INDIAN SCHOOL MUSCAT
FINAL TERM EXAMINATION - CLASS 09 (2017-18)
ANSWER KEY - MATHEMATICS

Section A (1 mk each)

1) $2.\overline{27}$ → (1)

2) Zero of $p(x) = -\frac{1}{2}$ → (1)

3) 3 units (to the left) → (1)

4) whole is greater than a part. → (1)

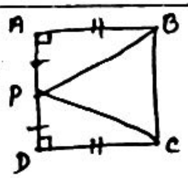
5) $\angle B + \angle D = 180° \Rightarrow (81+x) + 89° = 180$
$x + 170 = 180 \Rightarrow \underline{x = 10°}$ → $(\frac{1}{2}+\frac{1}{2})$

6) $ar(\Delta^{le}) = \frac{\sqrt{3}}{4}a^2 = \frac{\sqrt{3}}{4} \times 3^2 = \underline{\frac{9\sqrt{3}}{4}}\ cm^2$ → $(\frac{1}{2}+\frac{1}{2})$

Section B (2 mks each)

7) $3x + 2y - 9 = 0$
$x = 0 \Rightarrow y = \frac{9}{2}$ → cuts y axis at $(0, \frac{9}{2})$ → (1)
$y = 0 \Rightarrow x = 3$ → cuts x axis at $(3, 0)$ → (1)

8) $\underset{-4}{x + 4} = \underset{-4}{10} \Rightarrow \underline{x = 6}$ → (1)
Equals subtracted from equals, remainders are equal → (1)

9) 

In ΔBAP & ΔCDP,
AB = CD (sides of a sq.)
$\angle A = \angle D$ $(= 90°)$
AP = DP (P is the midpt.) → (1)
$\therefore \Delta BAP \cong \Delta CDP$ (SAS)
$\therefore$ BP = CP (cpct) → (½)
$\Rightarrow \underline{\angle PCB = \angle PBC}$ ($\angle^{les}$ opp. to eq. sides in Δ PBC) → (½)

10) Let $1 \angle^{le} = x°$
$\therefore$ adj. $\angle^{le} = \frac{2}{3}x°$ $\Rightarrow x + \frac{2}{3}x = 180°$ (consecutive $\angle^{les}$ of a $\|^{gm}$) → (1)
$\frac{5x}{3} = 180°$
$x = \frac{\overset{36}{\cancel{180}} \times 3}{\cancel{5}} = 36 \times 3 = \underline{108°}$ → (½)
$\therefore \frac{2}{3}x = \frac{2}{3} \times 108 = 2 \times 36 = \underline{72°}$
$\therefore$ Smallest $\angle^{le} = \underline{72°}$ → (½)

11) LSA of cube $= 196 m^2$
$4a^2 = 196 \Rightarrow a^2 = 49 \Rightarrow \underline{a = 7\ m}$ → (1)
$\therefore$ vol. of the cube $= a^3 = 7^3 = \underline{343 m^3}$ → (1)

12) 1^{st} 11 multiples of 3 → 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 → (1)
Median = $\underline{18}$ → (1)

Section C - (03 mks each)

13) $\left[5\left(8^{\frac{1}{3}}+27^{\frac{1}{3}}\right)^3\right]^{\frac{1}{4}} = \left[5(2+3)^3\right]^{\frac{1}{4}} = (5\times5^3)^{\frac{1}{4}} \longrightarrow (1+1)$

$= (5^4)^{\frac{1}{4}} = \underline{5} \longrightarrow (\frac{1}{2}+1\frac{1}{2})$

(OR) $\sqrt{5}$ on no. line

No. line / $\perp_r$ at '1' / 1 unit on $\perp_r$ / $\sqrt{5}$ on hypotenuse / $\sqrt{5}$ on no. line / scale $\Big\} \longrightarrow$ ($\frac{1}{2}$ each)

14) $99^3 = (100-1)^3 \longrightarrow (\frac{1}{2})$

$= 100^3 - 3(100)^2(1) + 3(100)1^2 - (1)^3 \longrightarrow (1)$

$= 1000000 - 30000 + 300 - 1 \longrightarrow (1)$

$= 1000300 - 30001 = \underline{970299} \longrightarrow (\frac{1}{2})$

15) $5\sqrt{5}x^2 + 30x + 8\sqrt{5}$

$= 5\sqrt{5}x^2 + 10x + 20x + 8\sqrt{5} \longrightarrow (1\frac{1}{2})$

$= 5x(\sqrt{5}x+2) + 4\sqrt{5}(\sqrt{5}x+2) \longrightarrow (1)$

$= (\sqrt{5}x+2)(5x+4\sqrt{5}) \longrightarrow (\frac{1}{2})$

(OR) $x^2+4y^2+16z^2+4xy+16yz+8zx$

$= (x+2y+4z)^2 \longrightarrow (2)$

$\therefore$ Value $= [2+2(-1)+4(1)]^2 = (\cancel{2}-\cancel{2}+4)^2 = 4^2 = \underline{16} \longrightarrow (1)$

