## GCSE Mathematics

## Practice Tests: Set 9

## Paper 1H (Non-calculator)

## Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

## Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided - there may be more space than you need.

- Calculators may be used.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working out.


## Information

- The total mark for this paper is 80
- The marks for each question are shown in brackets - use this as a guide as to how much time to spend on each question.


## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.
Write your answers in the spaces provided.

## You must write down all the stages in your working.

1
Here is a hexagon $A B C D E F$.


Diagram NOT accurately drawn
$C D$ is parallel to $A F$.
Work out the area of hexagon $A B C D E F$.
$\mathrm{cm}^{2}$
(Total for Question $\mathbf{1}$ is $\mathbf{4}$ marks)

(a) Reflect triangle $\mathbf{S}$ in the line $y=x$

Label the new triangle $\mathbf{R}$.
(b) Translate triangle $\mathbf{S}$ by the vector $\binom{4}{6}$ Label the new triangle $\mathbf{T}$.
$3 \quad E=n^{2}+n+5$
Ali thinks that the value of $E$ will be a prime number for any whole number value of $n$.
Is Ali correct?
You must give a reason for your answer.

4


Diagram NOT accurately drawn
$A B C$ and DEF are parallel lines.

$$
\begin{aligned}
& B G=B E \\
& \text { Angle DEG }=38^{\circ} \\
& \text { Angle GEB }=65^{\circ}
\end{aligned}
$$

Find the size of angle $A B G$.
$\qquad$
。

Here are the first four terms of an arithmetic sequence.

| 6 | 10 | 14 | 18 |
| :--- | :--- | :--- | :--- |

(a) Find an expression, in terms of $n$, for the $n$th term of this sequence.
$\qquad$
(b) Write down an expression, in terms of $n$, for the $(n+1)$ th term of this sequence.
$\qquad$
(a) Simplify fully $\frac{20 x^{2} y^{6}}{4 x^{2} y^{2}}$
$\qquad$
(b) Make $e$ the subject of the formula $h=3 e+f$
$\qquad$
(a) Write 1390000 in standard form.
(b) Write 0.005 in standard form.

8 Solve

$$
\begin{aligned}
3 x+2 y & =15 \\
10 x-4 y & =2
\end{aligned}
$$

Show clear algebraic working.

$$
\begin{aligned}
& x= \\
& y=
\end{aligned}
$$

(Total for Question 8 is $\mathbf{3}$ marks)


Diagram NOT accurately drawn
$A, C$ and $D$ are points on a circle, centre $O$.
$A B$ and $C B$ are tangents to the circle.
Angle $A B C=74^{\circ}$
Work out the size of angle ADC.
Show your working clearly.

10 Each month Edna spends all her income on rent, on travel and on other living expenses.

She spends $\frac{1}{3}$ of her income on rent.
She spends $\frac{1}{5}$ of her income on travel.
She spends $\$ 420$ of her income on other living expenses.
Work out her income each month.
$11128=4^{2 x} \times 2^{x}$
Work out the value of $x$.
$x=$
(Total for Question 11 is $\mathbf{3}$ marks)
(a) Simplify $\left(2 e^{2} f^{3}\right)^{3}$
$\qquad$
(b) Expand and simplify $(3 x-4 y)(x+3 y)$
$\frac{\sqrt{a} a}{a^{2}}$ can be written in the form a ${ }^{k}$
(c) Find the value of $k$.
k $=$ $\qquad$
(d) Simplify $\frac{2^{n}-1}{4^{n}-1}$
$\qquad$

13 There are two bags of counters, bag $\mathbf{X}$ and bag $\mathbf{Y}$.
There are 20 counters in bag X .
11 of the counters are blue and the rest are red.
There are 16 counters in bag $\mathbf{Y}$.
9 of the counters are blue and the rest are red.
Arkady takes at random a counter from bag $\mathbf{X}$ and takes at random a counter from bag $\mathbf{Y}$.
(a) Complete the probability tree diagram.
bag $\mathbf{X}$
bag Y

(3)
(b) Work out the probability that the two counters are both red.
$\qquad$
(c) Work out the probability that the two counters are both red or are both blue.

14 The table gives information about the areas, in hectares, of some farms in Spain.

| Area (A hectares) | Frequency |
| :---: | :---: |
| $0<A \leq 20$ | 40 |
| $20<A \leq 50$ | 90 |
| $50<A \leq 100$ | 140 |
| $100<A \leq 300$ | 140 |
| $300<A \leq 350$ | 40 |

On the grid, draw a histogram for this information.

(Total for Question 14 is $\mathbf{3}$ marks)

15 (a) Use algebra to show that $0.4 \dot{3} \dot{6}=\frac{24}{55}$
(b) Show that $\frac{\sqrt{20}+\sqrt{80}}{\sqrt{3}}$ can be expressed in the form $\sqrt{a}$ where a is an integer. Show your working clearly.

16 Two functions, $f$ and $g$ are defined as

$$
\begin{array}{lll}
\mathrm{f}: \mathrm{x} & \mapsto \quad 1+\frac{1}{x} & \\
& \begin{array}{l}
\text { for } \mathrm{x}> \\
0
\end{array} \\
\mathrm{~g}: \mathrm{x} & \mapsto \frac{x+1}{2} & \begin{array}{l}
\text { for } \mathrm{x}>
\end{array}
\end{array}
$$

Given that $\mathrm{h}=\mathrm{fg}$
express the inverse function $\mathrm{h}^{-1}$ in the form $\mathrm{h}^{-1}: \mathrm{x} \mapsto \ldots$
$h^{-1}: x \mapsto$
(Total for Question 16 is $\mathbf{4}$ marks)

17 Here is the graph of $y=f(x)$

(a) On the grid above, draw the graph of $y=2+f(x)$

Here is the graph of $y=f(x)$

(b) On the grid above, draw the graph of $y=f(-x)$
(Total for Question 17 is $\mathbf{4}$ marks)
(a) Show that $x(x-1)(x+1)=x^{3}-x$
(b) Prove that the difference between a whole number and the cube of this number is always a multiple of 6 .
[This question wouldn't appear on a GCSE (9-1) paper but it's been left in as a challenge problem to solve!]

19 Work out the sum of the multiples of 3 between 1 and 1000.

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