INDIAN SCHOOL MUSCAT
SECOND PRELIMINARY EXAMINATION
CLASS 10 (2017–18) – MATHEMATICS – MARKING SCHEME

Section A (1 mark each)

1. $\frac{6}{1250} = \frac{3}{625} = \frac{3}{5^4} \Rightarrow$ after 4 decimal places → (1)

2. $\sqrt{3x^2+6} = 9 \Rightarrow 3x^2+6 = 81 \Rightarrow 3x^2 = 75$
$\Rightarrow x^2 = 25 \Rightarrow x = 5$ ($\because$ +ve sq. root) → (1)

3. $a_{16} - a_{12} = (a+15d) - (a+11d) = 4d = 4 \times {}^-6 = {}^-24$ → (1)

4. 5 units → (1)

5. $\tan(3x+30^\circ) = 1 \Rightarrow 3x + 30^\circ = 45^\circ \Rightarrow 3x = 15^\circ \Rightarrow x = 5^\circ$ → (1)

6. $P(\text{atmost } 2) = \frac{2}{6} = \frac{1}{3}$ → (1)

Section B (2 marks each)

7. $4025 > 1656$
By Euclid's division lemma,
$4025 = 1656 \times 2 + 713$
$r \neq 0 \Rightarrow 1656 = 713 \times 2 + 230$
$r \neq 0 \Rightarrow 713 = 230 \times 3 + 23$
$r \neq 0 \Rightarrow 230 = 23 \times 10 + 0$ → $(1\frac{1}{2})$
$r = 0 \Rightarrow$ HCF $(4025, 1656) = 23$ → $(\frac{1}{2})$

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8. $A(-1,0), B(3,1), C(2,2), D(-2,1)$
Midpt. of $AC = \left(\frac{-1+2}{2}, \frac{0+2}{2}\right) = \left(\frac{1}{2}, 1\right)$ → $(\frac{1}{2})$
Midpt. of $BD = \left(\frac{3-2}{2}, \frac{1+1}{2}\right) = \left(\frac{1}{2}, 1\right)$ → $(\frac{1}{2})$
$\Rightarrow$ Midpt. of AC = Midpt. of BD
$\Rightarrow$ Diagonals bisect each other.
$\Rightarrow$ ABCD is a $\parallel^{gm}$ → $(\frac{1}{2} + \frac{1}{2})$

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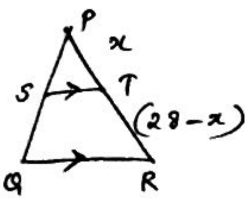
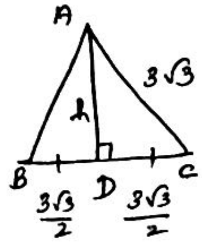
9. 

$\frac{PT}{TR} = \frac{PS}{SQ}$ (BPT) → $(\frac{1}{2} + \frac{1}{2})$
$\frac{x}{28-x} = \frac{3}{5} \Rightarrow 5x = 84 - 3x$
$8x = 84$ → $(\frac{1}{2})$
$x = 10.5 \Rightarrow PT = 10.5\text{ cm}$ → $(\frac{1}{2})$

10.



ΔABC is equilateral (Fig) $\rightarrow$ (½)

$AC = 3\sqrt{3}$; AD is the altitude

$\Rightarrow BD = CD = \frac{3\sqrt{3}}{2}$ (median & altitude coincide in an equilateral Δ^{le}) $\rightarrow$ (½)

In rt. ΔADC, $h^2 = (3\sqrt{3})^2 - \left(\frac{3\sqrt{3}}{2}\right)^2$ (Pyth. thm) $\rightarrow$ (½)

$= 27 - \frac{27}{4} = \frac{108-27}{4}$

$h^2 = \frac{81}{4} \Rightarrow h = \frac{9}{2} = 4.5\text{ cm}$ $\rightarrow$ (½)

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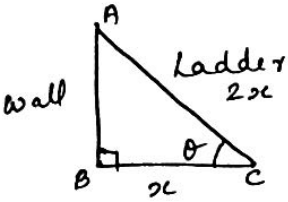
11. $\sin(A+B) = 1 \Rightarrow A+B = 90°$ — ① $\rightarrow$ (½)

$\sin(A-B) = \frac{1}{2} \Rightarrow A - B = 30°$ — ② $\rightarrow$ (½)

① + ② $\Rightarrow$ $2A = 120° \Rightarrow A = 60°$ $\rightarrow$ (½)

In ① $\Rightarrow$ $B = 30°$ $\rightarrow$ (½)

12.



