NMTC_2017

(NATIONAL MATHEMATICS TALENT CONTEST)

PRIMARY LEVEL - V & VI STANDARDS

PART - A

1. Which one of the following numbers is NOT the sum of two prime numbers?

(A) 24 (B) 30 (C) 67 (D) 21

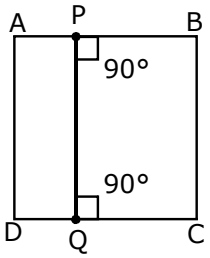
Sol. C

$24 = 19 + 5$

$30 = 23 + 7$

$21 = 19 + 2$

2. ABCD is a square and PB = 2AP. The perimeter of the rectangle APQD is 80 cm. The perimeter of ABCD in cms is



(A) 100 (B) 120 (C) 140 (D) 160

Sol. B

PQ = BC = AD = x

AP = DQ = y

2(x + y) = 80

x + y = 40

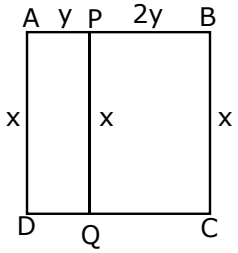
If x = 3y

4y = 40

y = 10 cm

x = 30 cm

Perimeter = 4x = 120 cm of ABCD



3. Saket added up all the even numbers from 1 to 101. Then, from the total he obtained, he subtracted all odd numbers between 0 and 100. The answer he would have obtained is

(A) 0 (B) 20 (C) 30 (D) 50

Sol. D

Adding even nos. = 2 + 4 + 6 + _____ + 98 + 100

Adding odd nos. = 1 + 3 + 5 + _____ + 97 + 99

1 + 1 + _____ 1 + 1 (5o times)

$\Rightarrow$ 50

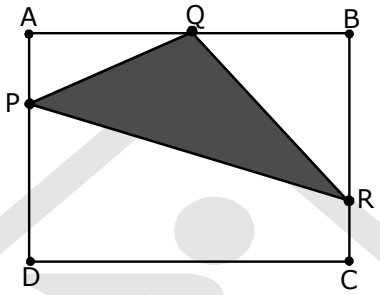
4. The value of $\frac{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}}{2+4+8}$ is

(A) 16 (B) 4 (C) $\frac{1}{4}$ (D) $\frac{1}{16}$

Sol. D

$$\frac{\frac{1}{2}+\frac{1}{4}+\frac{1}{8}}{2+4+8} = \frac{\frac{4+2+1}{8}}{14} = \frac{7}{8\times 14} = \frac{1}{16}$$

5. ABCD is a rectangle. AB=8 cm and BC = 6 cm. Q is the midpoint of AB. P,R are on AD and BC respectively such that AP= 2 cm, CR = 1 cm. Area of the shaded triangle in square cms is



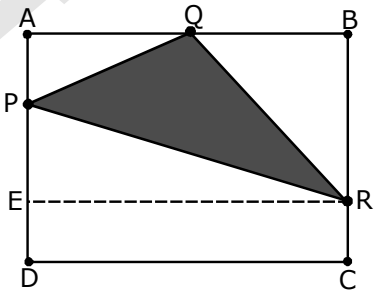
(A) 12 (B) 13 (C) 14 (D)16

Sol. C

Join ER

Now, Area of ΔPQR

= Area of rectangle ABCD – Area of remaining triangles + rectangle



$$= 8\times 6 - \left[\frac{1}{2}\times 2\times 4 + \frac{1}{2}\times 4\times 5 + \frac{1}{2}\times 3\times 8 + 8\times 1\right]$$

= 48 – [4 + 10 + 12 + 8]

= 48 – [34] = 14

6. The Rishimoolam of a number is defined as follows. Consider the number 234. By multiplying its digits 2,3 and 4, we obtain 2 x 3 x 4 = 24. Again , multiplying the digits of 24, we get 2 x 4 = 8. We say 8 is the Rishimoolam of the numbers 234. If 0 is the Rishimoolam, we say the number has no Rishimoolam. Which one of the following has no Rishimoolam?

