Odisha LTR Practice Mock Test - Maths

Q1. The statement between two rational numbers there lies another rational number is called:
(a) Archimedean property
(b) Denseness property
(c) Mid-Value property
(d) Inequality

Q2.H.C.F of 143 and 481 is 143m + 481n, then m, n are equal to:
(a) –7,3
(b) –8,3
(c) –9,3
(d) –10,3

Q3. Which of the following is false?
(a) Every rational number is a real number
(b) Every integer is a real number
(c) Every irrational number is a real number
(d) $\sqrt{2}$ is a rational number

Q4. If $a = \frac{1}{3-2\sqrt{2}}, b = \frac{1}{3+2\sqrt{2}}$ then the value of $a^2 + b^2$ is:
(a) 35
(b) 34
(c) 37
(d) 36

Q5. By what number $\frac{2^{-6}}{3}$ be divided that the quotient is equals to $\frac{3^{-6}}{2}$
(a) $\left(\frac{3}{2}\right)^{12}$
(b) $\left(\frac{3}{2}\right)^{6}$
(c) $\left(\frac{2}{3}\right)^{6}$
(d) $\left(\frac{2}{3}\right)^{12}$

Q6. The number of ways in which 39312 can be resolved into two factors which are prime to each other are:
(a) 4
(b) 6
(c) 8
(d) 10

Q7. For every positive integer n, $n^7 + \frac{n^5}{5} + \frac{2n^3}{3} - \frac{n}{105}$ is:
(a) An integer
(b) A rational number
(c) A negative real number
(d) An odd integer

Q8. The number of factors and their sum of 360 are:
(a) 12, 540
(b) 24, 1170
(c) 24,1080
(d) 12,810

Q9. The equations $2x^3 + 5x^2 - 6x - 9 = 0$ and $3x^3 + 7x^2 - 11x - 15 = 0$ have two common roots find them:
(a) $(1, -3)$
(b) $\left(-1, \frac{-3}{2}\right)$
(c) $(-1, -3)$
(d) $\left(1, \frac{3}{2}\right)$

Q10. Find the sum of the cubes of the roots of the equation $x^3 - 6x^2 + 11x - 6 = 0$
(a) 36
(b) 35
(c) 32
(d) 31

Q11. Solve the equation $x^3 - 13x^2 + 15x + 189 = 0$, being given that one of the roots exceeds another by 2
(a) $(-3, 7, 9)$
(b) $(-3, -7, -9)$
(c) $(3, 7, 9)$
(d) $(3, -7, -9)$

Q12. If $\alpha + \beta + \gamma = 5$, $\alpha\beta + \beta\gamma + \gamma\alpha = 7$ and $\alpha\beta\gamma = 3$, then the equation where roots are α, β and γ is:
(a) $x^3 - 7 = 0$
(b) $x^2 + 7x^2 + 3 = 0$
(c) $x^3 - 5x^2 + 7x - 3 = 0$
(d) $x^3 + 7x^2 - 3 = 0$

Q13. If $4x+\frac{1}{x}=5$, $x \neq 0$, then the value of $\frac{5x}{4x^2+10x+1}$ is

(a) 1/2
(b) 1/3
(c) 2/3
(d) 3

Q14.
For what value of k do the equations $3(k-1)x+4y=24$ and $15x+20y=8(k+13)$ have infinite solutions?

(a) 1
(b) 4
(c) 3
(d) 2

Q15.
If the system of equations $2x-3y=3$ and $-4x+qy=\frac{p}{2}$ is inconsistent which of the following cannot be the value of p?

(a) –24
(b) –12
(c) –18
(d) –36

Q16. If an ordered pair satisfying the equations 2x-3y=18 and 4x-y=16 also satisfying the equation 5x-py-23=0,then find the value of p:
(a) 1
(b) 2
(c) –1
(d) –2

Q17.
If one roots of the equation $x^2+px+12=0$ is 4, while the equation $x^2+px+q=0$ has equal roots, then the value of q is:

(a) 3
(b) 12
(c) 49/4
(d) 4

Q18. Which term of the arithmetic progression 21, 42, 63, 84__________ is 420?
(a) 19
(b) 20
(c) 21
(d) 22

Q19. The sum of the first 20 terms of an arithmetic progression whose first term is 5 and common difference is 4 is ________:
(a) 820
(b) 830
(c) 850
(d) 860

Q20. The general term of A.P. whose sum of n terms is given by $4n^2 + 3n$, is:
(a) 6n+2
(b) 6n-2
(c) 8n+1
(d) 8n-1

Q21. If $a^2 + b^2 + c^2 = 1$ then $ab + bc + ca$ lies in the interval:
(a) $\left[\frac{1}{2}, 1\right]$
(b) $\left[0, \frac{1}{2}\right]$
(c) $\left[-\frac{1}{2}, 1\right]$
(d) $\left[-1, \frac{1}{2}\right]$

Q22.
$(a + b + c)\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$ is:
(a) Greater than or equal to 3
(b) Greater than or equal to 9
(c) Less than or equal to 9
(d) Less than or equal to 3

