10th maths study material for slow learners

Day1

1. Write Euclid's division algorithm?

A. Given positive integers a and b ,there exists unique pair of integers q and r satisfying a=bq+r, where $0 \leq r < b$.

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2. Use Euclid's division algorithm to find the HCF of 96 and 72?

A. a = b q + r

96 = 72x1+24

72 = 24x3 + 0

HCF(96,72) = 24.

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3. Use Euclid's division algorithm to find the HCF of 900 and 270?

A. a = b q + r

900 = 270x3+ 90

270 = 90x3 + 0

HCF(96,72) = 90.

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4. State The Fundamental Theorem Of Arithmetic?

A. Every composite number can be expressed as a product of primes.

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5. Find the LCM and the HCF of 72,108?

A.

72 = 2x36 = 2x2x18 =2x2x2x9 =2x2x2x3x3 = 2^3 x 3^2	108 = 2x54 =2x2x27 = 2x2x3x9 = 2x2x3x3x3 = 2^2 x 3^3

LCM(72,108) = 2^3 X 3^3 =8x27 =216

HCF(72,108) = 2^2 x 3^2 = 4x9 =36.

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Day 2

6.Show that 5-√3 is irrational.?

A. let 5-√3 be rational

$\Rightarrow 5-\sqrt{3} = \frac{a}{b}$

$\Rightarrow -\sqrt{3} = \frac{a}{b} - 5$

$\Rightarrow -\sqrt{3} = \frac{a-5b}{b}$

$\Rightarrow \sqrt{3} = \frac{5b-a}{b}$

$\Rightarrow$ √3 = rational

$\Rightarrow$ this is contradiction.

Hence 5-√3 is irrational.

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7. Show that 3√2 is irrational.?

A. let 3√2 be irrational.

$\Rightarrow 3\sqrt{2} = \frac{a}{b}$

$\Rightarrow \sqrt{2} = \frac{a}{3b}$

$\Rightarrow$ √2 = rational

$\Rightarrow$ this is contradiction.

Hence 3√2 is irrational .

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8. Expand $\log \frac{343}{125}$?

A. $\log \frac{343}{125}$ = log 343 – log 125

= $\log 7^3 - \log 5^3$

= 3log7 - 3 log5.

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9. Expand $\log \frac{128}{625}$?

A. $\log \frac{128}{625}$ = log 128 – log 625

= $\log 2^7 - \log 5^4$

= 7log2 - 4 log5.

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10. Determine $\log_2 512$?

A. $\log_2 512 = \log_2 2^9$

$= 9 \log_2 2$

= 9 x 1

= 9.

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Day3

11. write {3,6,9,12} in set – builder form?

A. {3,6,9,12} = {3(1), 3(2), 3(3),3(4)}

= $\{3x / x \in N, x \leq 4\}$

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12. write {5,25,125,625} in set – builder form?

A. $\{5,25,125,625\} = \{5^1,5^2,5^3,5^4\}$

$= \{5^x /\ x \in N, x \leq 4\}$

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13. Write the following in roster and set builder forms.

(i) The set of all natural numbers which divide 42.

(ii) The set of natural numbers which are less than 10.

A. let A be set of all natural numbers which divide 42.

A = {1,2,3,6,7,14,21,42}

A = { x/ x is natural numbers which divide 42}

Let B set of natural numbers which are less than 10.

B = { 1, 2, 3, 4, 5, 6, 7, 8, 9}

B = {x : x is a natural number less than 10}

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14. B = {x : $x + 5 = 5$} is not an empty set. Why?

A. x + 5 = 5

x = 5-5

x = 0

B = {0} is not an empty set

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15. List all the subsets of {x, y, z}?

A. { }, {x},{y},{z},{x,y},{y,z},{z,x},{x,y,z}

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Day4

16. List all the subsets of {1,4,9,16}?

A. { },{1},{4},{9},{16},{1,4},{1,9},{1,16}, {4,9},{4,16},{9,16},{1,4,9},{1,9,16},{4,9,16}, {1,4,16},{1,4,9,16}.

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17. Let A = {2, 5, 6, 8} and B = {5, 7, 9, 1}. Find A ∪ B and B ∪ A.?

