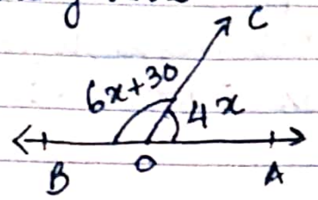
IX Revision

1) Find the value of $\left(\frac{x^q}{x^r}\right)^{\frac{1}{qr}} \times \left(\frac{x^r}{x^p}\right)^{\frac{1}{rp}} \times \left(\frac{x^p}{x^q}\right)^{\frac{1}{pq}}$

2) Find the mirror image of the point (3,2) with respect to the y-axis.

3)



If AOB a line, find the value of x

4) The class mark of the class 16–24 is ___

5) State T/F with reason

(i) Product of a rational and an irrational number is always irrational.

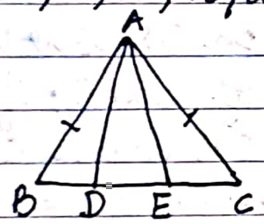
(ii) The graph of linear equation $2x+3y=6$ cuts y-axis at the point (0,3)

(iii) If side of an equilateral Δ is 'a' cm and its altitude is 3a.

6) Construct a frequency distribution table for the following ages (in years) of 30 students using equal class intervals one of them being 9–12, where 12 is not included.

18, 12, 7, 6, 11, 15, 21, 9, 13, 8, 15, 17, 19, 22, 14, 21, 8, 23, 12, 17, 6, 18, 15, 23, 16, 22, 9, 21, 16, 11

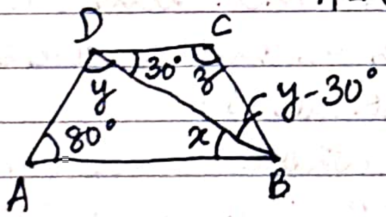
7)



In an isosceles ΔABC with $AB = AC$, D and E are points on BC such that $BE = CD$. Show that $AD = AE$

8) Simplify: $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$

9)



AB || CD

10) In a parallelogram, S.T the angle bisectors of two adjacent angles intersect at right angles.

11) Draw the graph of the linear equation $x-5y+14=0$ and determine the coordinates of the point on the graph whose abscissa is $1\frac{1}{2}$ times its ordinate.

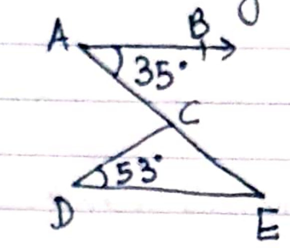
12) $\sqrt[4]{\sqrt[3]{2^2}} =$ (a) $2^{-\frac{1}{6}}$ (b) 2^{-6} (c) $2^{\frac{1}{6}}$ (d) 2^{6}

13) The mean of $x-1, x+1, x+3$ and $x+5$ is
(a) $x+1$ (b) $x+2$ (c) $x+3$ (d) $x+4$

14) Convert $2.7434343\ldots$ in the form $\frac{p}{q}$

15) The longest side of a right angled triangle is 125m and one of the remaining two sides is 100m. Find its area using Heron's formula.

16)



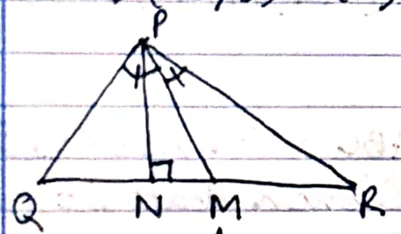
find $\angle DCE$ and $\angle DEC$

17) If $a = 5+2\sqrt{6}$, find the value of $a^2 + \frac{1}{a^2}$

18) The polynomials $ax^3 - 3x^2 + 7$ and $2x^3 + 7x - 2a$ are divided by $x+3$. If the remainders in each case is same, find the value of a.

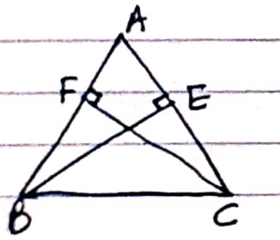
19) In which quadrant or on which axis the following points lie?
(i) $(-3,5)$ (ii) $(4,-1)$ (iii) $(5,0)$

20)



M is the mid-point on QR such that PM is the bisector of $\angle QPR$, if the $\perp$ from P on QR meets QR at N, then P.T $\angle MPN = \frac{1}{2}(\angle Q - \angle R)$

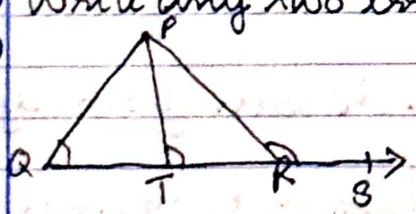
21)



ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. S.T $\triangle ABC$ is an isosceles $\triangle$.

