INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2023

SET A

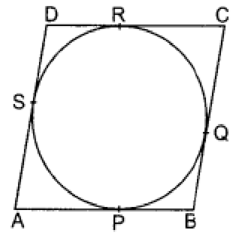
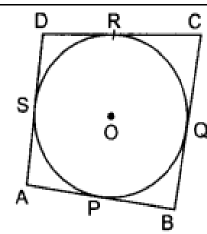
MATHEMATICS - 041

CLASS:X Max.Marks: 80

MARKING SCHEME			
SET	QN.NO	VALUE POINTS	MARKS SPLIT UP
	1	(b) -1	
	2	(b) 6	
	3	(a) $3:1$	
	4	(b) 2	
	5	(d) $\frac{1}{7}$	
	6	(b) 25	
	7	(c) 5	
	8	(c) 8 cm	
	9	(c) 2×7^2	
	10	(c) 20	
	11	(a) 1.5	
	12	(b) 10 cm	
	13	(a) $+3\sqrt{3},\ -3\sqrt{3}$	
	14	(b) 50°	
	15	(c) $\frac{12}{13}$	

	16	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	
	17	(b) 5 units	
	18	(d) Assertion (A) is false but reason(R) is true.	
	19	(d) SSS similarity criterion	
	20	(a) 240	
	21	HCF = 5 LCM = 300	1 1
	22	S = $(3 + \sqrt{2}) + (3 - \sqrt{2}) = 6$ P = $(3 + \sqrt{2}) \times (3 - \sqrt{2}) = (3)^2 - (\sqrt{2})^2 = 9 - 2 = 7$ Quadratic polynomial = $x^2 - Sx + P = x^2 - 6x + 7$	½ ½ 1
	23	AB = 10 units … [Given $AB^2 = 10^2 = 100$ … [Squaring both sides $(11 - 3)^2 + (y + 1)^2 = 100$ $8^2 + (y + 1)^2 = 100$ $(y + 1)^2 = 100 - 64 = 36$ $y + 1 = \pm 6$ … [Taking square-root on both sides $y = -1 \pm 6 \therefore y = -7$ or 5 OR Area of $\Delta ABC = \frac{1}{2} \times$ base $\times$ corr, altitude $= \frac{1}{2} \times 5 \times 3 = 7.5$ sq.units	 1 1 1 1
	24	$a = 2, b = -4, c = 3$ $b^2 - 4ac = -8 < 0$ No real root OR Roots are $\frac{2}{3}$ $and -\frac{1}{2}$	½ 1 ½ 1+1
	25	Table Median = 340	1 1
	26	Let the large number be x. Square of the larger number = x^2 Square of the srnall number = 8x+8 $x^2 - 8x - 8 = 145$ $\Rightarrow x = -9$ (or) $x = 17$ Larger no = 17 Square of small no=144 Small no=12 The numbers are 17 and 12	 1 1 1

	27	The total surface area of the solid =Total surface area of the cube+Curved surface area of the hemisphere−Area of the base of the hemisphere. $= 6a^2 + 2\pi r^2 - \pi r^2$ $= \left[6 \times 10^2 + 2 \times 3.14 \times 5^2 - 3.14 \times 5^2\right]$ cm^2 $= 600 + 157 - 78.5 = 678.5$cm^2 Cost of painting=Rs.5 per 100cm^2 ∴,Cost of painting the solid= $678.5 \times \frac{5}{100}$ =Rs.33.90 Hence, the approximate cost of painting the solid so formed is Rs.33.90	½ 2 ½
	28	(i)1/5 (ii)3/20 (iii)1/10 OR (i)1/4 (ii)1/18 (iii)1/6	1 + 1 + 1
	29	Volume of cone Volume of cylinder Volume of hemisphere Total volume Conclusion	½ ½ ½ 1 ½
	30	We have, $6x^2 - 3 - 7x$ $= 6x^2 - 7x - 3$ $= (2x - 3)(3x + 1)$ Zeroes are: $2x - 3 = 0$ or $3x + 1 = 0$ Therefore $x = 3/2$ or $x = -1/3$ Verification: Here $a = 6$, $b = -7$, $c = -3$ Sum of the zeroes, $(\alpha + \beta) = 3/2 + (-1/3) = (9 - 2)/6 = 7/6$ $7/6 = -$ (coefficient of x)/(Coefficient of x^2) $= -b/a$ Product of Zeroes $(\alpha \times \beta) = 3/2 \times (-1/3) = -3/6$ $-3/6 =$ Constant term / Coefficient of $x^2 = c/a$ Therefore, Relationship holds	1 1 1

