



INSTITUTE OF MATHEMATICS EDUCATION
JUNIOR MATHS OLYMPIAD – 2023 (Primary Level)

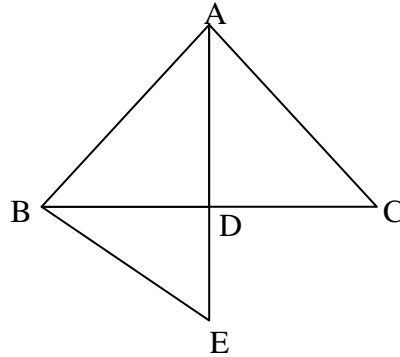
Std. : V and VI
 Time : 2 Hours

Question Paper

Date : 05.02.2023
 Total Marks : 100

Q.1. Find the sum of 4 digit Harshad numbers whose digital sum is 4. **(6 marks)**

Q.2. Refer figure. $\angle BAC = 60^\circ$, $\angle ACB = 80^\circ$. ADE is angle bisector of $\angle BAC$. Also $\angle EBC = \angle BEA + 10^\circ$. Determine interior angles of $\triangle BDE$. **(6 marks)**



Q.3. Solve the following in the respective bases and find values of x and y. **(6 marks)**

(i) $(847)_9 = \boxed{x}_{12}$

(ii) $(e4te)_{12} = \boxed{y}_8$

Q.4. Find the number of even divisors of the number 4800. **(6 marks)**

Q.5. An ‘Ascending Integer’ is one in which each digit is greater than any other digit that precedes it. (e.g. 157). How many ascending integers are there between 200 and 300? **(6 marks)**

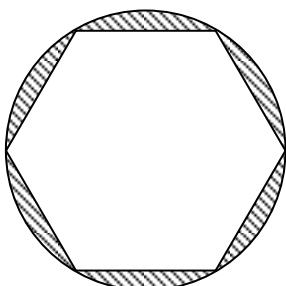
Q.6. Decipher letters for numbers. Each alphabet represents a separate digit.
 Take $B = 2$ and $N = 9$.

$$\begin{array}{r}
 \text{B A N A N A} \\
 + \quad \text{G U A V A} \\
 \hline
 \text{O R A N G E}
 \end{array}$$

(8 marks)

Q.7. If $\frac{925-924}{925} + \frac{925-920}{925} + \frac{925-913}{925} + \frac{925-903}{925} + \dots + \frac{925-73}{925} + \frac{925-0}{925} = \frac{x}{925}$,
 then $x =$ **(8 marks)**

Q.8.



A round table cover has 6 equal designs shown shaded in an adjacent figure. If the radius of the table cover is 28 cm, then find the cost of making 6 designs at the rate of ` 5 per sq. cm. **(8 marks)**

Q.9. Find any four groups of 3 numbers whose $\text{GCD} = 12$ and $\text{LCM} = 1080$ **(8 marks)**

Q.10. Find the remainder when **(8 marks)**

$1! + 2! + 3! + 4! + \dots + 2023!$ is divided by 30.

Q.11. Identify all possible bases and find A, B, C accordingly. Find the values of $(A + C - B)$ in the respective bases. $(x \leq 12)$ **(10 marks)**

$$\begin{array}{r}
 \\
 \\
 \\
 \\
 \hline
 1
 \end{array}$$

[No rough space provided on this page. Please use rough space at the end of the answer paper.]

Q.12. There are 3 squares in a row. The 1st square is to be painted by any colour from Group 1. The 2nd square is to be painted by any colour from Group 2. The 3rd square is to be painted by any colour from Group 3. No two adjacent squares should have the same colour. The colours in Groups 1, 2, 3 are as follows. **(10 marks)**

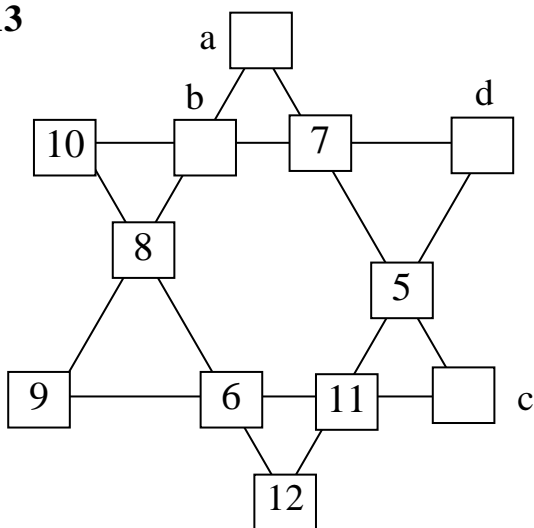
Group 1 : Red, Orange, Yellow.

Group 2 : Blue, Green, Yellow.

Group 3 : Yellow, Blue, Violet, White.

Find the number of ways of colouring the 3 squares

Q.13



Numbers 1 to 12 are to be filled in the boxes of the given figure such that when you multiply four numbers along any line and then divide the product by 13, the remainder is 1.

e.g. $10 \times 8 \times 6 \times 12 = 5760$ and

$$5760 = (13 \times 443) + 1.$$

Some numbers have been already filled. Without altering their positions find the numbers at places a, b, c, d. **(10 marks)**