MATHEMATICS STANDARD (041)

PRACTICE QUESTION PAPER: MARKING SCHEME

CLASS – X (2026 – 27) | Board Examination 2027

Maximum Marks: 80

Alternative correct methods should be given full credit. Marks in brackets show the step-wise distribution.

SECTION – A (1 mark each)		
1.	(B) 16 — 245 − 5 = 240 and 1029 − 5 = 1024; HCF(240, 1024) = 16.	**1**
2.	(A) $x^2 - x - 12$ — Sum = 1, product = −12, so x^2 − (sum)x + product.	**1**
3.	(C) 6 — $1/3 = 2/k \neq 5/20$ gives k = 6.	**1**
4.	(D) 2 — D = 16 − 8k = 0, so k = 2.	**1**
5.	(A) 23 — Mode = 3 × median − 2 × mean = 75 − 52 = 23.	**1**
6.	(D) 30 cm — Side ratio = 3 : 5, so perimeter = 18 × 5/3 = 30 cm.	**1**
7.	(C) (−1, 0) — $(x - 3)^2 + 4 = (x + 5)^2 + 4$, so x = −1.	**1**
8.	(B) 2 — $\cos\theta = 4/5$, so $\sec\theta + \tan\theta = 5/4 + 3/4 = 2$.	**1**
9.	(B) 6/13 — Black non-king cards = 24, so probability = 24/52 = 6/13.	**1**
10.	(D) 176 m — Circumference = 22/7 × 56 = 176 cm; 100 revolutions = 17600 cm = 176 m.	**1**
11.	(A) 462 cm^2 — $3\pi r^2 = 3 \times 22/7 \times 49 = 462$.	**1**
12.	(C) 7 — Mean = x + 4 = 11, so x = 7.	**1**
13.	(C) 2/3 — Favourable outcomes 2, 3, 5, 6 = 4, so probability = 4/6 = 2/3.	**1**
14.	(B) −1 — $k = (1 \times (-7) + 2 \times 2)/3 = -1$.	**1**
15.	(A) 7 cm — $r = \sqrt{(25^2 - 24^2)} = 7$ (tangent ⊥ radius).	**1**
16.	(D) 14 cm — $2\pi r = 88$, so r = 14.	**1**
17.	(C) 60° — $\sin\theta = 5\sqrt{3}/10 = \sqrt{3}/2$, so θ = 60°.	**1**
18.	(C) 8 — P(blue) = 2 × P(red), so blue = 2 × 4 = 8.	**1**
19.	(A) — Using the section formula with 1 : 2: x = (4 + 2)/3 = 2, y = (5 + 4)/3 = 3, so A is true and R is its correct explanation.	**1**
20.	(C) — ∠AOB = 180° − 70° = 110° (A true). The tangent is perpendicular, not parallel, to the radius (R false).	**1**

SECTION – B		
21(A).	$120 = 2^3 \times 3 \times 5$ and $144 = 2^4 \times 3^2$. HCF = $2^3 \times 3 = 24$ (1); LCM = $2^4 \times 3^2 \times 5 = 720$ (1)	**2**
21(B).	Required number = LCM(12, 15, 20) + 5. LCM = 60 (1). Number = 60 + 5 = 65 (1)	**2**

22(A).	For infinitely many solutions: $2/(k-1) = 3/(k+2) = 7/(3k)$ (½) $2(k+2) = 3(k-1)$, so $k = 7$ (1) Check: $3/9 = 7/21 = 2/6 = 1/3$ (½)	**2**
22(B).	Subtracting: $7y = 35$, so $y = 5$; then $2x = 11 - 15$, so $x = -2$ (1) Putting in $y = mx + 3$: $5 = -2m + 3$, so $m = -1$ (1)	**2**
23.	$5(1/4) + 4(4/3) - 1 = 5/4 + 16/3 - 1$ (1) $= 67/12$; denominator = 1, so value = 67/12 (1)	**2**
24.	Angle swept in 10 minutes = 60° (½) Area = $(60/360) \times (22/7) \times 21 \times 21$ (1) = 231 cm² (½)	**2**
25.	Total balls = 20. (i) P(not red) = 15/20 = 3/4 (1) (ii) P(white or green) = 12/20 = 3/5 (1)	**2**

