

MATHEMATICS OLYMPIAD COMPETITION
SELECTION TEST FOR THE NATIONAL LEVEL TRAINING POOL - 2014

Time: 1 hour 30 minutes

General Instructions.

INDEX NO:

2014 / /

This question paper consists of two parts. Answer all questions in both parts.

PART I – Answers to be on the question paper itself. Select the correct choice and write the number of your choice as 1, 2, 3 or 4 in the cage in front of each question.

PART II

- Answers to be written only on paper provided. Write your index number on the top right hand corner of each paper.
- How the answers were obtained has to be given step by step. No marks will be awarded if the answers are not clear.

Note – Diagrams are not to scale.

Part I

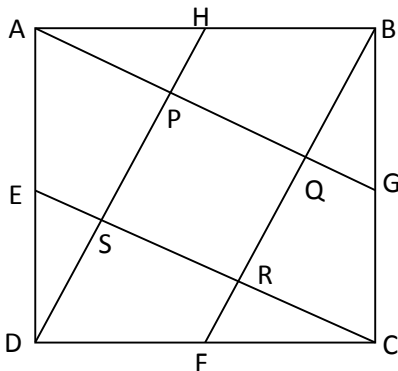
1. What is the sum of the digits of the product 999×555 ?
 (1) 27 (2) 30 (3) 36 (4) 42

2. $\begin{array}{r} \text{TWO} \\ + \text{TWO} \\ \hline \text{FOUR} \end{array}$ If $O = 7$ find the value of U ?
 (1) 2 (2) 3 (3) 4 (4) 6

3. The perimeter of a square is $(a + b)$. Find the area of this square ?
 (1) $(a + b)^2$ (2) $\frac{(a+b)^2}{2}$ (3) $\frac{(a+b)^2}{4}$ (4) $\frac{(a+b)^2}{16}$

4. ABCD is a square with side 2cm. E,F,G, H are mid points of the sides .A square PQRS is obtained by joining the vertices of the square and midpoints of the sides as shown in the figure.

What is the area of the square PQRS ?



- (1) $\frac{3}{4} \text{ cm}^2$ (2) $\frac{4}{5} \text{ cm}^2$ (3) $\frac{5}{6} \text{ cm}^2$ (4) $\frac{6}{7} \text{ cm}^2$

5. What is the value of $\left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \dots \dots \dots \left(1 - \frac{1}{2014}\right)$?

- (1) $\frac{1}{2014}$ (2) $\frac{2}{2014}$ (3) $\frac{3}{2014}$ (4) $\frac{4}{2014}$

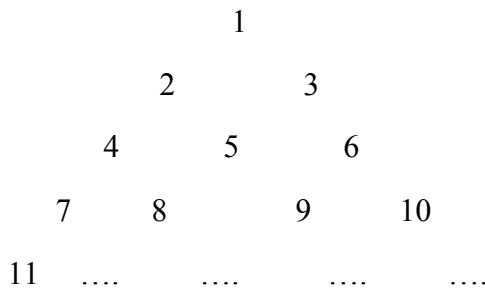
6. What is the time at which an accurate 12 hour clock show the two arms at right angles between 3 p.m and 4 p.m ?

- (1) 3.30 p.m (2) $3.31\frac{10}{11}$ p.m (3) 3.32 p.m (4) $3.32\frac{8}{11}$ p.m

7. Given that $M = \frac{10n}{1+2n}$ and n is positive number. Value of n increases gradually. What happens to M ?

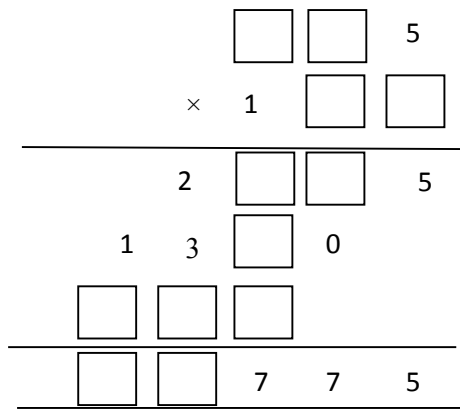
- (1) Decreases gradually (2) Increases gradually
 (3) Remains constant (4) Increases up to some number and then decreases

8. What is the number that will occupy the middle of the 9th row of the pattern given here ?



- (1) 40 (2) 41 (3) 42 (4) 43

9.



