

CDS 1 2025

LIVE

MATHS

STATISTICS

CLASS 3

NAVJYOTI SIR

SSBCrack
CLAMS

Crack
EXAMS

A frequency distribution is as follows :

PYQ - 2024 - II

Marks	18-26	27-35	36-44	45-53	54-62	63-71	72-80
Number of students	5	7	10	15	8	3	2

What is the median of the distribution ?

- (a) 44.9
- (b) 45.5
- (c) 45.9
- (d) 46.3

<u>Marks</u>	<u>f</u>	<u>cf</u>
18 - 0.5 — 26 + 0.5	5	5
26.5 — 35.5	7	12
35.5 — 44.5	10	22
44.5 — 53.5	15	37
53.5 — 62.5	8	45
62.5 — 71.5	3	48
71.5 — 80.5	2	50 = n = $\sum f$

$$\frac{\sum f}{2} = \frac{50}{2} = 25$$

Median class = 44.5 - 53.5

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$$

$$= 44.5 + \left(\frac{25 - 22}{15} \right) \times 9$$

(1)

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$$= 44.5 + \frac{(25 - 22)}{15} \times 9$$

$$= 44.5 + \frac{3}{15} \times 9$$

$$= 44.5 + \frac{9}{5}$$

$$= 44.5 + 1.8$$

$$= 46.3$$

A frequency distribution is as follows :

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Number of students	5	7	10	15	8	3	2

What is the median of the distribution ?

- (a) 44.9
- (b) 45.5
- (c) 45.9
- (d) 46.3

Ans: (d)

What is the mode of the distribution ?

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- (a) 47.25
- (b) 47.75
- (c) 48.25
- (d) 48.75

A frequency distribution is as follows :

Marks	18-26	27-35	36-44	45-53	54-62	63-71	72-80
Number of students	5	7	10	15	8	3	2

Modal class

$$\frac{44.5 + 53.5}{2}$$

$$44.5 + \left(\frac{15}{4}\right)$$

$$44.5 + 3.75 = 48.25$$

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

$$= 44.5 + \left(\frac{15 - 10}{2 \times 15 - 10 - 8} \right) \times 9 = 44.5 + \left(\frac{5}{12} \right) \times 9$$

What is the mode of the distribution ?

PYQ – 2024 - II

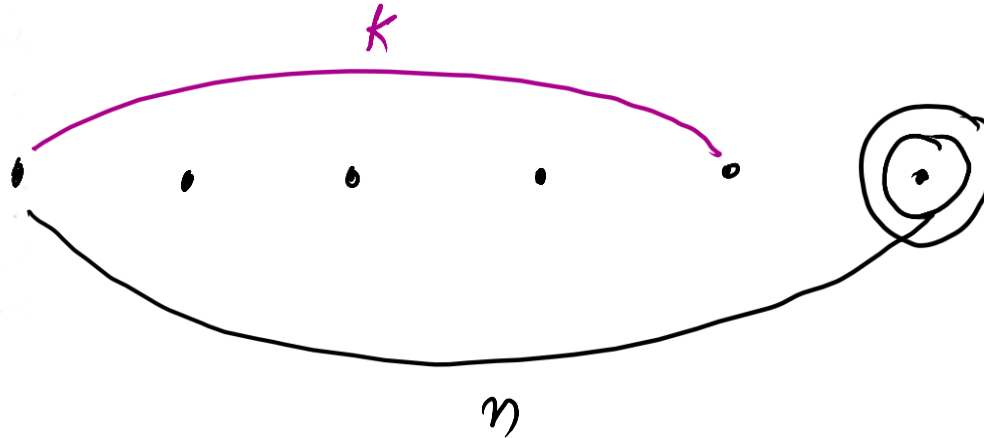
- (a) 47.25
- (b) 47.75
- (c) 48.25
- (d) 48.75

Ans: (c)

The arithmetic mean of n numbers is M . If the sum of first $(n - 1)$ terms is k , then what is the n th number?

PYQ - 2024 - II

- (a) $M - k$
- (b) $nM - k$
- (c) $n(M - k)$
- (d) $M - nk$



$$\begin{aligned} n^{\text{th}} \text{ number} &= \text{sum of } n \text{ numbers} - \text{sum of } (n-1) \text{ numbers} \\ &= nM - k \end{aligned}$$

PYQ – 2024 - II

The arithmetic mean of n numbers is M . If the sum of first $(n - 1)$ terms is k , then what is the n th number ?