Let $BC = x \Rightarrow AC = 2x$ (given) (Fig) $\rightarrow$ (½) $\rightarrow$ (½)

$\therefore$ In rt. ΔABC,

$\cos\theta = \frac{x}{2x} = \frac{1}{2}$ $\rightarrow$ (½)

$\Rightarrow \theta = 60°$ $\rightarrow$ (½)

Section C (3 marks each)

13. Assumption + Definition $\rightarrow$ (½ + ½)

Proof $\rightarrow$ (1)

Contradiction + Conclusion $\rightarrow$ (½ + ½)

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*14. $\frac{6}{x-1} - \frac{3}{y-2} = 1 \Rightarrow 6a - 3b = 1$ — ①

$\frac{5}{x-1} + \frac{1}{y-2} = 2 \Rightarrow 5a + b = 2$ — ② $\}$ $\rightarrow$ (½)

② $\times 3 \Rightarrow 15a + 3b = 6$ — ③ solving $\rightarrow$ (½)

① + ③ $\Rightarrow 21a = 7$ a, b, x, y $\rightarrow$ (2)

$\boxed{a = \frac{1}{3}} \Rightarrow \frac{1}{x-1} = \frac{1}{3}$

$\Rightarrow x - 1 = 3 \Rightarrow x = 4$

In ① $\Rightarrow \left(6 \times \frac{1}{3}\right) - 3b = 1$

$1 = 3b$

$\Rightarrow \boxed{b = \frac{1}{3}} \Rightarrow \frac{1}{y-2} = \frac{1}{3}$

$\Rightarrow y - 2 = 3 \Rightarrow y = 5$

OR Let the ten's place digit be x and the unit's place digit be y.

$\therefore$ The no. $= 10x + y$

Given $(x+y)8-5 = 10x+y \Rightarrow \boxed{2x-7y=-5}$ —— ①

Also $(x-y)16+3 = 10x+y \Rightarrow \boxed{6x-17y=-3}$ —— ②

① × 3 $\Rightarrow$ $6x-21y=-15$ —— ③

② − ③ $\Rightarrow$ $4y = 12 \Rightarrow \underline{y=3}$

In ① $\Rightarrow$ $2x-21=-5$

$2x = 16 \Rightarrow \underline{x=8}$

$\therefore$ The no. is $\underline{83}$

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*15. A.P. $\rightarrow$ $6, 13, 20, \ldots 216$.

$a=6$; $d=7$; $a_n = 216$

i.e, $a+(n-1)d = 216$

$6+(n-1)7 = 216$

$6+7n-7 = 216$

$7n = 217 \Rightarrow \underline{n=31}$ (odd) $\longrightarrow$ (1½)

$\therefore$ Middle Term $= \left(\frac{n+1}{2}\right)^{th} = \underline{16}^{th}$ term $\longrightarrow$ (½)

$\therefore a_{16} = a+15d = 6+(15\times 7) = 6+105 = \underline{111}$ $\longrightarrow$ (1)

(OR) Given $a_{16} = 5a_3 \Rightarrow a+15d = 5(a+2d)$

$a+15d = 5a+10d$ $\longrightarrow$ (½)

$\boxed{4a-5d=0}$ —— ①

Also, $a_{10} = 41 \Longrightarrow$ $\boxed{a+9d=41}$ —— ② $\longrightarrow$ (½)

② × 4 $\Rightarrow$ $4a+36d=164$ —— ③

③ − ① $\Rightarrow$ $41d = 164 \Rightarrow \underline{d=4}$

In ② $\Rightarrow$ $a+(9\times 4) = 41 \Rightarrow \underline{a=5}$ $\longrightarrow$ (½ + ½)

$\therefore S_{15} = \frac{15}{2}\left[2a+14d\right] = \frac{15}{2}\left[(2\times 5)+(14\times 4)\right]$

$= \frac{15}{2}\left[10+56\right] = \frac{15}{2}\times 66 = 15\times 33 = \underline{495}$ $\longrightarrow$ (1)

