

TOTAL QUESTIONS-10,
TIME – 10 MINUTES,
MARKS –10
MATH

- What is the sum of the first 17 terms of an arithmetic progression if the first term is -20 and last term is 28 ?
 (A) 68 (B) 156 (C) 142 (D) 242
- What is the value of $\frac{1+x}{1-x^4} \div \frac{x}{1+x^2} \times x(1-x)$?
 (A) $1/x$ (B) $x^2 - 1$ (C) $x + 1$ (D) x
- If $x + \frac{1}{x} = 17$, then what is the value of $\frac{x^4 + \frac{1}{x^2}}{x^2 - 3x + 1}$?
 (A) $2431/7$ (B) $3375/7$ (C) $3375/14$ (D) $3985/9$
- What will be the common difference of an A.P. Whose first term is 2 and the sum of the first 29 terms is 1276 ?
 (A) 2 (B) 3 (C) 4 (D) 5
- In how many ways can letters of the word ALLAHABAD be arranged so that vowels always occupy even place ?
 (A) 60 (B) 24 (C) 30 (D) 120
- In how many ways, a cricket team of 11 players can be made from 15 players, if a particular player is always chosen?
 (A) 1835 (B) 1001 (C) 1635 (D) 1365
- A bag contains 20 tickets numbered from 1 to 20. Two tickets are drawn at random. What is the probability that both numbers are prime?
 (A) $\frac{8}{20}$ (B) $\frac{14}{95}$ (C) $\frac{7}{20}$ (D) $\frac{21}{190}$
- For $x > 0$, if a variable takes discrete values $x + 4, x - 3.5, x - 2.5, x - 3, x - 2, x + 0.5, x - 0.5, x + 5$, then what is the median?
 (A) $x - 1.25$ (B) $x - 0.5$ (C) $x + 0.5$ (D) $x + 1.25$
- If α, β be the roots of the quadratic equation $3x^2 - 6x + 4 = 0$, find the value of $\left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha}\right) + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$:
 (A) 6 (B) 8 (C) 7 (D) 5
- In an experiment with 15 observations on x , the following results were available $\sum x^2 = 2830, \sum x = 170$. On observation that was 20 was found to be wrong and was replaced by the correct value 30, then the corrected variance is
 (A) 78.00 (B) 188.66 (C) 177.33 (D) 8.33

ANSWER KEYS

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|---|---|----|---|
| 1 | A | 6 | B |
| 2 | A | 7 | B |
| 3 | A | 8 | A |
| 4 | B | 9 | B |
| 5 | A | 10 | A |

$$S_n = \frac{n}{2}(a + \ell)$$

$$\Rightarrow S_{17} = \frac{17}{2}(-20 + 28) \Rightarrow S_{17} = 68$$

2. A;

$$\frac{1+x}{1-x^4} \div \frac{x}{1+x^2} \times x(1-x)$$

$$\Rightarrow \frac{1+x}{(1+x^2)(1+x^2)} \times x(1-x) \Rightarrow \frac{1}{(1-x)x^2} \times x(1-x) = \frac{1}{x}$$

EXPLANATIONS
1. A; We know,

3. A;

$$x + \frac{1}{x} = 17$$

$$\text{Now, } \frac{x^4 + \frac{1}{x^2}}{x^2 - 3x + 1} = \frac{x \left(x^3 + \frac{1}{x^3} \right)}{x \left(x - 3 + \frac{1}{x} \right)} = \frac{x^3 + \frac{1}{x^3}}{\left(x + \frac{3}{x} \right) - 3}$$

$$= \frac{4913 - 51}{17 - 3} = \frac{4862}{14} = \frac{2431}{7}$$

4. B;

$$1276 = \frac{29}{2} \{ 2 \times 2 + (29 - 1) \times d \}$$

$$\text{or, } 44 \times 2 = 4 + 28d \text{ or, } d = \frac{88 - 4}{28} = 3$$

5. A; Vowels are – A, A, A, A, consonants are – L, L, H, B, D

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According to question vowels can put at second, fourth, sixth and eighth places i.e.

they can put at 4 places in $\frac{4!}{4!} = 1$ ways.

On the remaining five place consonants can be in $\frac{5!}{2!}$ ways = 60 ways.

6. B; Since, particular player is always chosen. It means that 11-1=10 players are to be selected out of the remaining 15-1= 14 players.

∴ Required number of ways

$$= {}^{14}C_{10} = \frac{4!}{10 \times 4!}$$

$$= \frac{14 \times 13 \times 12 \times 11}{4 \times 3 \times 2 \times 1}$$

$$= 7 \times 13 \times 11 = 91 \times 11 = 1001$$

7. B; Prime numbers from 1 to 20

= 2, 3, 5, 7, 11, 13, 17, 19

∴ Required probability

$$= \frac{{}^8C_2}{{}^{20}C_2} = \frac{8 \times 7}{2 \times 1} \times \frac{2 \times 1}{20 \times 19} = \frac{14}{95}$$

8. A; We have, $x > 0$, and the observations are,

X+4, x-3.5, x-2.5, x-3

x-2, x+0.5, x-0.5, x+5

Arrange in ascending order

x-3.5, x-3, x-2.5, x-2, x-0.5, x+0.5,

x+4, x+5

Total number of observations = 8

$$\therefore \text{Median} = \frac{(4\text{th} + 5\text{th}) \text{ observations}}{2}$$

$$= \frac{(x-2) + (x-0.5)}{2} = \frac{2x-2.5}{2} = x-1.25$$

9. B; $\alpha + \beta = \frac{6}{3} = 2$ and $\alpha\beta = \frac{4}{3}$

$$\therefore \left(\frac{\alpha}{\beta} + \frac{\beta}{\alpha} \right) + 2 \left(\frac{1}{\alpha} + \frac{1}{\beta} \right) + 3\alpha\beta$$

$$= \frac{\alpha^2 + \beta^2}{\alpha\beta} + 2 \left(\frac{\alpha + \beta}{\alpha\beta} \right) + 3\alpha\beta$$

$$= \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\alpha\beta} + 2 \left(\frac{\alpha + \beta}{\alpha\beta} \right) + 3\alpha\beta$$

$$= \frac{4 - \frac{8}{3}}{\frac{4}{3}} + 2 \left(\frac{2}{\frac{4}{3}} \right) + 3 \times \frac{4}{3}$$

$$= \frac{4}{\frac{4}{3}} + 3 + 4 = 8$$

10. A; $\sum x = 170, \sum x^2 = 2830$

Increase in $\sum x = 10$.

Then, $\sum x^1 = 170 + 10 = 180$

Increase $\sum x^2 = 900 - 400 = 500$, then

$\sum x^{1/2} = 2830 + 500 = 3330$

$$\therefore \text{Variance} = \frac{1}{n} \sum x^{1/2} - \left(\frac{\sum x^1}{n} \right)^2$$

$$= \frac{3330}{15} - \left(\frac{180}{15} \right)^2 = 222 - 144 = 78.$$

ALL THE POWER IS WITHIN YOU; YOU CAN DO ANYTHING AND EVERYTHING BELIEVE IN THAT; DON'T BELIEVE THAT YOU ARE WEAK. STAND UP AND EXPRESS THE DIVINITY WITHIN YOU"
