BRINDHAVAN HR SEC SCHOOL,SUKKIRANPATTI

QUARTERLY EXAM -SEP 2024 ANSWER KEY

10th Standard

Maths

Date : 25-09-24

Exam Time : 03:00 Hrs

Reg.No. : ☐☐☐☐☐☐

Total Marks : 100

PART -A

Choose the correct answer 13 x 1 = 13

1) If there are 1024 relations from a set A = {1, 2, 3, 4, 5} to a set B, then the number of elements in B is

(a) 3 **(b) 2** (c) 4 (d) 8

2) If the order pairs (a, -1) and (5, b) blongs to {(x, y) | y = 2x + 3}, then a and b are ________

(a) -13, 2 (b) 2, 13 (c) 2, -13 **(d) -2,13**

3) The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is

(a) 2025 (b) 5220 (c) 5025 **(d) 2520**

4) If t_n is the n^{th} term of A.P, then $t_{2n} - t_n$ is ________.

(a) 2nd **(b) nd** (c) a+nd (d) 2a+2nd

5) The seuence $\sqrt{11}, \sqrt{55}, 5\sqrt{11}, 25\sqrt{11}, \ldots\ldots$ represents

(a) an A.P only **(b) a G.P only** (c) neither an A.P nor a G.P (d) both A.P and G.P

6) If (x - 6) is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is

(a) 3 **(b) 5** (c) 6 (d) 8

7) Which of the following should be added to make $x^4 + 64$ a perfect square

(a) $4x^2$ **(b) $16x^2$** (c) $8x^2$ (d) $-8x^2$

8) A Quadratic equation whose one zero is 5 and sum of the zeroes is 0 is given by ________

(a) $x^2-5x=0$ (b) $x^2-5x=5=0$ **(c) $x^2-25=0$** (d) $x^2-5=0$

9) The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If PQ = 10 cm, then the length of AB is

(a) $6\frac{2}{3}cm$ (b) $\frac{10\sqrt{6}}{3}cm$ (c) $66\frac{2}{3}cm$ **(d) 15 cm**

10) In a △ABC, AD is the bisector ∠BAC. If AB = 8 cm, BD = 6 cm and DC = 3 cm. The length of the side AC is

(a) 6 cm **(b) 4 cm** (c) 3 cm (d) 8 cm

11) The straight line given by the equation x = 11 is

(a) parallel to X axis **(b) parallel to Y axis** (c) passing through the origin
(d) passing through the point (0,11)

12) If (5, 7), (3, p) and (6, 6) are collinear, then the value of p is

(a) 3 (b) 6 **(c) 9** (d) 12

13) (2, 1) is the point of intersection of two lines.

(a) $x - y - 3 = 0; 3x - y - 7 = 0$ **(b) $x + y = 3; 3x + y = 7$** (c) $3x + y = 3; x + y = 7$

(d) $x + 3y - 3 = 0; x - y - 7 = 0$

14) If $5x = \sec\theta$ and $\frac{5}{x} = \tan\theta$, then $x^2 - \frac{1}{x^2}$ is equal to

(a) 25 **(b) $\frac{1}{25}$** (c) 5 (d) 1

PART- B 10 x 2 = 20

Answer any 10 questions.question no 28 is compulsory

15) A Relation R is given by the set {(x,y) / y = x + 3, x ∈ {0, 1, 2, 3, 4, 5}}. Determine its domain and range.

Answer : Given Set = {(x,y) / y = x + 3, x ∈ {0, 1, 2, 3, 4, 5}}

When x = 0, y = 0 + 3 = 3

When x = 1, y = 1 + 3 = 4

When x = 2,y = 2 + 3 = 5

When x = 3, y = 3 + 3 = 6

When x = 4, y = 4 + 3 = 7

When x = 5, y = 5 + 3 = 8

Relation R = {(0, 3), (1,4), (2,5), (3,6), (4,7), (5,8)}

Domain of R = {0, 1, 2, 3, 4, 5}

Range of R = {3, 4, 5, 6, 7, 8}

16) Let f be a function from R to R defined by f(x) = 3x - 5. Find the values of a and b given that (a,4) and (1,b) belong to f.