A. A ∪ B = {2, 5, 6, 8} U {5, 7, 9, 1}

= { 1,2,5,6,7,8,9}

B ∪ A = {5, 7, 9, 1} U {2, 5, 6, 8}

= { 1,2,5,6,7,8,9}

Hence A ∪ B = B ∪ A

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18. Find A ∩ B and B ∩ A when A = {5, 6, 7, 8} and B = {7, 8, 9, 10} ?

A. A ∩ B = {5, 6, 7, 8} ∩ {7, 8, 9, 10}

= { 7,8}

B ∩ A = {7, 8, 9, 10} ∩ {5, 6, 7, 8}

= { 7,8}

Hence A ∩ B = B ∩ A .

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19. A={1, 2, 3, 4, 5, 6, 7, 8, 9, 10}; B ={2,3,5,7}. Find A ∩ B and show that A ∩ B = B. ?

A. A ∩ B ={1,2,3,4,5,6,7,8,9}∩ {2,3,5,7}

= {2,3,5,7}

= B.

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20. If A = {2, 3, 5}, find A ∪ φ and φ ∪ A and compare.?

A. A ∪ φ = {2, 3, 5} U { }

= {2, 3, 5}

= A.

φ ∪ A = { } U {2, 3, 5}

= {2, 3, 5}

= A.

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Day5

21. If A = {1, 2, 3, 4 ,5}; B = {4, 5, 6, 7}then find A – B and B – A. Are they equal?

A. A – B = {1, 2, 3, 4 ,5} - {4, 5, 6, 7}

= {1,2,3}

B – A = {4, 5, 6, 7} - {1, 2, 3, 4 ,5}

= {6,7}

Hence A – B ≠ B – A

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22. A = {0, 2, 4}, find A ∩ φ and A ∩ A. Comment.

A. A ∩ φ = {0, 2, 4} ∩ { }

= { }

= φ

A ∩ A = {0, 2, 4} ∩ {0,2,4 }

= {0, 2, 4}

= A.

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23. Check whether the given pair of equations represent intersecting, parallel or coincident lines. $2x + y - 5 = 0$ and $3x - 2y - 4 = 0$?

A.. $2x + y - 5 = 0$ and $3x - 2y - 4 = 0$

$\frac{a_1}{a_2} = \frac{2}{3}$ $\quad \frac{b_1}{b_2} = \frac{1}{-2}$ $\quad \frac{c_1}{c_2} = \frac{-5}{-4}$

Since $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

therefore they are intersecting lines .

hence, they have unique solution.

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24.write the general form of linear equation in two variables?

A. ax + by + c =0.

25. Check whether the following pair of equations is consistent. $3x + 4y = 2$ and $6x + 8y = 4$.?

A. $3x + 4y - 2 = 0$

$6x+8y - 4 = 0$

$\frac{a_1}{a_2} = \frac{3}{6} = \frac{1}{2}$ $\frac{b_1}{b_2} = \frac{4}{8} = \frac{1}{2}$ $\frac{c_1}{c_2} = \frac{-2}{-4} = \frac{1}{2}$

Since $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

They are coincident lines.

They have infinitely many solutions.

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Day6

27. Check whether the equations 2x-3y = 5 and 4x-6y = 15 are consistent?

A. $4x-6y - 15 = 0$

$2x-3y - 5 = 0$

$\frac{a_1}{a_2} = \frac{4}{2} = 2$ $\frac{b_1}{b_2} = \frac{-6}{-3} = 2$ $\frac{c_1}{c_2} = \frac{-15}{-5} = 3$

Since $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

They are parallel lines.

They have no solutions.

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28. For what value of 'p' the following pair of equations has a unique solution. 2x + py = - 5 and 3x + 3y = - 6?

A. 2x + py = - 5 and 3x + 3y = - 6

We have $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$\frac{2}{3} \neq \frac{p}{3}$

$p \neq \frac{2}{3} \times 3$

$p \neq 2$

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29. Find the value of 'k' for which the pair of equations 2x - ky + 3 = 0, 4x + 6y - 5 =0 represent parallel lines.?

A. 2x - ky + 3 = 0, 4x + 6y - 5 =0

We have $\frac{a_1}{a_2} = \frac{b_1}{b_2}$

$\frac{2}{4} = \frac{-k}{6}$

$k = \frac{2}{4} \times -6$

$k = -3$

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30. For what value of 'k', the pair of equation $3x + 4y + 2 = 0$ and $9x + 12y + k = 0$ represent coincident lines.?