22) Write any two irrational numbers whose sum is an integer.

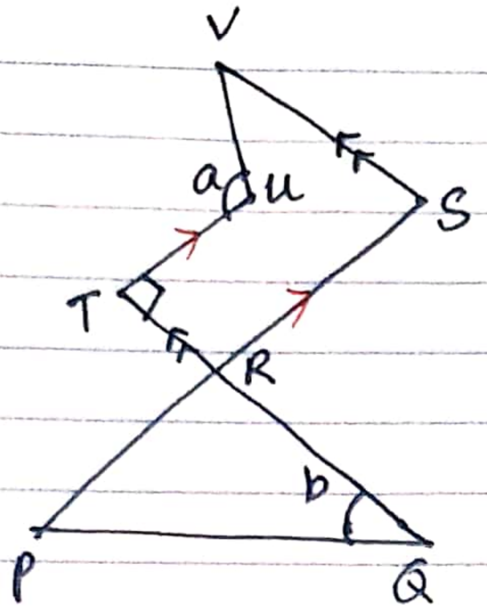
23)



Side QR of $\triangle PQR$ is produced to a point S. The bisector of $\angle P$ meets QR at T. Prove that $\angle PQR + \angle PRS = 2\angle PTR$

24) If $x = \frac{\sqrt{2}+1}{\sqrt{2}-1}$; $y = \frac{\sqrt{2}-1}{\sqrt{2}+1}$, find the value of $x^2 + xy + y^2$

25)



$UT \perp TR$

$\angle SPQ = 50^\circ$

$\angle UVS = 25^\circ$

$TU \parallel RS$, $TR \parallel VS$, then find a and b.

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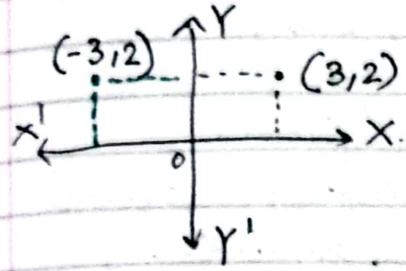
IX **Revision** (17th Sept - Answers)

1) $\dfrac{x^{q\times\frac{1}{qr}}}{x^{r\times\frac{1}{qr}}} \times \dfrac{x^{r\times\frac{1}{rp}}}{x^{p\times\frac{1}{rp}}} \times \dfrac{x^{p\times\frac{1}{pq}}}{x^{q\times\frac{1}{pq}}}$

$= \dfrac{\cancel{x^{\frac{1}{r}}}}{\cancel{x^{\frac{1}{q}}}} \times \dfrac{\cancel{x^{\frac{1}{p}}}}{\cancel{x^{\frac{1}{r}}}} \times \dfrac{\cancel{x^{\frac{1}{q}}}}{\cancel{x^{\frac{1}{p}}}} = \underline{\underline{1}}$

2) 

The mirror image of (3,2) with respect to y-axis is (-3,2)

3) $6x + 30° + 4x = 180°$ (linear pair)

$10x = 180° - 30° = 150°$

$\therefore x = \dfrac{150°}{10°} = 15$ //

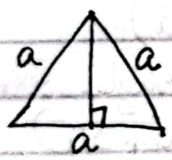
4) Class mark $= \dfrac{\text{lowerlimit} + \text{upperlimit}}{2} = \dfrac{16+24}{2} = \dfrac{40}{2} = \underline{\underline{20}}$

5) (i) F, $0 \times \sqrt{3} = 0$, a rational number. F

(ii) when $x = 0$, $3y = 6$

$y = \dfrac{6}{3} = 2$

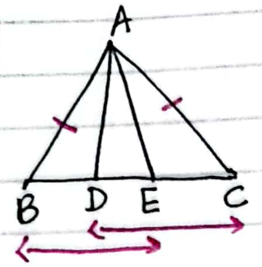
The given line cuts the y-axis at (0, 2) F

(iii) 

altitude $= \dfrac{\sqrt{3}a}{2}$ F

6)

Class interval	Tally marks	Frequency
6-9	卌	5
9-12	IIII	4
12-15	IIII	4
15-18	卌 II	7
18-21	III	3
21-24	卌 II	7
		30

7) 

Given: in isosceles $\triangle ABC$, $AB = AC$
$BE = CD$

To prove: $AD = AE$

Proof:- $BE = CD$ (given)
$\Rightarrow BE - DE = CD - DE$
$\Rightarrow BD = CE \rightarrow (1)$