16) (i) ordinate 2 ; abscissa $-3 \rightarrow (-3,2) \rightarrow \underline{2^{nd}\text{ quad.}} \longrightarrow (1)$

(ii) $(0,0) \longrightarrow (1)$

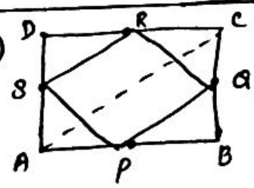
(iii) Any point of the form $(0, K) \longrightarrow (1)$

17) $25^\circ + x = 60^\circ + 40^\circ$ (ext. $\angle^{le}$ ppty)

$x = 100 - 25^\circ = \underline{75^\circ}$ $\Big\} \longrightarrow (1+\frac{1}{2})$

$25^\circ + y = 60^\circ$ (corr. $\angle^{les}$)

$\therefore y = \underline{35^\circ}$ $\Big\} \longrightarrow (1+\frac{1}{2})$

18) 

Given: Rect ABCD; P, Q, R, S are midpts...

(?) PQRS is a square $\Big\}$ Fig + const $\longrightarrow (\frac{1}{2}+1\frac{1}{2})$

Const: Join AC

Proof: SR $\parallel$ AC ; SR $= \frac{1}{2}$AC (Midpt thm in ΔDAC)

PQ $\parallel$ AC ; PQ $= \frac{1}{2}$AC (" " " ΔBAC)

$\Rightarrow$ SR $\parallel$ PQ ; SR = PQ

$\Rightarrow$ PQRS is a $\parallel^{gm}$ —— ① $\Big\} \longrightarrow (1)$

Now in ΔSAP & ΔQBP,

SA = QB ($\because$ AD = BC & S & Q are midpts)

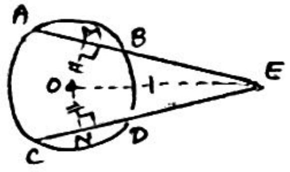
$\angle$A = $\angle$B (= 90°)

AP = BP ($\because$ P is midpt.)

$\therefore \Delta SAP \cong \Delta QBP$ (SAS) $\Big\} \longrightarrow (1)$

$\Rightarrow \boxed{SP = QP}$ (cpct) —— ②

from ① & ②, PQRS is a $\underline{\text{rhombus}}$ ($\parallel^{gm}$ with one pair of adj sides eq)

19) 

Given: A $\odot^{le}$ with centre O ; chords AB = CD
(?) BE = DE ; AE = CE

Const: OM ⊥ AB ; ON ⊥ CD and join OE — construc^n → (1/2)

Proof: In △OME ; △ONE,
∠1 = ∠2 (= 90°)
OE = OE (common)
OM = ON (equal chords are equidistant from the centre) → (1)

∴ △OME ≅ △ONE (RHS)

$\boxed{ME = NE}$ (cpct) (1)

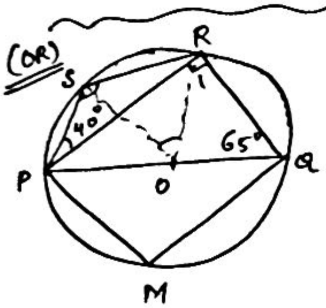
$\boxed{AB = CD}$ (2) → (1/2)

⇒ $\frac{1}{2}$ AB = $\frac{1}{2}$CD

⇒ $\boxed{MB = ND}$ (3) → (1/2)

(1) – (3) ⇒ $\boxed{BE = DE}$ (4) → (1/2)

(2)+(4) ⇒ AE = CE

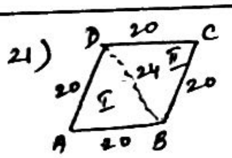
(OR) 

(i) ∠1 = 90° (∠^{le} in a semi $\odot^{le}$)
∴ ∠QPR = 90 – 65° (∠^{le} sum in △PRQ)
= 25° → (1)

(ii) ∠S = 180 – 65° (opp. ∠^{les} of cyclic quad. SPQR)
= 115°
∴ ∠PRS = 180 – (40 + 115°) (∠^{le} sum in △PSR)
= 180 – 155°
= 25° → (1)

(iii) ∠SOR = 2 × ∠SPR (central ∠^{le})
= 2 × 40° = 80° → (1)

20) Base / Base ∠^{le} / marking sum / join / ⊥$_r$ bisector / marking 3rd vertex → (1/2 each)

21) 

△I $s = \frac{20+20+24}{2} = \frac{64}{2} = 32$ cm → (1/2)

