Marathon 5

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Chapter 2 – Equations

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Concepts at a Glance

Simple Equations

- An equation with only one variable with a linear power is known as a Simple Equation.
- Try the options to solve the questions.

Simultaneous Linear Equations in Two Variables

- Two equations with two variables with linear power are known as simultaneous linear equations.
- Try the options to solve the questions.

Quadratic Equations

- A quadratic equation is an equation in which the highest power of the variables is 2.
- A quadratic equation is of the form $ax^2 + bx + c = 0$.
- x is a variable while a, b and c are constants.
- A quadratic equation has two solutions/roots.

Methods of Solving Quadratic Equations

There are three methods of solving any quadratic equation:

1. Factorization Method
2. Quadratic Formula

$$\text{Quadratic Formula} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If we call the roots α, and β, then,

$$\alpha = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$\beta = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

Sum of Roots $(\alpha + \beta) = -\frac{b}{a}$

Product of Roots $\alpha\beta = \frac{c}{a}$

3. Fastest Method

Solve the equation $x^2 - 5x + 6 = 0$ using fastest method.

Here, $a = 1$; $b = -5$; $c = 6$

Sum of Roots $= -\frac{b}{a} = -\frac{-5}{1} = 5$

Product of Roots $= \frac{c}{a} = \frac{6}{1} = 6$

Now, take the sum of the roots, divide it by half, and add x to it. You'll get $\left(\frac{5}{2} + x\right)$.

Similarly, take the sum of the roots, divide it by half, and subtract x from it. You'll get $\left(\frac{5}{2} - x\right)$. Multiply these two and equate with the product, i.e. 6.

$$\left(\frac{5}{2} + x\right)\left(\frac{5}{2} - x\right) = 6$$

$$\Rightarrow \left(\frac{5}{2}\right)^2 - x^2 = 6$$

$$\Rightarrow \frac{25}{4} - x^2 = 6$$

$$\Rightarrow x^2 = \frac{25}{4} - 6$$

$$\Rightarrow x^2 = 6.25 - 6$$

$$\Rightarrow x^2 = 0.25$$

$$\Rightarrow x = \sqrt{0.25}$$

$$\Rightarrow x = 0.5$$

Now, put the value of $x = 0.5$ in the factors $\left(\frac{5}{2}+x\right)$, and $\left(\frac{5}{2}-x\right)$. You'll get the roots.

Therefore, $\alpha = \frac{5}{2}+0.5 = 3;\ \beta = \frac{5}{2}-0.5 = 2.$

This method applies to complicated roots as well.

Important Rule

If α and β are the roots of the equation, the equation is given by:

$$x^2 - (\alpha+\beta)x + \alpha\beta = 0$$

In other words,

$$x^2 - (Sum\ of\ Roots)x + Product\ of\ Roots = 0.$$

Nature of Roots

We know that the quadratic formula gives us the value of x as follows:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

In this formula, the term $b^2 - 4ac$ plays a very important role. The nature of the roots is dependent on $b^2 - 4ac$.

1. If $b^2 - 4ac = 0$, the roots are real and equal.
2. If $b^2 - 4ac > 0$, the roots are real and unequal.
    a. If $b^2 - 4ac$ is a perfect square, the roots are real, rational, and unequal.

b. If $b^2 - 4ac$ is not a perfect square, the roots are real, irrational, and unequal.

3. If $b^2 - 4ac < 0$, the roots are imaginary and unequal.

Since $b^2 - 4ac$ discriminates the roots, it is known as the discriminant.

Points to be noted –

1. A real number is a number which can be expressed on a number line. Therefore, every number is a real number, including negative numbers.
2. An imaginary number is a number multiplied by a unit "*i*", which is identified by its property $i^2 = -1$.
3. An integer is a number without any fractional part. It includes positive as well as negative numbers.

4. A rational number is a number which can be expressed as a fraction of two integers. The decimal expansion of a rational number either terminates after a finite number of digits, or begins to repeat the same finite sequence of digits over and over. Examples:

   a. 2 is a rational number as it can be expressed in the form of $\frac{2}{1}$.

   b. $\frac{5}{2}$ is a rational number as its decimal expansion 2.5 terminates after a finite number of digits.

   c. $\frac{2}{9}$ is a rational number as its decimal expansion comes to 0.222…, i.e. it begins to repeat itself over and over.

d. $-\frac{5}{2}, -\frac{2}{9}$ are also rational numbers.