Also, $AB = AC \Rightarrow \angle ABC = \angle ACB$ [angles opposite to equal sides]
$\Rightarrow \angle ABD = \angle ACE \rightarrow (2)$

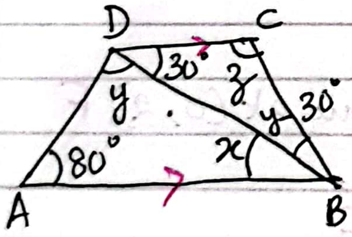
In $\triangle ABD$ and $\triangle ACE$, $AB = AC$ (given)
$\angle ABD = \angle ACE$ [from eq: (2)]
$BD = CE$ (from eq: (1))
$\therefore \triangle ABD \cong \triangle ACE$ (SAS congruency)

Thus $AD = AE$ (by CPCT)

Hence Proved.

8) $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}} = \frac{(4+\sqrt{5})^2}{(4)^2-(\sqrt{5})^2} + \frac{(4-\sqrt{5})^2}{(4)^2-(\sqrt{5})^2}$

$= \frac{16+5+\cancel{8\sqrt{5}}+16+5-\cancel{8\sqrt{5}}}{16-5} = \frac{42}{11}$

9) 

$x = 30°$ (alternate interior angles, $AB \parallel DC$ and DB is the transversal).

In $\triangle ADB$, using angle sum property, $y = 180° - (80° + x) = 180° - (80° + 30°)$
$= 180° - 110° = 70°$

In $\triangle DCB$, $y - 30° = 70° - 30° = 40°$

Using angle sum property, $z = 180° - (30° + 40°)$
$= 180° - 70°$
$= 110°$

$\therefore x = 30°$
$y = 70°$
$z = 110°$

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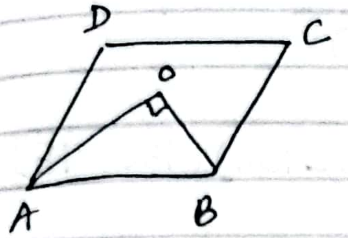
10) 

Given: in ||gm ABCD,
OA bisects $\angle A$
OB bisects $\angle B$.

To prove: $\angle AOB = 90^\circ$

Proof:- $\angle A + \angle B = 180^\circ$ (adjacent angles of a ||gm)

$\Rightarrow \frac{1}{2}\angle A + \frac{1}{2}\angle B = \frac{1}{2}\times 180^\circ$

$\Rightarrow \angle OAB + \angle OBA = 90^\circ$ [$\because$ OA bisects $\angle A$; OB bisects $\angle B$] $\rightarrow (1)$

Using angle sum property in $\triangle AOB$,

$(\angle OAB + \angle OBA) + \angle AOB = 180^\circ$

$90^\circ + \angle AOB = 180^\circ$ [from eq:(1)]

$\therefore \angle AOB = 180^\circ - 90^\circ = 90^\circ$

Hence proved.

11) -

12) $\sqrt[4]{\sqrt[3]{2^2}} = 2^{\cancel{2}^{1}\times\frac{1}{3}\times\frac{1}{\cancel{4}_{2}}} = 2^{\frac{1}{6}}$ (c)

13) mean $= \dfrac{\text{sum of observations}}{\text{No. of observations}}$

$= \dfrac{x - \cancel{1} + x + \cancel{1} + x + 3 + x + 5}{4} = \dfrac{4x+8}{4} = \dfrac{4(x+2)}{4}$

$= x + 2$ (b)

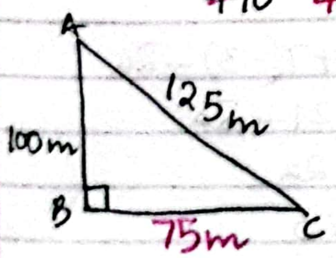
14) Let $x = 2.7434343\ldots$

$10x = 27.434343\ldots \rightarrow (1)$

$1000x = 2743.434343\ldots \rightarrow (2)$

$990x = 2716$

$x = \dfrac{\cancel{2716}\ 1358}{\cancel{990}\ 495} = \dfrac{1358}{495}$, which is in the form $\frac{p}{q}$

15) 