Q23. In every $(n + 1)$---- elementic subset of the set (1, 2, 3----$2n$) which of the following is correct:
(a) There exist at least two natural numbers which are prime to each other
(b) There exist no consecutive natural number
(c) There exist at least three natural umber which are prime toeach other
(d) There exist more than two natural numbers which are prime to each other

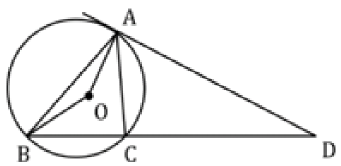
Q24. If $f(x) = \frac{1}{1+2^{1/x}}$ than at $x = 0$ the function is:
(a) Continuous
(b) Discontinuous because $R \lim_{x\to 0} f(x)$ does not exist
(c) Discontinuous because $L \lim_{x\to 0} f(x) \neq R \lim_{x\to 0} f(x)$
(d) Discontinuous because $\lim_{x\to 0} f(0) \neq f(0)$

Q25. The area of three adjacent surfaces of cuboid are 59cm^2, 59cm^2 and 4 cm^2. Then find the volume of this cuboid?
(a) 114 cm^3
(b) 108 cm^3
(c) 118 cm^3
(d)128 cm^3

Q26. In ΔABC, AB=5cm BC=6cm and CA=7cma transversal is drawn to cut the sides AB at F, BC produced at D and CA at E so that AF=2cm, AE=4cm applying Menlaus theorem the length of BD is:
(a) 8cm
(b) 10cm
(c) 12cm
(d) 14cm

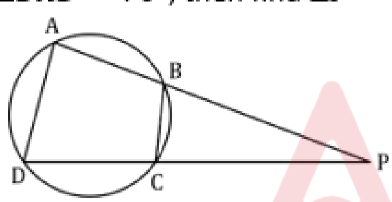
Q27. There are two circles of centers A and B, of radii 3cm and 5cm respectively. The distance between their centers AB=10cm. A direct common tangent is drawn that meets the line BA produced at C, then the length of CA is equals to:
(a) 20cm
(b) 17cm
(c) 15cm
(d) 14cm

Q28.
In the given figure O is the centre of the circle and AD is the tangent to the circle at A. if ∠CAD=55° and ∠ADC=25° then find ∠ABO



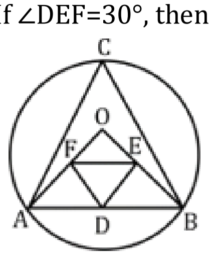
(a) 10°
(b) 15°
(c) 20°
(d) 25°

Q29.
In the following figure (not to scale), $AB = CD$ and $\overline{AB}$ and $\overline{CD}$ are produced to meet at point P. if $\angle BAD = 70°$, then find $\angle P$



(a) 30°
(b) 40°
(c) 45°
(d) 50°

Q30. In the following figure, O is the centre of the circle and D, E and F are the mid points of AB, OA respectively.
If ∠DEF=30°, then find ∠ACB.



(a) 30°
(b) 60°
(c) 90°
(d) 120°

Q31. The vertices of a triangle ABC are (2, 3), (4, 7), (−5,2). The length of the altitude through A is:
(a) $\frac{13}{53}\sqrt{53}$
(b) $\frac{13}{53}\sqrt{106}$
(c) $\frac{9}{52}\sqrt{53}$
(d) $\frac{9}{53}\sqrt{106}$

Q32. The locus of the point that is equidistant from two points (2, 3) and (−4,5) is:
(a) x+3y=1
(b) 2x+3y=2
(c) 3x+y=1
(d) 3x-y=1

Q33. If (3, 2), (6, 3), (x, y) and (6, 5) are the vertices of a parallelogram, the (x, y) is:
(a) (8, 7)
(b) (5, 6)
(c) (9, 6)
(d) (9, 8)

Q34. The coordinates of the point which is equidistant from the vertices (8, −10), (7, −3) and (0, −4) of a right angled triangle is:
(a) $(4, -7)$
(b) $(7, -6)$
(c) $\left(\frac{7}{3}, -\frac{7}{3}\right)$
(d) $\left(\frac{15}{2}, -\frac{15}{2}\right)$

Q35. The ratio in which the line joining the points (1, -1) and (4, 5) is divided by the point (2, 1) is:
(a) 2:1
(b) 1:3
(c) 3:1
(d) 1:2

Q36. The coordinated of A,B and C are (6, 3), (-3, 5) and (4, -2) respectively. The area of ΔABC is:
(a) 51/2 square units
(b) 45/2 square units
(c) 47/2 square units
(d) 49/2 square units

Q37. A chord of a circle of radius 28cm subtends an angle 90° at the centre of the circle. The area of the minor segment is:
(a) 290 cm^2
(b) 184 cm^2
(c) 248 cm^2
(d) 224 cm^2

Q38. A rectangular block 6cm × 12 cm × 15cm is cut into exact number of equal cubes. The least possible number of cubes will be:
(a) 6
(b) 11
(c) 33
(d) 40