Answer : f(x) = 3x - 5 can be written as f{(x, 3x - 5) |x ∈ R }

(a, 4) means the image of a is 4. That is, f(a) = 4

3a - 5 = 4 ⇒ a = 3

(1,b) means the image of 1 is b. That is, f(1) = b ⇒ b =-2

3(1) - 5 = b ⇒ b = -2

17) If $f(x) = x^2 - 1$, $g(x) = x - 2$ find a, if g o f(a) = 1

Answer : $f(x) = x^2 - 1$, $g(x) = x - 2$

$f(a) = a^2 - 1$

Given, (g o f) (a) = 1

g[f(a)] = 1

$g[a^2 - 1] = 1$

$a^2 - 1 - 2 = 1$

$a^2 - 3 = 1$

$a^2 = 1 + 3 = 4$

$a = \pm 2$

18) Solve $5x \equiv 4 \pmod 6$

Answer : Solve 5x ≡ 4 (mod 6)
5x - 4 = 6k for some integer k.
$x = \frac{6k+4}{5}$
When we put k = 1, 6, 11, 16...
then 6k + 4 is divisible by 5
$x = \frac{6(1)+4}{5} = \frac{10}{5} = 2$
$x = \frac{6(6)+4}{5} = \frac{40}{5} = 8$
$x = \frac{6(11)+4}{5} = \frac{70}{5} = 14$
$x = \frac{6(16)+4}{5} = \frac{100}{5} = 20$
Therefore, the solution are 2,8, 14, 20,...

19) In a G.P. 729, 243, 81.....find t_7

Answer : n^{th} term of G.P = ar^{n-1}
Here a = 729
$r = \frac{t_2}{t_1} = \frac{243}{729}$
$r = \frac{1}{3}$
$t_7 = ar^{7-1} = ar^6 = 729\left(\frac{1}{3}\right)^6$
$= 729 \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3}$
$t_7 = 1$

20) If 1 + 2 + 3 +...+ k = 325, then find $1^3 + 2^3 + 3^3 + ...K^3$.

Answer : Sum of first k natural numbers = $\frac{k(k+1)}{2} = 325$
Sum of cube of first k natural numbers
$= \left[\frac{k(k+1)}{2}\right]^2$
$= (325)^2 = 1,05,625$
$1^3 + 2^3 + 3^3 + \ldots + k^3 = 1,05,625$

21) Determine the nature of the roots for the following quadratic equations
$15x^2 + 11x + 2 = 0$

Answer : $15x^2 + 11x + 2 = 0$ comparing with $ax^2 + bx + c$
=0.Here a = 15, b = 11, c = 2.
$\Delta = b^2 - 4ac$
$= 11^2 - 4 \times 15 \times 2$
=121-120
=1 > 1
∴ The roots are real and unequal.

22) Find the excluded values, if any of the expression $\frac{t}{t^2-5t+6}$

Answer : $\frac{t}{t^2-5t+6}$ is undefined when $t^2-5t+6=0$ i.e.
(t-3)(t-2)=0.⇒t=3,2.
∴ The excluded values are 3, 2.

23) Simplify
$\frac{x^3}{x-y} + \frac{y^3}{y-x}$

Answer : $\frac{x^3}{x-y}+\frac{y^3}{y-x}=\frac{x^3}{x-y}-\frac{y^3}{y-x}=\frac{x^3-y^3}{(x-y)}$

$=\frac{(x-y)\left(x^2+xy+y^2\right)}{x-y}$

$x^2 + xy + y^2$

24) If $\triangle$ABC is similar to $\triangle$DEF such that BC = 3 cm, EF = 4 cm and area of $\triangle$ABC = 54 cm^2. Find the area of $\triangle$DEF.