$\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
$= \sqrt{32(32-20)(32-20)(32-24)}$
$= \sqrt{32 \times 12 \times 12 \times 8} = \sqrt{8 \times 4 \times 12 \times 12 \times 8}$ → (1½)
$= 8 \times 2 \times 12 = 192$ cm^2

∴ ar (rh) = 2 × ar (△I) = 2 × 192 = 384 cm^2 → (1/2)

22) Conical tent : h = 10m ; r = 24m

(i) $l = \sqrt{r^2 + h^2} = \sqrt{24^2 + 10^2} = 26$m → (1)

(ii) CSA of the tent $= \pi r l = \frac{22}{7} \times 24 \times 26$ → (1)

∴ Cost of canvas @ ₹70/m² $= \left(\frac{22}{\cancel{7}} \times 24 \times 26\right) \times \cancel{70}^{10}$
= ₹ 137280 → (1)

Section D (4 mks each)

23) $x = \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3}+\sqrt{2}} = \frac{(\sqrt{3}-\sqrt{2})^2}{3-2} = 5 - 2\sqrt{6}$ → (1)

$y = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} = \frac{(\sqrt{3}+\sqrt{2})^2}{3-2} = 5 + 2\sqrt{6}$ → (1)

(PTO)

$\therefore x^2 + xy + y^2 = (5-2\sqrt{6})^2 + (5-2\sqrt{6})(5+2\sqrt{6}) + (5+2\sqrt{6})^2 \longrightarrow (1)$

$= (25 - \cancel{20\sqrt{6}} + 24) + (25-24) + (25 + \cancel{20\sqrt{6}} + 24)$

$= 49 + 1 + 49 = \underline{\underline{99}}$ $\Big\} \longrightarrow (1)$

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24) a) $a+b+c = 55 + (-25) + (-30) = 55 - 55 = \underline{\underline{0}} \longrightarrow (1)$

$\therefore a^3 + b^3 + c^3 = 3abc$

ie, $55^3 + (-25)^3 + (-30)^3 = 3 \times 55 \times -25 \times -30$

$= \underline{\underline{123750}}$ $\Big\} \longrightarrow (1)$

b) Let $P(x) = ma - nx - 3x^2$.

$(x+a)$ is a factor (given)

ie, $P(-a) = 0 \Rightarrow ma - n(-a) - 3(-a)^2 = 0 \longrightarrow (1/2 + 1)$

$ma + na - 3a^2 = 0$

$\div a \Rightarrow \quad m + n - 3a = 0$

ie, $a = \underline{\underline{\dfrac{m+n}{3}}}$ $\Big\} \longrightarrow (1/2)$

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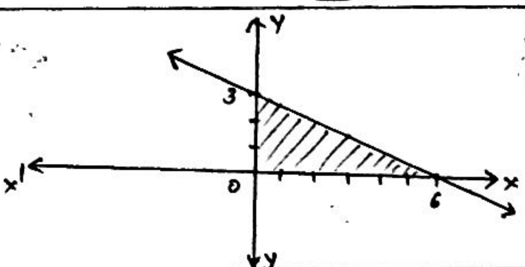
25) $x + 2y - 6 = 0$

$\Rightarrow x = 6 - 2y$

$\Rightarrow$

x	6	4	2	0	
y	0	1	2	3	



Soln $\longrightarrow$ (1½)
plotting $\longrightarrow$ (1½)
Line $\longrightarrow$ (½)
shading $\longrightarrow$ (½)

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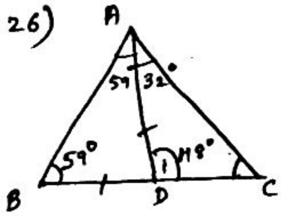
26)



AD = BD (given)

$\Rightarrow \angle B = 59°$ ($\angle$les opp. to eq. sides in $\triangle ABD$) $\Big\} \longrightarrow (1)$

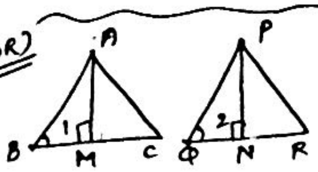
$\therefore \angle 1 = 59° + 59° = 118°$ (ext $\angle$le ppty) $\longrightarrow$

& $\angle C = 180° - (118 + 32) = \underline{30°}$ ($\angle$le sum in $\triangle ADC$) $\longrightarrow$ $\Big\}$ (1½)

$\Rightarrow AC > AD$ (side opp. to greater $\angle$le is longer) $\longrightarrow (1)$

$\Rightarrow \underline{\underline{AC > BD}}$ ($\because AD = BD$) $\longrightarrow (1/2)$

(OR)



Given: $\triangle ABC$ & $\triangle PQR$; AB = PQ, BC = QR, altitudes AM = PN $\Big\}$ Given TP $\} \rightarrow$ (½), Fig $\rightarrow$ (½)