A. $3x + 4y + 2 = 0$ and $9x + 12y + k = 0$

We have $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

$\frac{3}{9} = \frac{2}{k}$

$k = 2 \times \frac{9}{3}$

$k = 6$

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Day 7

31. Find the 10th term of the AP : 5, 1, –3, –7 . . .?

A. Here, $a = 5$, $d = 1 – 5 = – 4$ and $n = 10$.

We have $a_n = a + (n – 1) d$

$a_{10} = 5 + (10 – 1) (–4)$

$= 5 – 36$

$= –31$

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32.Which term of the AP : 21, 18, 15, . . . is – 81?

A.Here, $a = 21$, $d = 18 – 21 = – 3$

$a_n = – 81$

$a + (n – 1) d = -81$

$21 + (n – 1)(– 3) = -81$

$24 – 3n = -81$

$– 3n = -81-24$

$– 3n = -105$

$n = \frac{-105}{-3}$

$n = 35.$

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33. In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?

A. 23, 21, 19, . . ., 5 AP.

Then $a = 23$, $d = 21 – 23 = – 2$,

$a_n = 5$

$a + (n – 1) d = 5$

$23 + (n – 1)(– 2) = 5$

$(n – 1)(– 2) = 5 – 23$

$(n – 1) = -18/-2$

$n = 9+1$

$n = 10.$

So, there are 10 rows in the flower bed.

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34. Find the distance between two points A(4, 2) and B(8, 6)?

A. $x_1 = 4$, $x_2 = 8$, $y_1 = 3$, $y_2 = 6$

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

$= \sqrt{(8 - 4)^2 + (6 - 3)^2}$

$= \sqrt{4^2 + 3^2}$

$= \sqrt{16 + 9}$

$= \sqrt{25}$

= 5 units.

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35. Find the centroid of the triangle whose vertices are (3, −5), (−7, 4), (10, −2) respectively.?

A. $G = \left(\frac{3-7+10}{3}, \frac{-5+4-2}{3}\right)$

$= \left(\frac{6}{3}, \frac{-3}{3}\right)$

$= (2, -1)$

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Day8

36. Find the area of a triangle whose vertices are (1, −1), (−4, 6) and (−3, −5).?

A. $\Delta = \frac{1}{2}\begin{vmatrix} 1 & -4 & -3 & 1 \\ -1 & 6 & -5 & -1 \end{vmatrix}$

$= \frac{1}{2}|(1x6) - (-4\ x - 1) + (-4\ x - 5) - (-3\ x\ 6) + (-3\ x - 1) - (1\ x - 5)|$

$= \frac{1}{2}|6 - 4 + 20 + 18 + 3 + 5|$

$= \frac{1}{2}$ x 48

= 24 sq.units.

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37. The end points of a line are (2, 3), (4, 5). Find the slope of the line.?

A. Here $x_1 = 2$, $y_1 = 3$, $x_2 = 4$, $y_2 = 5$

Slope $m = \frac{y_2-y_1}{x_2-x_1}$

$= \frac{5-3}{4-2}$

$= \frac{2}{2}$

= 1.

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38. Determine x so that 2 is the slope of the line through P(2, 5) and Q(x, 3)?

A. Here $x_1 = 2$, $y_1 = 5$, $x_2 = x$, $y_2 = 3$

Slope $m = \frac{y_2-y_1}{x_2-x_1} = 2$

$\frac{3-5}{x-2} = 2$

-2 = 2 (x-2)

$-\frac{2}{2}$ = x-2

-1+2 = x

x = 1

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39. The points (3, −2) (−2, 8) and (0, 4) are three points in a plane. Show that these points are collinear.?

A. $\Delta = \frac{1}{2}\begin{vmatrix} 3 & -2 & 0 & 3 \\ -2 & 8 & 4 & -2 \end{vmatrix}$

$= \frac{1}{2}|(3x8) - (-2\ x - 2) + (-2\ x\ 4) - (0\ x8) + (0\ x - 2) - (3\ x4)|$

$= \frac{1}{2}(24 - 4 - 8 - 0 + 0 - 12)$

$= \frac{1}{2}$ x 0

= 0 sq.units.

Hence the three points are collinear.

Day9

40. Write the properties of the similar triangles?

A. Two triangles are similar if

(i) All the corresponding angles are equal and

(ii) All the corresponding sides are in the same ratio.

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41. State Basic Proportionality theorem?

A. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.

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42. State the converse of Basic Proportionality theorem?