Answer : Since the ratio of area of two similar triangles is equal to the ratio of the squares of any two corresponding sides, we have

$\frac{Area(\Delta ABC)}{Area(\Delta DEF)}=\frac{BC^2}{EF^2}$ gives $\frac{54}{Area(\Delta DEF)}=\frac{3^2}{4^2}$

$Area(\Delta DEF)=\frac{16\times 54}{9}=96cm^2$

25) Find the slope of a line joining the given points (- 6, 1) and (-3, 2)

Answer : (- 6, 1) and (-3, 2)

The slpoe $\frac{y_2-y_1}{x_2-x_1}=\frac{2-1}{-3+6}=\frac{1}{3}$

26) Show that the straight lines x - 2y + 3 = 0 and 6x + 3y + 8 = 0 are perpendicular.

Answer : Show of the straight lines x - 2y + 3 = 0 is

$m_1 = \frac{-1}{-2}=\frac{1}{2}$

Slope of the straight line 6x + 3y + 8 = 0 is

$m_2 = \frac{-6}{3}$=-2

Now, m_1 x m_2 = $\frac{1}{2}$ x (-2) = -1

Hence, the two straight lines are perpendicular

27) prove the following identity.

$\sqrt{\frac{1+sin\theta}{1-sin\theta}}=sec\theta+tan\theta$

Answer : $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}=\sec\theta+\tan\theta$

$\textbf{LHS}=\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$

$=\sqrt{\frac{1+\sin\theta}{1-\sin\theta}\times\frac{1-\sin\theta}{1-\sin\theta}}$

[Multiplying the Numerator and denominator by $\sqrt{1-\sin\theta}$]

$=\sqrt{\frac{1^2-\sin^2\theta}{(1-\sin\theta)^2}}\quad\left[\because(a+b)(a-b)=a^2-b^2\right]$

$=\sqrt{\frac{\cos^2\theta}{(1-\sin\theta)^2}}\quad\left[\because 1-\sin^2\theta=\cos^2\theta\right]$

$=\frac{\cos\theta}{1-\sin\theta}$

$=\frac{\cos\theta}{1-\sin\theta}\times\frac{1+\sin\theta}{1+\sin\theta}$

[Multiplying Numerator and denominator by $1+\sin\theta$]

$=\frac{\cos\theta(1+\sin\theta)}{1^2-\sin^2\theta}=\frac{\cos\theta(1+\sin\theta)}{\cos^2\theta}$

$\left[\because(a+b)(a-b)=a^2-b^2\right]\left[1-\sin^2\theta=\cos^2\theta\right]$

$=\frac{1+\sin\theta}{\cos\theta}=\frac{1}{\cos\theta}+\frac{\sin\theta}{\cos\theta}$

$=\sec\theta+\tan\theta=$ RHS

28) Find the equation of straight line whose slope -4 and passing through the point (1 , 2)

Answer : point $=(1,2);\mathrm{m}=-4$

$y-y_1=m\,(x-x_1)$

$y-2=-4(x-1)$

$y-2=-4x+4$

$4x+y-2-4=04x+y-6=0$

PART- C 14 x 5 = 70

Answer any 10 questions.question no 28 is compulsory

29) Let A = {x ∈ W | x < 2}, B = {x ∈ N | 1 < x ≤ 4} and C = (3,5). Verify that A x (B U C) = (A x B) U (A x C)

Answer : Given A = {x ∈ W | x < 2} A = {0,1}

B = {x ∈ N | 1 < x ≤ 4} B = {2,3,4}

C = {3,5}

A x (B U C) = (A x B) U (A x C)

$B\cup C$ = {2,3,4,5}

A x (B U C) = {0,1} x {2,3,4,5}

= {{0,2},(0,3),(0,4),(0,5),(1,2),(1,3),(1,4),(1,5)} ...(1)

A x B = {0,1} x {2,3,4}

= {(0,2),(0,3),(0,4),(1,2),(1,3),(1,4)}

A x C = {0,1} x {3,5}

= {{0,3},(0,5),(1,3),(1,5)}

$(A\times B)\cup(A\cup C)$ = {(0,2),(0,3),(0,4),(0,5),(1,2),(1,3),(1,4),(1,5)} ...(2)