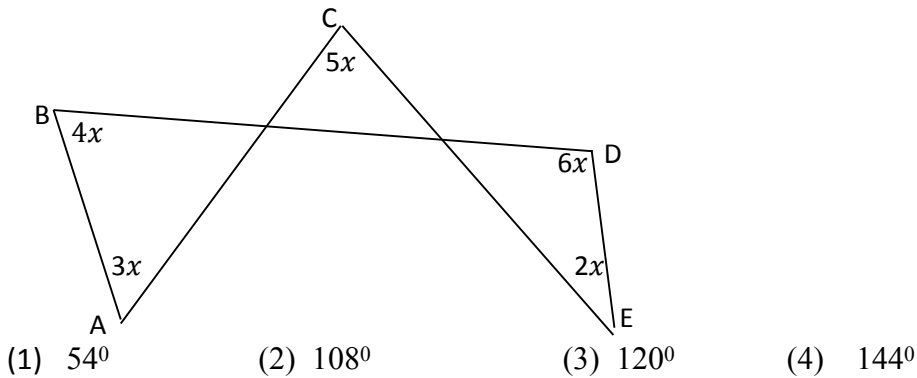
What is the number by which the multiplication is done?

- (1) 141 (2) 143 (3) 145 (4) 147

10. What is the value of $\left(1 + \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 + \frac{1}{5}\right) \dots \dots \dots \left(1 + \frac{1}{11}\right)$?

- (1) 3 (2) 4 (3) 5 (4) 6

11. Angles in this figure are marked as $2x$, $3x$, $4x$, $5x$ and $6x$. What is the value of $6x$?



12. Charuka takes 8, 10, 13 and 16 in two pairs, and get the difference of the summation of the numbers of each pair. How many different answers she may get?

- (1) 2 (2) 3 (3) 4 (4) 5

13. The product of three consecutive whole numbers is equal to 21 times of their sum. What is the sum of these three numbers?

- (1) 24 (2) 27 (3) 30 (4) 33

14. 150 apples and 105 guava fruits were distributed equally among a group of children. No apples and no guava fruits were left. What is the maximum number of children who could have been in the group?

- (1) 3 (2) 5 (3) 15 (4) 30

15. $A = \{ 130 \leq x \leq 140, x \in \mathbb{Z} \}$
 $B = \{ 150 \leq x \leq 160, x \in \mathbb{Z} \}$
 $C = \{ 200 \leq x \leq 210, x \in \mathbb{Z} \}$
 $D = \{ 250 \leq x \leq 260, x \in \mathbb{Z} \}$

What is the set among the 4 sets above that does not contain any prime numbers?

- (1) A (2) B (3) C (4) D

Part II

1. Solutions of two problems written in numbers of different bases are given here. Write them in base ten and give the answers also in base ten.

$$\begin{array}{r} \text{(a)} \quad 240 \\ \quad 412 \\ \quad \underline{+131} \\ \quad \underline{\underline{1333}} \end{array}$$

$$\begin{array}{r} \text{(b)} \quad 423 \\ \quad \underline{- 146} \\ \quad \underline{\underline{255}} \end{array}$$

2. AB is a straight line segment 18 cm long. ABC is a triangle with $\hat{BAC} = 10^\circ$ and $\hat{ACB} = 158^\circ$. P and Q are points on AB such that $\hat{PCA} = 10^\circ$ and $\hat{PCQ} = 136^\circ$. Draw a rough diagram and mark the data. Find the value of $PQ + QC + CP$ with reasons.

3. p, q, r, s, t are whole numbers which exist in the range from 2 to 19 including both 2 and 19.

- p is a prime number with two digits. Sum of digits of it is a prime number.
- q is a multiple of 5.
- r is an odd number which is not a prime number.
- s is a square of a prime number.
- t is a prime number and is the mean of p and q .

Find the numbers p, q, r, s and t with reasons.