Second Mid Term 2017 IX Class (Mathematics) Gurpreet's

1. $m^{a-b+b-c+c-a} = m^0 = 1$ (1)

2. $p(-1) = 10(-1) - 4(-1)^2 - 3 = -10 - 4 - 3 = -17$ (1)

3. Any two $\left(\frac{1}{2} + \frac{1}{2}\right)$

4. Statement (1)

5. Wrong. He has not arranged the data in ascending or descending order $\left(\frac{1}{2}+\frac{1}{2}\right)$

6. $ar.(\Delta QAD) + ar.(\Delta QBC) = \frac{1}{2} ar(\|gm\ ABCD)$

$= \frac{1}{2} \times 84 = 42\ cm^2$ (1)

7. $AC = BD$ (given)

$AC - BC = BD - BC$ (Subtracting equals from both sides) $\longrightarrow$ (1)

$AB = CD$ (Euclid's Axiom) $\longrightarrow$ (1)

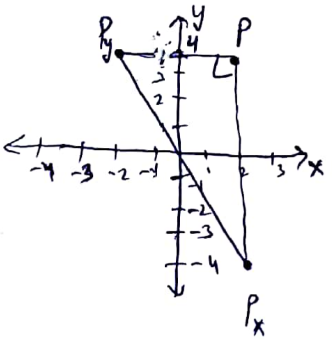
8. $z + 75 + 90 = 180°$ (Co interior angles AB // EF) $\longrightarrow$ $\left(\frac{1}{2}\right)$

$z = 15°$ $\longrightarrow$ $\left(\frac{1}{2}\right)$

$y + 75 = 180°$ (Co interior angles CD // EF)

$y = 105°$ $\longrightarrow$ $\left(\frac{1}{2}\right)$

$x = y = 105°$ (Corresponding angles AB // CD) $\longrightarrow$ $\left(\frac{1}{2}\right)$

9.


let reflected point in X-axis be P_x and in Y-axis be P_y.

Clearly $\Delta P P_x P_y$ is right angled triangle, $\angle P = 90°$

$\left(1\frac{1}{2}\right)$ plotting

$\left(\frac{1}{2}\right)$ Name of Δ.

10. $3x + 2y + 7 = 0$ ①

$(a-1, 2a)$ lies on ①

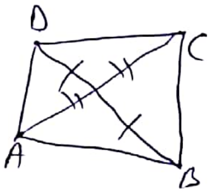
$\therefore 3(a-1) + 2(2a) + 7 = 0$ $\longrightarrow$ (1)

$3a - 3 + 4a + 7 = 0$

$7a = -4$

$a = -\frac{4}{7}$ $\longrightarrow$ (1)

11. If diagonals bisect each other then it is a ||gm.



($\frac{1}{2}$)

In ||gm sum of adjacent angles is 180°. ($\frac{1}{2}$)

$\angle A + \angle B = 145 + 45 = 190^\circ$ ($\frac{1}{2}$)

so it is not true. ($\frac{1}{2}$)

12. $\frac{2+3+5+7+11+13+17+19+23+29}{10}$ (1)

$= \frac{129}{10} = 12.9$ (1)

13. Drawing line 8.7 units and extending it 1 unit ($\frac{1}{2}$)

Drawing $\perp$ bisector of full line ($\frac{1}{2}$)

Drawing a semicircle ($\frac{1}{2}$)

Constructing 90° at 8.7 mark ($\frac{1}{2}$)

Dropping $\sqrt{8.7}$ length on number line. ($\frac{1}{2}$)

marking number line ($\frac{1}{2}$)

OR

$x = 3.145555\ldots$ ($\frac{1}{2}$)

$1000x = 3145.5555\ldots$ ($\frac{1}{2}$)

$-100x = 314.5555\ldots$ ($\frac{1}{2}$)

$900x = 2831$ (1)

$x = \frac{2831}{900}$ ($\frac{1}{2}$)

