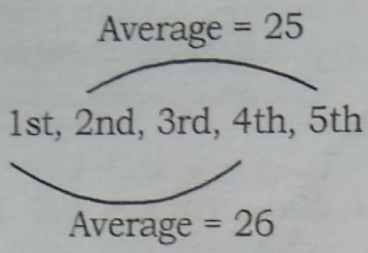
Total of last six numbers = 11.4 × 6
= 68.4

Total of 12 numbers = 63.0 + 68.4
= 131.4

∴ 6th number = 131.4 - 119.9
= 11.5

25. 1;



Total of 1st, 2nd, 3rd, 4th numbers
= 26 × 4 = 104

Total of 2nd, 3rd, 4th & 5th numbers
= 25 × 4 = 100

1st - 5th number
= 104 - 100 = 4

26.4; Average of 10 numbers = 7 then
Sum of 10 numbers = 10 × 7
= 70

Sum of 12×(10) numbers = 12(10) × 7
= 840

∴ Average of 10 numbers (new)

$= \frac{840}{10} = 84$

26.4; **Shortcut:-** New average = 7 × 12 = 84

27.1; Salary of the new person
= 5700 + 15(5700 – 5500)
= ₹ 8700

28.2; Person's income in the eight month
= ₹ (8 × 3160 + 5 × 4120 – 12 × 3400)
= ₹ (25280 + 20600 – 40800)
= ₹ 5080

29.3; Average income of the whole group

$= \frac{4200 \times 40 + 4000 \times 35}{75}$

$= \frac{168000 + 140000}{75}$

$= \frac{308000}{75} = 4106\frac{2}{3}$

30.4; $z = 1/-$
$y = 1.5/-$
$x = 3/-$

Average $= \frac{1+1.5+3}{3} = \frac{5.5}{3}/-$

If Average $= \frac{5.5}{3}/-$ then x has 3/-

If Average = 100 then x has

$= \frac{110 \times 3}{\frac{5.5}{3}} = ₹\ 180$

30.4; **Shortcut:-**

X	Y	Z
$6x$	$3x$	$2x$

$\frac{11x}{3} = 110$

$11x = 330 \Rightarrow 6x = ₹\ 180$

31.1; Let the cost of a chair be ₹ x

∴ $13 \times x + 5 \times 1227 = 8280$

⇒ $13x = 8280 - 6135$

∴ $x = \frac{2145}{13} = ₹\ 165$

32.3; Average =

$\frac{13 \times 50 + 15 \times 60 + 12 \times 65}{13 + 15 + 12}$

$\frac{650 + 900 + 780}{40} = \frac{2330}{40} = 58.25$

33.2; Let the required number of non-officers = x

Then, $110x + 460 \times 15 = 120(15 + x)$

$110x + 460 \times 15 = 120 \times 15 + 120x$

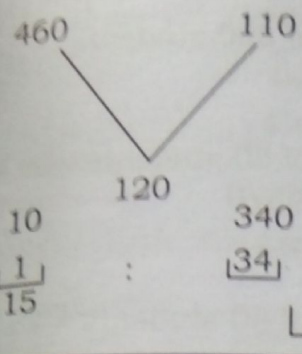
or, $120x - 110x = 460 \times 15 - 120 \times 15$

or, $10x = 15 \times 340$

∴ $x = 15 \times 34$

$= 510$

33.2; **Shortcut:-**



34.1; Let the number of passed candidates be x

Then total marks = 120×35

$= 39x + (120 - x) \times 15$

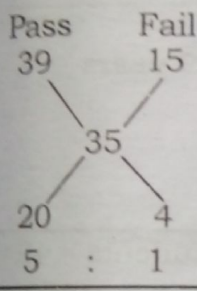
or, $4200 = 39x + 1800 - 15x$

or, $24x = 2400$

$\therefore \quad x = 100$

$\therefore$ number of passed candidates = 100

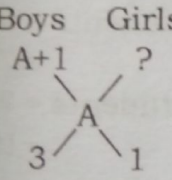
34.1; **Shortcut:-**



Hence, total number of passed condidates

$= \frac{5}{6} \times 120 = 100$

35.1;



If A + 1 - A = 1

Then A - (A - 3)

= A - A + 3

= 3

$\therefore$ Answer = (A - 3)

36.1; Total wt of 24 students = 35 × 24 kgs

Total weight of 24 students + 1 teacher = 35.4 × 25 kgs

$\therefore$ Weight of the teacher = 35.4 × 25 - 35 × 24

= 45 kgs

37.1; **Short Trick :-**

Total increase in weight = 1.5 × 8

= 12 kgs

The weight of the new person = 65 + 12

= 77 kgs

38.2; From problem,

The total age of all boys excluding the teacher = 24 × (15 – 1)