Q39. A cylinder has a diameter of 14 cm and its area of curved surface is 220 cm^2
The volume of the cylinder is:
(a) 770 cm^3
(b) 1000 cm^3
(c) 1540 cm^3
(d) 3080 cm^3

Q40. Find the limit of $\sin(y)/x$,where (x, y) approaches to (0,0)?
(a) 0
(b)1
(c)infinite
(d)doesn't exist

Q41. The value of expression cos 60° cos 36 ° cos 42° cos 78° is:
(a) $\frac{1}{8}$
(b) $\frac{1}{4}$
(c) $\frac{1}{16}$
(d) $\frac{\sqrt{3}}{8}$

Q42. What is $\frac{\cot 54°}{\tan 36°} + \frac{\tan 20°}{\cot 70°}$ *equal to?*
(a) 0
(b) 1
(c) 2
(d) 3

Q43.
Let $X \sim N(\mu, \sigma^2)$. If $\mu^2 = \sigma^2$, $(\mu > 0)$, then the value of $P(X < -\mu | X < \mu)$ in terms of cumulative function $N(0,1)$ is:
(a) $2[1 - P(Z \leq 1)]$
(b) $2[1 - P(Z \leq 2)]$
(c) $[1 - P(Z \leq 1)]$
(d) $[1 - P(Z \leq 2)]$

Q44.

The mean and variance of binomial distribution $B(x: n, p)$ are 4 and $\frac{4}{3}$ respectively. What is the probability of getting 2 successes?

(a) 20/342

(b) 20/423

(c) 20/243

(d) 1/243

Q45. If $P(A \cap B) = \frac{1}{2}, P(\overline{A} \cap \overline{B}) = \frac{1}{2}$ and $2P(A) = P(B) = p$, then the value of p is given by:

(a) 1/4

(b) 1/2

(c) 1/3

(d) 2/3

Q46. In a Mathematics test 15 students scored 80 marks, 20 students scored 75 marks, 28 students scored 65 marks and 25 students scored 60 marks, mode of the score is:

(a) 80

(b) 75

(c) 65

(d) 60

Q47. Consider the following distribution:

Marks obtained	No. of students
More than or equal to zero	63
More than or equal to 10	58
More than or equal to 20	55
More than or equal to 30	51
More than or equal to 40	48
More than or equal to 50	42

The frequency of the class 30–40 is:

(a) 3

(b) 4

(c) 48

(d) 51

Q48. For the following distribution:

ss		0	15	20	25
quency					

The sum of lower limits of the median class and modal class is:

(a) 15

(b) 25

(c) 30

(d) 35

Q49. The measure of the central tendency is given by the X-coordinate of the point of intersection of the more than ogive and less than ogive is:
(a) Mean
(b) Median
(c) Mode
(d) All the above

Q50.

If the mean of a n observations $1^2, 2^2, 3^2$ ______________ n^2 is $\frac{46n}{11}$, then n is equal to:

(a) 11
(b) 12
(c) 23
(d) 22

Solutions

S1. Ans.(b)
Sol. Denseness property.

S2. Ans(d)
Sol. H.C. F of 143 and 481 is 13.
But given H.C. F of 143 and 481 = 143m+481n
13 = 143m + 481n
For option(d) we put m = -10 and n = 3
13 = 143 x -10 + 481 x 3
13 = -1430 + 1443
13 = 13

S3. Ans.(d)
Sol.
$\sqrt{2}$ is a rational number.

S4. Ans.(b)
Sol.
If $a = \frac{1}{3-2\sqrt{2}} \times \frac{3+2\sqrt{2}}{3+2\sqrt{2}} = \frac{3+2\sqrt{2}}{(3)^2-(2\sqrt{2})^2} = \frac{3+2\sqrt{2}}{9-8} = 3 + 2\sqrt{2}$

and $b = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}} = \frac{3-2\sqrt{2}}{(3)^2-(2\sqrt{2})^2} = \frac{3-2\sqrt{2}}{9-8} = 3 - 2\sqrt{2}$

Now, $a^2 = (3 + 2\sqrt{2})^2 = 9 + 8 + 6\sqrt{2} = 17+6\sqrt{2}$

$b^2 = (3 - 2\sqrt{2})^2 = 9 + 8 - 6\sqrt{2} = 17-6\sqrt{2}$

$a^2 + b^2 = 34.$

S5. Ans.(a)
Sol.
According to question

$$\left(\frac{2}{3}\right)^{-6} = x \times \left(\frac{3}{2}\right)^{-6}$$

$$x= \left(\frac{2}{3}\right)^{-6} \times \left(\frac{2}{3}\right)^{-6} = \left(\frac{3}{2}\right)^{12}$$

S6. Ans.(c)

Sol. The prime factorization of 39312 is $2^4 \times 3^3 \times 7 \times 13$

When two numbers are prime to each other, their greatest common divisor (GCD) is 1.

Applying this formula to the prime factorization of 39312,

we get,

There are four distinct primes in factorization of the given number.

The required number of ways of co prime numbers N = 2^{n-1}

= 2^3 = 8

S7. Ans.(b)

Sol.

