# Primary Mathematics Challenge Bonus Paper 

3 February 2021

Name Class $\qquad$

Please do not start to answer questions until you are told to do so. When you do turn over the page you will have 45 minutes for the challenge.

You must do all the work on your own. You should use rough paper for your working out.
Write down A B C D or E in the space for each answer.
When you have finished use a B or an HB pencil to copy your answer onto the machinereadable sheet, which will be sent in for marking.

Each correct answer gains one mark.

## Practice Questions

P1 Which whole number is closest in value to $\frac{20}{21}$ ?
A 0
B 1
C 2
D 3
E 4

P2 How many $1 \times 1$ squares are shaded in this $7 \times 4$ rectangle?
A 24
B 25
C 26
D 27
E 28


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1. The odometer in Martin's car shows that the car has travelled 45125 miles. The digit 5 appears twice.
How many more miles must Martin travel before the

## 4505

$\square$ mileage includes two digits that are the same?
A 5
B 6
C 7
D 8
E 9
2. The average pay of a restaurant waiter in the UK is $£ 6.81$ per hour.

For roughly how many hours will a waiter have work to earn $£ 100$ ?

A 5
B 8
C 11
D 15
E 18
3. Tick's clock shows a time of 16:27, but Tock's clock shows a time of 16:31.

Tock's clock is 3 minutes slow. Then Tick's clock is

A 7 minutes slow
B 6 minutes slow
C showing the correct time
D 1 minute fast
E 3 minutes fast
4. A square has a perimeter equal to that of a regular hexagon.

The perimeter of the hexagon is 48 cm .


What is the area of the square?
A $36 \mathrm{~cm}^{2}$
B $48 \mathrm{~cm}^{2}$
C $64 \mathrm{~cm}^{2}$
D $120 \mathrm{~cm}^{2}$
E $144 \mathrm{~cm}^{2}$
5. This pattern is made from 25 small tiles like this one: $\square$ How many different kinds of tile are there?
A 2
B 3
C 4
D 5
E 6

6. Who am I? I am the sum of the squares of two consecutive numbers less than 20 and I look the same upside down! $\square$
A IOI
B 161
C 181
D 808
E 818
7. What is the remainder when 7999999999 is divided by 8 ?
A 0
B 1
C 7
D 8
E 9

8. Adie is addicted to a new quiz game on her phone.

She gets one diamond for getting the first question correct, two diamonds for getting the second question correct, four diamonds for getting the third question correct.
In fact, every time she answers a question correctly the number of diamonds she receives doubles!

She receives 127 diamonds in total.


How many questions did she answer correctly?
A 6
B 7
C 8
D 9
E 10
9.

$$
4 \times 8 \times 3 \times 11 \times 2 \times N=32 \times 33 \times 34
$$

In the calculation above, what is the value of $N$ ?

A 13
B 14
C 15
D 16
E 17
10. Patrick remembers his favourite number this way: if you take away 500 from it you get a negative number, but if you add 501 you get a 4-digit number.


What is the total of the digits in Patrick's favourite number?
A 20
B 21
C 22
D 23
E 24
11. This plan of a rectangular garden shows that it is divided into three smaller rectangles.
The area of the flowerbed is equal to that of the vegetable patch and half the area of the grass.
The flowerbed is 2 metres wide and the vegetable patch is 6 metres long.
What is the area of the grass?
A $12 \mathrm{~m}^{2}$
B $36 \mathrm{~m}^{2}$
C $48 \mathrm{~m}^{2}$
D $72 \mathrm{~m}^{2}$
E impossible to tell

12. In six years' time Penny will be three times as old as she was four years ago. How old is Penny now?

A 6
B 7
C 8
D 9
E 12
13. I have three jars. In the first jar there are 16 buttons, in the second there are 28 buttons and in the third there are 37 buttons.


What is the smallest number of buttons that must be moved to ensure that each jar will have the same number of buttons?
A 10
B 11
C 12
D 13
E 14
14. The diagram shows the design of an Islamic tile in the V\&A museum.
It is made from regular octagons, trapezia and arrow-shaped quadrilaterals.
What is the size of each of the smallest angles of the quadrilateral that is shaded?

A $20^{\circ}$
B $22.5^{\circ}$
C $25^{\circ}$
D $27.5^{\circ}$
E $30^{\circ}$
15. How many of the five numbers below are multiples of 13 ?

$$
\begin{array}{lllll}
13 & 131 & 1313 & 13131 & 131313
\end{array}
$$


A 1
B 2
C 3
D 4
E 5
16. The grass tennis courts at Wimbledon are immaculate! A tennis court is a rectangle of dimensions 23.77 m by 10.97 m .
I count 18 single blades of grass in one square centimetre.
Roughly how many blades of grass are there altogether on one court?

A 5000
B 50000
C 500000
D 5000000
E 50000000
17. If you were to think of two positive whole numbers so that the product of their sum and their difference was 21, what is the largest that one of your numbers could be?
A 7
B 8
C 9
D 10
E 11
18. Alice made some cupcakes.

She gave $\frac{1}{3}$ to her best friend, $\frac{1}{5}$ to her mum and $\frac{1}{9}$ to her granny.


She kept the rest herself.
Mum got 8 more cupcakes than granny and none were cut.
How many did Alice keep for herself?
A 16
B 20
C 24
D 28
E 32
19. The diagram shows a cube before and after a pyramid was cut off as shown on the right.
Which of the nets below does not show a possible net for the remaining solid?

A

B

C

D

E

20. The height of a man in a top hat standing on stilts is 320 cm !

The height of the man just wearing his top hat is 225 cm .
The height of the man on stilts without his top hat on is 285 cm .
How tall is the man without stilts or the top hat?
A 170 cm
B 180 cm
C 190 cm
D 200 cm
E 210 cm
21. This hexagon is split into five isosceles triangles. How much larger is angle $k^{\circ}$ than angle $j^{\circ}$ ?
A $2.5^{\circ}$
B $5^{\circ}$
C $7.5^{\circ}$
D $10^{\circ}$
E $15^{\circ}$

22. In this diagram, the number above or below each cogwheel is the number of teeth or cogs on that wheel.

When the wheel on the far left turns through 1 complete turn, how much does the wheel on the right turn?

A a quarter-turn
B a half-turn
C a complete turn
D 2 complete turns
E 4 complete turns
23. Polly makes a parallelogram by cutting off two vertices from an equilateral triangle.
The length of the perimeter of the parallelogram is 20 cm .
What was the length of the perimeter of the equilateral triangle?
A 18 cm
B 21 cm
C 24 cm
D 27 cm
E 30 cm
24. How many positive numbers less than 1000000 are multiples of 12 and have only 1 or 2 or both as their digits? $\square$
A 11
B 12
C 13
D 14
E 15
25.


The three puzzle pieces above fit into the 3 by 3 grid without rotation or reflection.

- $\mathbf{U}$ is not in the same row as $\mathbf{P}$ or $\mathbf{Q}$
- T has a blank square immediately above it
- S touches $\mathbf{Q}$ diagonally and is not in column 2

Based on the three clues above, in which square does $\mathbf{S}$ go?
A X1
B X3
C Y2
D Z1
E Z3