= 336 years

and the total age of all boys along with the teacher = (24 + 1) × 15

= 375 years

$\therefore$ The age of the teacher = 375 – 336

= 39 years

39.2; Total age of 12 players = 12 × 25

= 300

Total age of 13 players (excluding captain) = 13 × 26

= 338

Age of the captain = 338 - 300

= 38 years

40.4; Total weight of 50 balls = 50 × 5 gms

= 250gms

Total weight of bag and balls

= 51 × 5.05gms = 257.55

weight of bag = 257.55- 250

= 7.55 gms

Direct Formula:

Weight of bag = Old average + Increase in average×(total number of objects) = 5 + 0.05 (51)

= 5 + 2.55

= 7.55 gm

41.5; **Short trick:-**

56 + 8 × 2.5

= 76 kgs

41.5; $Aw_2 - AW_1 = 2.5$

$$\frac{\text{Total wt}_1}{\text{Number of people}} - \frac{\text{Total wt}_2}{\text{Number of people}} = 2.5$$

$$\frac{\text{Total weight}_1 - \text{Total weight}_2}{8}$$

Total weight$_1$ - Total weight$_2$ = 20.0 kgs
This difference is because of the new man.
Hence the weight of the new man
= 56 + 20
= 76 kgs.

42.4; Total weight of 10 students
= 6 × 50 + 2 × 51 + 2 × 55
Average weight of 10 students

$$= \frac{\text{Total weight of 10 students}}{10}$$

$$= 300 + 102 + 110 = \frac{512}{10} = 51.2$$

43.1; Total age of 8 members = 40 × 8
= 320 years
Age of 1 member
= 320 - 55 years = 265 years
New member is of 39 years
New total age = 265 + 39
= 304 years

$$\text{New average} = \frac{304}{8} = 38 \text{ years}$$

Diff. in Average age = 40 - 38
= 2 years

43.1; **Short Trick**
8 Members = 40 yrs.

55 y Leaves →
39 y ← Comes
Diff = 16 y

$$\text{Diff in the average age} = \frac{16}{8} = 2 \text{ yrs}$$

44.2; Total age of 3 friends = 23 × 3 years
Total age of 4 friends = 23 × 4 years
Age of the 4th friend = 23 × 4 – 23 × 3
= 23 (4 - 3)
= 23 years

44.2; **Short Trick**
Diff = 0
new age = 23 + 0
= 23 years

45.1; Total age of 600 students = 600×18
= 10800 years
Total age of 550 students
= 17.4 × 550
= 9570 years
Total age of 50 students who left
= 10800 - 9570
= 1230 years

$$\text{Average age of 50 students} = \frac{1230}{50}$$

= 24.6 years

46.1; The total age of 25 people = 15 × 25
= 375 years
If teacher's age is excluded
New total age of 24 students
= 24 × 14
= 336 years
Teachers age = 375 - 336
= 39 years

Short Trick

24 + 15 = 39 years

↓ ↓

No. of students — Average

47.1; Total age of 40 students = 40×15
= 600 years
Total age of 50 students = 50 × 15.2
= 760 years
Total age of 10 students = 760 – 600
= 160 years

$$\text{Average age of 10 students} = \frac{160}{10}$$

= 16 years

47.1; **Short Trick**
0.2 × 50 = 10 years

$$\text{Average age of 10 students} = \frac{10}{10} = 1$$

Average age of 10 new students = 15 + 1
= 16 years

48.1; **Short Trick**

Average age of 8 members increases by 2 years. This means total age increases by 8×2

$= 16$ years.

The sum of the ages of two women are $= 35 + 45 + 16$ years $= 96$ years

Hence their average age $= \frac{96}{2}$

$= 48$ years

48.1; Suppose, the average age of the remaining 6 members in x. Then the age of 6 members $= 6x$

Total of 8 members $= \frac{6x + 35 + 45}{8}$

Total of 8 members with two new women $= \frac{6x + 2y}{8}$

Difference $= 2$

$$\frac{6x + 2y}{8} - \frac{6x + 80}{8} = 2$$

$$\frac{6x + 2y - (6x + 80)}{8} = 2$$

$$\frac{6x + 2y - 6x - 80}{8} = 2$$

$$2y - 80 = 16$$

$$2y = 96$$

$$y = 48$$

Average age of 2 women $= 48$ years

49.3; **Short Trick:-**

Average age of 11 players increases by 2 months i.e. $\frac{2}{12}$ years i.e. $\frac{1}{6}$ year. This means total increase in age $= 11 \times \frac{1}{6} = \frac{11}{6}$ years

$\therefore$ The two new persons are $= 18 + 20 + \frac{11}{6}$ yrs. $= \frac{108+120+11}{6} = \frac{239}{6}$ years

