## Collins

## AQA <br> GCSE <br> Mathematics

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## Materials

## For this paper you must have:

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


## Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80 .
- You may use additional paper, graph paper and tracing paper.

Name:

1 (a) Find the simple interest earned on an investment of $£ 2500$ at $2.5 \%$ per year for 2 years.

Circle your answer.
£125 £156.25 £62.50 $\quad$ 1250

1 (b) Which of the following calculations would decrease $£ 350$ by $13 \%$ ? Circle your answer.
$350 \times 0.13$
$350 \times 1.13$
$350 \times 0.87$
$350 \times(-0.13)$

2 Give the name of this type of sequence
$6,12,24,48,96$
Circle your answer.
Geometric $\quad$ Arithmetic $\quad$ Fibonacci $\quad$ Quadratic
[1 mark]

3 Which of the following linear equations would give a graph with a negative gradient?
Tick two boxes.

$$
\begin{array}{ll}
y=3 x+2 & \square \\
x+y=7 & \square \\
8-y=4-x & \square \\
y=-5+2 x & \square \\
5-y=x & \square
\end{array}
$$

4 Which of the following diagrams shows a bearing of $A$ from $B$ as $240^{\circ}$ ?
Circle your answer.


5 A rectangle has a length of 8 cm and a width of 5 cm .
A similar rectangle has a length of 10 cm .
Work out the width of the rectangle.
Circle your answer.
7 cm
5.625 cm
6.6 cm
6.25 cm
(a) Calculate $\frac{5.3 \times 2.1^{2}}{\sqrt[3]{5.32+8.9}}$

Write down all the numbers on your calculator display.

6 (b) Round your answer to part (a) to 3 significant figures.

## Answer

710 people were asked their height and annual income.
The table shows the results.

| Income (f) | 14000 | 21000 | 26500 | 32500 | 28500 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Height (m) | 1.59 | 1.72 | 1.85 | 1.65 | 1.57 |


| Income (f) | 15000 | 13000 | 25000 | 33500 | 29000 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Height (m) | 1.83 | 1.71 | 1.65 | 1.79 | 1.72 |

7 (a) Plot a scatter graph for this data.

(b) Interpret the scatter graph, stating any correlation found.

8 Find the highest common factor of 135 and 630.

Answer

9 Qahhar writes ' $\frac{1}{x^{2}}<x$, for any value of $x^{\prime}$.
Is Qahhar correct?
Give a reason for your answer.

A sports centre has a gym and a swimming pool.
On Wednesday, 51 people visited the centre.
13 people who used the gym also went swimming.
21 people did not use the gym and 6 of those did not swim either.
Complete the frequency tree to illustrate this information.


1126 people start on an evening course in September.
By January there are only 19 people left on the course.
What percentage of people have left the course?
[2 marks]

Answer
\%

12 A metal rod for a piece of machinery is $3 \frac{4}{5}$ inches long.
The designer says that the rod would work better if it was $\frac{1}{3}$ longer.
How long should the rod be?
Give your answer as a mixed number.

Answer
inches

13 The interior angle of a regular polygon is $2 x$.


Show that the number of sides that the polygon has can be written in the form $\frac{a}{b-x}$

14 These four shapes are made with different types of metal: iron, silver, copper and zinc.

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



|  |  |  | Zinc Cone |
| :---: | :---: | :---: | :---: |
|  | Silver Cylinder | Copper Sphere |  |
| Iron Cuboid |  |  | Mass $=336 \mathrm{~g}$ |
|  | Mass $=557 \mathrm{~g}$ | Density $=$ |  |
| Mass $=661 \mathrm{~g}$ |  |  | Radius $=3 \mathrm{~cm}$ |
|  | Volume $=55 \mathrm{~cm}^{3}$ | $9.96 \mathrm{~g} / \mathrm{cm}^{3}$ |  |
|  |  |  | Height $=5 \mathrm{~cm}$ |

Use all the information to list the four metals in order from least to highest density.

You must show your working.

15 An airfield is going to be built near the towns of Brooks, Redding and Dufresne. It must be closer to Redding than to Brooks.

It must be within 5 miles of Dufresne.

| Redding | Scale: <br> $1 \mathrm{~cm}=1.6 \mathrm{miles}$ |  |
| :--- | :--- | :--- |
| $\boldsymbol{X}$ | Dufresne |  |
|  |  |  |

## X <br> Brooks

Shade on the map, the region where the airfield can be built.

16 Solve the inequality $2 x^{2}-5 x \leqslant 3$
[4 marks]

Answer

17 Jason asks 21 of his friends how many songs they have downloaded in the last month. The stem and leaf diagram shows the result.

| 0 | 00023 |
| :--- | :--- | :--- |
| 1 | 566778 |
| 2 | 134479 |
| 3 | 01244 |
| 4 | 13 |

Key: $4 \mid 3$ means 43 downloads
He says, 'The median is closer to the upper quartile than the lower quartile'.
Is Jason correct?
Justify your answer.


Answer
182.5 litres of water is boiling in a pan, with a constant heat.

The water evaporates at a rate of $3.5 \%$ every minute.
How many minutes would it take for 500 ml of water to evaporate?

19 (a) Which graph shows the relationship that $y$ is inversely proportional to $x$ ? Circle your answer.





19 (b) Sketch a graph to show that $y$ is directly proportional to the square of $x$.

$A, B, C$ and $D$ are points on the circumference of a circle, with centre $O$.


Not drawn accurately

Find the size of the angle marked $x$.

$$
x=
$$

21 Prove that $0.2 \dot{3}$ can be written as $\frac{7}{30}$

22
(a) Show that the equation $x^{3}+5 x-3=0$ can be rearranged into $x=\frac{3-x^{3}}{5}$

22 (b) Show that the equation $x^{3}+5 x-3=0$ has a solution between 0 and 1 .
[2 marks]
(c) Starting with $x_{0}=0$

Use the iteration formula $x_{n+1}=\frac{3-x_{n}^{3}}{5}$ to find a solution to the equation $x^{3}+5 x-3=0$.
Give your answer correct to 2 decimal places.

$$
x=
$$

23 The universal set = \{factors of 100\}
Set $\mathrm{A}=\{$ prime numbers $\}$
Set $B=\{e v e n$ numbers $\}$
23 (a) Complete the Venn diagram.


23 (b) Find $P(A \cap B)$

Answer

24 The first four terms of a geometric sequence are
$\sqrt{2}$
2
$2 \sqrt{2}$
4

Find the $9^{\text {th }}$ term in this sequence.
Give your answer as a surd in its simplest form.

25 Solve the simultaneous equations.

$$
\begin{aligned}
& y=\frac{3}{x+1} \\
& \frac{4}{x-3}+y=1
\end{aligned}
$$

$x=\quad y=$
$x=\quad y=\quad \quad y=$

The following shape is a cube.


26 (a) Write down the ratio $A D: A F$ in its simplest form.

## Answer

26 (b) Find the size of angle GAF.
[2 marks]
$G A F=$
$\circ$