5. An irrational number is a number whose decimal expansion either does not terminate after a finite number of digits or does not repeat itself over and over.
   Examples:
   a. π is an irrational number as its decimal expansion is 3.14159265359…, i.e. it neither terminates after a finite number of digits nor does it repeat itself over and over.
   b. $\sqrt{2}$ is an irrational number as its decimal expansion is 1.41421356237…, i.e. it neither terminates after a finite number of digits nor does it repeat itself over and over.
6. Irrational roots occur in conjugate pairs, i.e. if $\left(m+\sqrt{n}\right)$ is a root, then $\left(m-\sqrt{n}\right)$ is the other root of the same equation.

7. If one root is reciprocal to the other root, then their product is 1 and so $\frac{c}{a}=1$, i.e. $c=a$.
8. If one root is equal to the other root but opposite in sign, then their sum = 0, i.e. $-\frac{b}{a}=0 \Rightarrow b=0$.

Cubic Equations

- An equation with the highest power of the variables as 3 is known as a cubic equation.
- Try the options to solve such an equation.

Questions Based on Simple Equations

Question

The denominator of a fraction exceeds the numerator by 5 and if 3 be added to both the fraction becomes $\frac{3}{4}$. Find the fraction.

(a) $\frac{12}{17}$ (b) $\frac{13}{17}$ (c) $\frac{14}{18}$ (d) $\frac{15}{19}$

Question

If thrice of A’s age 6 years ago, be subtracted from twice his present age, the result would be equal to his present age. Find A’s present age.

(a) 8 (b) 9 (c) 10 (d) 11

Question

A number consists of two digits. The digit in the ten’s place is twice the digit in the unit’s place. If 18 be subtracted from the number, the digits are reversed. Find the number.

(a) 63 (b) 84 (c) 42 (d) 21

Question

For a certain commodity, the demand equation giving demand *'d'* in kg, for a price *'p'* in rupees per kg. is $d = 100(10 - p)$. The supply equation giving the supply *s* in kg. for a price *p* in rupees per kg. is $s = 75(p - 3)$. The market price is such at which demand equals supply. Find the market price and quantity that will be bought and sold.

(a) 10, 400, 400 (b) 9, 500, 500 (c) 8, 340, 440 (d) 7, 300, 300

Question

The sum of two numbers is 52 and their difference is 2. The numbers are:

(a) 17 and 15 (b) 12 and 10 (c) 27 and 25 (d) None

Question

The diagonal of a rectangle is 5 cm and one of at sides is 4 cm. Its area is:

(a) 20 sq. cm. (b) 12 sq. cm. (c) 10 sq. cm. (d) None

Question

Divide 56 into two parts such that three times the first part exceeds one third of the second by 48. The parts are:

(a) (20, 36) (b) (25, 31) (c) (24, 32) (d) None

Question

The sum of the digits of a two-digit number is 10. If 18 be subtracted from it, the digits in the resulting number will be equal. The number is:

(a) 37 (b) 73 (c) 75 (d) None

Question

The fourth part of a number exceeds the sixth part by 4. The number is:

(a) 84 (b) 44 (c) 48 (d) None

Question

Ten years ago, the age of a father was four times of his son. Ten years hence, the age of the father will be twice that of his son. The present ages of the father and the son are:

(a) (50, 20) (b) (60, 20) (c) (55, 25) (d) None

Question

The product of two numbers is 3200 and the quotient when the larger number is divided by the smaller is 2. The numbers are:

(a) (16, 200) (b) (160, 20) (c) (60, 30) (d) (80, 40)

Question

The denominator of a fraction exceeds the numerator by 2. If 5 be added to the numerator, the fraction increases by unity. The fraction is:

(a) $\frac{5}{7}$ (b) $\frac{1}{3}$ (c) $\frac{7}{9}$ (d) $\frac{3}{5}$

Question

Three persons Mr. Roy, Mr. Paul and Mr. Singh together have ₹51. Mr. Paul has ₹4 less than Mr. Roy and Mr. Singh has got ₹5 less than Mr. Roy. They have the money as:

(a) (₹20, ₹16, ₹15) (b) (₹15, ₹20, ₹16) (c) (₹25, ₹11, ₹15) (d) None

Question

A number consists of two digits. The digits in the ten's place is 3 times the digit in the unit's place. If 54 is subtracted from the number, the digits are reversed. The number is:

(a) 39 (b) 92 (c) 93 (d) 94

Question

One student is asked to divide a half of a number by 6 and other half by 4 and then to add the two quantities. Instead of doing so, the student divides the given number by 5. If the answer is 4 short of the correct answer, then the number was:

(a) 320 (b) 400 (c) 480 (d) None

Question

If a number of which the half is greater than $1/5^{th}$ of the number by 15, then the number is:

(a) 50 (b) 40 (c) 80 (d) None

Questions Based on Simultaneous Linear Equations in Two Variables

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Question

The point of intersection between the lines $3x+4y=7$ and $4x-y=3$ lie in the:

(a) 1st Quadrant (b) 2nd Quadrant (c) 3rd Quadrant (d) 4th Quadrant

Question

If the numerator of a fraction is increased by 2 and the denominator by 1, it becomes 1. Again, if the numerator is decreased by 4 and the denominator by 2, it becomes 1/2. Find the fraction.