In rt. $\triangle ABC$, using Pythagoras theorem

$BC^2 = AC^2 - AB^2 = 125^2 - 100^2$

$= (125+100)(125-100)$

$= 225 \times 25$

$\therefore BC = \sqrt{225\times 25} = 15\times 5 = 75m$

Let $a = 125m$, $b = 100m$, $c = 75m$

$S = \dfrac{a+b+c}{2} = \dfrac{125+100+75}{2} = \dfrac{300}{2} = 150m$

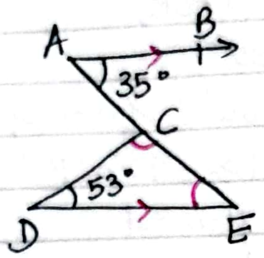
$$\text{Area of } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{150(150-125)(150-100)(150-75)}$$

$$= \sqrt{\underset{25\times6}{150} \times 25 \times \underset{25\times2}{50} \times \underset{25\times3}{75}}$$

$$= 25\times6\times5\times5 = \underline{\underline{3750\,m^2}}$$

16)



$\angle BAE = \angle AED = 35°$ (alternate interior angles, $AB \parallel DE$ and AE is the transversal)

$\therefore \angle DEC = \underline{35°}$

Using angle sum property in ΔCDE,

$$\angle DCE = 180° - (53° + 35°)$$
$$= 180° - 88° = \underline{\underline{92°}}$$

17) $a = 5 + 2\sqrt{6}$

$$\frac{1}{a} = \frac{1}{5+2\sqrt{6}} = \frac{5-2\sqrt{6}}{5^2-(2\sqrt{6})^2} = \frac{5-2\sqrt{6}}{25-24} = 5-2\sqrt{6}$$

$$\therefore a^2 + \frac{1}{a^2} = \left(a+\frac{1}{a}\right)^2 - 2 = (5+\cancel{2\sqrt{6}}+5-\cancel{2\sqrt{6}})^2 - 2$$
$$= 10^2 - 2$$
$$= 100 - 2 = 98 \;//$$

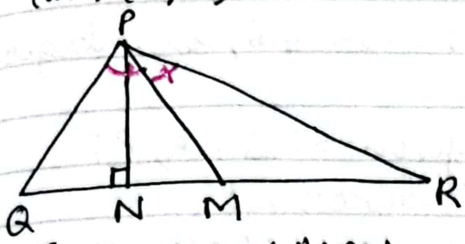
18) Let $p(x) = ax^3 - 3x^2 + 7$ and $g(x) = 2x^3 + 7x - 2a$

ATQ, $p(-3) = g(-3)$

$$\Rightarrow a(-3)^3 - 3(-3)^2 + 7 = 2(-3)^3 + 7(-3) - 2a$$
$$\Rightarrow -27a - 27 + 7 = -54 - 21 - 2a$$
$$\Rightarrow -27a - 20 = -75 - 2a$$
$$\Rightarrow -27a + 2a = -75 + 20$$
$$-25a = -55$$
$$a = \frac{-55}{-25} = \underline{\underline{\frac{11}{5}}}$$

19) (i) $(-3,5) \rightarrow$ II quadrant
(ii) $(4,-1) \rightarrow$ IV quadrant
(iii) $(5,0) \rightarrow$ x-axis

20)



Given: in $\triangle PQR$, $PN \perp QR$
PM bisects $\angle QPR$
ie, $\angle QPM = \angle RPM \longrightarrow (1)$

To prove: $\angle MPN = \frac{1}{2}(\angle Q - \angle R)$

Proof:- Using angle sum property in $\triangle PNQ$,

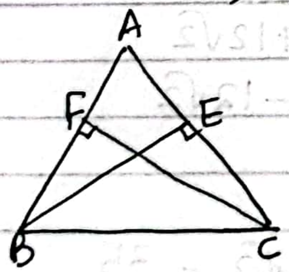
$$\angle PQN + \angle PNQ + \angle QPN = 180^\circ$$
$$\Rightarrow \angle PQN + \angle QPN = 180^\circ - 90^\circ = 90^\circ$$
$$\Rightarrow \angle PQN = 90^\circ - \angle QPN$$
$$\Rightarrow \angle PQN = 90^\circ - (\angle QPM - \angle MPN)$$
$$\Rightarrow \angle PQN = 90^\circ - \angle QPM + \angle MPN \rightarrow (2)$$

Similarly, in $\triangle PNR$, $\angle PNR + \angle NPR + \angle PRN = 180^\circ$
$$\Rightarrow 90^\circ + \angle NPR + \angle PRN = 180^\circ$$
$$\Rightarrow \angle NPR + \angle PRN = 90^\circ$$
$$\Rightarrow (\angle MPN + \angle RPM) + \angle PRN = 90^\circ$$
$$\Rightarrow \angle PRN = 90^\circ - \angle MPN - \angle RPM \rightarrow (3)$$

(2) $-$ (3), $\angle PQN - \angle PRN = \cancel{90^\circ} - \cancel{\angle QPM} + \angle MPN - \cancel{90^\circ} + \angle MPN + \cancel{\angle RPM}$
$[\because \angle QPM = \angle RPM]$

$$\Rightarrow \angle Q - \angle R = 2\angle MPN$$
$\therefore \angle MPN = \frac{1}{2}(\angle Q - \angle R)$. Hence Proved.