14. $27a^3 - \frac{9}{2}a^2 + \frac{1}{2}a - \frac{1}{216}$

$(3a)^3 - 3\left(\frac{1}{6}\right)(3a)^2 + 3(3a)\left(\frac{1}{6}\right)^2 - \left(\frac{1}{6}\right)^3$

$(3a)^3 - 3.(3a)^2.\frac{1}{6} + 3(3a)\left(\frac{1}{6}\right)^2 - \left(\frac{1}{6}\right)^3$ (1)

now comparing with ($\frac{1}{2}$)

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - (b)^3$

we get

$\left(3a - \frac{1}{6}\right)^3$ (1)

$= \left(3a - \frac{1}{6}\right)\left(3a - \frac{1}{6}\right)\left(3a - \frac{1}{6}\right)$ ($\frac{1}{2}$)

OR

$\frac{(0.75)^3 + (0.25)^3}{(0.75)^2 - (0.75)(0.25) + (0.25)^2}$ ($\frac{1}{2}$)

now using

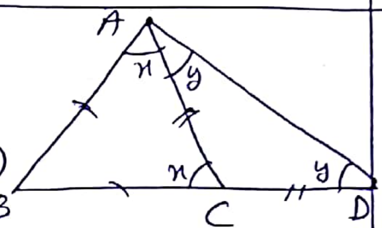
$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ ($\frac{1}{2}$)

$= \frac{(0.75+0.25)\cancel{[(0.75)^2 - (0.75)(0.25) + (0.25)^2]}}{\cancel{[(0.75)^2 - (0.75)(0.25) + (0.25)^2]}}$ (1)

$= 0.75 + 0.25$ ($\frac{1}{2}$)

$= 1.00 = 1$ ($\frac{1}{2}$)

15. $AB = BC$, $AC = CD$ (given)



$\angle BAC = \angle BCA = (x$ say$)$

and

$\angle CAD = \angle CDA = (y$ say$)$ [opposite sides to equal angles] (1)

$\angle CDA + \angle ADC = \angle BCA$

now $y + y = x$ (ext. angle property)

$\therefore x = 2y$ ($\frac{1}{2}$)

$\therefore \angle BAD = x + y = 2y + y$

$= 3y$ (1)

$\angle ADB = y$ (assumed).

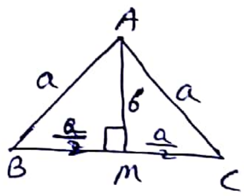
Clearly $\angle BAD : \angle ADB = 3:1$ ($\frac{1}{2}$)

16. (a) $\frac{\sqrt{3}}{4}a^2$ (1)

(b) let side be a

median is $\perp$ to base

In ΔAMB



$a^2 = \left(\frac{a}{2}\right)^2 + (6)^2$ (1)

$a^2 - \frac{a^2}{4} = (6)^2$

$\frac{3a^2}{4} = (6)^2$

$a^2 = \frac{36 \times 4}{3} = 12 \times 4 = 4 \times 4 \times 3$ ($\frac{1}{2}$)

$a = 2 \times 2 \times \sqrt{3}$

$a = 4\sqrt{3}$ cm. ($\frac{1}{2}$)

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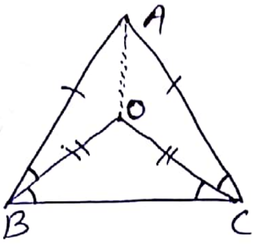
17.

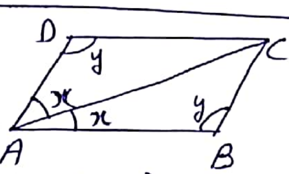


(a) Prove ΔOBC is isosceles
$\therefore OB = OC$ (1)

(b) Prove $\Delta BOA \cong \Delta COA$ (By SAS) $(1\frac{1}{2})$
$\angle BAO = \angle CAO$ (CPCT)
OA bisects $\angle A$ $(\frac{1}{2})$