(a) 2/3 (b) 4/5 (c) 7/8 (d) None

Question

The age of a man is three times the sum of the ages of his two sons and 5 years hence his age will be double the sum of their ages. Find the present age of the man?

(a) 23 (b) 45 (c) 78 (d) None

Question

A number consist of three digits of which the middle one is zero and the sum of the other digits is 9. The number formed by interchanging the first and third digits is more than the original number by 297. Find the number.

(a) 306 (b) 207 (c) 702 (d) None

Question

Monthly incomes of two persons are in the ratio 4 : 5 and their monthly expenses are in the ratio 7 : 9. If each saves ₹50 per month find their monthly incomes.

(a) (500, 400) (b) (400, 500) (c) (300, 600) (d) (350, 550)

Question

Find the fraction which is equal to 1/2 when both its numerator and denominator are increased by 2. It is equal to 3/4 when both are increased by 12.

(a) 3/8 (b) 5/8 (c) 2/8 (d) 2/3

Question

The age of a person is twice the sum of the ages of his two sons and five years ago his age was thrice the sum of their ages. Find his present age.

(a) 60 years (b) 52 years (c) 51 years (d) 50 years

Question

A number between 10 and 100 is five times the sum of its digits. If 9 be added to it the digits are reversed find the number.

(a) 54 (b) 53 (c) 45 (d) 55

Question

The wages of 8 men and 6 boys amount to ₹33. If 4 men earn ₹4.50 more than 5 boys determine the wages of each man and boy.

(a) (₹1.50, ₹3) (b) (₹3, ₹1.50) (c) (₹2.50, ₹2) (d) (₹2, ₹2.50)

Question

A number consisting of two digits is four times the sum of its digits and if 27 be added to it the digits are reversed. The number is:

(a) 63 (b) 35 (c) 36 (d) 60

Question

Of two numbers, 1/5th of the greater is equal to 1/3rd of the smaller and their sum is 16. The numbers are:

(a) (6, 10) (b) (9, 7) (c) (12, 4) (d) (11, 5)

Question

y is older than *x* by 7 years. 15 years back, *x*'s age was 3/4th of *y*'s age. Their present ages are:

(a) (x = 36, y = 43) (b) (x = 50, y = 43) (c) (x = 43, y = 50) (d) (x = 40, y = 47)

Question

The sum of the digits in a three digit number is 12. If the digits are reversed, the number is increased by 495 but reversing only of the tens and units digits increases the number by 36. The number is:

(a) 327 (b) 372 (c) 237 (d) 273

Question

Two numbers are such that twice the greater number exceeds twice the smaller one by 18 and 1/3rd of the smaller and 1/5th of the greater number are together 21. The numbers are:

(a) (36, 45) (b) (45, 36) (c) (50, 41) (d) (55, 46)

Question

The demand and supply equations for a certain commodity are $4q + 7p = 17$ and $p = \frac{q}{3} + \frac{7}{4}$ respectively where p is the market price and q is the quantity. The equilibrium price and quantity are:

(a) $2, \frac{3}{4}$ (b) $3, \frac{1}{2}$ (c) $5, \frac{3}{5}$ (d) None

Question

The cab bill is partly fixed and partly varies on the distance covered. For 456 km, the bill is ₹8252, for 484 km the bill is ₹8728. What will the bill be for 500 km?

(a) ₹8876 (b) ₹9156 (c) ₹9472 (d) ₹9000

Question

The value of k for the system of equations $kx + 2y = 5$ and $3x + y = 1$ has no solution is:

(a) 5 (b) 2/3 (c) 6 (d) 3/2

Questions Based on Quadratic Equations

Question

If α, β be the roots of the equation $2x^2 - 4x - 3 = 0$, then the value of $\alpha^2 + \beta^2$ is:

(a) 5 (b) 7 (c) 3 (d) –4

Question

Examine the nature of roots of the following equation: $3x^2 - 8x + 4 = 0$.