$n^7 + \frac{n^5}{5} + \frac{2n^3}{3} - \frac{n}{105}$

Where n is positive integer

Put n = 1

$= 1^7 + \frac{1^5}{5} + \frac{2(1)^3}{3} - \frac{1}{105}$

= 13/7 this is rational number

Similarly n= 2..

S8. Ans.(b)

Sol. To find the number of factors and their sum for 360

The prime factorization of 360 = $2^3 \times 3^2 \times 5^1$

$n = p_1^{k_1} \times p_2^{k_2} \times ... \times p_r^{k_r}$ is $(k_1+1) \times (k_2+1) \times ... \times (k_r+1)$,

where $p_1, p_2, ..., p_r$ are the prime factors of n, and $k_1, k_2, ..., k_r$ are their respective powers.

Number of factors

= (3+1)×(2+1)×(1+1)

= 4×3×2 = 24

The sum of all factors of n = $\prod_{i=1}^{r} \left(\frac{p_i^{k_i+1} - 1}{p_i - 1}\right)$, where ∏ denotes the product over all

Sum of factors = $\left(\frac{2^4-1}{2-1}\right) \times \left(\frac{3^3-1}{3-1}\right) \times \left(\frac{5^2-1}{5-1}\right)$

= (15) × (13) × (6) = 1170

S9. Ans.(c)

Sol.

Let p(x) = $2x^3 + 5x^2 - 6x - 9 = 0$

And q(x) = $3x^3 + 7x^2 - 11x - 15 = 0$

Taking option (c) put x = -1

We get p(x) = 0 and q(x)= 0

Similarly put x = -3

Now, we get p(x) = 0 and q(x) = 0

So, option c is correct.

S10. Ans.(a)
Sol.
$x^3 - 6x^2 + 11x - 6=0$
Put x = 1 then (x-1) is one of the factor
This equation $(x^3 - 6x^2 + 11x - 6)$ dividing by (x-1)
Now, $(x-1)(x^3 - 6x^2 + 11x - 6) = 0$
$(x-1)(x-2)(x-3) = 0$
X = 1,2 and 3
the sum of the cubes of the roots = $1^3 + 2^3 + 3^3 = 36$

S11. Ans.(a)
Sol. the equation $x^3 - 13x^2 + 15x + 189 = 0$
Let the roots be α , α + 2 , β.
Sum of roots is 2 α + β + 2 = 13
β = 11 − 2 α
Sum of the product of roots taken two at a time is α (α + 2) + (α + 2) β + β α = 15
or $\alpha^2 + 2\alpha + 2(\alpha + 1)\beta = 15$
Product of the roots is α β (α + 2) = − 189
Eliminating β from (1) and (2), we get
$\alpha^2 + 2\alpha + 2(\alpha + 1)(11 - 2\alpha) = 15$
or $3\alpha^2 - 20\alpha - 7 = 0$
$(\alpha - 7)(3\alpha + 1) = 0$
α = 7 or − 1/3
⇒ β = − 3 , 35/3 Out of these values ,
α = 7 and β = − 3
satisfy the third relation α β (α + 2) = − 189 ,
(- 21) (9) = − 189
Hence, the roots are 7, 7 + 2 , − 3 or − 3,7,9

S12. Ans.(c)
Sol. If α + β + γ = 5, αβ + βγ + γα = 7 and α β γ = 3
For a cubic polynomial $x^3 - px^2 + qx - r = 0$
The sum of the roots, equals α + β + γ = p = 5
The sum of the products of the roots taken two at a time αβ + βγ + γα = q = 7
The product of the roots, αβγ = r = 3
Put the values of p,q and r in cubic equation
$x^3 - 5x^2 + 7x - 3 = 0$

S13. Ans.(b)
Sol.
$$4x + \frac{1}{x} = 5$$
$$4x^2 + 1 = 5x$$
Therefore, $\frac{5x}{4x^2+1+10x} = \frac{5x}{5x+10x}$
$= \frac{1}{3}$

S14. Ans.(d)
Sol.
The equations 3(k -1)x + 4y = 24 and 15x + 20y = 8(k +13) have infinite solutions.

$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} = \frac{3(k-1}{15} = \frac{4}{20} = \frac{24}{8(k+13)}$

From (i) and (ii)

$= \frac{3(k-1)}{15} = \frac{4}{20}$

= k-1 = 1

= k= 2

S15. Ans.(b)
Sol.
Given system equation 2x - 3y = 3 and -4x+qy = p/2

General equations $a_1x+b_1y=c_1$ and $a_2x+b_2y=c_2$ to be inconsistent

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} = \frac{2}{-4} = \frac{-3}{q} \neq \frac{3}{p/2}$

From (1) and (3)

$\frac{2}{-4} \neq \frac{3}{p/2}$

$p \neq -12$

S16. Ans.(b)
Sol.
Let's solve these equations to find the values of x and y.
The solution to the system of equations is x=3 and y=−4.
Put the values of x and y in the equation we
5(3)−p(−4)−23=0
15 +4p-23 = 0
4p – 8 = 0
p = 2

S17. Ans.(c)
Sol.
If one root of the equation x^2+ px +12 =0 is 4,

So, put x = 4 in equation

$(4)^2 + 4p + 12 = 0$

4p = -28 or p = -7

while the equation x^2 -7x +q = 0 has equal roots.