A. If a line divides two sides of a triangle in the same ratio, then the line is parallel to the third side.

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43. State Pythagoras theorem?

A. In a right triangle, the square of hypotenuse is equal to the sum of the squares of the other two sides.

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44. State the converse of Pythagoras theorem?

A. In a triangle if square of one side is equal to the sum of squares of the other two sides, then the angle opposite to the first side is a right angle and the triangle is a right angled triangle.

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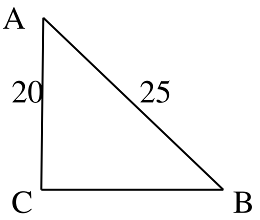
Day10

45. A ladder 25m long reaches a window of building 20m above the ground. Determine the distance of the foot of the ladder from the building.?

A.



In ΔABC, ∠C = 90°

⇒ $AB^2 = AC^2 + BC^2$ (by Pythagoras theorem)

$25^2 = 20^2 + BC^2$

$BC^2 = 625 - 400 = 225$

$BC = \sqrt{225} = 15$m

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46. ABC is an isosceles triangle right angled at C. Prove that $AB^2 = 2AC^2$.?

A. In ΔABC, ∠C = 90° and AC=BC

⇒ $AB^2 = AC^2 + BC^2$ (by Pythagoras theorem)

⇒ $AB^2 = AC^2 + AC^2$

⇒ $AB^2 = 2AC^2$

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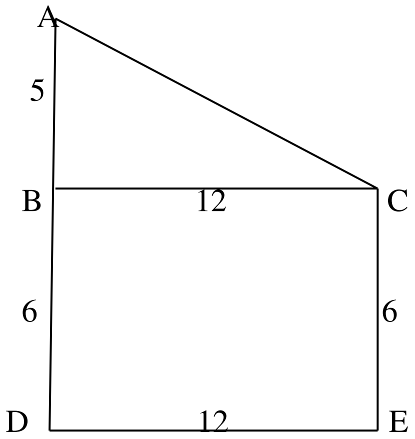
47. Two poles of heights 6m and 11m stand on a plane ground. If the distance between the feet of the poles is 12m find the distance between their tops.?

A.



In ΔABC, $\angle B = 90°$

$\Rightarrow AC^2 = AB^2 + BC^2$ (by Pythagoras theorem)

$\Rightarrow AC^2 = 5^2 + 12^2$

$\Rightarrow AC^2 = 25 + 144$

$\Rightarrow AC^2 = 169$

$\Rightarrow AC = 13m.$

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48. $\Delta ABC \sim \Delta DEF$ and their areas are respectively $64cm^2$ and $121\ cm^2$. If EF = 15.4 cm., then find BC.

A. $\Delta ABC \sim \Delta DEF$

$\Rightarrow \frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{BC^2}{EF^2}$

$\Rightarrow \frac{64}{121} = \frac{BC^2}{15.4^2}$

$\Rightarrow \frac{8}{11} = \frac{BC}{15.4}$

$\Rightarrow BC = \frac{8}{11}$ X 15.4

$\Rightarrow BC = 11.2$ cm

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49. Find the length of the tangent to a circle with centre 'O' and radius = 6 *cm*. from a point P such that OP = 10 *cm*.?

A. Given r = 6 cm

d = 10cm

The length of the tangent $= \sqrt{d^2 - r^2}$

$= \sqrt{10^2 - 6^2}$

$= \sqrt{100 - 36}$

$= \sqrt{64}$

= 8cm.

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50. Calculate the length of tangent from a point 15 *cm*. away from the centre of a circle of radius 9 *cm*.?

A.Given r = 9cm

d = 15cm

The length of the tangent $= \sqrt{d^2 - r^2}$

$= \sqrt{15^2 - 9^2}$

$= \sqrt{225 - 81}$

$= \sqrt{144}$

= 12cm.

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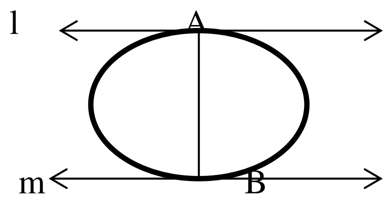
Day11

51. Prove that the tangents to a circle at the end points of a diameter are parallel.?

A.



Given AB is a diameter.

l , m are tangents at A and B.

There fore l ⊥ AB and m ⊥ AB

Hence l || m.