(a) Real and Equal
(b) Real and Unequal
(c) Imaginary and Unequal
(d) Real, Rational, Unequal

Question

Examine the nature of roots of the following equation: $5x^2 - 4x + 2 = 0$.

(a) Real and Equal
(b) Real and Unequal
(c) Imaginary and Unequal
(d) Real, Rational, Unequal

Question

If the roots of the equation $2x^2 + 8x - m^3 = 0$ are equal, then the value of m is:

(a) –3 (b) –1 (c) 1 (d) –2

Question

The equation $x^2-(p+4)x+2p+5=0$ has equal roots. The value of p will be:

(a) ± 1 (b) 2 (c) ± 2 (d) –2

Question

The roots of the equation $x^2+(2p-1)x+p^2=0$ are real if:

(a) $p \geq 1$ (b) $p \leq 4$ (c) $p \geq 1/4$ (d) $p \leq 1/4$

Question

If $L+M+N=0$, and L, M, and N are rationals, the roots of the equation $(M+N-L)x^2+(N+L-M)x+(L+M-N)=0$ are:

(a) Real and Irrational
(b) Real and Rational
(c) Imaginary and Equal
(d) Real and Equal

Solution

(b)

We have

$$\left(M+N-L\right)x^2+\left(N+L-M\right)x+\left(L+M-N\right)=0$$

We know that

$$L+M+N=0$$

Therefore,

$$M+N=-L;\ N+L=-M;\ L+M=-N;\ M=-N-L$$

Therefore, we have

$$(-L-L)x^2+(-M-M)x+(-N-N)=0$$

$$\Rightarrow -2Lx^2-2Mx-2N=0$$

$$\Rightarrow -2\left(Lx^2+Mx+N\right)=0$$

$$\Rightarrow Lx^2+Mx+N=0$$

Here, $a=L;\ b=M;\ c=N$

$$b^2-4ac=M^2-(4)(L)(N)$$

$$=(-N-L)^2-4LN$$

$$=\{-(N+L)\}^2-4LN$$

$$= (N + L)^2 - 4LN$$

$$= N^2 + L^2 + 2LN - 4LN$$

$$= N^2 + L^2 - 2LN$$

$$= (N - L)^2$$

Therefore, *D* is a perfect square. Hence, the roots are rational. Also, the roots are real. This is because even if N – L comes to be a negative figure, squaring it would make it positive, and thereafter, its square root will be determined in the quadratic formula. Therefore, the roots are Real and Rational.

Question

If one root of the equation is $2-\sqrt{3}$, form the equation given that the roots are irrational.

(a) $x^2-4x+2=0$

(b) $x^2-3x+9=0$

(c) $x^2-5x+2=0$

(d) $x^2-4x+1=0$

Question

If the roots of the equation $p(q-r)x^2+q(r-p)x+r(p-q)=0$ are equal, find the value of $\frac{1}{p}+\frac{1}{r}$.

(a) $\frac{2}{q}$ (b) $\frac{1}{q}$ (c) $\frac{1}{2}$ (d) None

Solution

(a)

Here, $a = p(q-r);\ b = q(r-p);\ c = r(p-q)$

Since the roots of this equation are equal, $b^2 - 4ac = 0$.

$$\{q(r-p)\}^2 - (4)\{p(q-r)\}\{r(p-q)\} = 0$$

$$q^2(r-p)^2 - \left[4pr(q-r)(p-q)\right] = 0$$

$$q^2\left(r^2 + p^2 - 2rp\right) - \left[4pr\left(qp - q^2 - pr + qr\right)\right] = 0$$

$$q^2r^2 + q^2p^2 - 2rpq^2 - \left[4p^2qr - 4pq^2r - 4p^2r^2 + 4pqr^2\right] = 0$$

$$q^2r^2+q^2p^2-2rpq^2-4p^2qr+4pq^2r+4p^2r^2-4pqr^2=0$$

$$q^2r^2+q^2p^2+4pq^2r-2rpq^2-4p^2qr+4p^2r^2-4pqr^2=0$$

$$q^2r^2+q^2p^2+2pq^2r-4p^2qr+4p^2r^2-4pqr^2=0$$

We know that $(a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ca$

If we look closely at the LHS of the following equation, $q^2r^2+q^2p^2+2pq^2r-4p^2qr+4p^2r^2-4pqr^2=0$, we'll find that it is the expansion of $(qr+qp-2pr)^2$.