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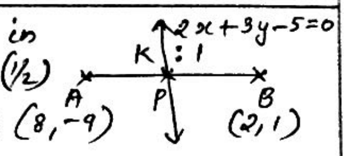
*16. Let $A(8,-9)$ & $B(2,1)$ and let P divides AB in the ratio $k:1$ $\longrightarrow$ (½)



$\therefore P\left(\frac{2k+8}{k+1}, \frac{k-9}{k+1}\right)$ $\longrightarrow$ (½)

Now P lies on $2x+3y-5=0$

i.e, $2\frac{(2k+8)}{(k+1)} + \frac{3(k-9)}{(k+1)} - 5 = 0$ $\longrightarrow$ (½)

$4k+16+3k-27-5k-5 = 0 \Rightarrow 2k-16=0 \Rightarrow k=8$

$\therefore$ Ratio is $8:1$ $\longrightarrow$ (½)

$\therefore$ P is $\left(\frac{16+8}{9}, \frac{8-9}{9}\right) \Rightarrow P\left(\frac{24}{9}, \frac{-1}{9}\right) \Rightarrow \underline{P\left(\frac{8}{3}, \frac{-1}{9}\right)}$ $\longrightarrow$ (1)

is the point of division.

(OR) A(2, 3), B(4, p) & C(6, −3) are collinear.

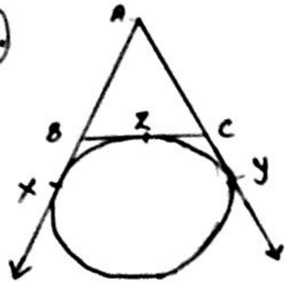
i.e., ar(ΔABC) = 0 ⇒ $\frac{1}{2}|x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)| = 0$ → (½)

i.e., $\frac{1}{2}|2(p+3)+4(-3-3)+6(3-p)| = 0$ → (1½)

$|2p+6-24+18-6p| = 0$

$|-4p| = 0 \Rightarrow p = 0$ → (1)

17.



(Fig) → (½)

Perimeter (ΔABC) = AB + BC + AC

= AB + BZ + CZ + AC (tangents from the same ext-pt)

= AB + BX + CY + AC

= AX + AY

= 2AX (" " ")

∴ $AX = \frac{1}{2} P(\Delta ABC)$ → (2½)

18. $\sin^2 30^\circ \cos^2 45^\circ + \tan^2 30^\circ + \frac{1}{2}\sin^2 90^\circ - 2\cos^2 90^\circ + \frac{1}{24}$

$= \left(\frac{1}{2}\right)^2 \times \left(\frac{1}{\sqrt{2}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 + \frac{1}{2}\times(1)^2 - 2\times(0)^2 + \frac{1}{24}$ → (2)

$= \left(\frac{1}{4}\times\frac{1}{2}\right) + \frac{1}{3} + \frac{1}{2} + \frac{1}{24} = \frac{1}{8} + \frac{1}{3} + \frac{1}{2} + \frac{1}{24} = \frac{3+8+12+1}{24} = \underline{1}$ → (1)

(OR) $LHS = \frac{\mathrm{cosec}^2\theta}{\mathrm{cosec}\theta - 1} - \frac{\mathrm{cosec}^2\theta}{\mathrm{cosec}\theta + 1} = \frac{\left(\frac{1}{\sin^2\theta}\right)}{\left(\frac{1}{\sin\theta} - 1\right)} - \frac{\left(\frac{1}{\sin^2\theta}\right)}{\left(\frac{1}{\sin\theta} + 1\right)}$ → (1)

$= \frac{1}{\sin^2\theta} \times \frac{\sin\theta}{(1-\sin\theta)} - \frac{1}{\sin^2\theta} \times \frac{\sin\theta}{(1+\sin\theta)} = \frac{(1+\sin\theta)-(1-\sin\theta)}{\sin\theta(1-\sin^2\theta)}$ → (1½)

$= \frac{2\sin\theta}{\sin\theta \times \cos^2\theta} = 2\sec^2\theta = \underline{RHS}$ → (½)

19. R = 7 cm ; r = $\frac{7}{2}$ cm ; For Δ^{le} ABC, b = AB = 14 cm ; h = OC = 7 cm (∵ AB ⊥ CD) → (½)

area (shaded)