Let two roots are a and a

Sum of roots a+a = -(-7)

2a= 7 or a = 7/2

Product of roots a^2 = q

$q = (7/2)^2 = 49/4$

S18. Ans.(b)
Sol.
21, 42, 63, 84 ..in A.P
A= 21 d = 42 – 21 = 21 Tn = 420
Tn = a + (n-1)d
420 = 21 + (n-1)(21)
420 = 21+ 21n – 21
21n = 420
n = 20

S19. Ans.(d)
Sol.
The sum of the first 20 terms of an arithmetic progression whose first term is 5 and common difference is 4
N = 20 , a = 5 and d = 4
Sn = n/2 [2a+(n-1)d]
Sn = 20/2 [2 x 5 + (20-1)(4)]
Sn = 10 [10 + 76]
Sn = 860

S20. Ans.(d)
Sol.
The general term of A.P. whose sum of n terms is given by $4n^2 + 3n$
$S_n = 4n^2 + 3n$
$S_{n-1} = 4(n-1)^2 + 3(n-1)$
$= 4n^2 + 4 - 8n + 3n - 3$
$= 4n^2 - 5n + 1$
$T_n = S_n - S_{n-1}$
$= 4n^2 + 3n - 4n^2 + 5n - 1$
$= 8n - 1$

S21. Ans.(c)
Sol. we know that
$(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$ and $(a+b+c)^2 \geq 0$ for any real a,b,c
Given, $a^2+b^2+c^2=1$
Therefore $1+2(ab+bc+ca) \geq 0$
$(ab + bc + ca) \geq -1/2$
Now, A.M.≥G.M.
$(a+b)/2 \geq \sqrt{ab}$
$a+b \geq 2\sqrt{ab}$
Let $a=a^2$ and $b=b^2$
$a^2+b^2 \geq 2ab$ ------(1)
similarly,
$b^2+c^2 \geq 2bc$ ------(2)
$c^2+a^2 \geq 2ac$ ------(3)
Adding (1), (2) and (3) we get
$a^2+b^2+c^2 \geq ab + bc + ca$
$(ab + bc + ca) \leq 1$
Therefore, ab + bc + ca lies in the interval [−1/2,1].

S22. Ans.(b)
Sol.
We know that, A.M.≥G.M.

$\frac{a+b+c}{3} \geq (abc)^{\frac{1}{3}}$

$\frac{1}{3}(\frac{1}{a}+\frac{1}{b}+\frac{1}{c} \geq \left(\frac{1}{a}\times\frac{1}{b}\times\frac{1}{c}\right)^{1/3}$

Multiplying both these inequalities

$= \frac{1}{9}(\frac{1}{a}+\frac{1}{b}+\frac{1}{c})(a+b+c) \geq (abc)^{\frac{1}{3}}\left(\frac{1}{a}\times\frac{1}{b}\times\frac{1}{c}\right)^{1/3}$

$= (a+b+c)\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right) \geq 9$

S23. Ans.(a)
Sol. Every $(n+1)$-element subset of the set $\{1,2,3,\ldots,2n\}$, there are at least two numbers whose sum is $2n+1$.

S24. Ans.(c)
Sol.
$f(x) = \frac{1}{1+2^{\frac{1}{x}}}$

RHL $\lim_{h\to 0+} = \frac{1}{1+2^{\frac{1}{h}}}$

Taking limit RHL = 0

LHL $\lim_{h\to 0^-} = \frac{1}{1+2^{\frac{1}{(-h)}}}$

Taking limit LHL = 1

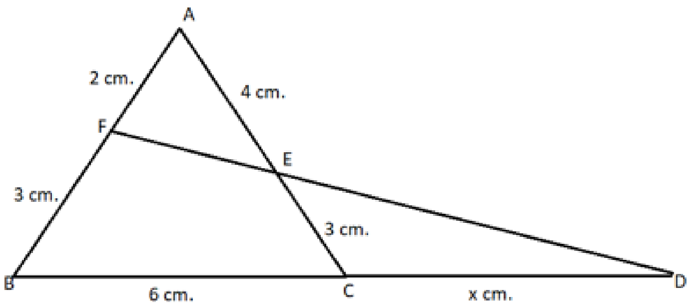
$LHL \neq RHL$

S25. Ans.(c)
Sol.
volume = $\sqrt{59 \times 59 \times 4}$
= $118\ cm^3$

S26. Ans.(a)
Sol.
Given In AABC, AB = 5cm BC = 6em and CA = 7cm a transversal is drawn to cut the sides AB at F, BC produced at D and

CA at E, so that AF = 2cm, AE = 4 cm

Let CD = x cm.