Therefore,

$$(qr+qp-2pr)^2=0$$

$$\Rightarrow qr + qp - 2pr = 0$$

$$\Rightarrow qr + qp = 2pr$$

Dividing the entire equation by pqr, we get:

$$\frac{qr}{pqr} + \frac{qp}{pqr} = \frac{2pr}{pqr}$$

$$\Rightarrow \frac{1}{p} + \frac{1}{r} = \frac{2}{q}$$

Question

If α and β be the roots of $x^2 + 7x + 12 = 0$, find the equation whose roots are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$.

(a) $x^2+50x+49=0$

(b) $x^2-24x+144=0$

(c) $x^2-50x+49=0$

(d) $x^2-19x+49=0$

Question

If α, β are the two roots of the equation $x^2 + px + q = 0$, form the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

(a) $qx^2 - \left(p^2 - 2q\right)x + q = 0$

(b) $px^2 - \left(p^2 - 2q\right)x + q = 0$

(c) $qx^2 - \left(p^2 - 2q\right)x + p = 0$

(d) $qx^2 + \left(p^2 - 2q\right)x + p = 0$

Solution

(a)

$x^2 + px + q = 0$

$\Rightarrow \alpha + \beta = -\frac{b}{a} = -\frac{p}{1} = -p$, and

$\alpha\beta = \frac{c}{a} = \frac{q}{1} = q$

We need an equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$

Quadratic equation is given by: $x^2 - (Sum\,of\ Roots)x + Product\,of\ Roots = 0$

Therefore,

$$x^2-\left(\frac{\alpha}{\beta}+\frac{\beta}{\alpha}\right)x+\left(\frac{\alpha}{\beta}\times\frac{\beta}{\alpha}\right)=0$$

$$\Rightarrow x^2-\left(\frac{\alpha^2+\beta^2}{\alpha\beta}\right)x+1=0$$

$$\Rightarrow x^2-\left(\frac{\alpha^2+\beta^2+2\alpha\beta-2\alpha\beta}{\alpha\beta}\right)x+1=0$$

$$\Rightarrow x^2-\left\{\frac{\left(\alpha^2+\beta^2+2\alpha\beta\right)-2\alpha\beta}{\alpha\beta}\right\}x+1=0$$

$$\Rightarrow x^2 - \left\{\frac{(\alpha+\beta)^2 - 2\alpha\beta}{\alpha\beta}\right\}x + 1 = 0$$

$$\Rightarrow x^2 - \left\{\frac{(-p)^2 - (2q)}{q}\right\}x + 1 = 0$$

$$\Rightarrow x^2 - \left\{\frac{p^2 - 2q}{q}\right\}x + 1 = 0$$

Multiplying the entire equation with q, we get:

$$qx^2 - q\left\{\frac{p^2 - 2q}{q}\right\}x + q = 0$$

$$\Rightarrow qx^2 - \left(p^2 - 2q\right)x + q = 0$$

Question

If one root of $5x^2 + 13x + p = 0$ be reciprocal of the other, then the value of p is:

(a) –5 (b) 5 (c) 1/5 (d) –1/5

Question

If α and β are the roots of $x^2 = x + 1$, then the value of $\frac{\alpha^2}{\beta} - \frac{\beta^2}{\alpha}$ is:

(a) $2\sqrt{5}$
(b) $\sqrt{5}$
(c) $3\sqrt{5}$
(d) $-2\sqrt{5}$

Question

If α, β be the roots of $2x^2 - 4x - 1 = 0$, find the value of $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$.

(a) –22 (b) 23 (c) –23 (d) None

Question

The value of $4+\cfrac{1}{4+\cfrac{1}{4+\cfrac{1}{4+...\infty}}}$ is:

(a) $1\pm\sqrt{2}$ (b) $2+\sqrt{5}$ (c) $2\pm\sqrt{5}$ (d) None

Question

The value of $\sqrt{6+\sqrt{6+\sqrt{6+...\infty}}}$ is:

(a) –3 (b) 2 (c) 3 (d) 4

Question

If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the squares of their reciprocals, then $\frac{b^2}{ac} + \frac{bc}{a^2}$ is:

(a) 2 (b) –2 (c) 1 (d) –1

Solution

(a)

$$ax^2 + bx + c = 0$$

$$\alpha + \beta = -\frac{b}{a}$$

$$\alpha\beta = \frac{c}{a}$$

Given: $\alpha + \beta = \frac{1}{\alpha^2} + \frac{1}{\beta^2}$

$$-\frac{b}{a} = \frac{\beta^2 + \alpha^2}{\alpha^2\beta^2}$$

$$-\frac{b}{a}=\frac{(\alpha+\beta)^2-2\alpha\beta}{(\alpha\beta)^2}$$

$$-\frac{b}{a}=\frac{\left(-\frac{b}{a}\right)^2-\left(2\times\frac{c}{a}\right)}{\left(\frac{c}{a}\right)^2}$$

$$-\frac{b}{a}=\left(\frac{b^2}{a^2}-\frac{2c}{a}\right)\div\frac{c^2}{a^2}$$

$$-\frac{b}{a}=\left(\frac{b^2-2ac}{a^2}\right)\times\frac{a^2}{c^2}$$

$$-\frac{b}{a}=\frac{b^2-2ac}{c^2}$$

$$-bc^2=ab^2-2a^2c$$

$$ab^2+bc^2=2a^2c$$

Dividing both sides by a^2c

$$\frac{ab^2}{a^2c}+\frac{bc^2}{a^2c}=\frac{2a^2c}{a^2c}$$

$$\frac{b^2}{ac}+\frac{bc}{a^2}=2$$

Question

If p and q are the roots of the $x^2 + 2x + 1 = 0$, then the values of $p^3 + q^3$ becomes:

(a) 2 (b) –2 (c) 4 (d) –4

Questions Based on Cubic Equations

Question

$x,\ x-4,\ x+5$ are the factors of the left-hand side of the equation:

(a) $x^3+2x^2-x-2=0$

(b) $x^3+x^2-20x=0$

(c) $x^3-3x^2-4x+12=0$

(d) $x^3-6x^2+11x-6=0$

Question

The equation $3x^3 + 5x^2 = 3x + 5$ has got 3 roots and hence the factors of the left-hand side of the equation $3x^3 + 5x^2 - 3x - 5 = 0$ are:

(a) $x - 1,\ x - 2,\ x - 5/3$

(b) $x - 1,\ x + 1,\ 3x + 5$

(c) $x + 1,\ x - 1,\ 3x - 5$

(d) $x - 1,\ x + 1,\ x - 2$

Statistical Description of Data

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Question

Which of the following statements is false?

(a) Statistics is derived from the Latin word ‘Status’
(b) Statistics is derived from the Italian word ‘Statista’
(c) Statistics is derived from the French word ‘Statistik’
(d) None of these

Question

Statistics is concerned with:

(a) Qualitative information
(b) Qualitative information
(c) (a) or (b)
(d) Both (a) and (b)

Question

Statistics is defined in terms of numerical data in the:

(a) Singular Sense
(b) Plural Sense
(c) Either (a) or (b)
(d) Both (a) and (b)

Question

Statistics is applied in:

(a) Economics
(b) Business Management
(c) Commerce and Industry
(d) All these

Question

An attribute is:

(a) A Qualitative Characteristic
(b) A Quantitative Characteristic
(c) A Measurable Characteristic
(d) All these

Question

Nationality of a student is:

(a) An attribute
(b) A continuous variable
(c) A discrete variable
(d) (a) or (c)

Question

Drinking habit of a person is:

(a) An attribute
(b) A variable
(c) A discrete variable
(d) A continuous variable

Question

Marks of a student is an example of

(a) An attribute
(b) A discrete variable
(c) A continuous variable
(d) None of these

Question

Annual income of a person is

(a) An attribute
(b) A discrete variable
(c) A continuous variable
(d) (a) or (c)

Question

Age of a person is

(a) An attribute
(b) A discrete variable
(c) A continuous variable
(d) A variable

Question

The data collected on the height of a group of students after recording their heights with a measuring tape are

(a) Primary Data
(b) Secondary Data
(c) Discrete Data
(d) Continuous Data

Question

The primary data are collected by

(a) Interview Method
(b) Observation Method
(c) Questionnaire Method
(d) All these

Question

The quickest method to collect primary data is

(a) Personal Interview
(b) Indirect Interview
(c) Telephone Interview
(d) By observation

Question

The best method to collect data, in case of a natural calamity, is

(a) Personal Interview
(b) Indirect Interview
(c) Questionnaire Method
(d) Direct Observation Method

Question

In case of a rail accident, the appropriate method of data collection is by:

(a) Personal Interview
(b) Direct Interview
(c) Indirect Interview
(d) All these

Question

Which method of data collection covers the widest area?