(?) $\triangle ABC \cong \triangle PQR$

Proof: In $\triangle ABM$ & $\triangle PQN$,

$\angle 1 = \angle 2$ (= 90°)

AB = PQ (given)

AM = PN (given)

$\therefore \triangle ABM \cong \triangle PQN$ (RHS)

$\Rightarrow \angle B = \angle C$ (cpct) — ① $\Big\} \longrightarrow$ (1½)

Now in $\triangle ABC$ & $\triangle PQR$,

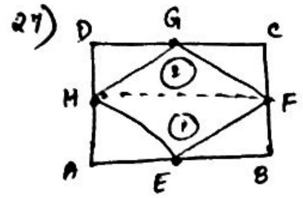
AB = PQ (given)

$\angle B = \angle C$ [from ①]

BC = QR (given)

$\therefore \underline{\underline{\triangle ABC \cong \triangle PQR}}$ (SAS) $\Big\} \longrightarrow$ (1½)

(PTO)

27) 

Given : Rect. ABCD ; E, F, G, H are midpt.s... ; ar (EFGH) = 16 cm² — Given, TP → (1/2) ; Fig → (1/2)

To find: ar (ABCD)

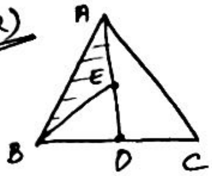
Solution: AD ∥ BC & AD = BC (opp. sides of a rect)
⇒ $\frac{1}{2}$AD ∥ $\frac{1}{2}$BC & $\frac{1}{2}$AD = $\frac{1}{2}$BC
⇒ AH ∥ BF & AH = BF
⇒ ABFH is a ∥^{gm}
III'ly CDHF is a ∥^{gm} → (1)

Now ar (Δ1) = $\frac{1}{2}$ ar (∥^{gm} ABFH)
& ar (Δ2) = $\frac{1}{2}$ ar (∥^{gm} CDHF) (Δ^{le} & ∥^{gm} on the same base & b/w the same ∥^{s}) → (1)

∴ ar(Δ1) + ar (Δ2) = $\frac{1}{2}$[ar (ABFH) + ar (CDHF)] → (1/2)

i.e., ar (EFGH) = $\frac{1}{2}$ ar(ABCD)

∴ ar (ABCD) = 2 ar (EFGH) = 2×16 = 32 cm² → (1/2)

(OR) 

Given : ΔABC ; median AD ; E is the midpt. of AD — Given, TP → (1/2) ; Fig → (1/2)

(i) ar (ABE) = $\frac{1}{4}$ ar(ΔABC)

Proof: ar (ΔABD) = $\frac{1}{2}$ ar (ΔABC) (1) [Median of a Δ^{le} divides it into 2 Δ^{les} of equal area] → (1)

III'ly ar (ABE) = $\frac{1}{2}$ ar (ABD) [∵ BE is a median] → (1)

= $\frac{1}{2}$ × $\frac{1}{2}$ ar (ΔABC), [from (1)]

= $\frac{1}{4}$ ar (ΔABC) → (1)

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28) cuboid (log)
L = 2.3 m
B = 75 cm = 0.75 m
H = ?
Vol = 1.104 m³

Planks
l = 2.3 m
b = 0.75 m
h = 4 cm = 0.04 m (thickness)

(i) LBH = 1.104 ⇒ H (Thickness) = $\frac{1.104}{0.75 \times 2.3}$ = $\frac{\cancel{1104}^{48}}{75 \times \cancel{23}}$ = $\frac{16}{25}$ = 0.64 m → (2)

(ii) No. of planks = $\frac{2.3 \times 0.75 \times 0.64}{2.3 \times 0.75 \times 0.04}$ = 16 planks. → (2)

(OR) Spherical matka
R = 39 cm

Cyl. glass
r = 4 cm
h = 13 cm

(i) No. of people = $\frac{\text{Vol. of water in matka}}{\text{Vol. of water in 1 glass}}$ → (1/2)

= $\frac{\frac{4}{3}\pi R^3}{\frac{3}{4} \times \pi r^2 h}$ = $\frac{\frac{4}{3} \times \cancel{39}^{13} \times 39 \times 39}{\frac{3}{4} \times 4 \times 4 \times \cancel{13}}$ = 507 people → (1+1+1/2)

(ii) Appropriate Value. → (1)

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29) Labelled axes/Scale/Histogram/Frequency polygon → (1/2 + 1/2 + 1½ + 1½)

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30) Tot → 100

(i) P (exactly 5 occupants) = $\frac{5}{100}$ = $\frac{1}{20}$ → (1)

(ii) P (more than 2 ") = $\frac{23+17+5}{100}$ = $\frac{45}{100}$ = $\frac{9}{20}$ → (1)

(iii) P (less than 5 occupants) = $\frac{95}{100}$ = $\frac{19}{20}$ → (1)

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