Ravi Maths Tuition

9TH CBSE MATHS TEST

9th Standard

Mathematics

1) Find three rational numbers $\frac{3}{5}$ and $\frac{7}{8}$ **Answer**: $\frac{3}{5} = \frac{3 \times 8}{5 \times 8} = \frac{24}{40}$ $\frac{7}{8} = \frac{7 \times 5}{8 \times 5} = \frac{35}{40}$ $\therefore 24 < 25 < 26 < 27 < 35$ $\therefore \frac{24}{40} < \frac{25}{40} < \frac{26}{40} < \frac{27}{40} < \frac{35}{40}$ Hence, three rational numbers between $\frac{3}{5}$ and $\frac{7}{8}$ can be taken as $\frac{25}{40}, \frac{26}{40}$ and $\frac{27}{40}$ $\frac{5}{8}, \frac{13}{20}$ and $\frac{27}{40}$

2) Find the values of a and b if: $rac{7+3\sqrt{5}}{3+\sqrt{5}}-rac{7-3\sqrt{5}}{3-\sqrt{5}}=a+\sqrt{5}b$

$$\begin{array}{l} \operatorname{Answer}: \ \frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}} = a + \sqrt{5}b \\ \frac{(7+3\sqrt{5})(3-\sqrt{5})}{(3+\sqrt{5})(3-\sqrt{5})} - \frac{(7+3\sqrt{5})(3+\sqrt{5})}{(3+\sqrt{5})(3+\sqrt{5})} \\ = \frac{21-7\sqrt{5}+9\sqrt{5}-15}{9-5} - \frac{21+7\sqrt{5}+9\sqrt{5}-15}{9-5} \\ = a + 5\sqrt{b} \\ \frac{6+2\sqrt{5}}{4} - \frac{6-2\sqrt{5}}{4} = a + \sqrt{5}b \\ = \frac{(6+2\sqrt{5})-(6-2\sqrt{5})}{4} = a + \sqrt{5}b \\ \frac{4\sqrt{5}}{4} = a + \sqrt{5}b \\ \sqrt{5} = a + \sqrt{5}b \\ a = 0, b = 1 \end{array}$$

- $^{3)}$ Evaluate: $\left(\sqrt{2}+\sqrt{3}
 ight)^2-\left(\sqrt{5}+\sqrt{2}
 ight)^2$ Answer : $2(\sqrt{10}+\sqrt{6}-1)$
- 4) Express $1.\overline{32} + 0.\overline{35}$ in the form of $\frac{p}{q}$, where p and q are integers and q≠0.

Answer:
$$1.3\bar{2} = \frac{119}{90}$$

 $0.\overline{35} = \frac{35}{99}$
 $1.3\bar{2} + 0.\overline{35} = \frac{1659}{990}$

5) Prove that $\frac{1}{3+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{3}} + \frac{1}{\sqrt{3}+1} = 1$

Answer:
$$\frac{1}{3+\sqrt{7}} = \frac{1}{3+\sqrt{7}} \times \frac{3-\sqrt{7}}{3-\sqrt{7}} = \frac{3-\sqrt{7}}{9-7} = \frac{3-\sqrt{7}}{2}$$

 $\frac{1}{\sqrt{7}+\sqrt{5}} = \frac{1}{\sqrt{7}+\sqrt{5}} \times \frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}-\sqrt{5}} = \frac{\sqrt{7}-\sqrt{5}}{2}$
 $\frac{1}{\sqrt{5}+\sqrt{3}} = \frac{1}{\sqrt{5}+\sqrt{3}} \times \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{\sqrt{5}-\sqrt{3}}{5-3}$
 $= \frac{\sqrt{5}-\sqrt{3}}{2}$
 $\frac{1}{\sqrt{3}+1} = \frac{1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{\sqrt{3}-1}{3-1} = \frac{\sqrt{3}-1}{2}$
 $LHS = \frac{3-\sqrt{7}}{2} + \frac{\sqrt{7}-\sqrt{5}}{2} + \frac{\sqrt{5}-\sqrt{3}}{2} + \frac{\sqrt{3}-1}{2}$
 $= \frac{3-1}{2} = \frac{2}{2} = 1 = RHS$