- (a) $M - k$
- (b) $nM - k$
- (c) $n(M - k)$
- (d) $M - nk$

Ans: (b)

What is the geometric mean of 3, 9, 27, 81, 243, 729, 2187?

PYQ - 2024 - II

- (a) 81
- (b) 105
- (c) 144
- (d) 243

$$a_1, a_2, a_3, \dots, a_n$$

$$GM = (a_1 a_2 a_3 \dots a_n)^{\frac{1}{n}}$$

$$= (3 \cdot 3^2 \cdot 3^3 \cdot 3^4 \cdot 3^5 \cdot 3^6 \cdot 3^7)^{\frac{1}{7}}$$

$$= \left(3^{1+2+3+4+5+6+7} \right)^{\frac{1}{7}}$$

$$= \left(3^{\frac{7(7+1)}{2}} \right)^{\frac{1}{7}} = 3^4 = 81$$

a, b

$$GM = \sqrt{ab}$$

$$= (ab)^{\frac{1}{2}}$$

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

What is the geometric mean of 3, 9, 27, 81, 243, 729, 2187 ?

PYQ – 2024 - II

- (a) 81
- (b) 105
- (c) 144
- (d) 243

Ans: (a)

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Let the positive numbers $a_1, a_2, a_3, \dots, a_{3n}$ be in GP. If P is the GM of $a_1, a_2, a_3, \dots, a_n$ and Q is the GM of $a_{n+1}, a_{n+2}, a_{n+3}, \dots, a_{3n}$, then what is the GM of $3n$ numbers ?

PYQ - 2024 - I

(a) P^2Q

(b) PQ^2

(c) \sqrt{PQ}

(d) $P^{1/3} Q^{2/3}$

$$P = (a_1 a_2 a_3 \dots a_n)^{\frac{1}{n}} \Rightarrow P^n = a_1 a_2 a_3 \dots a_n$$

$$Q = (a_{n+1} a_{n+2} a_{n+3} \dots a_{3n})^{\frac{1}{2n}}$$

$$Q^{2n} = a_{n+1} a_{n+2} \dots a_{3n}$$

$3n - n - 1$
 $2n - 1 + 1 = 2n$

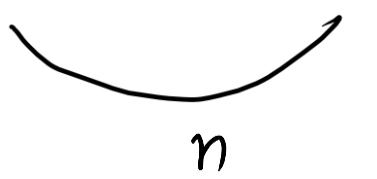
$$GM = (a_1 a_2 a_3 \dots a_{3n})^{\frac{1}{3n}}$$

$$= (a_1 a_2 a_3 \dots a_n \cdot a_{n+1} a_{n+2} \dots a_{3n})^{\frac{1}{3n}}$$

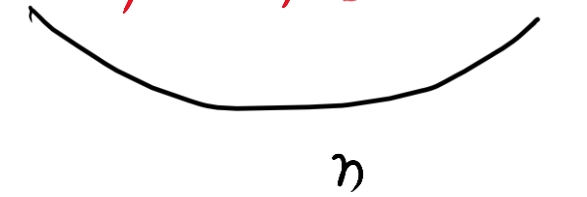
$$= (a_1 a_2 \dots a_n)^{\frac{1}{3n}} \times (a_{n+1} a_{n+2} \dots a_{3n})^{\frac{1}{3n}}$$

$$= (P^n)^{\frac{1}{3n}} (Q^{2n})^{\frac{1}{3n}} = P^{\frac{1}{3}} Q^{\frac{2}{3}}$$


1, 2, ..., n



n+1, n+2, ..., 2n



2n+1, 2n+2, ..., 3n



$a_1, a_2, \dots, a_{3n} \Rightarrow$ Total '3n' terms

Let the positive numbers $a_1, a_2, a_3, \dots, a_{3n}$ be in GP. If P is the GM of $a_1, a_2, a_3, \dots, a_n$ and Q is the GM of $a_{n+1}, a_{n+2}, a_{n+3}, \dots, a_{3n}$, then what is the GM of $3n$ numbers ?