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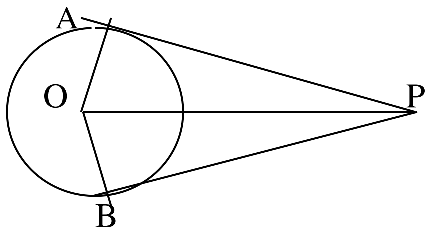
52. prove that The lengths of tangents drawn from an external point to a circle are equal.?

A.



Given PA and PB are tangents to a circle.

In triangles AOP , BOP

AO = BO (radii)

PO = PO (common)

$\angle A = \angle B = 90^0$

Hence $\Delta AOP \equiv \Delta BOP$

Hence PA = PB (cpct)

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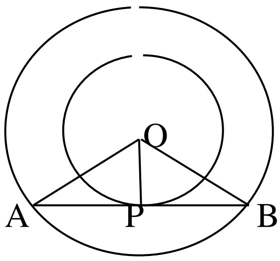
53. Two concentric circles are radii 5 cm and 3cm are drawn. Find the length of the chord of the larger circle which touches the smaller circle.?

A.



Given OA = 5cm , OP = 3cm

Since ΔAOP is right triangle,

$AP^2 = OA^2 - OP^2$

$AP^2 = 5^2 - 3^2$

$AP^2 = 25 - 9 = 16$

AP = 4cm

Since OP bisects AB, AP = PB

AB = AP+PB

AB = 2AP

AB = 2X4 = 8cm.

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54. Find the probability of getting a head when a coin is tossed once. Also find the probability of getting a tail.?

A. S = { H, T} ⇒ n(S) = 2

⇒ n(H) = 1

⇒ n(T) = 1

$\therefore P(H) = \frac{n(H)}{n(S)} = \frac{1}{2}$

$\therefore P(T) = \frac{n(T)}{n(S)} = \frac{1}{2}$

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55. A bag contains a red ball, a blue ball and an yellow ball, all the balls being of the same size. Manasa takes out a ball from the bag without looking into it. What is the probability that she takes a (i) yellow ball? (ii) red ball? (iii) blue ball?

A. S = { R, B, Y} ⇒ n(S) = 3

⇒ n(R) = 1

⇒ n(B) = 1

⇒ n(Y) = 1

$\therefore P(R) = \frac{n(R)}{n(S)} = \frac{1}{3}$

$\therefore P(B) = \frac{n(B)}{n(S)} = \frac{1}{3}$

$\therefore P(Y) = \frac{n(Y)}{n(S)} = \frac{1}{3}$

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Day 12

56.If P(E) = 0.05, what is the probability of 'not E'?

A. Given P(E) = 0.05

P(not E) = 1 - P(E)

= 1 - 0.05

= 0.95

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57. A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out (i) an orange flavoured candy? (ii) a lemon flavoured candy?

A. The probability of an orange flavoured candy is 0, because this is impossible event.

The probability of a lemon flavoured candy is 1 , because this is sure event.

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58. A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be (i) white? (ii) blue? (iii) red?

A. S= { 3blue, 2white, 4 red marbles}

n(S) = 3+2+4 = 9

n(white) = 2, n(blue) = 3, n(red) = 4

$p(white) = \frac{n(white)}{n(S)} = \frac{2}{9}$

$p(blue) = \frac{n(blue)}{n(S)} = \frac{3}{9}$

$p(red) = \frac{n(red)}{n(S)} = \frac{4}{9}$

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59. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ? (ii) not red?

A. n(S) = 3+5=8

n (R) = 3 and n(B) =5

$p(R) = \frac{n(R)}{n(S)} = \frac{3}{8}$

p (notR) = 1 - p (R)

$= 1 - \frac{3}{8}$

$= \frac{5}{8}$

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60. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be (i) red? (ii) white ? (iii) not green?

A. n(S) = 5+8+4=17

n (R) = 5 , n(W) =8, n (G) = 4

$p(R) = \frac{n(R)}{n(S)} = \frac{5}{17}$

$p(W) = \frac{n(W)}{n(S)} = \frac{8}{17}$

$p(G) = \frac{n(G)}{n(S)} = \frac{4}{17}$

$p(\text{not } G) = 1 - p(G) = 1 - \frac{4}{17} = \frac{13}{17}$

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Day13

61. write formula for mean of grouped data by Step-deviation method.?

