Mind Curve Mid-Term Test Series 2026–27

Class X | Test 01 – Answer Key

Chapters 1–2: Real Numbers & Polynomials

Q.No	Step-by-Step Solution	Marks Split-up
	SECTION – A (Q1–10, 1 mark each)	
1	**Q1** $\sqrt{27} = 3\sqrt{3}$ Multiplying by $\sqrt{3}$: $\sqrt{27} \times \sqrt{3} = \sqrt{81} = 9$ (rational) Among the given options, $\sqrt{3}$ is the smallest number that rationalises $\sqrt{27}$ ($3\sqrt{3}$ and $\sqrt{27}$ also give rational products, but are larger) **Answer: (c) $\sqrt{3}$**	*1 mark for the correct option.*
2	**Q2** By Euclid's division lemma: $117 = 65\times1 + 52$ $65 = 52\times1 + 13$ $52 = 13\times4 + 0$ So HCF(65, 117) = 13 Back-substituting: $13 = 65 - 52$ $= 65 - (117 - 65) = 2(65) - 117$ Comparing with $65m - 117$: $m = 2$ **Answer: (b) 2**	*1 mark for the correct option.*
3	**Q3** The required number exactly divides $(70 - 5) = 65$ and $(125 - 8) = 117$ HCF(65, 117) = 13 (as found in Q2) **Answer: (a) 13**	*1 mark for the correct option.*
4	**Q4** Sum of zeroes: $\alpha + \beta = 2/p$ Product of zeroes: $\alpha\beta = 3p/p = 3$ Given $\alpha + \beta = \alpha\beta$, so $2/p = 3$ Solving: $p = 2/3$ **Answer: (b) 2/3**	*1 mark for the correct option.*
5	**Q5** $20 = 2^2\times5$ $24 = 2^3\times3$ LCM(20, 24) = $2^3\times3\times5 = 120$ **Answer: (d) 120**	*1 mark for the correct option.*
6	**Q6** Common difference: $12-7 = 5$, $15-10 = 5$, $16-11 = 5$ (same in each case) LCM(12, 15, 16) = 240 Required number = $240 - 5 = 235$ **Answer: (b) 235**	*1 mark for the correct option.*

Q.No	Step-by-Step Solution	Marks Split-up
SECTION – A (Q1–10, 1 mark each)		
7	**Q7** Numbers are 12k, 24k, 36k with HCF = 12k Given HCF = 12, so k = 1 Numbers are 12, 24, 36 Largest number = 36; $\sqrt{36} = 6$ **Answer: (c) 6**	*1 mark for the correct option.*
8	**Q8** $HCF(a,b) = p^{\min(3,2)} \times q^{\min(4,3)} = p^2q^3$, so m = 2, n = 3 $LCM(a,b) = p^{\max(3,2)} \times q^{\max(4,3)} = p^3q^4$, so r = 3, s = 4 $(m+n)(r+s) = (2+3)(3+4) = 5\times7 = 35$ **Answer: (c) 35**	*1 mark for the correct option.*
9	**Q9** Discriminant of $p(x) = x^2+3x+3$: $(3)^2 - 4(1)(3) = 9 - 12 = -3$ Since the discriminant < 0, the polynomial has two non-real zeroes, so Assertion (A) is TRUE Reason (R) claims a quadratic always has at least two real zeroes — this is not true in general, so R is FALSE **Answer: (c) A is true but R is false**	*1 mark for the correct option.*
10	**Q10** $8^n = 2^{3n}$, whose only prime factor is 2 (no factor of 5) So 8^n never ends in 0, meaning Assertion (A) is FALSE Reason (R) is a correct general statement, so R is TRUE **Answer: (d) A is false and R is true**	*1 mark for the correct option.*
SECTION – B (Q11–13, 2 marks each)		
11	**Q11** **(A)** 28 − 8 = 20 and 32 − 12 = 20 (same difference, so the shortcut method applies) $28 = 2^2\times7$, $32 = 2^5$ $LCM(28, 32) = 2^5\times7 = 224$ Required number = 224 − 20 = 204 **Answer: 204** **(B)** $15 = 3\times5$, $24 = 2^3\times3$, $36 = 2^2\times3^2$ $LCM(15, 24, 36) = 2^3\times3^2\times5 = 360$ 9999 ÷ 360 = 27, remainder 279 Greatest 4-digit multiple = 9999 − 279 = 9720 **Answer: 9720**	*1 mark for LCM; 1 mark for the final answer.*
12	**Q12** $kx(x-2) + 6 = 0$ expands to $kx^2 - 2kx + 6 = 0$	*1 mark for forming the condition; 1 mark for the value of k.*