(a) Telephone Interview Method
(b) Mailed Questionnaire Method
(c) Direct Interview Method
(d) All these

Question

The amount of non-responses is maximum in

(a) Mailed Questionnaire Method
(b) Interview Method
(c) Observation Method
(d) All these

Question

Data collected on religion from the census reports are

(a) Primary Data
(b) Secondary Data
(c) Sample Data
(d) (a) or (b)

Question

Some important sources of secondary data are

(a) Some important sources of secondary data are
(b) International and primary sources
(c) Private and primary sources
(d) Government sources.

Question

Internal consistency of the collected data can be checked when

(a) Internal data are given
(b) External data are given
(c) Two or more series are given
(d) A number of related series are given

Question

The accuracy and consistency of data can be verified by:

(a) Internal checking
(b) External checking
(c) Scrutiny
(d) Both (a) and (b)

Question

The mode of presentation of data are

(a) Textual, tabulation and diagrammatic
(b) Tabular, internal and external
(c) Textual, tabular and internal
(d) Tabular, textual and external

Question

For tabulation, ‘caption’ is:

(a) The upper part of the table
(b) The lower part of the table
(c) The main part of the table
(d) The upper part of a table that describes the column and sub-column

Question

‘Stub’ of a table is the:

(a) Left part of the table describing the columns
(b) Right part of the table describing the columns
(c) Right part of the table describing the rows
(d) Left part of the table describing the rows

Question

The entire upper part of a table is known as

(a) Caption
(b) Stub
(c) Box Head
(d) Body

Question

The unit of measurement in tabulation is shown in

(a) Box Head
(b) Body
(c) Caption
(d) Stub

Question

In tabulation source of the data, if any, is shown in the

(a) Footnote
(b) Body
(c) Stub
(d) Caption

Question

Which of the following statements is untrue for tabulation?

(a) Statistical analysis of data requires tabulation
(b) It facilitates comparison between rows and not columns
(c) Complicated data can be presented
(d) Diagrammatic representation of data requires tabulation

Question

The most accurate mode of data presentation is

(a) Diagrammatic Method
(b) Tabulation
(c) Textual Presentation
(d) None of these

Question

The chart that uses logarithm of the variable is known as:

(a) Line Chart
(b) Ratio Chart
(c) Multiple Line Chart
(d) Component Line Chart

Question

Multiple line chart is applied for:

(a) Showing multiple charts
(b) Two or more related time series when the variables are expressed in the same unit
(c) Two or more related time series when the variables are expressed in different unit
(d) Multiple variations in the time series

Question

Multiple axis line chart is considered when:

(a) There is more than one time series
(b) The units of the variables are different
(c) (a) or (b)
(d) (a) and (b)

Question

Horizontal bar diagram is used for

(a) Qualitative Data
(b) Data varying over time
(c) Data varying over space
(d) (a) or (c)

Question

Vertical bar diagram is applicable when

(a) The data are qualitative
(b) The data are quantitative
(c) When the data vary over time
(d) (b) or (c)

Question

In order to compare two or more related series, we consider:

(a) Multiple Bar Chart
(b) Grouped Bar Chart
(c) (a) or (b)
(d) (a) and (b)

Question

Divided bar chart is considered for:

(a) Comparing different components of a variable
(b) The relation of different components to the table
(c) (a) or (b)
(d) (a) and (b)

Question

Pie-diagram is used for:

(a) Comparing different components and their relation to the total
(b) Representing qualitative data in a circle
(c) Representing quantitative data in circle
(d) (b) or (c)

Question

Cost of sugar in a month under the heads raw materials, labour, direct production and others were 12, 20, 35 and 23 units respectively. What is the difference between the central angles for the largest and smallest components of the cost of sugar?

(a) 72° (b) 48° (c) 56° (d) 92°

Question

Hidden trend, if any, in the data can be noticed in:

(a) Textual presentation
(b) Tabulation
(c) Diagrammatic Representation
(d) All these

Question

Diagrammatic representation of data is done by

(a) Diagrams
(b) Charts
(c) Pictures
(d) All these

Question

The best method of presentation of data is

(a) Textual
(b) Tabular
(c) Diagrammatic
(d) (b) and (c)

Question

The most attractive method of data presentation is

(a) Tabular
(b) Textual
(c) Diagrammatic
(d) (a) or (b)

Question

The distribution of shares is an example of the frequency distribution of:

(a) A discrete variable
(b) A continuous variable
(c) An attribute
(d) (a) or (c)

Question

The number of accidents for seven days in a locality are given below:

No. of Accidents	0	1	2	3	4	5	6
Frequency	15	19	22	31	9	3	2

What is the number of cases when 3 or less accidents occurred?