From (1) x (2),it is clear that

$A\times(B\cup C)=(A\times B)\cup(A\times C)$

Hence verified

30) Let f: A ⟶ B be a function defined by f(x) = $\frac{x}{2}$-1, where A = {2, 4 , 6, 10, 12}, B = {0, 1, 2, 4, 5, 9}, Represent f by

(i) set of ordered pairs

(ii) a table

(iii) an arrow diagram

(iv) a graph

Answer : f: A ⟶ B

f(x) = $\frac{x}{2}$-1,

f(2) = $\frac{2}{2} - 1 = 0$

f(2) = $\frac{4}{2} - 1 = 1$

f(2) = $\frac{6}{2} - 1 = 2$

f(2) = $\frac{8}{2} - 1 = 4$

f(2) = $\frac{12}{2} - 1 = 5$

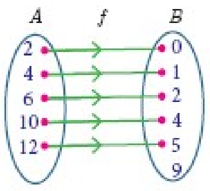
A = {2,4,6,10,12} B = {0,1,2,4,5,9}

(i) Set of ordered pairs

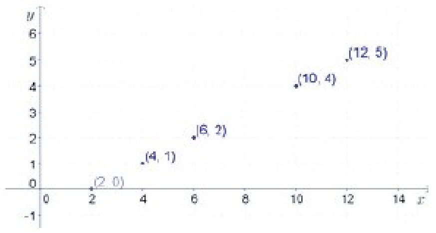
= {(2,0),(4,1),(6,2),(10,4),(12,5)}

(ii) Table

x	2	4	6	10	12
f(x)	0	1	2	4	5

(iii) Arrow diagram 

(iv) Graph



31) If f(x) = x^2, g(x) = 3x and h(x) = x - 2, Prove that (f o g) o h = f o (g o h).

Answer : f(x) = x^2, g(x) = 3x, h(x) = x - 2

f o g = f [g(x)] = f (3x)

= $(3x)^2$ - $9x^2$

(f o g) o h = (f o g) [h (x)] = (f o g) [x - 2]

= 9 (x - 2)^2

g o h = g [h (x)] = g[x - 2] = 3 (x - 2)

f o (g o h) = f [g (h(x))]

= f [3(x - 2)] = [3(x - 2))]^2 = 9 (x - 2)^2

(f o g) o h = f o(g o h)

Hence proved.

32) The 13th term of an A.P is 3 and the sum of the first 13 terms is 234.Find the common difference and the sum of first 21 terms.

Answer : Given the 13th term = 3 so, t_{13} = a + 12d = 3..... (1)

Sum of first 13 terms = 234 gives $\frac{13}{2}$ [2a + 12d] = 234

2a + 12 = 36...(2)

Solving (1) and (2) we get , a = 33, d = $\frac{-5}{2}$

Therefore, common difference is $\frac{-5}{2}$.

Sum of first 21 terms S_{21} = $\frac{21}{2}\left[2 \times 33 + (21-1) \times \left(-\frac{5}{2}\right)\right] = \frac{21}{2}$[66 - 50] = 168.

33) Find the sum to n terms of the series

3 + 33 + 333 + ...to n terms

Answer : 3 + 33 + 333 + ... to n terms.

Let S_n = 3 + 33 + 333 + ...upto n terms

= 3(1 + 11 + 111 + ... to n terms)

= $\frac{3}{9}$ (9 + 99 + 999 + ... to n terms)

(multiply and divide by 9)

= $\frac{1}{3}$3[(10 - 1) + (100 - 1) + (1000 - 1) + to n terms]

= $\frac{1}{3}$ [(10 - 1) + (10^2 - 1) + (10^3 - 1) +... + n upto n terms]

= $\frac{1}{3}$ {[10 + 10^2 + 10^3 +...upto n terms] - n}

10 + 10^2 +... is a G.P. with a = 10, r = 10.

$$\therefore S_n = \frac{a(r^n - 1)}{r - 1}$$

$$S_n = \frac{1}{3}\left\{\left[\frac{10(10^n - 1)}{10 - 1}\right] - n\right\}$$

$$= \frac{1}{3}\left[\frac{10(10^n - 1)}{9} - n\right]$$

$$= \frac{10}{27}(10^n - 1) - \frac{n}{3}$$

3 + 33 + 333 + ... to n terms $= \frac{10}{27}(10^n - 1) - \frac{n}{3}$

34) There are 12 pieces of five, ten and twenty rupee currencies whose total value is Rs.105. When first 2 sorts are interchanged in their numbers its value will be increased by Rs.20. Find the number of currencies in each sort.