SECTION – C		
26.	Suppose $3 + 2\sqrt{5}$ is rational, $= p/q$ where p, q are integers, $q \neq 0$ (1) Then $\sqrt{5} = (p - 3q)/(2q)$, which is rational (1) This contradicts the given fact that $\sqrt{5}$ is irrational. Hence $3 + 2\sqrt{5}$ is irrational. (1)	**3**
27.	$\alpha + \beta = 5/3$, $\alpha\beta = -2/3$ (1) $1/\alpha + 1/\beta = (\alpha + \beta)/\alpha\beta = -5/2$ (1) Required value $= -5/2 - 2(-2/3) = -5/2 + 4/3 = -7/6$ (1)	**3**
28(A).	$a = S_1 = 3 + 5 = 8$ (½); $S_2 = 12 + 10 = 22$, so $a_2 = 14$ (½) $d = 6$; the AP is 8, 14, 20, … (1) $a_{20} = 8 + 19 \times 6 = 122$ (1)	**3**
28(B).	First multiple of 7 = 105, last = 994 (1) n: $994 = 105 + (n-1)7$, so $n = 128$ (1) $S = (128/2)(105 + 994) = 64 \times 1099 = 70336$ (1)	**3**
29.	Given: PA and PB are tangents from external point P to circle with centre O. To prove: PA = PB. (½ for figure + given/to prove) Join OA, OB, OP. OA □ PA and OB □ PB (tangent □ radius), so ∠OAP = ∠OBP = 90° (1) In right Δs OAP and OBP: OA = OB (radii), OP common, ∠OAP = ∠OBP = 90°, so ΔOAP ≅ ΔOBP (RHS) (1) Hence PA = PB (CPCT) (½)	**3**
30.	Let y-axis divide AB in ratio k : 1; x-coordinate: $(-k + 5)/(k + 1) = 0$ (1) $k = 5$, so ratio is 5 : 1 (1) $y = (5(-4) + 1(-6))/6 = -13/3$; point is $(0, -13/3)$ (1)	**3**
31(A).	LHS $= \sin\theta(1 - 2\sin^2\theta) / \cos\theta(2\cos^2\theta - 1)$ (1) $1 - 2\sin^2\theta = (\cos^2\theta + \sin^2\theta) - 2\sin^2\theta = \cos^2\theta - \sin^2\theta$; $2\cos^2\theta - 1 = \cos^2\theta - \sin^2\theta$ (1) So LHS $= \sin\theta / \cos\theta = \tan\theta$ = RHS (1)	**3**
31(B).	LHS $= (1/\sin\theta - \cos\theta/\sin\theta)^2 = (1 - \cos\theta)^2/\sin^2\theta$ (1) $= (1 - \cos\theta)^2 / (1 - \cos\theta)(1 + \cos\theta)$ (1) $= (1 - \cos\theta)/(1 + \cos\theta)$ = RHS (1)	**3**