$$^{6)}$$
 $\,\,$ If $p(x)\,=x^2-4x+3,$ evaluate $p(2)-p(-1)+p(1/2).$

Answer:
$$p(2) = (2)^2 - 4(2) + 3 = 4 - 8 + 3 = -1$$

 $p(-1) = (-1)^2 - 4(-1) + 3 = 1 + 4 + 3 = 8$
 $p\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 - 4\left(\frac{1}{2}\right) + 3$
 $= \frac{1}{4} - 2 + 3 = \frac{5}{4}$
 $\therefore p(2) - p(-1) + p\left(\frac{1}{2}\right)$
 $= -1 - 8 + \frac{5}{4} = \frac{-31}{4}$

Using suitable identify, find the value of $rac{87^3+13^3}{87^2-87 imes13+13^3}$

Answer:
$$\frac{87^3 + 13^3}{87^2 - 87 \times 13 + 13^3} = \frac{(87 + 13(87^2 - 87 \times 13 + 12^2))}{(87^2 - 87 \times 13 + 13^2)}$$

= 87+13=100

⁸⁾ If the polynomial $2x^3+ax^2+7x-6$ is exactly divisible by 2x-1, then find the value of a. Hence factorize the polynomial.

Answer: Let
$$p(x)=2x^3+ax^2+7x-6$$

 $p(x)$ is divisble by 2x-1
 $\Rightarrow p\left(\frac{1}{2}\right) = 0$
 $p\left(\frac{1}{2}\right) = p\left(\frac{1}{2}\right)^3 + a\left(\frac{1}{2}\right)^2 + 7\left(\frac{1}{2}\right) - 6 = 0$
 $\Rightarrow 2 \times \left(\frac{1}{8}\right) + a\left(\frac{1}{4}\right) + 7\left(\frac{1}{2}\right) - 6 = 0$
 $\Rightarrow \frac{1}{4} + \frac{a}{4} + \frac{7}{2} - 6 = 0$
 $\Rightarrow \frac{a}{4} - \frac{9}{4} = 0$
 $\Rightarrow a = 9$
 $\therefore p(x)=2x^3+ax^2+7x-6$
 $\frac{x^3+5x+6}{2x-1)2x^3+9x^2+7x-6}$
 $\frac{-+}{10x^2-5x}$
 $\frac{-+}{10x^2-5x}$
 $\frac{-+}{12x-6}$
 $\frac{-+}{0}$
 $\therefore x^2+5x+6=(x+2)(x+3)$

Hence p(x)=(2x-1)(x+2)(x+3)

⁹⁾ Find the value of 'a' if remainder is same when polynomial $p(x)=x^3+8x^2+17x+ax$ is divided by (x+2) and (x+1)

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Answer: p(x)=x^3+8x^2+17x+ax

p(x) leave the same remainder when divided by (x+2) and (x+1).

p(-2)=(-2)^3+8(-2)^2+17(-2)+a-(-2)

= -8+32-34-2a

= -10-2a

\therefore Remainders are equal

So, -10-2a=-10-a

\Rightarrow -a = 0

\therefore a = 0
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¹⁰⁾ Without plotting the points, indicate the quadrants in which they will lie, if

- (i) ordinate is 5 and abscissa is -3.
- (ii) abscissa is -5 and ordinate is -3.
- (iii) abscissa is -5 and ordinate is 3.
- (iv) ordinate is 5 and abscissa is 3.

Answer: (i) II quadrant (ii) III quadrant (iii) II quadrant (iv) I quadrant

¹¹⁾ Find three different solutions of the Table of solutions equation: 4x + 3y = 12, from its graph.

