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MATHS OLYMPIAD




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EXAM BOOKLET FOR CLASS 8

13th NATIONAL INTER-SCHOOL MATHS OLYMPIAD

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13th NATIONAL INTER-SCHOOL MATHS OLYMPIAD

INSTRUCTIONS

1. The total time for the Olympiad is 90 minutes. There is no negative marking.
2. There are 50 questions. (Calculator is **not** allowed.)
3. Do not forget to write your name, class and gender on your answer sheet.
4. There is only one correct answer for each question out of given 4 options A, B, C, D. If you mark more than one choice the answer will be considered wrong. Mark your answers on answer sheet; marks on the booklet will not be accepted.
5. Answer sheets will be checked by using the optical reader. Do not fold or use your answer sheet for calculation etc.
6. Before you begin to answer the questions, read them carefully.
7. You may begin your answer from any question; however you must make sure that the number of the question you are answering matches the correct number in the answer sheet.
8. Mark your answer with a lead pencil by filling only the inside of the circles. Do not write or put any other mark on your answer sheet.
9. Speed is important when you answer the questions. If you have difficulty with a question, do not waste your time to solve it, just move on to the next question, You may go back to the 'difficult' question if you still have time after finishing other parts of the Olympiad.
10. The blank areas in the booklet may be used for writing and calculations.
11. Answer key will be uploaded on our website at 7:00 p.m. on 27th November 2017.
12. Results will be announced through our website (www.ismo.pk).

Q1: If a is an odd integer and b is an even integer, which of the following is an odd integer?

- A) $a+3$ B) $5a+1$
 C) $2(a+b)$ D) $a+4b$

Q2: What number should be multiplied by itself to get 0.36?

- A) 0.6 B) 0.06 C) 0.03 D) 0.9

Q3: How many natural numbers are there between 48 and 144 which are divisible by 3 or 4 where 48 and 144 are included?

- A) 48 B) 49 C) 50 D) 51

Q4: If H.C.F. of x and y is 9, then which of the following could be L.C.M. of x and y ?

- A) 64 B) 194 C) 450 D) 600

Q5: $\left[\frac{1}{2} \times \left(-\frac{1}{3} \right) + \frac{1}{2} - 1 \right] \div \frac{1}{4} = ?$

- A) -4 B) -2 C) 2 D) 4

Q6: What number between 11 and 20 has more than 4 positive factors?

- A) 12 B) 15 C) 14 D) 19

Q7: 20% of which of the following number is half of the 40% of 2000?

- A) 1000 B) 2000
 C) 2400 D) 4000

Q8: If $A = \{1, 2, 3, 4\}$ and $B = \{2, 3\}$, what is $B - A$?

- A) $\{3, 4\}$ B) $A = \{1, 2, 3, 4\}$
 C) $\{ \}$ D) $A = \{1, 2\}$

Q9: Which of the following is equivalent to $(A \cup B) - (A \cap B)$?

- A) $(A - B) \cup (B - A)$ B) $A \cup (A - B)$
 C) $(A - B) \cap (B - A)$ D) $A \cap (A - B)$

Q10: $12 \div 2 + 3 \times (7 + 3 - 3 \times 3) - (7 - 2 \times 3)^2 = ?$

- A) 4 B) 8 C) 10 D) 12

Q11: Which of the following has the greatest value?

- A) 2^{125} B) 4^{63} C) 8^{43} D) 16^{30}

Q12: How many rational numbers with denominator 18 are between $\frac{3}{2}$ and $\frac{5}{9}$?

- A) 17 B) 16 C) 15 D) 14

Q13: $\frac{(-1)^{2001} (-1)^{2002} (-1)^{2003}}{(-1)^{1001} \div (-1)^{1002}} = ?$

- A) 2 B) 1 C) 0 D) -1

Q14: What percentage of numbers from 10 to 89 have even number in the unit's digit and odd number in the ten's digit?

- A) 20 B) 25 C) 30 D) 35

Q15: If 2^n is greater than 1000, what is the smallest possible integer value of n ?

- A) 9 B) 10 C) 11 D) 12

Q16: The product of two natural numbers is 64. Which of the following cannot be some of the numbers?

- A) 65 B) 34 C) 24 D) 20

Q17: Which of the following could be the value of $x^2 + 3$?

- A) 0 B) 1 C) 2 D) 3

Q18: What is the remainder when $10^{10} - 1$ is divided by 9?

- A) 0 B) 1 C) 3 D) 9

Q19: Which of the following integers doesn't satisfy $\frac{5}{9} < \frac{a}{36} < \frac{3}{4}$?

- A) 20 B) 22 C) 24 D) 26

Q20: If $\frac{5(x-3)}{6} - x = 1 - \frac{x}{9}$, then what is x ?