$= \pi R^2 - \frac{1}{2}bh = \left(\frac{22}{7}\times 7\times 7\right) - \left(\frac{1}{2}\times 14\times 7\right) = 154 - 49 = \underline{105\ cm^2}$ → (2½)

20. Cyl. bucket: $r_1 = 18$ cm ; $h_1 = 32$ cm

Conical heap: $r_2 = ?$; $h_2 = 24$ cm

Vol. of sand in the bucket = Vol. of sand in the heap

$\pi r_1^2 h_1 = \frac{1}{3}\pi r_2^2 h_2$

$18\times 18\times 32 = \frac{1}{3}\times r_2^2 \times 24$

$r_2^2 = \frac{18\times 18\times 32}{8} = 18^2\times 4$

∴ $r_2 = 18\times 2 = 36$ cm → (2)

∴ slant ht. $(l) = \sqrt{r_2^2 + h_2^2} = \sqrt{36^2+24^2}$

$= \sqrt{1296+576} = \sqrt{1872} = 12\sqrt{13}$ cm

or ≈ $\underline{43.26}$ cm (upto 2 d.p.) → (1)

21.

< u.l.	cf
< 250	10
< 300	15
< 350	26
< 400	34
< 450	40
< 500	50

* Ogive given in Pg10

table ⟶ (1)
Ogive ⟶ (1½)
Median = ₹ 345 ⟶ (½)

22. All red face cards removed ⇒ Tot = 52 − 6 = 46

(i) $P(\text{red card}) = \frac{20}{46} = \frac{10}{23}$ ⟶ (1)

(ii) $P(\text{face card}) = \frac{6}{46} = \frac{3}{23}$ ⟶ (1)

(iii) $P(\text{a card of clubs}) = \frac{13}{46}$ ⟶ (1)

Section D (4 marks each)

23. Let $p(x) = x^4 + 6x^3 + x^2 - 24x - 20$

$+2$ & -5 are zeroes ⇒ $(x-2)$ & $(x+5)$ are factors ⇒ $x^2+3x-10$ is a factor ⟶ (1)

$$\begin{array}{r|l} & x^2 + 3x + 2 \\ \hline x^2+3x-10 & x^4 + 6x^3 + x^2 - 24x - 20 \\ & x^4 + 3x^3 - 10x^2 \\ \hline & 3x^3 - 11x^2 - 24x \\ & 3x^3 + 9x^2 - 30x \\ \hline & 2x^2 + 6x - 20 \\ & 2x^2 + 6x - 20 \\ \hline & 0 \end{array}$$

(Division) ⟶ (2)

∴ $x^2 + 3x + 2 = (x+2)(x+1)$ ⟶ (½)

⇒ -2 & -1 are also zeroes
∴ The zeroes of $p(x)$ are $2, -5, -2, -1$ ⟶ (½)

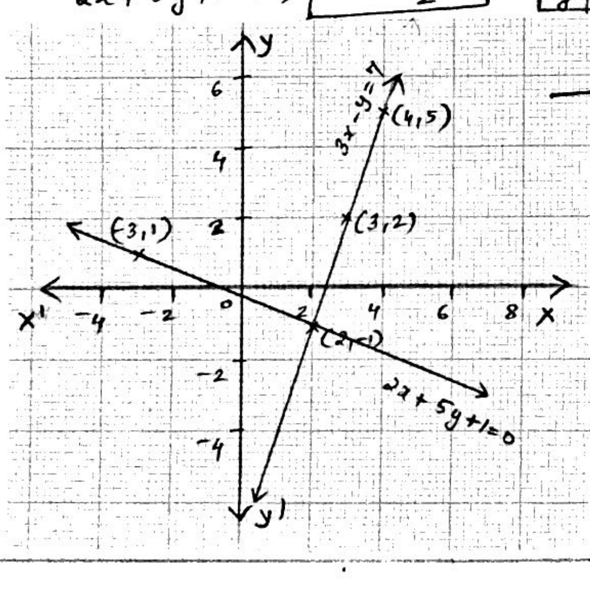
24. $3x - y = 7 \Rightarrow \boxed{y = 3x - 7} \Rightarrow$

$2x + 5y + 1 = 0 \Rightarrow \boxed{x = \frac{-5y-1}{2}} \Rightarrow$

x	2	4	3
y	−1	5	2

x	−3	2
y	1	−1

⟶ (½+½)



⟶ (1+1)