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Answer: The given equation is
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$$4x + 3y = 12 \dots(i)$$

$$\Rightarrow 3y = 12 - 4x \dots(ii)$$

$$\Rightarrow y = \frac{12 - 4x}{3}$$
Table of solution
$$\boxed{X|30}$$

$$\boxed{Y|04}$$

We plot the points (3, 0) and (0, 4) on a graph paper and join the same by a ruler to get the line which is the graph of the equation 4x + 3y = 12



Three different solutions of the equation 4x + 3y = 12 from the graph are (0, 4), (3, 0) and (6,-4).

¹²⁾ A cylinder 3 m high, is open at the top. The circumference of its base is 22 cm. Find its total surface area. $(Take\pi = \frac{22}{7})$

Answer: Let the base radius of the cylinder be r cm. Then,

$$2\pi r = 22$$

$$\Rightarrow 2 \times \frac{22}{7} \times r = 22$$

$$\Rightarrow r = \frac{7}{2}$$

$$h = 3m$$

$$\therefore \text{ Total surface area}$$

$$= 2\pi rh + \pi r^{2}$$

$$= 2 \times \frac{22}{7} \times \frac{7}{2} \times 3 + \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$

$$= 66 + 38.5$$

$$= 104.5m^{2}$$

¹³⁾ A vessel is in the shape of a cone. Radius of the broader end is 2.1 cm and height is 20 cm. Find the volume of the vessel.

Answer : r = 2.1 cm, h = 20 cm ∴ Volume of the vessel $= \frac{1}{3}\pi r^2 h = \frac{1}{3}\frac{22}{7}(2.1)^2 (20) = 92.4cm^3$

¹⁴⁾ Find the curved surface area of a cone whose area of the base and height are 154 cm² and 24 cm, respectively.

Answer : Area of base,
$$\pi r^2=154\Rightarrow r^2=rac{154 imes 7}{22}\Rightarrow r=7\Rightarrow l=\sqrt{\left(24
ight)^2+\left(7
ight)^2}=25cm^2$$

Curved surface area = π rl

¹⁵⁾ The following table gives the performance of 90 students in a mathematics test of 100 marks.

WARKS	NUMBER OF STUDENTS
0-20	07
20-30	10
30-40	10
40-50	20
50-60	20
60-70	15
70-above	08
Total	90

Represent the given information with the help of a histogram.

Answer	: Adjusted frequency a d	class <u>M</u>	<u>linimum class size</u> Class size	imes Frequency	$of\ the\ class$
	Minimum class size =	10			
MARKS	NUMBER OF STUDENTS	ADJUS	TED FREQUENCY		
0-20	07	$\frac{10}{20}$	imes 7 = 3.5		
20-30	10	$\frac{10}{10}$	imes 10 = 10		
30-40	10	$\frac{10}{10}$	imes 10 = 10		
40-50	20	$\frac{10}{10}$	imes 20 = 20		
50-60	20	$\frac{10}{10}$	imes 20 = 20		
60-70	15	$\frac{10}{10}$	imes 15 = 15		
70-80	08	$\frac{10}{10}$	imes 08 = 08		
Y 20-	n an an Anna Anna Anna Anna Anna Anna A			a	



16) 1500 families with 2 children were released randomly and the following data was recorded:

No.of girls	No.of.families
0	211
1	814
2	475

If a family is chosen at random, find the probability that it has

(i) at most one girl

(ii) at least one girl

Answer: Total number of families = 1500

(i) at most one girl means 0 girl or 1 girl.

Number of families which have at most one girl

= Number of families which have 0 girl + Number of families which have 1 girl.

= 211 + 814 = 1015

Probability that it has at most one girl= $\frac{1015}{1500} = \frac{203}{300}$

(ii) at least one girl means 1 girls or 2 girls.

Number of families which have at least one girl

= Number of families which have I girl + Number of families which have 2 girls.

= 814 + 475 = 1289

Probability that it has at least one girl= $\frac{1289}{1500}$

17) Without actually calculating the cubes, find the calue of $\left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 - \left(\frac{5}{6}\right)^3$

Answer: 0