(A) 736 (B) 647 (C) 831 (D)619

Sol. D

619 = 6 × 1 × 9

= 54

54 = 5 × 4

= 20

20 = 2 × 0

= 0

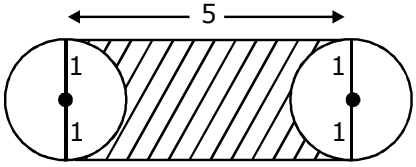
7. Two circles touch two parallel lines as shown in the diagram. The radius of each circle is 1 cm. The distance between the centres of the circles is 5 cm. The area of the shaded region is square cms is

(A) 5π (B) $10-\pi$

(C) $10-\pi$ (D) $10+\pi$

Sol. B

Ara of shaded region = $5\times 2-\left[\frac{22}{7}\times 1\right] = 10-\pi$



8. Sumrud wrote two consecutive integers, one of which ends in a 5. He multiplied both. He squared the answer. The last two digits of his answer is

(A) 50 (B) 40 (C) 10 (D) 00

Sol. D

The number is of the form

$\_\underline{5}, \_\underline{6} = 3\underline{0}$

or

$\_\underline{4}, \_\underline{5} = 2\underline{0}$

Their product will end with a zero

Now, on squaring, we will get 2 zeros

$\therefore$ Last two digits will be 00

9. Vishwa wrote a number on each side of 3 cards. In each card, the numbers written on the sides are different. One side of each card is a prime number and the other sides had 44, 59 and 38 respectively. Given that the sum of the numbers on each card is the same, the difference between the largest and the second largest of the prime numbers on the cards is

(A) 6 (B) 7 (C) 9 (D) 4

Sol. A

3 cards $\longrightarrow$ 6 numbers

3 prime no. 3 no. given 44, 59, 38

Sum of numbers on 3 cards is same

Smallest prime no. = 2

Let's add it to 59 $\rightarrow$ 59 + 2 = 61

Now other 2 prime numbers could be

61 – 44 = 17 & 61 – 38 = 23

One set of 3 prime numbers = 2, 17, 23

23 – 17 = 6

10. The number of three digit number abc such that a x b x c = 15 is

(A) 2 (B) 6 (C) 8 (D) 9

Sol. B

For $a \times b \times c = 15$

Take numers 1, 3, 5

$$\left.\begin{matrix}1\times3\times5\\1\times5\times3\\3\times1\times5\\3\times5\times1\\5\times1\times3\\5\times3\times1\end{matrix}\right] \text{6 such numbers}$$

PART - B

11. Five chairs cost as much as 12 desks, 7 desks cost as much as 2 tables and 3 tables cost as much as 2 sofas. If the cost of 5 sofas is Rs 5250, then the cost of a chair (in Rs) is _____.

Sol. Let Chairs be C, Desks be D, Tables be T, Sofas be S.

If cost of 5 Sofas = Rs.5250

According to question,

$5C = 12D$

$7D = 2T$

$3T = 2S$

Cost of 1 Sofa = $\frac{5250}{5} = 1050\,\text{Rs.}$

Cost of 1 Table = $\frac{2\times350}{3} = 700\,\text{Rs.}$

Cost of 1 Desks = $\frac{2\times700}{7} = 200\,\text{Rs.}$

$\therefore$ Cost of 1 Chairs = $\frac{12\times200}{5} = 480\,\text{Rs.}$

12. The average age of a class of 20 children is 12.6 years. 5 new children joined with an average agee of 12.2 years. The new average of the class (to one decimal place)_____.

Sol. Total of 20 children = 12.6 × 20

= 252 years

New total = 252 + 5 × 12.2

= 252 + 61.0

= 313 years

New average = $\frac{313}{25}$

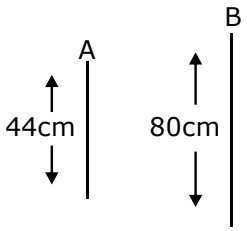
= 12.5 years

13. 13 is a two digit prime and when we reverse its digits, the number 31 obtained is also a prime number. The number of two digit numbers having this property is_____.