* The pair of equations has a unique solution. (∵ they are intersecting) ⟶ (½+½)

* The solution is $x = 2, y = -1$

25. Let the original length be x m $\longrightarrow (\frac{1}{2})$

$\frac{200}{x} - \frac{200}{x+5} = ₹\,2 \longrightarrow (1)$

$\frac{100}{200}\left[\frac{\cancel{x}+5-\cancel{x}}{x(x+5)}\right] = 2 \Rightarrow 500 = x^2+5x$
$\Rightarrow x^2+5x-500=0$
$(x+25)(x-20)=0$
$x = -25, 20$ $\longrightarrow (1\frac{1}{2})$
(rej)

$\therefore$ Length of the cloth $= 20\,m \longrightarrow (\frac{1}{2})$

& Original rate " $= \frac{200}{2} = ₹\,10/m \longrightarrow (\frac{1}{2})$

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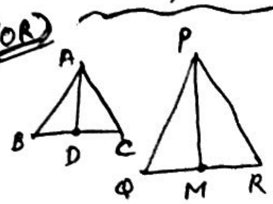
*26. Area-Ratio theorem

Given, TP, fig, Construction $\longrightarrow (\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2})$

Proof $\longrightarrow (2)$

(OR)



Given: ΔABC & ΔPQR; AD & PM are medians and $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$. $\longrightarrow (\frac{1}{2})$

TP: $\Delta ABC \sim \Delta PQR$ (Fig) $\longrightarrow (\frac{1}{2})$

Proof: $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM} \Rightarrow \frac{AB}{PQ} = \frac{\frac{1}{2}BC}{\frac{1}{2}QR} = \frac{AD}{PM}$

$\Rightarrow \frac{AB}{PQ} = \frac{BD}{QM} = \frac{AD}{PM}$ $\longrightarrow (1\frac{1}{2}+\frac{1}{2})$

$\Rightarrow \Delta ABD \sim \Delta PQM$ (SSS)

$\Rightarrow \boxed{\angle B = \angle Q}$ (corr. parts of $\sim^{lr}$ Δ^{les}) — (1)

Now in ΔABC & ΔPQR,

$\frac{AB}{PQ} = \frac{BC}{QR}$ (given)

$\angle B = \angle Q$ (from (1))

$\Rightarrow \Delta ABC \sim \Delta PQR$ (SAS) $\longrightarrow (1)$

(27.) Rough figure and justification $\longrightarrow (\frac{1}{2})$

Circle, centre & radius OA $\longrightarrow (\frac{1}{2})$

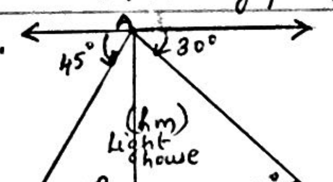
constructing $\perp_r$ at A $\longrightarrow (1)$

" " $\angle AOB = 120°$ $\longrightarrow (1)$

" " $\perp_r$ at B $\longrightarrow (\frac{1}{2})$

Marking pt. of intersection 'P' $\longrightarrow (\frac{1}{2})$

28.



Let AB → Light house
P & Q → Positions of the ships (Fig + explain) $\longrightarrow (\frac{1}{2}+\frac{1}{2})$

($\angle 1 = 45°$, $\angle 2 = 30°$ (alt $\angle$s)) $\longrightarrow (\frac{1}{2})$

In rt. ΔABQ,
$\tan 45° = \frac{h}{x} \Rightarrow \boxed{h = x}$ — (1) $\longrightarrow (\frac{1}{2})$

In rt. ΔABP,
$\tan 30° = \frac{h}{100-x} \Rightarrow \frac{1}{\sqrt{3}} = \frac{x}{100-x}$ $\longrightarrow (1)$

ie, $100 - x = \sqrt{3}x \Rightarrow (\sqrt{3}+1)x = 100$ $\longrightarrow (\frac{1}{2})$

$\therefore x = \frac{100}{(\sqrt{3}+1)} = \frac{100(\sqrt{3}-1)}{2} = 50(\sqrt{3}-1)\,m$

$\therefore$ Ht. of the Light house $(h) = x = 50(\sqrt{3}-1)\,m$ or $36.6\,m \longrightarrow (\frac{1}{2})$

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*29. Metal container open from top: $h = 21\,cm$; $r = 8\,cm$; $R = 20\,cm$

