

Notes for valuers

- Give full marks for any correct alternative method. Award step marks as shown in brackets.
- If the method is right but there is an arithmetic slip, deduct only the marks for that step.

SECTION – A

20 × 1 = 20

1. C) $\sqrt{7}$
2. B) non-terminating and recurring
3. A) 2.5
4. B) 8
5. A) 2^5
6. B) 4
7. B) 3
8. A) 0
9. A) 0
10. B) $a^2 + 2ab + b^2$
11. B) II quadrant
12. A) 4
13. B) (0, -3)
14. B) 4
15. B) $y = 0$
16. A) $x + y = 3$
17. B) 1
18. A) Elements
19. B) 110°
20. C) equal

SECTION – B

4 × 2 = 8

21. Any two, e.g. $\sqrt{5}$ and $\sqrt{6}$ (or $\sqrt{7}$, 2.101001000...) [1 + 1]
22. $x^2 + 5x + 6 = x^2 + 2x + 3x + 6 = x(x + 2) + 3(x + 2)$
 $= (x + 2)(x + 3)$
23. (-2, 4): II quadrant; (3, -1): IV quadrant; (-1, 0): on the negative x-axis; (1, 2): I quadrant [½ each]
24. Let the angle be x. Then $x = 90^\circ - x \rightarrow 2x = 90^\circ \rightarrow x = 45^\circ$

SECTION – C

5 × 4 = 20

25. Let $x = 0.4747\ldots \rightarrow 100x = 47.4747\ldots$
 $100x - x = 47 \rightarrow 99x = 47 \rightarrow x = 47/99$

26. $p(x) = x^3 + 3x^2 + 3x + 1$. Zero of $x + 1$ is -1 .

[theorem 1, remainder 2, conclusion 1]

Remainder = $p(-1) = -1 + 3 - 3 + 1 = 0$

Since the remainder is 0, $x + 1$ is a factor of $p(x)$ (Factor Theorem). [$p(x) = (x + 1)^3$]

27. $y = 7 - 2x$

[1 each]

$x = 0 \rightarrow y = 7$; $x = 1 \rightarrow y = 5$; $x = 2 \rightarrow y = 3$; $x = 3 \rightarrow y = 1$

Solutions: (0, 7), (1, 5), (2, 3), (3, 1) — any four correct solutions

28. (i) $(\sqrt{5} + \sqrt{2})^2 = 5 + 2\sqrt{10} + 2 = 7 + 2\sqrt{10}$

[2 + 2]

(ii) $1/(\sqrt{7} - 2) \times (\sqrt{7} + 2)/(\sqrt{7} + 2) = (\sqrt{7} + 2)/(7 - 4) = (\sqrt{7} + 2)/3$

29. $\angle AOC$ and $\angle BOD$ are vertically opposite angles, so $3x = 2x + 20^\circ \rightarrow x = 20^\circ$

$\angle AOC = \angle BOD = 60^\circ$

$\angle AOD = \angle BOC = 180^\circ - 60^\circ = 120^\circ$ (linear pair)

SECTION – D

4 × 8 = 32

30. a) (i) $(3 + \sqrt{7})/(3 - \sqrt{7}) \times (3 + \sqrt{7})/(3 + \sqrt{7}) = (9 + 6\sqrt{7} + 7)/(9 - 7) = (16 + 6\sqrt{7})/2 = 8 + 3\sqrt{7} \rightarrow a = 8, b = 3$ [4 + 2]

(ii) $2^{2/3} \times 2^{1/5} = 2^{(2/3 + 1/5)} = 2^{13/15}$

(iii) $(1/3^3)^7 = 1/3^{21} = 3^{-21}$

30. b) Steps: Mark O (0) and A (1) on the number line, OA = 1 unit.

At A draw $AB \perp OA$ with $AB = 1$ unit. Join OB; $OB = \sqrt{2}$.

At B draw $BC \perp OB$ with $BC = 1$ unit. Join OC; $OC = \sqrt{2 + 1} = \sqrt{3}$.

With O as centre and OC as radius, draw an arc to cut the number line at P. Then $OP = \sqrt{3}$; P represents $\sqrt{3}$.

Marks: figure 4, steps 4.

31. a) $p(1) = 1 - 2 - 1 + 2 = 0 \rightarrow (x - 1)$ is a factor.

[factor 2, division 3, final 3]

$x^3 - 2x^2 - x + 2 = (x - 1)(x^2 - x - 2)$

$x^2 - x - 2 = (x - 2)(x + 1)$

$\therefore x^3 - 2x^2 - x + 2 = (x - 1)(x + 1)(x - 2)$

31. b) (i) $104 \times 96 = (100 + 4)(100 - 4) = 10000 - 16 = 9984$

[2 + 3 + 3]

(ii) $(103)^3 = (100 + 3)^3 = 1000000 + 90000 + 2700 + 27 = 1092727$

(iii) $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz = (2x)^2 + (3y)^2 + (-4z)^2 + 2(2x)(3y) + 2(3y)(-4z) + 2(-4z)(2x) = (2x + 3y - 4z)^2$

32. a) Correct plotting of the four points (4 marks), joining in order (1 mark).

A(2, 3) — I quadrant; B(-3, 2) — II quadrant; C(-2, -4) — III quadrant; D(3, -1) — IV quadrant (3 marks).

32. b) Table of values for $x + y = 4$:

x	0	2	4
y	4	2	0

The line meets the x-axis at (4, 0) and the y-axis at (0, 4).

For (1, 3): $1 + 3 = 4 \checkmark$, so the point lies on the line.

Marks: table 2, graph 3, intercepts 2, checking 1.

33. a) Given: lines AB and CD intersect at O. To prove: $\angle AOC = \angle BOD$ and $\angle AOD = \angle BOC$.

Ray OA stands on line CD $\rightarrow \angle AOC + \angle AOD = 180^\circ$ (linear pair) ... (1)

Ray OD stands on line AB $\rightarrow \angle AOD + \angle BOD = 180^\circ$... (2)

From (1) and (2): $\angle AOC = \angle BOD$.

Similarly $\angle AOD = \angle BOC$. Hence proved.

Marks: figure 2, given/to prove 2, proof 4.

33. b) Interior angles on the same side of the transversal are supplementary.

$$(3x + 10) + (2x - 5) = 180 \rightarrow 5x + 5 = 180 \rightarrow x = 35$$

$$\text{Angles: } 3(35) + 10 = 115^\circ \text{ and } 2(35) - 5 = 65^\circ$$

Of the eight angles, four are 115° and four are 65° (using vertically opposite, corresponding and alternate angles).

Marks: figure 2, equation 2, x 2, all angles 2.

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