A. $Mean = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

a = assumed mid value

f_i = i th class frequency

h = size of the class

$u_i = \frac{x_i - a}{h}$

x_i = class mark.

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62. The wickets taken by a bowler in 10 cricket matches are as follows: 2, 6, 4, 5, 0, 2, 1, 3, 2, 3. Find the mode of the data.?
A. Given 0, 1, 2,2,2,3,3,4,5,6
Mode = 2.

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63.Write the formula for mode ?
A. Mode = $l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2}$ x h
Where l = lower boundary of the modal class,
h = size of the modal class interval,
f_1 = frequency of the modal class,
f_0 = frequency of the class preceding the modal class,
f_2 = frequency of the class succeeding the modal class.

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64. Write the formula for median?
A. Median = $l + \frac{\frac{n}{2} - cf}{f}$ x h
Where l = lower boundary of median clas,
n = number of observations,
cf = cumulative frequency of class preceding the median class,
f = frequency of median class,
h = class size

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65. Define "ogive"?
A. we plot the lower boundaries on the X-axis and the corresponding greater than cumulative frequencies on the Y-axis. Then we plot the points (lower boundaries, corresponding cumulative frequency), on a graph paper, and join them by a free hand smooth curve. The curve we get is a greater than cumulative frequency curve, or an ogive (of the more than type).
(or)
we plot the upper boundaries on the X-axis and the corresponding less than cumulative frequencies on the Y-axis. Then we plot the points (upper boundaries, corresponding cumulative frequency), on a graph paper, and join them by a free hand smooth curve. The curve we get is a less than cumulative frequency curve, or an ogive (of the less than type).

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Day 14

66. The radius of a conical tent is 7 meters and its height is 10 meters. Calculate the length of canvas used in making the tent if width of canvas is 2m.?
A. Given r = 7m, h = 10m
$\therefore\ l = \sqrt{r^2 + h^2}$
$= \sqrt{7^2 + 10^2}$
$= \sqrt{149}$ = 12.2m

Surface area of conical tent = $\pi r l$
$= \frac{22}{\cancel{7}} \times \cancel{7} \times 12.2$
= 22 x 12.2
= 268.4 sq.m
the width of the canvas = 2m
Length of canvas = $\frac{area}{width}$
$= \frac{268.4}{2}$
= 134.2m

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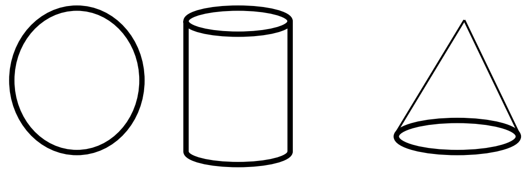
67. A sphere, a cylinder and a cone are of the same radius and same height. Find the ratio of their curved surface areas?
A.



Radius of sphere = r and h = 2r
Radius of cylinder = r and h = 2r
Radius of cone = r and h = 2r
Slant height $l = \sqrt{r^2 + h^2}$
$= \sqrt{r^2 + (2r)^2} = \sqrt{5}r$
The ratio of their curved surface areas =
$4\pi r^2 : 2\pi rh : \pi rl$
$= 4\pi r^2 : 2\pi r(2r) : \pi r(\sqrt{5}r)$
$= 4 : 4 : \sqrt{5}$

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68. Find the volume and surface area of a sphere of radius 2.1cm?
A. Surface area of sphere = $4\pi r^2$
$= 4 \times \frac{22}{7} \times 2.1 \times 2.1$
= 55.44sq.cm
Volume of sphere = $\frac{4}{3}\pi r^3$
$= \frac{4}{3} \times \frac{22}{7} \times 2.1 \times 2.1 \times 2.1$
= 38.808 cm^3

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69. Find the volume and the total surface area of a hemisphere of radius 3.5 *cm*.?
A. Given r = 3.5 = $\frac{7}{2}$ cm
Volume of hemisphere = $\frac{2}{3}\pi r^3$
$= \frac{2}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2}$
= 89.83cm^3
Total surface area = $3\pi r^2$
$= 3 \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$
= 115.5 cm^2

Day15

1. **Prove that $\sqrt{2}$ is irrational.?**

A. Let $\sqrt{2}$ be rational.

$\Rightarrow \sqrt{2} = \frac{p}{q}$ (p,q are co-primes)