$\therefore$ Average $= \frac{239}{6 \times 2} = \frac{239}{12}$ years

$= 19\frac{11}{12}$ years

49.3; Increase in the average age when two new members added

$= \frac{2}{12} = \frac{1}{6}$ years

Sum of the total increased years

$= \frac{1}{6} \times 11$

$= \frac{11}{6}$ years

Sum of the ages of two old members

$= 20 + 18$

$= 38$ years

$\therefore$ Sum of the ages of new members

$= 38 + \frac{11}{6}$ years $= \frac{239}{6}$ years

Required average

$= \frac{239}{6 \times 2} = \frac{239}{12} = 19\frac{11}{12}$ years

i.e 19 years 11 months

50.2; Now after 1 boy of 20 years left and two boys of age 'x' years and $x + 5$ years joined, the number of boys becomes 31.

Average age $= \frac{\text{Total age of 31 boys}}{31} = 15$

$$\frac{450 - 20 + x + x + 5}{31} = 15$$

$$435 + 2x = 465$$

$$2x = 30$$

$$x = 15 \text{ years}$$

51.1; Total age of 40 students = 40 × 18
= 720 years

Total age of 60 students after 20 new came = 60 × 18.5 years
= 1110 years

Total age of 20 new students
= 1100-720
= 380 years

Average age of 20 students = $\frac{380}{20}$
= 19 years

52.1; Total age of students (Let x in number) = x × 6 years

Total age of 12 teachers = 12 × 40
= 480 years

Average age of all persons

$$= \frac{\text{Total age}}{\text{Total numbers of people}} = 7$$

$$= \frac{6x+480}{12+x} = 7$$

$$= 84 + 7x = 6x + 480$$

$$\therefore \quad x = 396$$

53.2; New average =

$$\frac{\text{Total marks of 4 subjects + Marks in 5th subject}}{\text{Total numbers of subjects}}$$

$$= \frac{4 \times 75 + 80}{5} = 76$$

53.2; New average = $75 + \frac{(80-75)}{5} = 76$

54.2; Total marks of x candidates = $50x$

Correction = 100 × 60
= 6000

Total marks of the 100 candidates before correction = 100 × 90
= 9000

Differecne = 9000 - 6000
= 3000

Difference = $50x = 3000$

Average = $\frac{50x-3000}{x} = 45$

$50x - 3000 = 45x$

$5x = 3000$

$x = 600$

55.1; **Paramount Concept:-**

Difference between the two scores = 84 - 48 = 36

average = $\frac{36}{5} = 7.2$

Correct average = 50-7.2 = 42.8

56.4;

	A	B
	10	6
Total marks	= 75 × 10	?
	= 750	

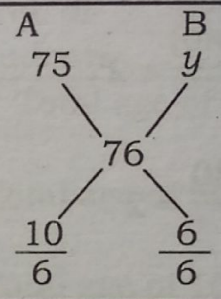
Total marks of 16 students = 76 × 16
= 1216

$\therefore$ Total marks of 6 students
= 1216 - 750
= 466

Average marks of 6 students

$$= \frac{466}{6} = 77\frac{2}{3}$$

56.4;



$$\therefore y = 76 + \frac{10}{6}$$

$$= 76 + \frac{5}{3}$$

$$= 77 + \frac{2}{3}$$

57.2; $\frac{A+B+C}{3} = 84$

A + B + C = 252 kgs.

$\frac{A+B+C+D}{4} = 80\ kgs.$

A + B + C + D = 320 kgs.

Weight of D = 320 - 252
= 68 kgs.

Hence E = 71 kgs.

$\frac{B+C+D+E}{4} = 79\ kgs.$

$$\frac{B+C+D+71}{4} = 79$$

$B + C + D = 79 \times 4 - 71$

$B + C + D = 316 - 71$

$= 245$

A's weight $= (A + B + C + D) - (B + C + D)$

$= 320 - 245$

$= 75$ kgs.

58.1; Let the average runs till 11th matches was x.

Then, total runs after 11 matches $= 11 \times x$

Total runs after 12 matches

$= 11x + 90$

Average after 12 matches

$$\frac{11x+90}{12} = x - 5$$

or, $11x + 90 = 12x - 60$

$\therefore \quad x = 150$

Thus, $x - 5 = 145$

58.1; **Shortcut:-**

$90 + (11 \times 5) = 145$

59.1; **Shortcut:-**

The required runs $= 32 + (11 \times 4)$

$= 76$ runs

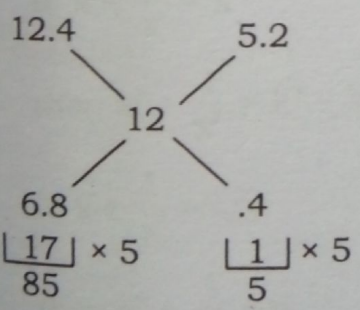
60.1; $$\frac{12.4 \times x + 26}{x+5} = 12$$

$12.4x + 26 = 12x + 60$

$0.4x = 34$

$$x = \frac{34}{0.4} \text{ or } \frac{340}{4} = 85$$

60.1; **Shortcut:-**



61.5; Total score of 42 innings

$= 42 \times 30$

$= 1260$ runs

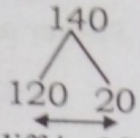
Total score of 40 innings

$= 40 \times 28$

$= 1120$ runs.