Q.No	Step-by-Step Solution	Marks Split-up
	SECTION – A (Q1–10, 1 mark each)	
	Product of zeroes = $6/k$ For reciprocal zeroes, the product must equal 1, so $6/k = 1$ **Answer: $k = 6$**	
13	**Q13** **(A)** $\alpha + \beta = 8$, $\alpha\beta = k$ $\alpha^2 + \beta^2 = (\alpha+\beta)^2 - 2\alpha\beta = 64 - 2k$ Given $\alpha^2 + \beta^2 = 40$: $64 - 2k = 40$ Solving: $k = 12$ **Answer: $k = 12$** **(B)** $5x^2+8x-4 = 5x^2+10x-2x-4$ $= 5x(x+2) - 2(x+2)$ $= (5x-2)(x+2)$ Zeroes: $x = 2/5$, $x = -2$ Sum of zeroes $= 2/5 + (-2) = -8/5$, which equals $-b/a$ ✓ Product of zeroes $= (2/5)(-2) = -4/5$, which equals c/a ✓ **Answer: Relationship verified**	*1 mark for setting up/factorising; 1 mark for the value/verification.*
	SECTION – C (Q14–15, 3 marks each)	
14	**Q14** For x^2-x-2: $\alpha+\beta = 1$, $\alpha\beta = -2$ $(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta = 1 + 8 = 9$ So $\alpha-\beta = \pm 3$ $1/\alpha - 1/\beta = (\beta-\alpha)/\alpha\beta = -(\alpha-\beta)/\alpha\beta$ $= -(\pm 3)/(-2) = \pm 3/2$ **Answer: $\pm 3/2$**	*1 mark for $\alpha+\beta$, $\alpha\beta$; 1 mark for $(\alpha-\beta)$; 1 mark for the final value.*
15	**Q15** **(A)** $1251 - 1 = 1250$, $9377 - 2 = 9375$, $15628 - 3 = 15625$ $1250 = 2\times5^4$ $9375 = 3\times5^5$ $15625 = 5^6$ HCF $= 5^4 = 625$ **Answer: 625** **(B)** LCM + HCF = 1260 and LCM = HCF + 900 Substituting: HCF + 900 + HCF = 1260 2 × HCF = 360, so HCF = 180 LCM = HCF + 900 = 1080	*1 mark for reducing/forming equations; 1 mark for factorisation/HCF & LCM; 1 mark for the final value.*