	31	**Given:** ABCD is parallelogram circumscribing a circle. **To prove:** ABCD is a rhombus **Proof:** We have, DR = DS ...(*i*) [Lengths of tangents drawn from an external point to a circle are equal] Also, AP = AS ...(*ii*) BP = BQ ...(*iii*) CR = CQ ...(*iv*)  Adding (*i*), (*ii*), (*iii*) and (*iv*), (DR + CR) + (AP + BP) = (DS + AS) + (BQ + CQ) ⇒ CD + AB = AD + BC ⇒ 2AB = 2AD [∵ In parallelogram, opposite sides are equal AB = CD and AD = BC] ⇒ AB = AD ∴ AB = AD = BC = CD Hence, ABCD is a rhombus as all sides are equal in rhombus. OR **Given:** A quadrilateral ABCD which circumscribes a circle. Let it touches the circle at P, Q, R and S as shown in figure. **To Prove:** AB + CD = AD + BC **Proof:** We know that the lengths of the tangents drawn from a point outside the circle to the circle are equal.  ∴ AP = AS; BP = BQ; CQ = CR and DR = DS ...(*i*) Consider, AB + CD = AP + PB + CR + RD = AS + BQ + CQ + DS [using (*i*)] = (AS + DS) + (BQ + CQ) = AD + BC	Fig ½ ½ 1 ½ ½ Fig ½ ½ 1 1
	32	Proof 1st part Proof 2nd part	3 2
	33	Statement Proof $\frac{AD}{DB} = \frac{AE}{EC}$ $\frac{x}{x+1} = \frac{x+3}{x+5}$ Simplification x=3	1 2 ½ ½ ½ ½
	34	Volume of cone is, $= \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi \times 660^2 \times 120$ $= 14000\pi cm^3$ Volume of cylinder is, $= \pi r^2 h$ $= \pi \times 60^2 \times 180$ $= 648000\pi cm^3$ Volume of hemisphere is, $= \frac{4}{3}\pi r^3 h$ $= \frac{2}{3}\pi 60^3 h$ $= 144000\pi cm^3$ Volume of water left in cylinder is $= \pi r^2 h - \frac{1}{3}\pi r^2 h - \frac{4}{3}\pi r^3 h$ $= (648000 - 288000)\pi$ $= 360000\pi$ $= 1130400 cm^3$	1½ 1½ 1

OR

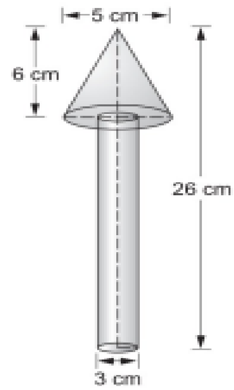
Radius of the conical part, $r = \frac{5}{2}$ cm. 1

Height of the conical part, $h = 6$ cm.

Radius of the cylindrical part, $R = \frac{3}{2}$ cm.

Height of cylindrical part, $H = (26 - 6)$ cm

$= 20$ cm.



Slant height of the conical part,

$$l = \sqrt{r^2 + h^2} = \sqrt{\left(\frac{5}{2}\right)^2 + 6^2} \text{ cm}$$ 1

$$= \sqrt{\frac{25}{4} + 36} \text{ cm} = \sqrt{\frac{169}{4}} \text{ cm} = \frac{13}{2} \text{ cm.}$$

Area to be painted orange

= curved surface area of the cone

+ base area of the cone − base area of the cylinder 1

$$= \pi r l + \pi r^2 - \pi R^2 = \pi(rl + r^2 - R^2)$$

$$= \left[3.14 \times \left(\frac{5}{2} \times \frac{13}{2} + \frac{5}{2} \times \frac{5}{2} - \frac{3}{2} \times \frac{3}{2}\right)\right] \text{cm}^2$$

$$= \left[3.14 \times \left(\frac{65}{4} + \frac{25}{4} - \frac{9}{4}\right)\right] \text{cm}^2 = \left(3.14 \times \frac{81}{4}\right) \text{cm}^2$$ 1

$$= (3.14 \times 20.25) \text{ cm}^2 = 63.585 \text{ cm}^2.$$

Area to be painted yellow

= curved surface area of the cylinder 1

+ base area of the cylinder

$$= 2\pi RH + \pi R^2 = \pi R(2H + R)$$

$$= \left[3.14 \times \frac{3}{2} \times \left(2 \times 20 + \frac{3}{2}\right)\right] \text{cm}^2$$

$$= \left(3.14 \times \frac{3}{2} \times \frac{83}{2}\right) \text{cm}^2 = \left(\frac{781.86}{4}\right) \text{cm}^2$$

$$= 195.465 \text{ cm}^2.$$

1

35

Class interval	Mid-values (x_i)	Frequency (f_i)	$u_i = \frac{x_i - 50}{20}$	$f_i u_i$
0–20	10	17	–2	–34
20–40	30	f_1	–1	$-f_1$
40–60	50	32	0	0
60–80	70	f_2	1	f_2
80–100	90	19	2	38
Total		$\Sigma f_i = 68 + f_1 + f_2$		$\Sigma f_i u_i = 4 - f_1 + f_2$

2

$f_1 + f_2 = 52$ ----(i) 1

Mean = 50

		Therefore, $f_1 - f_2 = 4$ ------(ii) Solving we get $f_1 = 28$ and $f_2 = 24$	1 1
		OR *Index* | *No. of weeks* (f_i) | *c.f.* 1500–1600 | 3 | 3 1600–1700 | 11 f_0 | 14 $\boxed{1700\text{–}1800 \quad 12\ f_1 \quad 26}$ 1800–1900 | 7 f_2 | 33 1900–2000 | 9 | 42 2000–2100 | 8 | 50 2100–2200 | 2 | 52 | $\Sigma f_i = 52$ | $n = 52, \frac{n}{2} = \frac{52}{2} = 26$ $\therefore$ Median class is 1700–1800 $\therefore$ Median $= l + \frac{\frac{n}{2} - c.f.}{f} \times h$ $= 1700 + \left(\frac{12}{12} \times 100\right) = \mathbf{1800}$ $\therefore$ Maximum frequency is 12 $\Rightarrow$ Modal class is 1700–1800 **Mode** $= l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$ $= 1700 + \frac{12 - 11}{24 - 11 - 7} \times 100$ $= \mathbf{1716.\bar{6}}$ **or 1716.67 (approx.)**	 2 1½ 1½
	36	(i)distance = (speed)x time (ii) $x^2 + 30x - 400 = 0$ (iii)10 km/hour OR (iii)1.5 hour	1 1 2
	37	(i)50m (ii)30m (iii) 24m OR (iii)36m	1 1 2
	38	(i)3 units (ii)(4,2) (iii)Ramesh travels more OR (iii) Library	1 1 2