21)



Given: $\triangle ABC$, $BE \perp AC$, $CF \perp AB$
$BE = CF$.

To prove:- $\triangle ABC$ is isosceles.

Proof:- In $\triangle ABE$ and $\triangle ACF$, $\angle BAE = \angle CAF$ (common angle)
$\angle BEA = \angle CFA$ (each 90°)
$BE = CF$ (given)
$\therefore \triangle ABE \cong \triangle ACF$ (AAS congruency)

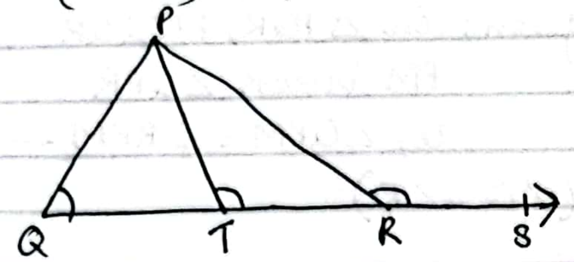
Thus AB = AC (by cpct)

$\Rightarrow \triangle ABC$ is an isosceles $\triangle$ with two sides equal

Hence Proved.

22) $(3+\sqrt{2})+(3-\sqrt{2}) = 3+\cancel{\sqrt{2}}+3-\cancel{\sqrt{2}} = 6$, an integer.

23)



Given: in $\triangle PQR$, PT bisects $\angle P$.

To prove: $\angle PQR + \angle PRS = 2\angle PTR$

Proof :- Since PT bisects $\angle QPR$, $\angle QPT = \angle TPR \longrightarrow (1)$

Using exterior angle property in $\triangle PQT$,

$\angle PQT + \angle QPT = \angle PTR$

$\Rightarrow \angle QPT = \angle PTR - \angle PQT \longrightarrow (2)$

Similarly, in $\triangle PTR$,

$\angle TPR + \angle PTR = \angle PRS$

$\Rightarrow \angle TPR = \angle PRS - \angle PTR \longrightarrow (3)$

From (1), (2) and (3), $\angle PTR - \angle PQT = \angle PRS - \angle PTR$

$\angle PTR + \angle PTR = \angle PQT + \angle PRS$

$2\angle PTR = \angle PQR + \angle PRS$

Hence Proved

24) $x = \dfrac{\sqrt{2}+1}{\sqrt{2}-1} = \dfrac{(\sqrt{2}+1)^2}{(\sqrt{2})^2-1^2} = \dfrac{2+1+2\sqrt{2}}{2-1} = 3+2\sqrt{2}$

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

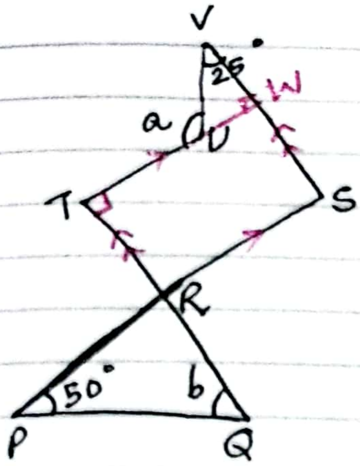
$x^2 = (3+2\sqrt{2})^2 = 9+8+12\sqrt{2} = 17+12\sqrt{2}$

$y^2 = (3-2\sqrt{2})^2 = 9+8-12\sqrt{2} = 17-12\sqrt{2}$

$xy = (3+2\sqrt{2})(3-2\sqrt{2}) = 9-8 = 1$

$\therefore x^2+xy+y^2 = 17+\cancel{12\sqrt{2}}+1+17-\cancel{12\sqrt{2}} = 35$

25)



Construction : Produce TU to W to meet VS at W.

Thus TR || WS and TW || RS and ∠WTR = 90°

∴ TRSW is a rectangle.

Using exterior angle property in △VUW

$a = 25° + 90° = \underline{\underline{115°}}$

∠TRS = ∠PRQ = 90° (VOA)

Using angle sum property in △PQR,

$b = 180° - (50° + 90°) = 180° - 140°$

$= \underline{\underline{40°}}$