18. Given, To prove, Construction, Figure (1)
Proving Congruency of triangles $(1\frac{1}{2})$
Showing Final result (1)

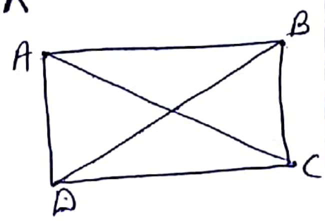
19. (i) $\angle DAC = \angle BAC = (x)$ (given AC bisects $\angle A$)



$\angle B = \angle D$ (opp. $\angle$s of ||gm) (1)
$= (y)$
$\angle DCA = \angle BCA = 180 - (x+y) = (z \text{ say})$ ① (angle sum property)
$\therefore$ AC bisects $\angle C$. $(\frac{1}{2})$

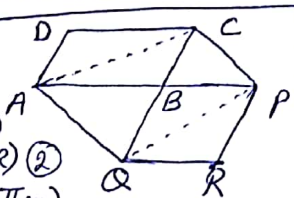
(ii) now $\angle DCA = \angle CAB$ (alt. int. $\angle$s) ②
$\therefore \angle BCA = \angle CAB$ By ① and ②
$\Rightarrow AB = BC$ (Sides opp. to equal angles). (1)
Hence adjacent sides of ||gm are equal $(\frac{1}{2})$
So ABCD is a rhombus

OR



Proving $\Delta ABC \cong \Delta DCB$ (1)
$\angle ABC = \angle DCB$ (CPCT) $(\frac{1}{2})$
Proving $\angle ABC = 90° = \angle DCB$ (1)
Concluding statement $(\frac{1}{2})$

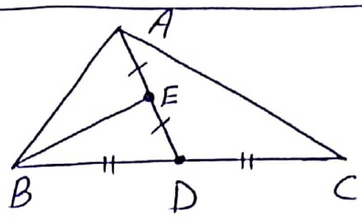
20) Join AC and PQ



$ar(\Delta ABC) = \frac{1}{2} ar(||ABCD)$ ①
$ar(\Delta BQP) = \frac{1}{2} ar(||PBQR)$ ② (Thm) (1)
now $ar(\Delta ACQ) = ar\Delta(AQP)$ (AQ || CP)

$ar(ACQ) - ar(\Delta ABQ) = ar(\Delta AQP) - ar(\Delta ABQ)$
$\Rightarrow ar(\Delta ABC) = ar(\Delta BPQ)$ ③ (1)
By ①, ② and ③
$\frac{1}{2}(ar\ ||gm\ ABCD) = \frac{1}{2} ar(||gm\ PBQR)$
$\Rightarrow ar(||gm\ ABCD) = ar(||gm\ PBQR)$ (1)

21

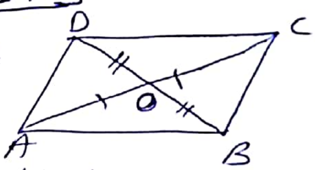


Given, To prove $(\frac{1}{2})$
$Ar(\Delta ABD) = Ar(\Delta ADC)$ (Property of median)

$\therefore Ar(\Delta ABD) = Ar(\Delta ADC) = \frac{1}{2} Ar(\Delta ABC)$ ① (1)
In ΔABD
$Ar(\Delta BED) = Ar(\Delta ABE) = \frac{1}{2} Ar(ABD)$ ② (property of median) (1)
By ① and ②
$Ar(\Delta BED) = \frac{1}{2} Ar(ABD)$
$= \frac{1}{2} \times \frac{1}{2} Ar(\Delta ABC)$ $(\frac{1}{2})$
$= \frac{1}{4} Ar(\Delta ABC)$.