Q.No	Step-by-Step Solution	Marks Split-up
	SECTION – A (Q1–10, 1 mark each)	
	Product of the numbers = HCF × LCM = 180 × 1080 = 194400 **Answer: 194400**	
	SECTION – D (Q16–17, 4 marks each)	
16	**Q16** **(i)** The sheet must fit exactly along both dimensions of every carton So its length must divide every carton length, and its breadth must divide every carton breadth HCF of all lengths: HCF(6, 12, 24, 36, 48) = 6 HCF of all breadths: HCF(8, 24, 36, 48, 96) = 4 **Answer: Maximum sheet size = 6 cm × 4 cm** **(ii)** The semi-large carton's length must be a multiple of 6, strictly between the medium (12) and large (24) carton lengths — the only option is 18 Its breadth must be a multiple of 4, strictly between the medium (24) and large (36) carton breadths — the options are 28 or 32 **Answer: The semi-large carton could be 18 cm × 28 cm or 18 cm × 32 cm**	*(i) 1 mark for HCF of lengths; 1 mark for HCF of breadths. (ii) 1 mark for the valid length; 1 mark for the valid breadth.*
17	**Q17** **(i)** Greatest number of students per row = HCF(480, 640) $480 = 2^5 \times 3 \times 5$ $640 = 2^7 \times 5$ $HCF = 2^5 \times 5 = 160$ **Answer: 160** **(ii)** Rows for girls = 480 ÷ 160 = 3 Rows for boys = 640 ÷ 160 = 4 **Answer: Total rows = 7** **(iii)(A)** Using HCF × LCM = product of the numbers: 160 × LCM = 480 × 640 Solving: LCM = 1920 Verification: HCF × LCM = 160 × 1920 = 307200 = 480 × 640 ✓ **Answer: LCM = 1920** **(iii)(B)** $45 = 3^2 \times 5$ $60 = 2^2 \times 3 \times 5$ $LCM(45, 60) = 2^2 \times 3^2 \times 5 = 180$ **Answer: Both finish singing together for the first time after 180 minutes**	*(i) 1 mark. (ii) 1 mark. (iii)(A)/(B) 2 marks: 1 mark for the LCM; 1 mark for the final answer/verification.*
	SECTION – E (Q18–19, 5 marks each)	

Q.No	Step-by-Step Solution	Marks Split-up
SECTION – A (Q1–10, 1 mark each)		
18	**Q18** For $f(x) = 2x^2-5x+7$: $\alpha+\beta = 5/2$, $\alpha\beta = 7/2$ Let $p = 2\alpha+3\beta$ and $q = 2\beta+3\alpha$ $p + q = 5(\alpha+\beta) = 25/2$ $pq = (2\alpha+3\beta)(2\beta+3\alpha) = 13\alpha\beta + 6(\alpha^2+\beta^2)$ $= 13\alpha\beta + 6[(\alpha+\beta)^2 - 2\alpha\beta]$ $= 13\times(7/2) + 6[(25/4) - 7]$ $= 91/2 + 6\times(-3/4) = 91/2 - 9/2 = 41$ Required polynomial: $k[x^2 - (p+q)x + pq] = k[x^2 - (25/2)x + 41]$ Taking $k = 2$ **Answer: $2x^2 - 25x + 82$**	*1 mark for α+β, αβ; 1 mark for p+q; 2 marks for pq; 1 mark for the final polynomial.*
19	**Q19** **<u>Part 1 – Prove √6 is irrational</u>** Assume $\sqrt{6} = a/b$, with integers a, b, gcd(a,b) = 1, $b \neq 0$ Squaring: $6 = a^2/b^2$, so $a^2 = 6b^2$ So a^2 is divisible by 2, which means a is divisible by 2. Let $a = 2k$ Then $4k^2 = 6b^2$, so $2k^2 = 3b^2$ So 3 divides $2k^2$, which means 3 divides k^2, so 3 divides k So both 2 and 3 divide a, i.e. 6 divides a. Let $a = 6t$ Substituting: $36t^2 = 6b^2$, so $6t^2 = b^2$ By the same reasoning, 6 divides b So a and b share a common factor 6, contradicting gcd(a,b) = 1 **Answer: Hence √6 is irrational** **<u>Part 2 – Prove √2+√3 is irrational</u>** Assume $\sqrt{2}+\sqrt{3} = p/q$, with integers p, q coprime, $q \neq 0$ Squaring: $2+3+2\sqrt{6} = p^2/q^2$, so $5+2\sqrt{6} = p^2/q^2$ So $\sqrt{6} = (p^2-5q^2)/2q^2$ The right side is rational, so √6 would be rational — contradicting Part 1 **Answer: Hence the assumption is false, and √2+√3 is irrational**	*3 marks for proving √6 is irrational (step-wise); 2 marks for extending the argument to √2+√3.*