Answer : Let the number of five, ten and twenty rupee currencies be x, y and z respectively.

Given x + y + z = 12 ...(1)

5x + 10y + 20z = 105 ...(2)

10x + 5y + 20z = 125 ...(3)

Consider (2) and (3)

5x + 10y + 20z = 105 ... (2)

10x + 5y + 20z = 125 ... (3)

(2) – (3) ⇒ –5x + 5y = – 20 ... (4)

Consider (1) and (2)

(1) × 20 ⇒ 20x + 20y + 20z = 240 ... (5)

(2) × 1 ⇒ 5x + 10y + 20z = 105 ... (2)

(5) – (2) ⇒ 15x + 10y = 135 ... (6)

Consider (4) and (6)

(4) × 3 ⇒ –15x + 15y = –60 ... (7)

15x + 10y = 135 ... (6)

25y = 75

$y = \frac{75}{25} = 3$

Substitutingy= 3 in (4)

-5x + 5(3) = -20

-5x = - 20 - 15

-5x = -35

$$x = \frac{35}{5} = 7$$

Substituting x - 7,y = 3 in (1)

7 + 3 + z = 12

z = 12 - 10 = 2

The number of five rupee currencies 7

The number of ten rupee currencies 3

The number of twenty rupee currencies 2

35) The roots of the equation $x^2 + 6x - 4 = 0$ are α, β. Find the quadratic equation whose roots are α^2 and β^2

Answer : If the roots are given, the quadratic equation is X^2 - (sum of the roots) x + product the roots =0. For the given equation.

$x^2 - 6x - 4 = 0$

$\propto + \beta = -6$

$\propto\beta = -4$

$\propto^2 + \beta^2 = (\propto+\beta)^2 - 2\propto\beta$

$= (-6)^2 - 2(-4) = 36 + 8 = 44$

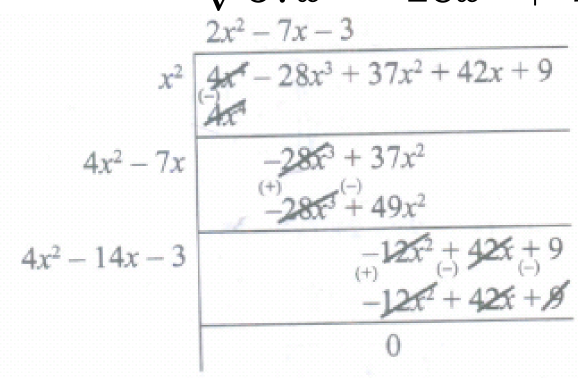
$\propto^2\beta^2 = (\propto\beta)^2 = (-4)2 = 16$

∴ The requird equation = $x^2 - 44x + 16 = 0$

36) Find the square root of the following polynomials by division method

$37x^2 - 28x^3 + 4x^4 + 42x + 9$

Answer : $\sqrt{37x^2 - 28x^3 + 4x^4 + 42x + 9} = ?$



$\therefore \sqrt{37x^2 - 28x^3 + 4x^4 + 42x + 9}$

$= |2x^2 - 7x - 3|$

37) Basic Proportionality Theorem (BPT) or State and prove Thales theorem?

Answer : Statement

A straight line drawn parallel to a side of triangle intersecting the other two sides, divides the sides in the same ratio.

