

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) real number
2. C) 0.333...
3. A) 3
4. B) $\frac{1}{3}$
5. B) $\sqrt{5}$
6. B) linear polynomial
7. C) -2
8. C) not defined
9. B) -3
10. A) 9801
11. C) origin
12. D) negative y-axis
13. B) 6
14. B) 6 units
15. A) x-axis
16. D) infinitely many solutions
17. A) axiom
18. B) 2
19. B) 55°
20. C) 105°

SECTION – B**4 × 2 = 8**

21. $0.375 = \frac{375}{1000} = \frac{3}{8}$
22. $p(0) = 1$; $p(1) = 1 - 1 + 1 = 1$; $p(2) = 4 - 2 + 1 = 3$
23. $(-5, -3)$: III; $(4, -2)$: IV; $(-1, 6)$: II; $(2, 7)$: I [½ each]
24. Any two: (1) Things which are equal to the same thing are equal to one another. (2) If equals are added to equals, the wholes are equal. (3) If equals are subtracted from equals, the remainders are equal. (4) The whole is greater than the part. (5) Things which coincide with one another are equal to one another.

SECTION – C

5 × 4 = 20

25. $\frac{3}{5} = \frac{12}{20}$ and $\frac{4}{5} = \frac{16}{20}$

Three rational numbers: $\frac{13}{20}$, $\frac{14}{20} (= \frac{7}{10})$, $\frac{15}{20} (= \frac{3}{4})$ (any correct three)

26. $p(1) = 1 - 6 + 11 - 6 = 0 \rightarrow x - 1$ is a factor.

[check 1, division 2, final 1]

$$x^3 - 6x^2 + 11x - 6 = (x - 1)(x^2 - 5x + 6)$$

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

27. $y = (6 - 2x)/3$

(3, 0): $2(3) + 3(0) = 6$ ✓ solution

(0, 2): $0 + 6 = 6$ ✓ solution

(1, 1): $2 + 3 = 5 \neq 6$ ✗ not a solution

28. (i) $105 \times 106 = (100 + 5)(100 + 6) = 10000 + 1100 + 30 = 11130$

[2 + 2]

(ii) $(998)^2 = (1000 - 2)^2 = 1000000 - 4000 + 4 = 996004$

29. (i) Angles $4x$ and $5x$: $9x = 180^\circ \rightarrow x = 20^\circ \rightarrow 80^\circ$ and 100°

[2 + 2]

(ii) $x = (90^\circ - x) + 24^\circ \rightarrow 2x = 114^\circ \rightarrow x = 57^\circ$

SECTION – D

4 × 8 = 32

30. a) Steps: Mark O (0) and A (2) on the number line, OA = 2 units.

At A draw $AB \perp OA$ with $AB = 1$ unit. Join OB.

$$OB = \sqrt{2^2 + 1^2} = \sqrt{5}.$$

With O as centre and radius OB, draw an arc cutting the number line at P. OP = $\sqrt{5}$.

Marks: figure 4, steps 4.

30. b) Multiply numerator and denominator by $(7 - 4\sqrt{3})$:

$$\text{Denominator: } 7^2 - (4\sqrt{3})^2 = 49 - 48 = 1$$

$$\text{Numerator: } (5 + 2\sqrt{3})(7 - 4\sqrt{3}) = 35 - 20\sqrt{3} + 14\sqrt{3} - 24 = 11 - 6\sqrt{3}$$

$$\therefore a + b\sqrt{3} = 11 - 6\sqrt{3} \rightarrow a = 11, b = -6$$

31. a) $p(-1) = -1 + 13 - 32 + 20 = 0 \rightarrow (x + 1)$ is a factor.

[factor 2, division 3, final 3]

$$x^3 + 13x^2 + 32x + 20 = (x + 1)(x^2 + 12x + 20)$$

$$x^2 + 12x + 20 = (x + 2)(x + 10)$$

$$\therefore = (x + 1)(x + 2)(x + 10)$$

31. b) $x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

[proof 5, value 3]

If $x + y + z = 0$, the RHS = $0 \rightarrow x^3 + y^3 + z^3 = 3xyz$.

Here $-12 + 7 + 5 = 0$, so $(-12)^3 + 7^3 + 5^3 = 3(-12)(7)(5) = -1260$

32. a) Table of values for $2x + y = 6$:

x	0	1	3
y	6	4	0

The line cuts the x-axis at (3, 0) and the y-axis at (0, 6).

Area of the triangle with the axes = $\frac{1}{2} \times 3 \times 6 = 9$ square units.

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

32. b) Total fare = $8 + 5(x - 1) \rightarrow y = 5x + 3$

Table: $x = 1 \rightarrow y = 8$; $x = 2 \rightarrow y = 13$; $x = 3 \rightarrow y = 18$

Plot the points and join them to get a straight line.

Marks: equation 3, table 2, graph 3.

33. a) Let ray OC stand on line AB, so $\angle AOC + \angle COB = 180^\circ$ (linear pair).

Let OD bisect $\angle AOC$ and OE bisect $\angle COB$.

$$\angle DOC = \frac{1}{2}\angle AOC \text{ and } \angle COE = \frac{1}{2}\angle COB$$

$$\angle DOE = \angle DOC + \angle COE = \frac{1}{2}(\angle AOC + \angle COB) = \frac{1}{2} \times 180^\circ = 90^\circ$$

Hence the bisectors are at right angles. Marks: figure 2, proof 6.

33. b) 1. A straight line may be drawn from any one point to any other point.

2. A terminated line can be produced indefinitely.

3. A circle can be drawn with any centre and any radius.

4. All right angles are equal to one another.

5. If a straight line falling on two straight lines makes the interior angles on the same side of it together less than two right angles, the two lines, if produced indefinitely, meet on that side.

The fifth postulate deals with parallel lines.

Playfair's axiom: For every line l and every point P not on l , there exists a unique line through P which is parallel to l .

Marks: postulates 5, identification 1, Playfair 2.

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