$$\frac{BD}{DC}\times\frac{CE}{EF}\times\frac{AF}{FB} = -1$$

$$\frac{BC+CD}{DC}\times\frac{CE}{EA}\times\frac{AF}{FB} = -1$$

$$\frac{6+x}{x}\times\frac{3}{4}\times\frac{2}{3} = -1$$

-2x = 6+x

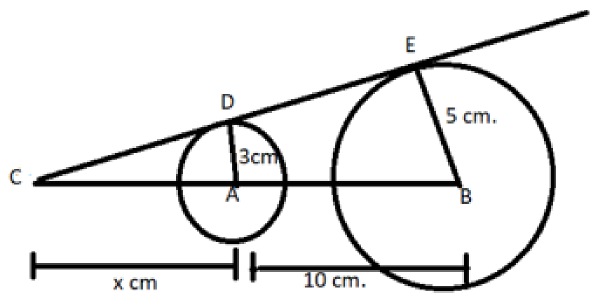
-3x =6

x = -2

(-ve) sign represent out side of triangle

Therefore, BD = BC+CD = 6 + 2 = 8 cm.

S27. Ans.(c)
Sol.



DA = 3cm. , BE = 5 cm. and AB = 10cm. A direct common tangent is drawn that meets the line BA produced at C

Let CA = x cm.

Using the property similar triangle on ΔACD and ΔBCE

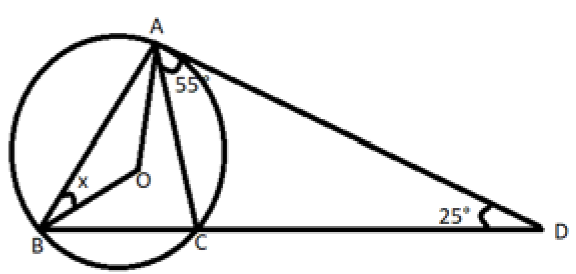
$\frac{3}{5} = \frac{x}{x+10}$

3x + 30 = 5x

2x = 30

X = 15 cm.

S28. Ans.(a)
Sol.



∠ACD = 55° and ∠ADC = 25°

Let ∠ABO = x°

In ΔACD

∠ACD + ∠ADC+ ∠ACD = 180°

55° + 25° + ∠ACD = 180°

∠ACD = 100°

Here, ∠ACD + ∠ACB = 180°

∠ACB = 80°

∠AOB = 2∠ACB = 160°

In ΔAOB

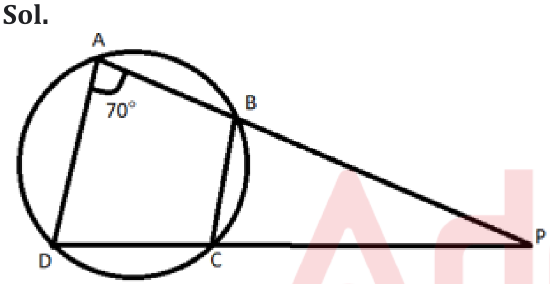
∠AOB + ∠ABO +∠BAO = 180°

160° + x+x= 180°

$2x = 20°$

$x = 10°$

S29. Ans.(b)
Sol.



∠BAD = 70°

∠BAD + ∠BCD = 180° (opposite angle)

70° +∠BCD = 180°

∠BCD = 110°

Here, ∠BCD + ∠BCP =180°

110° + ∠BCP =180°

∠BCP =70°

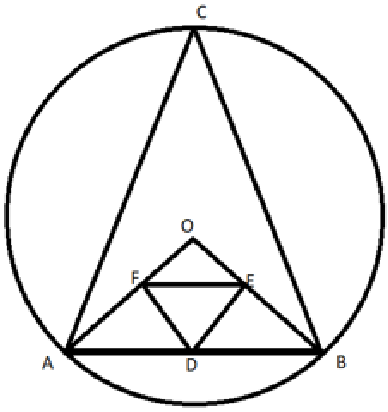
Given AB = CD

∠CBP + ∠BCP+∠CPB = 180°

70° + 70° + ∠CPB = 180°

∠CPB = 40°

S30. Ans.(b)
Sol.



Given ∠DEF = 30°

O is the centre of the circle and D, E and F are the mid points of AB, BO and OA respectively.

We know that AFED is a parallelogram.
Now, ∠DEF=30° [given]
∠FAD=∠DEF=30° (opposite angles of a parallelogram are equal)
Now, OA=OB
In ΔOAB,
∠OAB=∠OBA=30°
Now,
∠OAB+∠OBA+∠AOB=180°

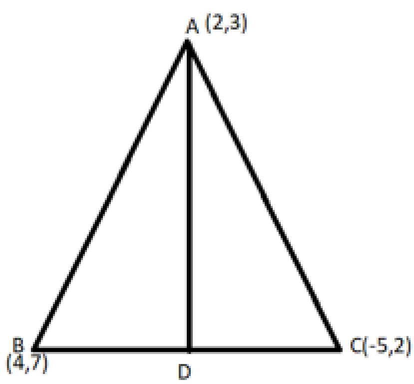
30°+30°+∠AOB=180°

∠AOB=120°
Since angle subtended by an arc at the centre is twice the angle subtended by it on the remaining part of the circle,
$\angle ACB=\frac{1}{2}\angle AOB$

$=\frac{1}{2}\times 120°$

Now, ∠ACB=60°

S31. Ans.(b)
Sol.