(a) 56 (b) 6 (c) 68 (d) 87

Question

The distribution of profits of a blue-chip company relates to:

(a) A discrete variable
(b) A continuous variable
(c) An attribute
(d) (a) or (b)

Question

Mutually exclusive classification

(a) Excludes both the class limits
(b) Excludes the upper class limit but includes the lower class limit
(c) Includes the upper class limit but excludes the upper class limit
(d) Either (b) or (c)

Question

Mutually inclusive classification is usually meant for

(a) A discrete variable
(b) A continuous variable
(c) An attribute
(d) All these

Question

Mutually exclusive classification is usually meant for

(a) A discrete variable
(b) A continuous variable
(c) An attribute
(d) Any of these

Question

The LCB is

(a) An upper limit to LCL
(b) A lower limit to LCL
(c) (a) and (b)
(d) (a) or (b)

Question

The UCB is

(a) An upper limit to UCL
(b) A lower limit to LCL
(c) Both (a) and (b)
(d) (a) or (b)

Question

Length of a class is:

(a) The difference between the UCB and LCB of that class
(b) The difference between the UCL and LCL of that class
(c) (a) or (b)
(d) Both (a) and (b)

Question

For a particular class boundary, the less than cumulative frequency and more than cumulative frequency add up to:

(a) Total frequency
(b) Fifty per cent of the total frequency
(c) (a) or (b)
(d) None of these

Question

The following data relate to the incomes of 86 persons:

Income in ₹	500 – 999	1000 – 1499	1500 – 1999	2000 – 2499
No. of Persons:	15	28	36	7

What is the percentage of persons earning more than ₹1,500?

(a) 50 (b) 45 (c) 40 (d) 60

Question

The following data relate to the marks of a group of students:

Marks	Below 10	Below 20	Below 30	Below 40	Below 50
No. of Students	15	38	65	84	100

How many students got marks more than 30?

(a) 65 (b) 50 (c) 35 (d) 43

Question

Find the number of observations between 250 and 300 from the following data:

Value	More than 200	More than 250	More than 300	More than 350
No. of Observations	56	38	15	0

(a) 56 (b) 23 (c) 15 (d) 8

Question

A frequency distribution

(a) Arranges observations in an increasing order
(b) Arranges observation in terms of a number of groups
(c) Relates to a measurable characteristic
(d) All these

Question

The frequency distribution of a continuous variable is known as:

(a) Grouped Frequency Distribution
(b) Simple Frequency Distribution
(c) (a) or (b)
(d) (a) and (b)

Question

From the following data find the number class intervals if class length is given as 5.

73, 72, 65, 41, 54, 80, 50, 46, 49, 53

(a) 6 (b) 5 (c) 7 (d) 8

Question

Frequency density corresponding to a class interval is the ratio of:

(a) Class frequency to the total frequency
(b) Class frequency to the class length
(c) Class length to the class frequency
(d) Class frequency to the cumulative frequency

Question

Relative frequency for a particular class

(a) Lies between 0 and 1
(b) Lies between 0 and 1, both inclusive
(c) Lies between –1 and 0
(d) Lies between –1 to 1

Question

Mode of a distribution can be obtained from:

(a) Histogram
(b) Less than type Ogives
(c) More than type Ogives
(d) Frequency Polygon

Question

A comparison among the class frequencies is possible only in:

(a) Frequency Polygon
(b) Histogram
(c) Ogives
(d) (a) or (b)

Question

Frequency curve is a limiting form of

(a) Frequency Polygon
(b) Histogram
(c) (a) or (b)
(d) (a) and (b)

Question

Most of the commonly used frequency curves are

(a) Mixed
(b) Inverted J-shaped
(c) U-shaped
(d) Bell-shaped

Question

The distribution of profits of a company follows

(a) J-shaped frequency curve
(b) U-shaped frequency curve
(c) Bell-shaped frequency curve
(d) Any of these

Question

Median of a distribution can be obtained from

(a) Frequency Polygon
(b) Histogram
(c) Less than type Ogives
(d) None of these

Question

Out of 1000 persons, 25 per cent were industrial workers and the rest were agricultural workers. 300 persons enjoyed world cup matches on TV. 30 per cent of the people who had not watched world cup matches were industrial workers. What is the number of agricultural workers who had enjoyed world cup matches on TV?

(a) 260 (b) 240 (c) 230 (d) 250

Question

A sample study of the people of an area revealed that total number of women were 40% and the percentage of coffee drinkers were 45 as a whole and the percentage of male coffee drinkers was 20. What was the percentage of female non-coffee drinkers?

(a) 10 (b) 15 (c) 18 (d) 20