PYQ – 2024 - I

- (a) P^2Q
- (b) PQ^2
- (c) \sqrt{PQ}
- (d) $P^{1/3} Q^{2/3}$

Ans: (d)

QUESTION

The following observations have been arranged in ascending order:

✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
29, 32, 48, 52, x, x + 3, 71, 75, 80, 92

If the median of data is 61.5, then what is the value of x?

- (a) 54
(c) 62

- (b) 60
(d) 56

$n = 10$ observations (even)

$\left(\frac{n}{2}\right)^{\text{th}}$ and $\left(\frac{n}{2} + 1\right)^{\text{th}}$ obs.

5th ; 6th $\Rightarrow \frac{x + x + 3}{2} = \text{Median}$

$$61.5 = \frac{2x + 3}{2}$$

$$2x = 120$$

$$x = 60$$

QUESTION

The following observations have been arranged in ascending order:

29, 32, 48, 52, x , $x + 3$, 71, 75, 80, 92

If the median of data is 61.5, then what is the value of x ?

- | | |
|--------|--------|
| (a) 54 | (b) 60 |
| (c) 62 | (d) 56 |

ANSWER : (b)

QUESTION

If mean of y and $\frac{1}{y}$ is M , then what is the mean of

y^3 and $\frac{1}{y^3}$?

(a) $\frac{M(M^2 - 3)}{3}$

(b) M^3

(c) $M^3 - 3$

(d) $M(4M^2 - 3)$ ✓

$$\frac{y + \frac{1}{y}}{2} = M$$

$$y + \frac{1}{y} = 2M$$

$$\frac{y^3 + \frac{1}{y^3}}{2}$$

$$\frac{\left(y + \frac{1}{y}\right)^3 - 3\left(y + \frac{1}{y}\right)}{2}$$

$$\frac{(2M)^3 - 3(2M)}{2} = \frac{8M^3 - 6M}{2}$$

$$= 4M^3 - 3M$$

$$= M(4M^2 - 3)$$

QUESTION

If mean of y and $\frac{1}{y}$ is M , then what is the mean of

y^3 and $\frac{1}{y^3}$?

(a) $\frac{M(M^2 - 3)}{3}$

(b) M^3

(c) $M^3 - 3$

(d) $M(4M^2 - 3)$

ANSWER : (d)

QUESTION

For the following frequency distribution: *modal class (mode always lies inside the modal class)*

Class interval	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	10	15	30	80	40	20

If m is the value of mode, then which one of the following is correct?

- (a) $5 < m < 10$ (b) $10 < m < 15$
(c) $15 < m < 20$ (d) $20 < m < 25$

QUESTION

For the following frequency distribution:

Class interval	0-5	5-10	10-15	15-20	20-25	25-30
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- (a) $5 < m < 10$ (b) $10 < m < 15$
(c) $15 < m < 20$ (d) $20 < m < 25$

ANSWER : (c)

QUESTION

An average Indian family allocates its monthly income under different heads as follows:

Items	Percentage Share
Food	40
House Rent	15
Saving	x
Transport	12
Miscellaneous	23

A pie diagram of this data is to be drawn. What is the value of x, if the angle which the sector representing saving makes at the centre is 36° ?

- (a) 13 (b) 11
(c) 10 (d) 8

$$36^\circ = \frac{x}{40 + 15 + x + 12 + 23} \times 360^\circ$$

$$\frac{1}{10} = \frac{x}{90 + x}$$

$$90 + x = 10x$$

$$9x = 90 \Rightarrow$$

$$x = 10$$

QUESTION

An average Indian family allocates its monthly income under different heads as follows:

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(c) 10 (d) 8

ANSWER : (c)

$$\mu f_1 + \mu f_2 + \mu f_3 + \dots + \mu f_n - y_1 f_1 - y_2 f_2 - y_3 f_3 - \dots - y_n f_n$$

$$\mu (f_1 + f_2 + f_3 + \dots + f_n) - (y_1 f_1 + y_2 f_2 + \dots + y_n f_n)$$

$$= \mu (f_1 + f_2 + \dots + f_n) - \mu (f_1 + f_2 + \dots + f_n)$$

$$= 0$$

$$\mu = \frac{\sum y_i f_i}{\sum f_i}$$

$$\mu \sum f_i = \sum y_i f_i$$

$$\mu (f_1 + f_2 + \dots + f_n) = y_1 f_1 + y_2 f_2 + \dots + y_n f_n$$

QUESTION

Data on percentage distribution of area of land in acres owned by households in two districts of a particular state are as follows:

Land Holding	District A	District B
0.01 – 0.99	5.62	13.53
1.0 – 2.49	18.35	21.84
2.5 – 7.49	47.12	39.32
7.5 – 12.49	19.34	12.15
12.5 – 19.99	7.21	7.43
20.0 – 29.99	2.36	5.73

What is the appropriate diagram to represent the above data? [2009-I]

- (a) Pie diagram (b) Histogram
(c) Bar chart (d) None of the above

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12.5 – 19.99	7.21	7.43
20.0 – 29.99	2.36	5.73

What is the appropriate diagram to represent the above data? [2009-I]

- (a) Pie diagram (b) Histogram
(c) Bar chart (d) None of the above

ANSWER : (c)

QUESTION

The geometric mean of x and y is 6 and the geometric mean of x , y and z is also 6. Then the value of z is [2017-II]

(a) 12

(b) $\sqrt{6}$

(c) 6

(d) $\sqrt[3]{6}$

$$\sqrt{xy} = 6 \Rightarrow (xy)^{\frac{1}{2}} = 6 \Rightarrow xy = 36$$

$$\sqrt[3]{xyz} = 6 \Rightarrow (xyz)^{\frac{1}{3}} = 6$$

$$xyz = 6^3$$

$$36xz = 6^3$$

$$z = 6$$

QUESTION

The geometric mean of x and y is 6 and the geometric mean of x , y and z is also 6. Then the value of z is [2017-II]

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(b) $\sqrt{6}$

(c) 6

(d) $\sqrt[3]{6}$

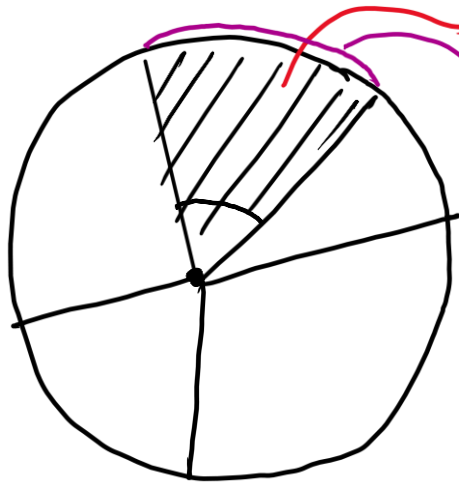
ANSWER : (c)

QUESTION

Which one of the following is not correct?

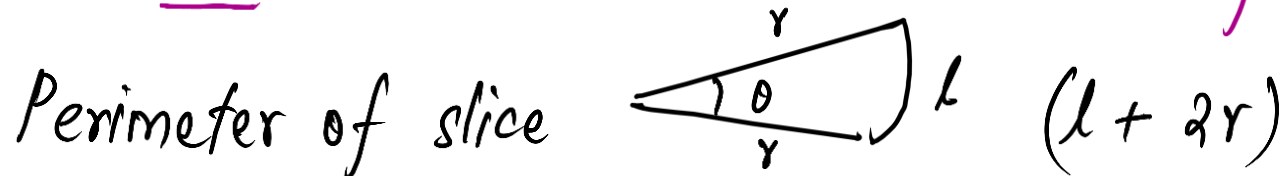
The proportion of various items in a pie diagram is proportional to the [2017-II]

- (a) Areas of slices ✓
- (b) Angles of slices ✓
- (c) Lengths of the curved arcs of the slices ✓
- (d) Perimeters of the slices ✗



$$\frac{\theta}{360^\circ} \times \pi r^2 = \text{Area} \Rightarrow \text{Area} \uparrow \text{ with } \theta \uparrow$$

$$l = \frac{\theta}{360^\circ} \times 2\pi r = \text{Length of arc} \Rightarrow \text{Length of arc} \uparrow \text{ with } \theta \uparrow$$



QUESTION

Which one of the following is not correct?