The vertices of a triangle ABC are (2,3), (4,7), (-5,2)

Area of tringle

A= (1/2) [x1(y2-y3)+x2(y3-y1)+x3(y1-y2)]

A = (1/2)[2(7-2)+4(2-3)+(-5)(3-7)]

A= (1/2)[10-4+20]

A= 13 square unit

Distance between B and C

BC = $(\sqrt{(-5-4)^2} + (2-7)^2$

BC = $\sqrt{81} + 25$

BC = $\sqrt{106} units$

Area of tringle ABC = (1/2) ×Base ×height

13 = (1/2) ×$\sqrt{106}$ × AD

AD = 26$\sqrt{106}$ $units$

AD = (13/53) $\sqrt{106}$ $units$

S32. Ans.(c)
Sol.

The locus of the point that is equidistant from two points (2,3) and (-4,1)

Formula of two points are equidistant

$\sqrt{(x-x_1)^2 + (y-y_1)^2} = \sqrt{(x-x_2)^2 + (y-y_2)^2}$

$\sqrt{(x-2)^2 + (y-3)^2} = \sqrt{(x-(-4))^2 + (y-1)^2}$

Squaring on sides

$(x-2)^2 + (y-3)^2 = (x+4)^2 + (y-1)^2$

$x^2 + 4 - 4x + y^2 + 9 - 6y = x^2 + 16 + 8x + y^2 + 1 - 2y$

13-4x-6y = 17+8x-2y

12x+4y = 4

3x+y = 1

S33. Ans.(c)
Sol.

If (3,2), (6,3), (x,y) and (6,5) are the vertices of a parallelogram

The midpoint of the diagonals of parallelogram is equal.

So midpoint formula = $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$

The midpoint of AC = The midpoint of BD

$(\frac{3+x}{2}, \frac{2+y}{2})$ = $(\frac{6+6}{2}, \frac{3+5}{2})$

$(\frac{3+x}{2}, \frac{2+y}{2})$ = (6,4)

$\frac{3+x}{2}$=6 and $\frac{2+y}{2} = 4$

x= 9 and y= 6

Now, (x,y) = (9,6)

S34. Ans (a)

Sol.

The coordinates of the paint which is equidistant from the vertices (8, -10), (7, -3) and (0,-4) of a right angled triangle

Taking two point (8, -10) and (7, -3)

$\sqrt{(x-8)^2+(y-(-10))^2} = \sqrt{(x-7))^2+(y-(-3))^2}$

Squaring on sides

$(x-8)^2+(y-(-10))^2 = (x-7))^2+(y-(-3))^2$

$x^2+64-16x+y^2+100+20y = x^2+49-14x+y^2+9+6y$

164-16x+20y = 58-14x+6y

2x-14y = 106

x-7y = 53-----(1)

Siimilarly

Taking point (7,-3) and (0,-4)

$\sqrt{(x-7)^2+(y-(-3))^2} = \sqrt{(x-0)^2+(y-(-4))^2}$

Squaring on sides

$(x-7)^2+(y+3))^2 = (x)^2+(y+4)^2$

$x^2+49-14x+y^2+9+6y = x^2+y^2+16+8y$

58-14x+6y = 16+8y

14x+2y = 42

7x+y =21-----(2)

Solving equation (1) and (2)

x=4 and y=-7

The coordinate points (4,-7).

S35. Ans.(d)

Sol.

The line joining the points (1,-1) and (4,5) is divided by the point (2,1) is

Let diving line in k:1

Use the formula (x,y) = $(\frac{kx_2+x_1}{k+1}, \frac{ky_2+y_1}{k+1})$

(2,1) = $(\frac{4k+1}{k+1}, \frac{5k-1}{k+1})$

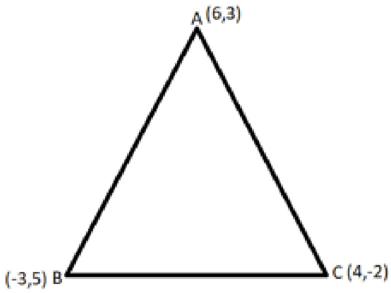
Here, $\frac{5k-1}{k+1} = 1$

5k-1 = k+1

4k = 2

k = ½ or 1:2

S36. Ans(d)
Sol.



The vertices of a triangle ABC are (6,3), (-3,5), (4,-2)
Area of tringle
A= (1/2) [x1(y2-y3)+x2(y3-y1)+x3(y1-y2)]
A = (1/2)[6(5-(-2))+(-3)[(-2)-3)+(4)(3-5)]
A= (1/2)[49]
A= 49/2 square units.