SECTION – D		
32.	Let speed of stream = x km/h. $24/(18 - x) - 24/(18 + x) = 1$ (1½) $24 \times 2x = 324 - x^2$, so $x^2 + 48x - 324 = 0$ (1) $(x + 54)(x - 6) = 0$, so $x = 6$ ($x = -54$ rejected) (1½) Speed of stream = 6 km/h (1)	**5**
33.	Theorem (Basic Proportionality Theorem): Given, to prove, figure and construction (join BE, CD; draw EF □ AB, DG □ AC) (1½) ar(ADE)/ar(BDE) = AD/DB and ar(ADE)/ar(CDE) = AE/EC (1) ar(BDE) = ar(CDE) (same base DE, between parallels DE and BC), so AD/DB = AE/EC (1) Application: $x/(x - 2) = (x + 2)/(x - 1)$, so $x^2 - x = x^2 - 4$, giving $x = 4$ (1½)	**5**
34(A).	Slant height $l = \sqrt{(7^2 + 24^2)} = 25$ cm (1) TSA $= 2\pi r^2 + \pi rl$ (1) $= 98\pi + 175\pi = 273\pi$ (1) $= 273 \times 22/7 = 858$ cm² (1) Cost = 858 × 2 = ₹ 1716 (1)	**5**
34(B).	r = 10.5 cm (1) TSA $= 6a^2 - \pi r^2 + 2\pi r^2$ (2) $= 2646 + (22/7)(10.5)^2$ (1) $= 2646 + 346.5 = 2992.5$ cm² (1)	**5**
35(A).	Let building be 60 m, tower height h. Horizontal distance $d = 60/\tan 60° = 20\sqrt{3}$ m (2) Fall from top of building to top of tower = $d \tan 30° = 20$ m (1½) Height of tower = 60 − 20 = 40 m (1) Distance = $20\sqrt{3}$ m ≈ 34.6 m (½)	**5**
35(B).	Let height = h, and B be the nearer point; $h/BD = \tan 60°$, $h/(BD + 60) = \tan 30°$ (1½) $BD = h/\sqrt{3}$ and $BD + 60 = h\sqrt{3}$ (1) $h\sqrt{3} - h/\sqrt{3} = 60$, so $2h/\sqrt{3} = 60$, $h = 30\sqrt{3}$ (1½) $h = 30 \times 1.73 = 51.9$ m (1)	**5**

SECTION – E		
36.	(i) d = 3 (1) (ii) $a_{10} = 20 + 9 \times 3 = 47$ seats (1) (iii)(A) $S_{15} = (15/2)[2(20) + 14(3)]$ (1) = 615 seats (1) (iii)(B) $20 + (n - 1)3 = 59$ (1), so n = 14; the 14th row (1)	**4**
37.	(i) 90° (1) (ii) PA $= \sqrt{(25^2 - 7^2)} = 24$ m (1) (iii)(A) Area = 2 × ½ × OA × PA (1) = 7 × 24 = 168 m² (1) (iii)(B) Area of OAPB = ½ × OP × AB (1), so 168 = ½ × 25 × AB, AB = 13.44 m (1)	**4**
38.	(i) Modal class = 30 – 40 (highest frequency 16) (1) (ii) N/2 = 25; cumulative frequencies 4, 12, 26, … so median class = 20 – 30 (1) (iii)(A) $\Sigma fx = 4(5) + 8(15) + 14(25) + 16(35) + 8(45) = 1410$ (1); Mean = 1410/50 = 28.2 (1) (iii)(B) Mode $= 30 + [(16 - 14)/(2(16) - 14 - 8)] \times 10$ (1) $= 30 + 2 = 32$ (1)	**4**

Unit-wise Weightage (as per 2026-27 Course Structure)

Unit	Marks	Questions
I Number Systems	6	Q1 (1), Q21 (2), Q26 (3)
II Algebra	20	Q2, Q3, Q4 (3), Q22 (2), Q27 (3), Q28 (3), Q32 (5), Q36 (4)
III Coordinate Geometry	6	Q7, Q14, Q19 (3), Q30 (3)
IV Geometry	15	Q6, Q15, Q20 (3), Q29 (3), Q33 (5), Q37 (4)
V Trigonometry	12	Q8, Q17 (2), Q23 (2), Q31 (3), Q35 (5)
VI Mensuration	10	Q10, Q11, Q16 (3), Q24 (2), Q34 (5)
VII Statistics & Probability	11	Q5, Q9, Q12, Q13, Q18 (5), Q25 (2), Q38 (4)
Total	**80**	