- A) -63 B) -9 C) 9 D) 63

Q21: What is the value of $2x + 1$ if $4x^2 + 4x + 1 = 25$?

- A) -5 B) 5
C) Both 5 and -5 D) None of these

Q22: Which of the following is wrong?

- A) $\sqrt{8} = 2\sqrt{2}$ B) $\sqrt{45} = 3\sqrt{5}$
C) $\sqrt{75} = 5\sqrt{3}$ D) $\sqrt{1000} = 10\sqrt{5}$

Q23: What is the value of a if $\frac{a}{1.2} = \frac{6}{2.4}$?

- A) 2 B) 3 C) 4 D) 8

Q24: $\left(1 + \frac{1}{2}\right) \times \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \times \dots \times \left(1 - \frac{1}{36}\right) = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{36}$ C) $\frac{1}{12}$ D) $\frac{35}{36}$

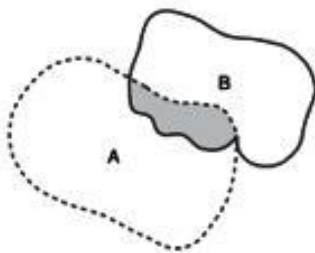
Q25: What is $a \times b + c$ if $\frac{a}{64} = \frac{5}{b}$ and $\frac{c}{12} = \frac{3}{4}$?

- A) 320 B) 445 C) 441 D) 329

Q26: $\sqrt{\sqrt{6}\sqrt{6}\sqrt{72}\sqrt{\frac{1}{16}}\sqrt{16}} = ?$

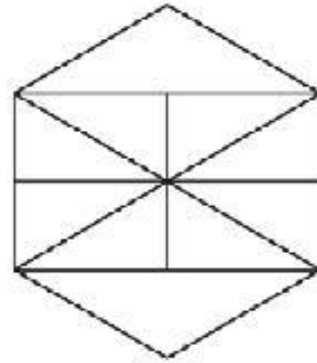
- A) 3 B) 6 C) 9 D) 12

Q27: In the figure below, the shaded area is 12 cm^2 . Areas of the region A and region B are 35 cm^2 and 40 cm^2 respectively. What is the area of the entire region?



- A) 63 cm^2 B) 66 cm^2
 C) 75 cm^2 D) 87 cm^2

Q28: How many triangles are there in the figure given below?



- A) 18 B) 19 C) 20 D) 21

Q29: $\frac{A+6}{A}$ is an integer. What is the set of all possible values of A ?

- A) $\{1, 2, 4\}$ B) $\{0, 1, 2, 3\}$
 C) $\{1, 2\}$ D) $\{1, 2, 3, 6\}$

Q30: A person purchased nine tables for Rs 7,000 each and five chairs for Rs 5,000 each. Then he sold all tables and chairs for Rs. 110,000. What was the percentage profit he made on the total sum he paid for all tables and chairs?

- A) 15% B) 20% C) 25% D) 30%

Q31: What is the simplest form of $\frac{m}{m+1} - \frac{n}{n-1}$ if

$$m = -\frac{2}{3} \text{ and } n = -\frac{1}{5}?$$

- A) $-\frac{13}{2}$ B) $-\frac{13}{6}$ C) $\frac{13}{6}$ D) $\frac{13}{2}$

Q32: What is the value of $m+n+k$ if $m+n=7$?

$$2m+k=11$$

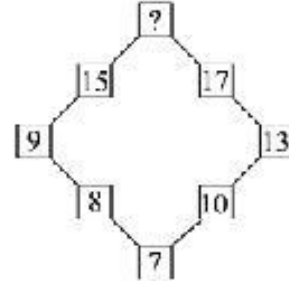
$$2n+2k=6$$

- A) 8 B) 9 C) 10 D) 12

Q33: Simplify $\frac{\sqrt{12} + \sqrt{48} - \sqrt{27}}{\sqrt{75} + 2\sqrt{3}}$

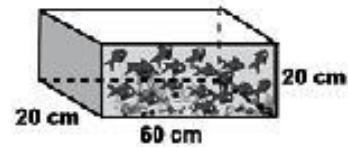
- A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{3}{7}$ D) $\frac{2}{3}$

Q34: What is the unknown number indicated by question mark in the figure given below?



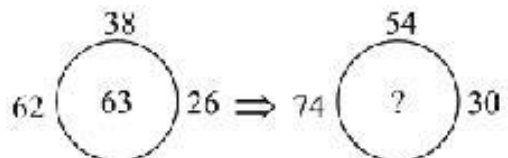
- A) 21 B) 27 C) 14 D) 35

Q35: What is the volume of the aquarium given below?