Sol. Such numbers are 11, 13, 31, 17, 71, 37, 73, 97, 79

14. In a garden there are two plants. One plants is 44cm tall and the otheris 80 cm tall. The first plant grows 3 cm in every 2 months and the second 5 cm in every 6 months. The number of months after which the two plants will have equal height is _____.

Sol. In first 6 months,
A grows = 44 + 9 = 53
B grows = 80 + 5 = 85
If this continuous for next 48 months,
A = 44 + 9 × 9 = 125
B = 80 + 5 × 9 = 125
No. of months = 54



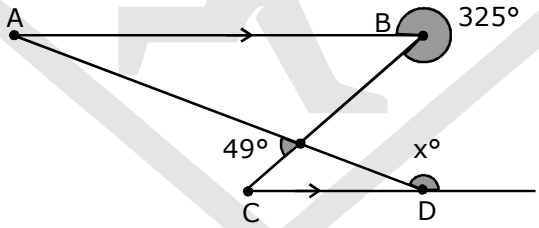
15. In 5 days a man walked a total of 85 KM. Every day he walked 4 KM less than the previous day. The number of KM he walked on the last day is _____.

Sol. In 5 days distance covered = 85 km
Let first day distance covered = a
difference = 4 km

$\therefore\ 85 = \frac{5}{2}[2\times a + 4\times 4]$ $\left[\text{Sum} = \frac{n}{2}[2a + (n-1)d]\right]$

a = 9km

16. In the adjoining figure, AB is parellel to CD. The value of x is _____.



Sol. $\angle ABC = 360 - 325$
$= 35°$ [complete angle]
$\therefore\ \angle BAD = 180 - [35 + 131]$
$= 180 - 166 = 14$
$x = 180° - 14°$ [linear pair]
$x = 166°$

17. In Mahadevans cycle shop for children, there are unicycles, having only one wheel, bicycles, having two wheels and tricycles, having three wheels. Samrud counts the seats and wheels and finds that there are totally 7 seats and 13 wheels. The number of bicycles is more than tricycles. The number of unicycles in the shop is _____.

Sol. If we take
Tricycle = 1 × 3 = 3
Bicycle = 4 × 2 = 8
Unicycle = 2 × 1 = 2
Total wheels = 13
$\therefore$ No. of unicycles = 2

18. There is a tree with several branches. Many parrots came to rest on the tree. When 6 parrots sat on each branch of the tree, all the branches were occupied but three parrots were left over. When 9 parrots sat on each branch. all parrots were seated but two branches were empty. If b is the number of branches and p is the number of parrots, the value of b + p is _____.

Sol. Total no. of parrots in

1st case

= 6 parrots on each branch + 3

p = 6b + 3

In 2nd case

9 parrots on each branch and 2 branches with no parrots

$\therefore$ p = 9(b – 2)

6b + 3 = 9(b – 2)

b = 7

p = 45

$\therefore$ b + p = 52

19. The incomes of A and B are in the ratio 3:2. Their expenditures ar eint he ratio 5:3. If each saves Rs 10,000, then As income is (in Rs) _____.

Sol. $I_A : I_B = 3 : 2$

$E_A : E_B = 5 : 3$ $\quad I_A = ?$

$S_A = S_B = 10,000$ Rs.

I = E + S

$I_A = E_A + S_A$

$\Rightarrow 3x = 5y + 10,000$

Also $2x = 3y + 10,000$

$$\frac{3x - 10,000}{5} = \frac{2x - 10,000}{3}$$

9x = 30,000 = 10x – 50,000

20,000 = x

$\therefore I_A \Rightarrow 3 \times 20,000 = 60,000$ Rs.

20. The radius of a circle is increased so that its circumference is increased by 5%. The area of the circle will increase by _____ %.

Sol. r_1, r_2 be initial and final radius

Given, $\frac{5}{100} = \frac{2\pi(r_2 - r_1)}{2\pi r_1}$

$$\frac{r_2}{r_1} = \frac{21}{20}$$

Now, change in area = $\frac{\pi(r_2^2 - r_1^2)}{\pi r_1^2} \times 100$

$$= \left[\left(\frac{r_2}{r_1}\right)^2 - 1\right] \times 100$$

$$= \frac{41}{400} \times 100 = 10.25\%$$