LEVEL 2 CHALLENGE
GRADE 6 AND 7 ROUND TWO

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INSTRUCTIONS

1. The time allocated for this paper is $1\frac{1}{2}$ hours.

All participants must remain for the full allocated time.

Under no circumstances may extra time be given.

2. This paper consists of two sections.

Section A consists of 10 multiple choice questions.

Section B consists of 5 questions where working out must be shown.

3. Question 1 – 10 are worth 2 marks each.

Question 11 – 15 are worth 4 marks each.

4. Negative marking will not be applied.

5. Calculators (and other calculating devices) and geometry instruments are not allowed.

6. Figures are not necessarily drawn to scale.

7. Answer all questions on the answer sheet provided.

8. Circle the letter you have chosen as your answer in pen for Section A (Questions 1 – 10). Should you wish to change an answer, put a cross over the letter and then circle your new chosen letter.

9. For Section B (Questions 11 – 15), full working must be shown in the space provided. Your final answer must be written in the allocated space.

10. Paper may be used for rough working.

SECTION A

1. Let $GRADE = 2021$.

   What is the value of: $6 \times GRADE + 7 + GRADE$?

A. 26273   B. 14054   C. 4055   D. 16174   E. 14154

2. In the table below, each row has the same pattern.   What is the value of x ?

$$3 \otimes 2 = 24$$
$$4 \otimes 2 = 32$$
$$4 \otimes 1 = 16$$
$$3 \otimes 3 = x$$

A.   9   B.   36   C.   0   D.   28   E.   18

3. A hardware shop sells pieces of wood of three different thicknesses, $10mm$, $16mm$, and $20mm$.   They wish to stack (place) the wood on the same shelf. Each stack will consist of pieces of wood of the same thickness.   The three stacks of wood of $10mm$, $16mm$, and $20mm$ are placed on the same shelf next to each other.   What is the minimum number of pieces of wood which must be placed on the shelf such that the height of each of the stacks of the three different thicknesses of wood is the same?

A. 17   B. 19   C. 18   D. 21   E. 15

4. What is the units digit in the product:

$$(5 + 1)(5^2 + 1)(5^3 + 1) \dots \dots \dots \dots (5^{2021} + 1) \ ?$$

A. 1   B. 5   C. 2   D. 4   E. 6

5. I'm standing in a queue of 2021 pupils, all facing the front.
    Amanda is in 90th position from the front, and Brian is 91 positions in front of the last pupil in the queue.   I'm standing one quarter of the way between Amanda and Brian.   If I am closer to Amanda than Brian, what is the sum of the digits of my position in the queue?

    A.   10   B.   13   C.   9   D.   14   E.   12

6. In the figure, a solid cylindrical disk lies inside and on the left of a rectangular metal frame. The disk is tangent to the three sides of the frame as shown. (It touches each of the three sides).   The disk is rotated in a clockwise direction and moves left to right along the frame without slipping. The disk completes a whole number of full revolutions before coming to rest against the right-hand side of the frame as shown.   The area of the rectangular frame is $720 \ cm^2$, and the radius of the disk is $2 \ cm$.   How many full revolutions did the disk complete?   Use the constant $\pi = \frac{22}{7}$.

    Start $\rightarrow$ $\rightarrow$ *End*
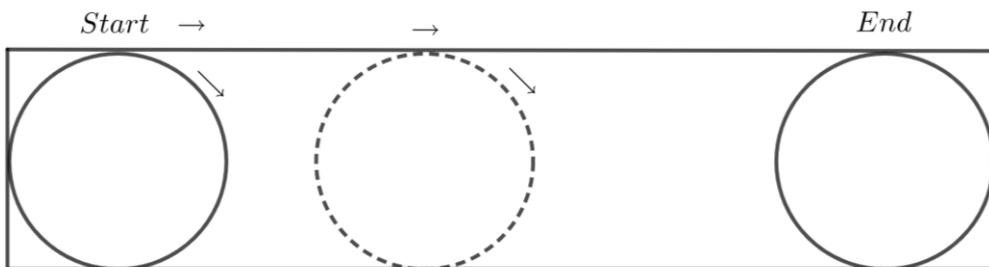
    A.   10   B.   11   C.   12   D.   13   E.   14