Proof

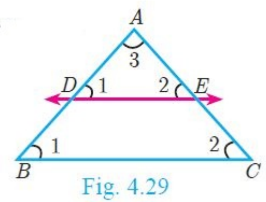


Fig. 4.29

In ΔABC ,D is a point on AB and E is a point on AC

To prove : $\frac{AD}{DB} = \frac{AE}{EC}$

Construction: Draw a line DE || BC

No.	Statement	Reason
1.	$\angle ABC = \angle ADE = \angle 1$	Corresponding angles are equal because DE || BC
2.	$\angle ACB = \angle AED = \angle 2$	Corresponding angles are equal because DE || BC
3.	$\angle DAE = \angle BAC = \angle 3$	Both triangles have a common angle
4.	$\Delta ABC \sim \Delta ADE$	By AAA similarity
	$\frac{AB}{AD} = \frac{AC}{CE}$	Corresponding sides are proportional
	$\frac{AD+DB}{AD} = \frac{AE+EC}{AE}$	Split AB and AC using the points D and E.
	$1 + \frac{DB}{AD} = 1 + \frac{EC}{AE}$	On simplification
	$\frac{DB}{AD} = \frac{EC}{AE}$	Cancelling 1 on both sides
	$\frac{AD}{DB} = \frac{AE}{EC}$	Taking reciprocals
		Hence proved

38) Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) and (-4, 3).

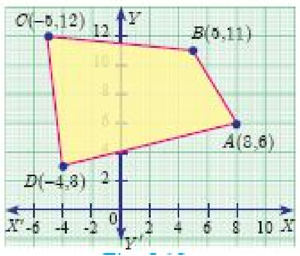
Answer : Before determining the area of quadrilateral, plot the vertices in a graph.
Let the vertices be A(8, 6), B(5, 11), C(-5, 12) and D(-4, 3).
Therefore, area of the quadrilateral ABCD

$=\frac{1}{2}\{(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\}$

$=\frac{1}{2}\{(80 + 60 - 15 - 24) - (30 - 55 - 48 + 24)\}$

$=\frac{1}{2}\{109 + 49\}$

$=\frac{1}{2}\{158\} = 79$ sq.units



39) Find the equation of a straight line Passing through (1, -4) and has intercepts which are in the ratio 2:5

Answer : Given that intercepts are in the ratio 2 : 5

$\frac{a}{b} = \frac{2}{5}$

$a = \frac{2b}{5}$

Equation of the line in Interceps form is $\frac{x}{a} + \frac{y}{b} = 1$

$\frac{x}{\left(\frac{2b}{5}\right)} + \frac{y}{b} = 1$

$\frac{5x}{2b} + \frac{y}{b} = 1$

5x + 2y = 2b

This passes through (1, - 4)

5(1) + 2(-4) = 2b

$5 - 8 = 2b \Rightarrow b = -\frac{3}{2}$

$a = \frac{2b}{5} = \frac{2\left(-\frac{3}{2}\right)}{5} = -\frac{3}{5}$

Equation of a straight line is

$\frac{x}{a} + \frac{y}{b} = 1 \Rightarrow \frac{x}{\left(-\frac{3}{5}\right)} + \frac{y}{\left(-\frac{3}{2}\right)} = 1$

$\frac{5x}{-3} + \frac{2y}{-3} = 1$

5x + 2y + 3 = 0.

40) Find the equation of the perpendicular bisector of the line joining the points A(-4, 2) and B(6, -4).

Answer : Given points A(- 4, 2) and B(6, - 4)

Mid point of AB $= \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= \left(\frac{-4+6}{2}, \frac{2-4}{2}\right) = (1, -1)$

slope of AB = $\frac{y_1-y_2}{x_1-x_2} = \frac{2+4}{-4-6} = \frac{6}{-10} = \frac{-3}{5}$

Slope of perpendicular line = $\frac{5}{3}$

Perpendicular bisector is passing through (1, -1) and having slope $\frac{5}{3}$

The equation of perpendicular bisector is

$y - y_1 = m(x - x_1)$

y + 1 = $\frac{5}{3}(x - 1)$

3y + 3 = 5x - 5

5x - 3y - 8 = 0

41) if cot θ + tanθ = x and secθ - cosθ = y, then prove that $\left(x^2y\right)^{\frac{2}{3}} - \left(xy^2\right)^{\frac{2}{3}} = 1$