S37. Ans.(d)
Sol.
Area of circle= πr^2

= $\pi(28)^2 = 2464\ cm^2$

Area of shaded part of circle =$\frac{3}{4}\pi r^2$

=$\frac{3}{4}\pi(28)^2$= 1848 cm^2

Area of tringle BOA =$\frac{1}{2}$ × b×h

$\frac{1}{2}$ × 28 × 28 = 392 cm^2

Area of minor part = Total area of a circle – (Area of shaded part of the circle + Area of triangle BOA)

= 2464(1848+392) = 224 cm^2

S38. Ans.(d)
Sol.
Atleast possible number of cubes,
HCF of 6, 12 and 15 = 3
Least possible number of cubes = (6/3) × (12/3) × (15/3)
=2 × 4 ×5 = 40

S39. Ans.(a)
Sol.
Diameter 2r, = 14 cm

Radius r = 7 cm

Curved surface area of cylinder = 2 π r h

220 = 2× (22/7) ×7× h

h = 5 cm

Therefore,

Volume of cylinder = $\pi r^2 h$ = (22/7) × 7 × 7 × 5 = 770 cm^3

S40. Ans.(d)

Sol. $\lim_{x,y-(0,0)} \sin\left(\frac{y}{x}\right)$

Taking limit then this function doesn't exist.

S41. Ans.(c)

Sol.

The value of expression cos60 cos36°cos42° cos78°

$= \frac{1}{2} x \frac{(\sqrt{5}+1)}{4} x \frac{(2\cos 42 \cos 78)}{2}$

$= \frac{(\sqrt{5}+1)}{16} x \{\cos(42 + 78) + \cos(78\text{-}42)\}$

$= \frac{(\sqrt{5}+1)}{16} x \{\cos 120 + \cos 36\}$

$= \frac{(\sqrt{5}+1)}{16} x \{\frac{-1}{2} + \frac{(\sqrt{5}+1)}{4}\}$

$= \frac{(\sqrt{5}+1)}{16} x \frac{(\sqrt{5}-1)}{4}$

$= \frac{(\sqrt{5})^2-(1)^2}{16\times 4}$

$= \frac{4}{16\times 4} = 1/16$

S42. Ans.(c)

Sol.

$$\frac{\cot 54°}{\tan 36°} + \frac{\tan 20°}{\cot 70°} = \frac{\cot(90°-36°)}{\tan 36°} + \frac{\tan(90°-70°)}{\cot 70°}$$

$$= \frac{\tan 36°}{\tan 36°} + \frac{\cot 70°}{\cot 70°} = 1 + 1 = 2$$

S43. Ans.(b)

S44. Ans.(c)

Sol.

Given mean = 4; Variance = 4/3

and x(successes) = 2

Binomial property

$= n_{C_x} p^x (1-p)^{n-x}$

Mean = np

Variance = np × (1 - p)

Here, 'n' is the number of repeated trials and 'p' is the

4/3 = 4(1-p)

1= 3 – 3p

P = 2/3

Now, np = 4

n × $\frac{2}{3}$ = 4

n = 6

Therefore,

$$= 6_{C_2}\left(\frac{2}{3}\right)^2\left(1-\frac{2}{3}\right)^{6-2}$$

$$= 15\times\frac{4}{9}\times\left(\frac{1}{3}\right)^4$$

$$= \frac{20}{243}$$

S45. Ans.(d)

S46. Ans.(c)
Sol.
Given,
In mathematics test 15 students scored = 80 marks.
20 students scored = 75 marks,
28 students scored = 65 marks
And 25 students scored = 60 marks.
28 maximum students scored 65 marks
So mode of the given data 65.

S47. Ans.(a)
Sol.

Marks obtained	No. of students
0-10	63-58 = 5
10-20	58-55 = 3
20-30	55-51 = 4
30-40	51-48 = 3
40-50	48-42 = 6
50-60	42

The frequency of the class 30-40 is 3.

S48. Ans.(b)
Sol.

Class	Frequency	C.F
0-5	10	10
5-10	15	10+15 = 25
10-15	12	25+12 = 37
15-20	20	37+20=57
20-25	9	57+9=66

66 is sum number, so N/2 = 66/2 = 33
33 in median class 37
Therefore, lower limit of median class = 10
We find highest frequency = 20
So, lower model class = 15
Sum of lower limits of the median class and model class = 10+15 = 25.

S49. Ans.(b)

Sol.

The measure of central tendency which is given by the x-coordinate of the point of intersection of the 'more than' ogive and 'less than' ogive is. Median.

S50. Ans.(a)

Sol.

If the mean of n observations $1^2, 2^2, 3^2 \ldots\ldots.. n^2$ is $\frac{46n}{11}$

$\frac{1^2+2^2+3^2 \ldots\ldots\ldots n^2}{n} = \frac{46n}{11}$

$\frac{n(n+1)(n+2)}{6n} = \frac{46n}{11}$

$276n = 11(2n^2 + 3n + 1)$

$(22n^2 + 33n + 11) = 276n$

$(22n^2 - 243n + 11) = 0$

$(22n^2 - 242n - n + 11) = 0$

22n(n-11) -1(n-11) = 0

(n-11)(22n-1) = 0

n = 11.