- A) 100 cm^3 B) 2400 cm^3
 C) 3000 cm^3 D) 24000 cm^3

Q36: What is the unknown number indicated by question mark in the figure given below?



- A) 89 B) 69 C) 98 D) 79

Q37: What is the difference between the greatest and the smallest possible 3 digit numbers which are formed by using different prime numbers?

- A) 235 B) 518 C) 753 D) 988

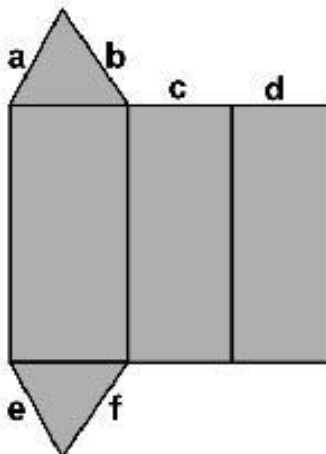
Q38: The average of 21 numbers is 30. The largest number is 50. If we remove the largest number, then the average of remaining numbers will be:

- A) 33 B) 31 C) 29 D) 27

Q39: Which of the following is a natural number?

- A) $\sqrt{289}$ B) $\sqrt{341}$ C) $\sqrt{421}$ D) $\sqrt{111}$

Q40: The net of a prism whose base is a scalene triangle is given below.



Which of the following two sides are congruent?

- A) a and c B) a and f
C) f and d D) e and d

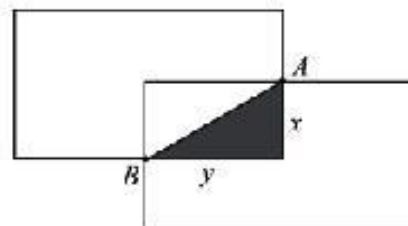
Q41: The perimeter of a rectangle is 120 cm. A small square having perimeter 12 cm is removed from every corner of the rectangle. What will be the perimeter of the new shape of the rectangle?

- A) 72 cm B) 108 cm
C) 120 cm D) 168 cm

Q42: What is the area of a circle if its circumference is 90π ?

- A) 9000π B) 8100π
C) 4500π D) 2025π

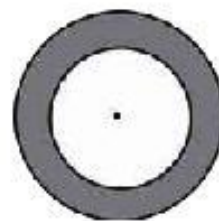
Q43: The following figure is made by two overlapping congruent rectangles where the points A and B are the mid points. If the shaded area is 24, what is the total area of the figure?



- A) 336 B) 340 C) 360 D) 384

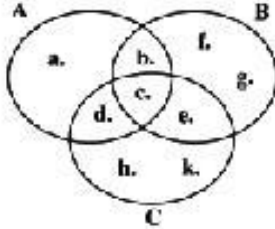
Q44: The diameters of two circles are 18 cm and 10 cm respectively. What is the area of shaded region?

Note: $\pi = \frac{22}{7}$



- A) 64cm^2 B) 176cm^2
C) 424cm^2 D) $\frac{625}{7}\text{cm}^2$

Q45: According to Venn Diagram which of the following is equal to $C - (A \cap B)$?



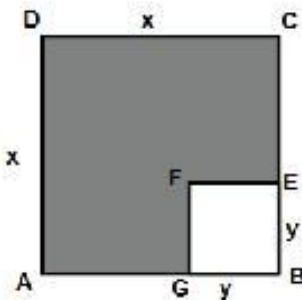
- A) $\{a, f, g\}$ B) $\{b, c\}$
 C) $\{d, e\}$ D) $\{d, e, h, k\}$

Q46: The product of integers x and y is factor of 36. If x is divisible by 6, which of the following might be true?

- I. y is divisible by x .
 II. y is divisible by 6.
 III. $\frac{y}{6}$ is divisible by 6.

- A) I only B) II only
 C) I and II only D) I and III only

Q47: In the figure below, ABCD and BEFG are two squares.



What is the length of CE if $x + y = 9$ and the shaded area is 45?

- A) 3 B) 4 C) 5 D) 6

Q48: If $a - 4 = b + 1$, then the value of $(a - b)^3 - (b - a)^3$ will be:

- A) -250 B) 0 C) 125 D) 250

Q49: The sum of consecutive natural numbers up to n is given by:

$$1 + 2 + 3 + 4 + \dots + n = \frac{n(n+1)}{2}$$

According to the method given above, what is the sum of $1 + 2 + 3 + \dots + 99 + 100$?

- A) 2025 B) 5050 C) 4950 D) 6550

Q50: The average of five numbers is 40. If one of the numbers is excluded, the average is reduced by 2. What is the excluded number?

- A) 44 B) 46 C) 48 D) 50

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