Vol $= \frac{1}{3}\pi h(R^2+Rr+r^2) = \frac{1}{3} \times \frac{22}{7} \times 21\left[20^2 + (20\times 8) + 8^2\right]$ $\longrightarrow (\frac{1}{2}+1)$

$= 22(400+160+64) = 22 \times 624 = 13728\ cm^3 = 13.728\,l$ $\longrightarrow (1+\frac{1}{2})$

$\therefore$ Cost of milk @ ₹35/litre $= 13.728 \times 35 = ₹\,480.48$ $\longrightarrow (1)$

(OR) Cylinder ⇒ $R = 3cm$; $H = 5cm$ & Cone: $r = \frac{3}{2}cm$; $h = \frac{8}{9}cm$.

$$\text{Ratio} = \frac{\pi R^2 H - \frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} = \frac{\cancel{\pi}\left[3\times 3\times 5 - \frac{1}{\cancel{3}}\times\frac{\cancel{3}}{2}\times\frac{3}{\cancel{2}}\times\frac{\cancel{8}}{9}\right]}{\left(\frac{1}{3}\cancel{\pi}\times\frac{\cancel{3}}{2}\times\frac{3}{\cancel{2}}\times\frac{\cancel{8}}{9}\right)} \longrightarrow (1+2)$$

$$= \frac{(45\times 9 - 6)}{\cancel{9}}\times\frac{\cancel{9}}{6} = \frac{405-6}{6} = \frac{399}{6} = \underline{133 : 2} \longrightarrow (1)$$

*30.

class	f	cf
0 – 10	5	5
10 – 20	x	$5 + x$
20 – 30	6	$11 + x$ (cf)
Med class (l) 30 – 40	y (f)	$11 + x + y$
40 – 50	6	$17 + x + y$
50 – 60	5	$22 + x + y$
(N)	40	

(Table) ⟶ (1)

$22 + x + y = 40$

$\boxed{x + y = 18} \Rightarrow \boxed{y = 18 - x}$ —— ① ⟶ (1/2)

$M = l + \left[\frac{\left(\frac{N}{2} - cf\right)}{f}\times h\right]$ ⟶ (1/2)

$31 = 30 + \left[\frac{20 - (11 + x)}{y}\times 10\right]$ ⟶ (1)

$1 = \frac{(20 - 11 - x)}{(18 - x)}\times 10$ [from ①]

$18 - x = (9 - x)\,10$

$18 - x = 90 - 10x$

$9x = 72 \Rightarrow x = 8$

In ① ⇒ $y = 18 - 8 = \underline{10}$ ⟶ (1/2 + 1/2)

(OR)

a)

classes	f	Mid x	u_i	f_iu_i
100 – 120	12	110	–2	–24
120 – 140	14	130	–1	–14
140 – 160	8	a 150	0	0
160 – 180	6	170	1	06
180 – 200	10	190	2	20
	$\Sigma f_i = 50$			$\Sigma f_iu_i = -12$

$\left.\begin{matrix}-24\\-14\end{matrix}\right\} -38$; $\left.\begin{matrix}06\\20\end{matrix}\right\} 26$

(Table) ⟶ (1)

$\bar{x} = a + \left(\frac{\Sigma f_iu_i}{\Sigma f_i}\times h\right)$ ⟶ (1/2)

$= 150 + \left(\frac{-12}{5\cancel{0}}\times 2\cancel{0}\right)$ ⟶ (1/2)

$= 150 - 4.8$

$= \underline{145.2}$ ⟶ (1/2)

b)

classes	f	
100 – 120	12	f_0
Modal class (l) 120 – 140	14	f_1
140 – 160	8	f_2
160 – 180	6	
180 – 200	10	

$\underline{h = 20}$

$\text{Mode} = l + \left[\frac{(f_1 - f_0)}{(2f_1 - f_0 - f_2)}\times h\right]$ ⟶ (1/2)

$= 120 + \left[\frac{(14 - 12)}{(28 - 12 - 8)}\times 20\right]$ ⟶ (1/2)

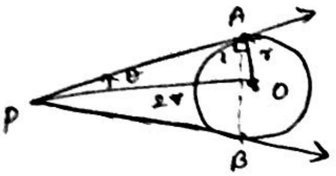
$= 120 + \left(\frac{2\times 20}{8}\right)$

$= 120 + 5 = \underline{125}$ ⟶ (1/2)

××× End of Set1 ×××

Set 2

13. Similar as in set 1.

17. 