Answer : We have $\cot\theta + \tan\theta = x$

$\sec\theta - \cos\theta = y$

Taking $\cot\theta + \tan\theta = x$

$\frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\cos\theta} = x$

$\frac{\cos^2\theta + \sin^2\theta}{\sin\theta\cos\theta} = x \frac{1}{\sin\theta\cos\theta} = x$

$\sec\theta - \cos\theta = y$

$\frac{1}{\cos\theta} - \cos\theta = y$

$\frac{1-\cos^2\theta}{\cos\theta} = y$

$\frac{\sin^2\theta}{\cos\theta} = y$

Now

$= \left[\left(\frac{1}{\cos\theta\sin\theta}\right)^2\left(\frac{\sin^2\theta}{\cos\theta}\right)\right]^{\frac{2}{3}} - \left[\left(\frac{1}{\cos\theta\sin\theta}\right)\left(\frac{\sin^4\theta}{\cos^2\theta}\right)\right]^{\frac{2}{3}}$

$= \left[\frac{1}{\cos^2\theta\sin^2\theta} \times \frac{\sin^2\theta}{\cos\theta}\right]^{\frac{3}{3}} - \left[\frac{1}{\cos\theta\sin\theta} \times \frac{\sin^4\theta}{\cos^2\theta}\right]^{\frac{3}{3}}$

$= \left(\frac{1}{\cos^3\theta}\right)^{\frac{2}{3}} - \left(\frac{\sin^3\theta}{\cos^3\theta}\right)^{\frac{2}{3}}$

$= \frac{1}{\cos^2\theta} - \frac{\sin^2\theta}{\cos^2\theta}$

$= \sec^2\theta - \tan^2\theta$

= 1 = RHS

42) Swathi has 15 ice cubes different sizes 9cm, 10 cm, 11cm................ 23 cm .How much volume of ice cubes can be used to prepare some fruit juice with these ice cubes?

Answer : $9^3 + 10^3 + ... + 23^3 = (1 + 2^3 + 3^3 + ... + 23^3) - (1^3 + 2^3 + 3^3 + ... + 8^3)$

$= \left[\frac{23\times(23+1)}{2}\right]^2 - \left[\frac{8\times(8+1)}{2}\right]^2 = (276)^2 - (36)^2 = 76176 - 1296 = 74880$ cm^3

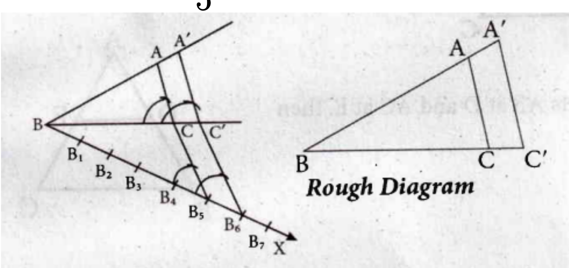
PART- D

4 x 8 = 32

Answer all thequestions.

43) a) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC (scale factor $\frac{6}{5} > 1$).

Answer : Given a triangle ABC, we are required to construct another triangle whose sides are $\frac{6}{5}$ of the corresponding sides of the ABC



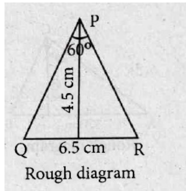
Steps of construction:

1. Constructed a ABC with any measurement
2. Drawn a ray BX making an acute angle with BC on the side opposite to the vertex A.
3. Joined B_5 to C and drawn a line through B_6 parallel to B_5C intersecting the extended line segment BC at C.
4. Drawn a line through C' parallel to CA intersecting the extended BA at A'.
5. Then A'BC' is the required triangle each of whose sides is six fifths of the corresponding sides of ABC.

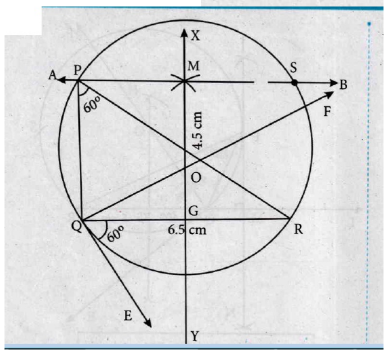
(OR)

b) Construct a △PQR such that QR = 5 cm,∠P = 30°and the altitude from P to QR is of length 4.2 cm.

