# 13+ ENTRANCE TEST <br> 2019 

## MATHEMATICS

Time allowed: 45 minutes

## Name:

Instructions:

The test is 45 minutes long.
You may not use a calculator.
There are $\mathbf{1 2}$ questions in this test.
Work steadily through the test and try to answer all the questions
Write all your answers and working on the test paper - marks may be awarded for working.

Check your answers carefully.

## Question 1

Show that $3 \frac{4}{7} \quad 1 \frac{5}{8}=1 \frac{53}{56}$

## Question 2



Diagram NOT accurately drawn
$A B C$ and $D E F$ are parallel lines.
$B G=B E$
Angle $D E G=38^{\circ}$
Angle GEB $=65^{\circ}$
Find the size of angle $A B G$.

## Question 3

Here is a sequence of patterns made from dots.

|  | $\bullet \bullet \bullet$ | $\bullet \bullet \bullet \bullet$ |  |
| :---: | :---: | :---: | :---: |
| $\bullet \bullet$ | $\bullet$ | $\bullet$ | $\bullet$ |
| •• | $\bullet \bullet$ | $\bullet \bullet \bullet$ |  |
| Pattern | Pattern | Pattern | Pattern |
| number 1 | number 2 | number 3 | number 4 |

(a) Draw Pattern number 4 in the space above.
(b) Complete the table.

| Pattern number | 1 | 2 | 3 | 4 | 5 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Number of dots | 4 | 8 | 12 |  |  |

(c) Work out the number of dots in Pattern number 13.
(d) Find an expression, in terms of $n$, for the number of dots in Pattern number $n$.

There are fewer than 90 dots in Pattern number $k$.
(e) What is the largest possible value of $k$ ?

## Question 4

(a) Find the value of $25-4 g$ when $g=-3$
$\qquad$
(b) Expand and simplify $x(2 x+1)+3(x-2)+7$

## Question 5

3 kg of potatoes and 2 kg of apples cost a total of $£ 7.33$.
4 kg of potatoes cost $£ 3.80$.
Work out the cost of 1 kg of apples.

## Question 6

There are some people in a cinema.
$\frac{3}{5}$ of the people in the cinema are children.
For the children in the cinema,
number of girls: number of boys $=2: 7$
There are 170 girls in the cinema.
Work out the number of adults in the cinema.

## Question 7

(a) Solve $8-2 p=15$

$$
p=
$$

(2)
(b) Solve $\frac{7 x \quad 2}{4}=3 x+1$

Show clear algebraic working.

## Question 8

$A=3^{5} \times 5 \times 7^{3}$
$B=2^{3} \times 3 \times 7^{4}$
(a) (i) Find the Highest Common Factor (HCF) of $A$ and $B$.
(ii) Find the Lowest Common Multiple (LCM) of $A$ and $B$.
$A=3^{5} \times 5 \times 7^{3}$
$B=2^{3} \times 3 \times 7^{4}$
$C=2^{p} \times 5^{q} \times 7^{r}$
Given that
the HCF of $B$ and $C$ is $2^{3} \times 7$
the LCM of $A$ and $C$ is $2^{4} \times 3^{5} \times 5^{2} \times 7^{3}$
(b) find the value of $p$, the value of $q$ and the value of $r$.
$\qquad$
$p=$
$q=$
$r=$

## Question 9

The diagram shows a right-angled triangle.


Diagram NOT accurately drawn

Five of these triangles are put together to make a shape.


Diagram NOT accurately drawn

Calculate the perimeter of the shape.

## Question 10

Gopal is paid 20000 rupees each month.
Jamuna is paid 19200 rupees each month.
Gopal and Jamuna are both given an increase in their monthly pay.
After the increase, they are both paid the same amount each month.
Gopal was given an increase of $8 \%$
Work out the percentage increase that Jamuna was given.

## Question 11



A wooden box measures 30 cm by 15 cm by 32 cm . The box has a lid.

A carton measures 5 cm by 5 cm by 5 cm .
James has 110 cartons.
He wants to put all these cartons in the box and be able to shut the lid.
Can James put all 110 cartons in the box and shut the lid?
Show your working clearly.

## Question 12

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 $A B C D E F$.
$\mathrm{cm}^{2}$