Given $OP = d$ (fig) $\longrightarrow (1/2)$

Let $OA = r \Rightarrow OP = 2r$ $\longrightarrow (1/2)$

Also let $\angle APO = \theta$; $\angle 1 = 90^\circ$ $(r \perp t)$

In rt. $\triangle OAP$,

$\sin\theta = \frac{r}{2r} \Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \underline{\theta = 30^\circ}$ $\longrightarrow (1/2)$

$\Rightarrow \angle APB = 2 \times 30^\circ = \underline{60^\circ}$ ($\because$ tangents are equally inclined to line segment joining centre & ext. pt.) $\longrightarrow (1/2)$

Now $PA = PB$ (tangents from same ext. pt.)

$\Rightarrow \angle PAB = \angle PBA$ ($\angle$les opp. to eq. sides)

$= 60^\circ$ (by angle sum ppty in $\triangle APB$ $\because \angle APB = 60^\circ$)

$\Rightarrow \triangle ABP$ is equilateral. $\longrightarrow (1/2 + 1/2)$

20. Tent: cyl $\rightarrow h = 2.1\,m$; $r = \frac{3}{2}\,m$; cone $\rightarrow l = 2.8\,m$; $r = \frac{3}{2}\,m$

Tot. area of the tent $= 2\pi rh + \pi rl$ $\longrightarrow (1/2)$

$= \pi r(2h + l) = \frac{22}{7} \times \frac{3}{2}\,[(2 \times 2.1) + 2.8]$

$= \frac{11 \times 3}{7} \times 7 = \underline{33\,m^2}$ $\longrightarrow (1\tfrac{1}{2})$

$\therefore$ cost of canvas @ ₹500/m^2 $= 33 \times 500 = \underline{₹16500}$ $\longrightarrow (1)$

22. Tot $\rightarrow$ 18 balls ; Red $\rightarrow x$ $\longrightarrow (1/2)$

(i) $P(\text{not Red}) = \frac{18 - x}{18}$ $\longrightarrow (1)$

(ii) Tot $\rightarrow$ 20 ; Red $\rightarrow x + 2$

Given $\frac{x+2}{20} = \frac{9}{8} \times \frac{x}{18_2} \Rightarrow \frac{x+2}{5} = \frac{x}{4}$

$\Rightarrow 4x + 8 = 5x \Rightarrow \underline{x = 8}$ $\longrightarrow (1\tfrac{1}{2})$

24. Solving each eqn. $\longrightarrow (1/2 + 1/2)$

Graphs (2) $\longrightarrow (1 + 1)$

Points where the lines meet x axis $\rightarrow (5, 0), (-2, 0)$ $\longrightarrow (1/2 + 1/2)$

25. Let usual speed be x km/hr. $\longrightarrow (1/2)$

$\frac{300}{x} - \frac{300}{x+5} = 2\,hrs \Rightarrow 300\frac{(\cancel{x} + 5 - \cancel{x})}{x(x+5)} = 2$ $\longrightarrow (1)$

$\Rightarrow 150 \times 5 = x^2 + 5x \Rightarrow \boxed{x^2 + 5x - 750 = 0} \Rightarrow (x + 30)(x - 25) = 0$

$x = -30, 25$ (rej) $\Rightarrow$ Usual speed = 25 km/hr $\longrightarrow (2\tfrac{1}{2})$

27. $\triangle ABC$ with $BC = 7\,cm$, $\angle B = 60^\circ$; $AB = 6\,cm$ $\longrightarrow (1)$

$\overrightarrow{BX}$ with 4 equal parts and correct joining $\longrightarrow (1)$

2 parallels $\longrightarrow (1 + 1)$

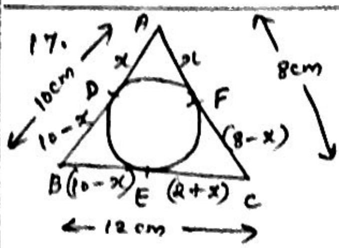
$\left(\frac{3}{4}\text{th}\right)$

××× End of Set 2 ×××

(PTO)

Set 3

13. Similar as in Set 1

17. 