Answer :



Rough diagram



Construction:

Steps (1) Draw QR = 6.5 cm.

Steps (2) Draw $\angle RQE = 60^0$

Steps (3) Draw $\angle FQE = 90^0$

Steps (4) Drawn the perpendicular bisector Xy to eR which intersects QF at O and eR at G.

Steps (5) With O as center and OQ as radius drawn a circle

Steps (6) XY intersects QR at G. On XY, from G marked an arc at M, such that GM = 4.5 cm

Steps (7) Drawn AB through M which is parallel to QR

Steps (8) AB meets the circle at P and S

Steps (9) Joined QP and RP Then △PQR is the required triangle.

Steps (10) Here △SQR is also another required triangle.

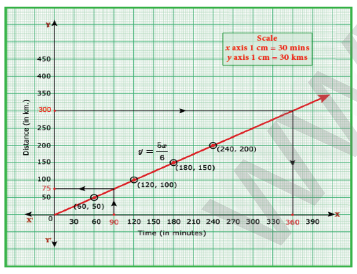
44) a) A bus is travelling at a uniform speed of 50 km/hr. Draw the distance-time graph and hence find

(i) the constant of variation

(ii) how far will it travel in $\frac{1}{2}$

(iii) the time required to cover a distance of 300 km from the graph.

Answer :



Let x be the time taken in minutes and y be the distance travelled in km.

Time taken **x** (in minutes)	60	120	180	240
Distance **y** (in km)	50	100	150	200

(i) Observe that as time increases, the distance travelled also increases. Therefore, the variation is a direct variation. It is of the form y = kx .

Constant of variation

$k = \frac{y}{x} = \frac{50}{60} = \frac{100}{120} = \frac{150}{180} = \frac{200}{240} = \frac{5}{6}$

Hence, the relation may be given as

$y = kx \;\Rightarrow\; y = \frac{5}{6}x$

(ii) From the graph, $y = \frac{5x}{6}$, if x = 90 , then $y = \frac{5}{6} \times 90 = 75$ km

The distance travelled for $1\frac{1}{2}$hours (i.e.,) 90 minutes is 75 km.

(iii) From the graph, $y = \frac{5x}{6}$, if $y = 300$ then $x = \frac{6y}{5} = \frac{6}{5} \times 300 = 360$ minutes (or) 6 hours.

The time taken to cover 300 km is 360 minutes, that is 6 hours.

(OR)

b) The following table shows the data about the number of pipes and the time taken to till the same tank.

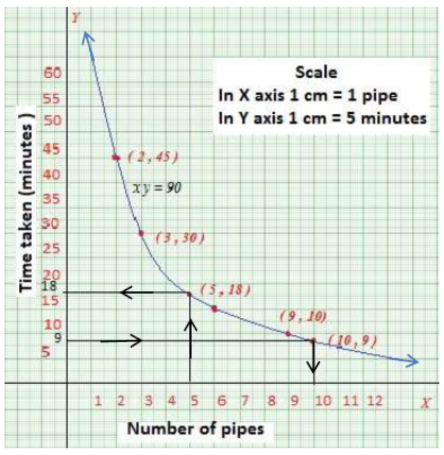
No\of pipes (x)	2	3	6	9
Time Taken (in min) (y)	45	30	15	10

Draw the graph for the above data and hence

(i) find the time taken to fill the tank when five pipes are used

(ii) Find the number of pipes when the time is 9 minutes.

Answer :



1.Table

No. of pipes (x)	2	3	6	9
Time taken (in minutes) (y)	45	30	15	10

2. Variation

Indirect Variation

3. Equation

xy = k

xy = 2 x 45 = 3 x 30 = 6 x 15 = ... = 90

xy = 90

4. Points

(2, 45),(3, 30),(6, 15),(9, 10)

5. Solution

(i) Time taken to fill the tank if using 5 pipes = 18 minutes

(ii) Number of pipes used if the tank fills up in 9 minutes = 10 pipes