OR

Given, To prove $(\frac{1}{2})$

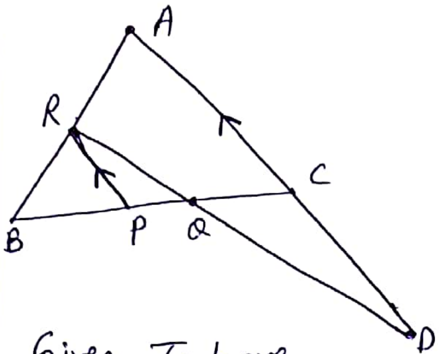


Diagonals of ||gm bisect each other $(\frac{1}{2})$
In ΔABC; BO is the median
$\therefore ar(\Delta OAB) = ar(\Delta OBC)$ ①
In ΔABD; AO is the median
$\therefore ar(OAB) = ar(OAD)$ ② (1)
Similarly $ar(\Delta AOD) = ar(\Delta OCD)$ ③
By ①, ② and ③
$ar(\Delta OAB) = ar(\Delta OBC) = ar(\Delta OCD) = ar(\Delta OAD)$ (1)

22 (a) $\frac{p+84}{6} = 17 \Rightarrow p = 102 - 84$ (1)
$p = 18$ $(\frac{1}{2})$

(b) median $= \frac{(x)+(x+3)}{2}$ (1)
So $\frac{2x+3}{2} = 23.5$
$2x = 47 - 3 = 44$
$x = 22$ $(\frac{1}{2})$

23.



Given, To prove (½)

$\angle DCQ = 180 - \angle C = 180 - 60 = 120°$

$\therefore \angle RPC = 120°$ (alt. ∠s; $RP \parallel AC$).

$\Rightarrow \Delta BRP$ is equilateral (1)

Now Prove $\Delta PQR \cong \Delta CQD$ (ASA) (2)

$PQ = QC$ (CPCT) (½)

$\therefore$ RD bisect PC at Q.

24. $\dfrac{1}{\sqrt{3}-\sqrt{2}-1} = \dfrac{1}{\sqrt{3}-\sqrt{2}-1} \times \dfrac{\sqrt{3}-\sqrt{2}+1}{\sqrt{3}-\sqrt{2}+1}$ (½)

$= \dfrac{\sqrt{3}-\sqrt{2}+1}{4-2\sqrt{6}}$ (1)

$= \dfrac{\sqrt{3}-\sqrt{2}+1}{4-2\sqrt{6}} \times \dfrac{4+2\sqrt{6}}{4+2\sqrt{6}}$ (½)

$= \dfrac{\sqrt{2}+\sqrt{6}+2}{-4}$ (1)

$= \dfrac{1.414+2+2.449}{-4} = -1.466$ (1)

25. $x^2 + \dfrac{1}{x^2} = 34$

using $\left(x+\frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2$

$\left(x+\frac{1}{x}\right)^2 = 34+2 = 36$

$\left(x+\frac{1}{x}\right) = 6$ (2)

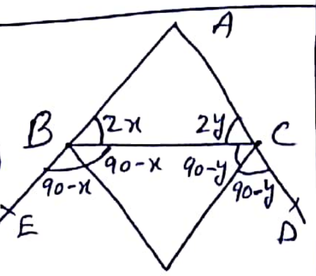
$\left(x+\frac{1}{x}\right)^3 = x^3 + \frac{1}{x^3} + 3x \cdot \frac{1}{x}\left(x+\frac{1}{x}\right)$

$(6)^3 = x^3 + \frac{1}{x^3} + 3(6)$

$x^3 + \frac{1}{x^3} = 216 - 18 = 198$ (2)

26. let $\angle ABC = 2x$

and $\angle ACB = 2y$



$\therefore \angle A = 180 - 2x - 2y$ ① (1)

(Angle sum property)

Also $\angle EBC = 180 - 2x$

so $\angle OBC = 90 - x$ (given OB bisect ∠B) ②

Similarly $\angle OCB = 90 - y$ ③ (1)

Now In ΔBOC

$\angle BOC = 180 - [\angle OBC + \angle OCB]$

$= 180 - [90 - y + 90 - x]$ By ② and ③

$= x + y$ ④ (1)

By ①

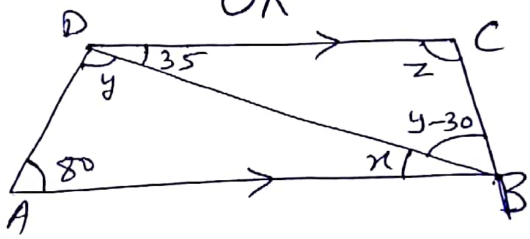
$\angle A = 180 - 2(x+y)$

$\therefore \angle A = 180 - 2(\angle BOC)$ By ④

$2\angle BOC = 180 - \angle A$

$\angle BOC = 90 - \frac{1}{2}\angle A$ (1)