Let AD = x cm ⇒ AF = x cm (tangents from the same ext pt.) (fig) → (1/2)
⇒ BD = 10 − x ⇒ BE = 10 − x
⇒ CE = 2 + x { FC = 8 − x (" " ") → (1)
Now 8 − x = 2 + x
2x = 6 ⇒ x = 3 cm

∴ AD = x = 3 cm
BE = 10 − x = 7 cm
CF = 8 − x = 5 cm → (1 1/2)

20. Hemisphere: r = 7 cm ; Cyl: r = 7 cm ; h = 13 − 7 = 6 cm. → (1)
TSA of the vessel = $2\pi r^2 + 2\pi rh$ → (1 1/2)
$= 2\pi r(r+h) = 2 \times \frac{22}{7} \times 7(7+6)$
$= 2 \times 22 \times 13 = 572\ cm^2$ → (1/2)

22. 1 to 100 no.s → Tot = 100
(i) P (a single digit no.) = $\frac{9}{100}$ → (1)
(ii) P (a perfect square) = $\frac{10}{100} = \frac{1}{10}$ → (1)
(iii) P (a no. ÷ble by 7) = $\frac{14}{100} = \frac{7}{50}$ → (1)

24. Solving each eqn. → (1/2 + 1/2)
Graphs (2) → (1+1)
Area of Δ^{le} formed $= \frac{1}{2}bh = \frac{1}{2} \times 8 \times 3 = 12$ sq units
The solution is x = 3 ; y = 3 → (1/2 + 1/2)

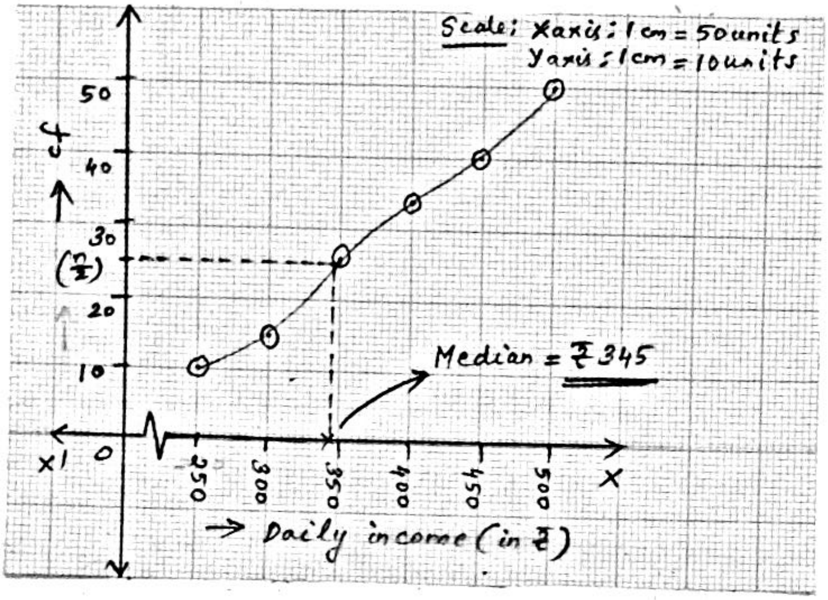
25. Let the speed of the stream be x km/hr → (1/2)
Speed of boat in still water = 18 km/hr
∴ Speed Upstream = (18 − x) km/hr { Speed downstream = (18 + x) km/hr → (1/2)
Given $\frac{24}{18-x} - \frac{24}{18+x} = 1$ hr → (1)
$\Rightarrow 24\frac{[(18+x)-(18-x)]}{(18-x)(18+x)} = 1 \Rightarrow 24 \times 2x = 324 - x^2$
$\Rightarrow \boxed{x^2 + 48x - 324 = 0} \Rightarrow (x+54)(x-6) = 0$
$x = -54, 6$ → (1 1/2)
rej
∴ Speed of the stream = 6 km/hr → (1/2)

27. A'B : AB = 3 : 2 ⇒ $\frac{A'B}{AB} = \frac{3}{2}$
ΔABC with BC = 5 cm ; ∠ABC = 60° ; ∠ACB = 30° → (1)
$\vec{BX}$ with " equal parts and correct joining → (1)
2 parallels → (1+1)

××× End of Set 3 ×××

(PTO)

* Ogive of Q21



××× End of answer key ×××