ruler and compasses, make an accurate construction of the kite. \(AC\) has been drawn for you.

[3 marks]
Work out the value of $x$.

[2 marks]

Answer ___________________ degrees
14 (b) \( AD \) is parallel to \( BC \).

\( AE = DE \)

Work out the size of angle \( BAE \).

[3 marks]

Answer \( \underline{\hspace{2cm}} \) degrees

Turn over for the next question
Oil is sold in two sizes.

1 litre
£8.75

5 litres
was £49.80
now 15% off

Which size is better value for money?
You must show your working.

[4 marks]

Answer _____________________________
   He drives at an average speed of 38 mph
   He starts his journey at 7 am

   What time does he arrive?                   [3 marks]

   _______________________________________
   _______________________________________
   _______________________________________
   _______________________________________

   Answer __________________________________

   Turn over for the next question
17 (a) The diagram shows a right-angled triangle.

Circle the two correct formulae.

\[ c = ab \quad c = a + b \quad c^2 = a^2 + b^2 \quad c = \frac{1}{2} ab \quad c = \sqrt{a^2 + b^2} \]

[2 marks]

17 (b) Work out the length \( y \).

Give your answer to 1 decimal place.

[4 marks]

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Answer _________________________________ cm
Show that $ABC$ is an equilateral triangle.

[5 marks]

Not drawn accurately
Two identical circles fit inside a rectangle as shown.

The length of the rectangle is 20 cm

Work out the area of the shaded section.

[6 marks]

Answer ___________________________________ cm$^2$

END OF QUESTIONS