OR



$y + 35 + 80 = 180°$ (Co-interior angles $AB \parallel CD$) (1)

$y = 65°$

$x = 35°$ (alt. int. ∠s) $AB \parallel CD$ (1)

Now In ΔBCD

$z + 35 + (y - 30) = 180°$ (1)

(angle sum property)

$z + 35 + (65 - 30) = 180$

$z = 180 - 70 = 110°$ (1)

27. (a) $x - y = 10$ where x is number of boys and y is number of girls. (1)

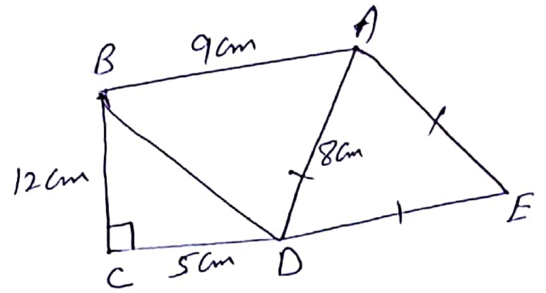
(b) Drawing of correct graph (2)

(C) From graph locating point

(20, 10) (1)

Girls = 10

28.



Area $= Ar\,\Delta BCD + Ar.\,\Delta BDA + Ar\,\Delta ADE$ $\left(\frac{1}{2}\right)$

$Ar\,\Delta BCD = \frac{1}{2}\times5\times12 = 30\,cm^2$ $\left(\frac{1}{2}\right)$

$Ar\,\Delta ADE = \frac{\sqrt{3}}{4}\times(8)^2 = \sqrt{3}\times\frac{64}{4} = 16\sqrt{3}\,cm^2$ $\left(\frac{1}{2}\right)$

$Ar\,\Delta BDA$

$BD^2 = BC^2 + CD^2 = 12^2+5^2 = 169$

$BD = 13\,cm$

Now $a=13,\ b=9,\ c=8$

$s = \frac{13+9+8}{2} = \frac{30}{2} = 15$ $\left(\frac{1}{2}\right)$

$Ar.\,\Delta BDA$

$= \sqrt{15(15-13)(15-8)(15-9)}$

$= \sqrt{15\times2\times7\times6}$

$= \sqrt{5\times3\times2\times2\times3\times7}$ $\left(\frac{1}{2}\right)$

$= \sqrt{(2\times2)\times(3\times3)\times(7\times5)}$

$= 2\times3\sqrt{35} = 6\sqrt{35}$

Req. area $= (30+16\sqrt{3}+6\sqrt{35})\,cm^2$ $\left(\frac{1}{2}\right)$

29. Corrected or adjusted frequencies $\left(1\frac{1}{2}\right)$

Correct histogram (2)

Scale and labelling $\left(\frac{1}{2}\right)$

30.

C.I.	f
10–12	2
12–14	4
14–16	5
16–18	2
18–20	2

(2)

10, 10, 12, 12, 12, 12, 14, 14, 14, 15, 15, 16, 16, 18, 19. (1)

Now ~~media~~ median $= \frac{15+1}{2} = 8^{th}$ term

median $= 14$ $\left(\frac{1}{2}\right)$

mode $= 12$ as it appears most $\left(\frac{1}{2}\right)$

OR

x	f	xf
10	17	170
30	5a+3	150a+90
50	32	1600
70	7a−11	490a−770
90	19	1710
	12a+60	2800+640a

→ (2)

→ $\left(\frac{1}{2}\right)$

mean $= \frac{\Sigma fx}{N} = 50$

$\therefore \frac{2800+640a}{12a+60} = 50$ —(1)

$2800+640a = 600a+3000$

$40a = 200$

$\boxed{a=5}$ — $\left(\frac{1}{2}\right)$

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