$\Rightarrow \sqrt{2}\, q = p$

$\Rightarrow (\sqrt{2}\, q)^2 = p^2$

$\Rightarrow 2q^2 = p^2$

$\Rightarrow$ 2 divides p^2

$\Rightarrow$ 2 divides p

$\Rightarrow$ let p = 2r

$\Rightarrow 2q^2 = (2r)^2$

$\Rightarrow 2q^2 = 4r^2$

$\Rightarrow q^2 = 2r^2$

$\Rightarrow$ 2 divides q^2

$\Rightarrow$ 2 divides q

Hence p and q have common factor 2

It is contradiction because p,q are co-primes

Hence $\sqrt{2}$ **is irrational .**

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2. **Prove that $\sqrt{3}$ is irrational.?**

A. Let $\sqrt{3}$ be rational.

$\Rightarrow \sqrt{3} = \frac{p}{q}$ (p,q are co-primes)

$\Rightarrow \sqrt{3}\, q = p$

$\Rightarrow (\sqrt{3}\, q)^2 = p^2$

$\Rightarrow 3q^2 = p^2$

$\Rightarrow$ 3 divides p^2

$\Rightarrow$ 3 divides p

$\Rightarrow$ let p = 3r

$\Rightarrow 3q^2 = (3r)^2$

$\Rightarrow 3q^2 = 9r^2$

$\Rightarrow q^2 = 3r^2$

$\Rightarrow$ 3 divides q^2

$\Rightarrow$ 3divides q

Hence p and q have common factor 3

It is contradiction because p,q are co-primes

Hence $\sqrt{3}$ **is irrational .**

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Day16

3. If A = {x : x is a natural number}
B = {x : x is an even natural number}
C = {x : x is an odd natural number}
D = {x : x is a prime number}
Find A ∩ B, A ∩ C, A ∩ D, B ∩ C, B ∩ D, C ∩ D.?

A. A = {x : x is a natural number}
= { 1,2,3,4,……………….}
B = {x : x is an even natural number}
= { 2,4,6,8,…………………}
C = {x : x is an odd natural number}
= { 1,3,5,7…………………..}
D = {x : x is a prime number}
= { 2,3,5,7,………………}

A ∩ B = { 2,4,6,8,…………………}
A ∩ C = { 1,3,5,7…………………..}
A ∩ D = { 2,3,5,7,………………}
B ∩ C = { }
B ∩ D = { 2}
C ∩ D = { 3,5,7,………………}

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4. If A = {3, 6, 9, 12, 15, 18, 21}; B = {4, 8, 12, 16, 20} C = {2, 4, 6, 8, 10, 12, 14, 16}; D = {5, 10, 15, 20} find (i) A – B (ii) A – C (iii) A – D (iv) B – A (v) C – A (vi) D – A (vii) B – C (viii) B – D (ix) C – B (x) D – B?

A. A = {3, 6, 9, 12, 15, 18, 21};
B = {4, 8, 12, 16, 20}
C = {2, 4, 6, 8, 10, 12, 14, 16};
D = {5, 10, 15, 20}

A – B = {3, 6, 9, 15, 18, 21}
A – C = {3, 9, 15, 18, 21}
A – D = {3, 6, 9, 12, 18, 21}
B – A = {4, 8, 16, 20}
C – A = {2, 4, 8, 10, 14, 16}
D – A = {5, 10, 20}
B – C = { 20}
B – D = {4, 8, 12, 16, }
C – B = {2, 6, 10, 14, }
D – B = {5, 10, 15, }

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Day 17

5. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.?

A. Given $x^2 + 7x + 10 = x^2 + 2x + 5x + 10$
$= x(x+2) + 5(x+2)$
$= (x+2)(x+5)$

∴ -2,-5 are zeroes of $x^2 + 7x + 10$.

Here a = 1, b = 7, c = 10 and
$\alpha = -2$, $\beta = -5$.

$\therefore \alpha + \beta = -2 - 5 = -7 = \frac{-7}{1} = \frac{-b}{a}$

$\therefore \alpha \cdot \beta = -2 \times -5 = 10 = \frac{10}{1} = \frac{c}{a}$

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6.Find a quadratic polynomial, the sum and product of whose zeroes are – 3 and 2, respectively.?

A. Given $\alpha + \beta = -3$ and $\alpha . \beta = 2$

Required quadratic polynomial is

$= x^2 + (\alpha + \beta)\, x + \alpha . \beta$

$= x^2 - 3x + 2$.

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