7. What is the value of:

$$2021 + \frac{3}{2} + \frac{4}{3} + \frac{5}{4} + \ldots\ldots\ldots + \frac{101}{100} - \left(2020 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots\ldots\ldots + \frac{1}{100}\right) ?$$

    A. $2021\frac{1}{4}$ B.   50   C.   100   D. $2020\frac{1}{2}$ E.   1001

8. Usha is out with three friends.   Usha's friends have all forgotten to bring any money with them.
    - Usha gives $\frac{1}{3}$ of the money in her purse to Megan.
    - She then gives $\frac{1}{4}$ of the money left in her purse to Maya.
    - Finally, she gives $\frac{1}{2}$ of the money left in her purse to Susan.
    - Usha then had R30 in her purse.

    How much did Usha originally have in her purse?

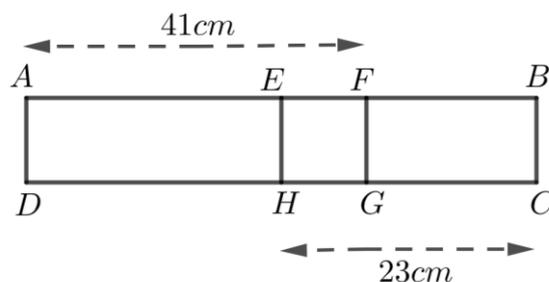A. R130   B.   R90   C. R75   D. R120   E. R180

9. In the equation below, a, b, c, and d are different prime numbers:

$$500a + 101b + 101c + d = 2021$$

    What is the value of $a + b + c + d$?

A.   25   B.   19   C.   17   D.   21   E.   23

10. In the diagram, $ABCD$ is a rectangle and $EFGH$ is a square. $AF = 41cm$ and $HC = 23cm$.   What is the <u>sum of the digits</u> of the length of the perimeter of the rectangle $ABCD$?

A. 11   B.   14   C.   10   D.   15   E.   13

SECTION B

NB : Show all working and write your final answer in the allocated space.

11. Three friends, Tarryn, Alan, and Renee are standing in a queue of 40 people. Their positions in the queue from the front are defined as follows:

   ➢ Tarryn's position in the queue is divisible by 2.
   ➢ Alan's position in the queue is divisible by 3.
   ➢ Renee's position in the queue is divisible by 5.

In how many different ways could the three friends be standing <u>together</u>, one behind the other in the queue?   (Show all working)

12. In the sum below, each letter stands for a different digit $0 - 9$.   The 4-digit number $TRIG$ is odd, and the letter $R = 3$.   What is the value of the word $ALAN$?   (Show all working)

$$
\begin{array}{r}
T\ R\ I\ G \\
+\ T\ R\ I\ G \\
\hline
A\ L\ A\ N
\end{array}
$$

13. D and E are different digits in the number $7D210034E$.   If this number is divisible by 5, how many different values can the sum $D + E$ have? (Show all working)

14.   Two different electric light bulbs are connected to the same plug.
      The plug is turned on.

   ➢ One light bulb flashes once every 20 seconds.
   ➢ The other light bulb flashes once every 45 seconds.

   How many times in total do the two light bulbs flash together at exactly the
   same time after 2021 minutes have passed since the plug was turned on?
   (Show all working)

15.   In the figure, rectangles $ABCD$, $EFGH$, and $CJKL$ are congruent, that is they
      are identical in shape and size.   The three rectangles are placed one over the
      other as shown, such that the three small rectangles formed are congruent.
      The area of the shape $ABCMFGHP$ is 270 cm^2, and $BL = 3 \times LC$.

   What is the length NJ ?   (Show all working)