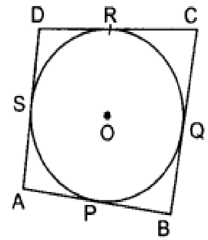
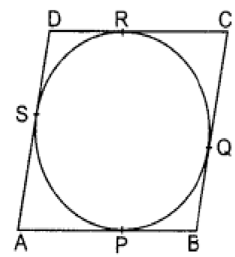
SET	B

INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2023
MATHEMATICS - 041

CLASS:X Max.Marks: 80

MARKING SCHEME			
SET	QN.NO	VALUE POINTS	MARKS SPLIT UP
	1	(c)8 units	
	2	(b) 10 cm	
	3	(c) 23	
	4	(c) 2×7^2	
	5	(d) 40^o	
	6	(a) $3:1$	
	7	(b) -1	
	8	(c) 20	
	9	(d) $\frac{1}{7}$	
	10	(b) 6	
	11	(c) AAA similarity criterion	
	12	(b) 2	
	13	(c) $\frac{12}{13}$	
	14	(a) 240	
	15	(b) 5	
	16	(d) 1.5	
	17	(a) $+3\sqrt{2},\ -3\sqrt{2}$	

	18	(d) 4 cm	
	19	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	
	20	(d) Assertion (A) is false but reason(R) is true.	
	21	$a = 2, b = -4, c = 5$ $b^2 - 4ac = -24 < 0$ No real root OR	½ 1 ½
		Roots are $\frac{2}{3}$ $and -\frac{1}{2}$	1+1
	22	Table Median = 340	1 1
	23	HCF = 5 LCM = 300	1 1
	24	S = (3 + √2) + (3 – √2) = 6 P = (3 + √2) x (3 – √2) = $(3)^2 - (\sqrt{2})^2$ = 9 – 2 = 7 Quadratic polynomial = $x^2 - Sx + P = x^2 - 6x + 7$	½ ½ 1
	25	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 = ±6 … [Taking square-root on both sides y = -1 ± 6 ∴ y = -7 or 5 OR	 1 1
		Area of ΔABC = $\frac{1}{2}$ × base × corr, altitude = $\frac{1}{2}$ × 5 × 3 = 7.5 sq.units	1 1
	26	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, (α + ß) = 3/2 + (-1/3) = (9 – 2)/6 = 7/6 7/6 = - (coefficient of x)/(Coefficient of x^2) = -b/a Product of Zeroes (α × ß) = 3/2 × (-1/3) = -3/6 -3/6 = Constant term / Coefficient of x^2 = c/a Therefore, Relationship holds	 1 1 1
	27	(i)1/6 (ii)1/10 (iii) 1/15	1 + 1 + 1
		(i)1/4 (ii)1/18 (iii)1/6	
	28	Volume of cone Volume of cylinder	½ ½

		Volume of hemisphere Total volume Conclusion	½ 1 ½
	29	**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. $\therefore$ 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 OR	Fig ½ ½ 1 1
		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) $\Rightarrow$ CD + AB = AD + BC $\Rightarrow$ 2AB = 2AD [$\because$ In parallelogram, opposite sides are equal AB = CD and AD = BC] $\Rightarrow$ AB = AD $\therefore$ AB = AD = BC = CD Hence, ABCD is a rhombus as all sides are equal in rhombus.	Fig ½ ½ 1 ½ ½
	30	Let the large number be x. Square of the larger number = x^2 Square of the srnall number = 8x $x^2 - 8x = 180$ $\Rightarrow x = -10$ (or) $x = 18$ Larger no = 18 Square of small no=144 Small no=12 The numbers are 18 and 12	 1 1 1

	31	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 $100cm^2$ $\therefore$,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
	32	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 hemisphere is, $= \frac{4}{3}\pi r^3 h$ $= \frac{2}{3}\pi 60^3 h$ $= 144000\pi cm^3$ Volume of cylinder is, $= \pi r^2 h$ $= \pi \times 60^2 \times 180$ $= 648000\pi cm^3$ Volume of water left in cylinder is $= \pi r^2 h - \frac{1}{3}\pi r^2 h - \frac{4}{3}\pi r^3 h$ $= (648000 - 288000)\pi$ $= 360000\pi$ $= 1130400 cm^3$ OR	1½ 1½ 1 1

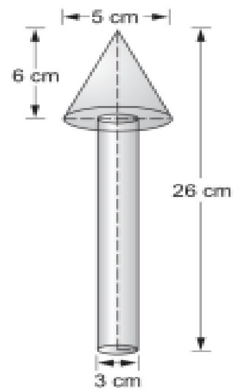
Radius of the conical part, $r = \frac{5}{2}$ cm.

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. 1



Slant height of the conical part,

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

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

1

Area to be painted orange

= curved surface area of the cone

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

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

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

1

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

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

1

Area to be painted yellow

= curved surface area of the cylinder

+ 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

33

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) 1

Solving we get $f_1 = 28$ and $f_2 = 24$ 1

OR

<table>
<tr><td></td><td></td><td>
<table>
<tr><th>Index</th><th>No. of weeks (f_i)</th><th>c.f.</th></tr>
<tr><td>1500–1600</td><td>3</td><td>3</td></tr>
<tr><td>1600–1700</td><td>11 f_0</td><td>14</td></tr>
<tr><td>$\boxed{1700\text{–}1800}$</td><td>$\boxed{12\ f_1}$</td><td>$\boxed{26}$</td></tr>
<tr><td>1800–1900</td><td>7 f_2</td><td>33</td></tr>
<tr><td>1900–2000</td><td>9</td><td>42</td></tr>
<tr><td>2000–2100</td><td>8</td><td>50</td></tr>
<tr><td>2100–2200</td><td>2</td><td>52</td></tr>
<tr><td></td><td>$\Sigma f_i = 52$</td><td></td></tr>
</table>
$n = 52,\ \frac{n}{2} = \frac{52}{2} = 26$
$\therefore$ Median class is 1700–1800
$\therefore$ Median $= l + \dfrac{\frac{n}{2} - c.f.}{f} \times h$
$= 1700 + \left(\frac{12}{12} \times 100\right) = \mathbf{1800}$
$\therefore$ Maximum frequency is 12
$\Rightarrow$ Modal class is 1700–1800
Mode $= l + \dfrac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$
$= 1700 + \dfrac{12 - 11}{24 - 11 - 7} \times 100$
$= \mathbf{1716.\overline{6}}$ or **1716.67 (approx.)**
</td><td>2

1½

1½</td></tr>
<tr><td></td><td>34</td><td>Statement
Proof
$\frac{AD}{DB} = \frac{AE}{EC}$
$\frac{x}{x+1} = \frac{x+3}{x+5}$
Simplification
x=3</td><td>1
2
½
½
½
½</td></tr>
<tr><td></td><td>35</td><td>Proof 1st part
Proof 2nd part</td><td>3
2</td></tr>
<tr><td></td><td>36</td><td>(i)4 units
(ii)(4,2)
(iii)Pulkit travels less
OR
(iii) Library</td><td>1
1
2</td></tr>
<tr><td></td><td>37</td><td>(i)distance = (speed)x time
(ii) $x^2 + 30x - 400 = 0$
(iii)10 km/hour
OR
(iii)1.5 hour</td><td>1
1
2</td></tr>
<tr><td></td><td>38</td><td>(i)50m
(ii)30m
(iii) 24m
OR
(iii)36m</td><td>1
1
2</td></tr>
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