The proportion of various items in a pie diagram is proportional to the **[2017-II]**

- (a) Areas of slices
- (b) Angles of slices
- (c) Lengths of the curved arcs of the slices
- (d) Perimeters of the slices

ANSWER : (d)

QUESTION

The weighted arithmetic mean of first 10 natural numbers whose weights are equal to the corresponding numbers is equal to **[2015-II]**

- (a) 7 (b) 14
 (c) 35 (d) 38.5

x	f
1	1
2	2
3	3
⋮	⋮
⋮	⋮
10	10

frequency

$$\text{Mean} = \frac{\sum xf}{\sum f} = \frac{1 \times 1 + 2 \times 2 + 3 \times 3 + \dots + 10 \times 10}{1 + 2 + 3 + 4 + \dots + 10}$$

$$= \frac{1^2 + 2^2 + 3^2 + \dots + 10^2}{1 + 2 + 3 + \dots + 10} = \frac{2(10) + 1}{3}$$

$$= \frac{21}{3} = 7$$

$$\frac{1^2 + 2^2 + \dots + n^2}{1 + 2 + \dots + n} = \frac{\cancel{n(n+1)}(2n+1)}{\cancel{n(n+1)} \cdot 3} = \frac{2n+1}{3}$$

QUESTION

The weighted arithmetic mean of first 10 natural numbers whose weights are equal to the corresponding numbers is equal to **[2015-II]**

- | | |
|--------|----------|
| (a) 7 | (b) 14 |
| (c) 35 | (d) 38.5 |

ANSWER : (a)

QUESTION

The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set **[2016-II]**

- (a) is increased by 2
- (b) is decreased by 2
- (c) is two times the original median
- (d) remains the same as that of original set

→ ascending order

a_1 a_2 a_3

a_4

a_5

a_6

a_7

a_8

a_9

+ 2

+ 2

+ 2

+ 2

Median

will be same

$n = 9$ (odd)

$$\text{Median} = \left(\frac{n+1}{2}\right)^{\text{th}} \text{ obs} = \left(\frac{9+1}{2}\right) = \underline{\underline{5^{\text{th}} \text{ obs}}}$$

QUESTION

The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set **[2016-II]**

- (a) is increased by 2
- (b) is decreased by 2
- (c) is two times the original median
- (d) remains the same as that of original set

ANSWER : (d)

QUESTION

The geometric mean of $(x_1, x_2, x_3, \dots, x_n)$ is X and the geometric mean of $(y_1, y_2, y_3, \dots, y_n)$ is Y . Which of the following is/are correct?

I. The geometric mean of $(x_1 y_1, x_2 y_2, x_3 y_3, \dots, x_n y_n)$ is XY . ✓

II. The geometric mean of $\left(\frac{x_1}{y_1}, \frac{x_2}{y_2}, \frac{x_3}{y_3}, \dots, \frac{x_n}{y_n}\right)$ is $\frac{X}{Y}$. ✓

Select the correct answer using the code given below.

[2014-I]

- (a) Only I
- (b) Only II
- (c) Both I and II ✓
- (d) Neither I nor II

(1)

$$(x_1 y_1 \cdot x_2 y_2 \cdot x_3 y_3 \cdot \dots \cdot x_n y_n)^{\frac{1}{n}}$$

$$\underbrace{(x_1 x_2 \dots x_n)^{\frac{1}{n}}}_{(X)} \underbrace{(y_1 y_2 y_3 \dots y_n)^{\frac{1}{n}}}_{(Y)}$$

$$(1) \left(\frac{x_1 x_2 x_3 \dots x_n}{y_1 y_2 y_3 \dots y_n} \right)^{\frac{1}{n}} = \frac{(x_1 x_2 \dots x_n)^{\frac{1}{n}}}{(y_1 y_2 \dots y_n)^{\frac{1}{n}}} = \frac{X}{Y}$$

QUESTION

The geometric mean of $(x_1, x_2, x_3, \dots, x_n)$ is x and the geometric mean of $(y_1, y_2, y_3, \dots, y_n)$ is y . Which of the following is/are correct?

I. The geometric mean of $(x_1 y_1, x_2 y_2, x_3 y_3, \dots, x_n y_n)$ is XY .

II. The geometric mean of $\left(\frac{x_1}{y_1}, \frac{x_2}{y_2}, \frac{x_3}{y_3}, \dots, \frac{x_n}{y_n}\right)$ is $\frac{X}{Y}$.

Select the correct answer using the code given below.

[2014-I]

- (a) Only I (b) Only II
(c) Both I and II (d) Neither I nor II

ANSWER : (c)

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