Diff $= 140$ runs

Diff between maximum and minimum score $= 100$



$\therefore$ Highest score $= 120$

62. 2; $H + W = 23 \times 2$

$= 46$ years (5 years ago)

Today $H + W = 46 + 10$

$= 56$ years

$H + W + C = 20 \times 3$

$= 60$ years (Today)

$C = 60 - 56$

$= 4$ years

63.2; 3 years ago total age of the family of 5 members $= 17 \times 5 = 85$ years

Today it is " $= 85 + 5 \times 3$

$= 85 + 15$

$= 100$

$$\text{Average} = \frac{\text{Total}}{\text{Number of members}}$$

Let the baby is of x years

Now, we have $\frac{100 + x}{6} = 17$

or, $100 + x = 102$

$\therefore \quad x = 2$ years

64.3; Total age 7 years ago $= 25 \times 2$

$= 50$ years

Total age today $= 50 + 7 \times 2$

$= 50 + 14$

$= 64$ years

Total age after child is born

$= 64 + x$ years

$$\text{Average} = \frac{64 + x}{3} = 22$$

$$= 64 + x = 66$$

$$\therefore \quad x = 2 \text{ years}$$

65.1; Total age of Mother + Father + Son
= 42 × 3 = 126 years
After 6 years total age of M + F + S + Daughter-in-law + baby = 36 × 5
= 180 years

After 6 years
Total age of Mother, Father and Son after 6 years

M F S
↓ ↓ ↓
+6 +6 +6

= 126 + 18 = 144 years.
144 + Daughter in law + 5 yrs = 180
(where the baby is of 5 years as he is born after one year of marriage)
Daughter in law = 180 - 149
= 31 years
The age of the daugher-in-law at the time of marriage = 31- 6 = 25 years.

66.4;

67.4; **By the formula:**
Average speed

$$= \frac{2 \times S_1 \times S_2}{S_1 + S_2} = \frac{2 \times 20 \times 30}{20 + 30}$$

= 24 km/hr.

68.1; Suppose the average expenditure was ₹ x. Then total expenditure = $35x$.
When 7 more students joined the mess, total expenditure = $35x + 42$
Now, the average expenditure

$$= \frac{35x + 42}{35 + 7} = \frac{35x + 42}{42}$$

Now, we have $\frac{35x + 42}{42} = x - 1$

or, $35x + 42 = 42x - 42$
or, $7x = 84 \quad \therefore \quad x = 12$
The original expenditure of the mess
= 35 × 12 = ₹ 420

16 ALGEBRA

CHAPTER

1. $(a + b)^2 = a^2 + b^2 + 2ab$
2. $(a - b)^2 = a^2 + b^2 - 2ab$
3. $a^2 - b^2 = (a + b)(a - b)$
4. $a^2 + \frac{1}{a^2} = \left(a + \frac{1}{a}\right)^2 - 2$ or $\left(a - \frac{1}{a}\right)^2 + 2$
5. $a^2 + b^2 + c^2 = (a + b + c)^2 - 2(ab + bc + ca)$
6. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
7. $(a^3 - b^3) = (a - b)(a^2 + b^2 + ab)$
8. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
9. $(a^3 + b^3) = (a + b)(a^2 + b^2 - ab)$
10. $a^3 + \frac{1}{a^3} = \left(a + \frac{1}{a}\right)^3 - 3\left(a + \frac{1}{a}\right)$
11. $a^3 - \frac{1}{a^3} = \left(a - \frac{1}{a}\right)^3 + 3\left(a - \frac{1}{a}\right)$
12. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$
13. If $a + b + c = 0$
    then $a^3 + b^3 + c^3 = 3abc$
14. If $x + \frac{1}{x} = k$

    then $x^2 + \frac{1}{x^2} = k^2 - 2$
15. If $x + \frac{1}{x} = k$

    then $x^3 + \frac{1}{x^3} = k^3 - 3k$
16. If $x + \frac{1}{x} = \sqrt{3}$

    (i) then $x^3 + \frac{1}{x^3} = 0$

    (ii) $x^6 + 1 = 0$ (iii) $x^6 = -1$
17. If $x^2 + \frac{1}{x^2} = k$

    (i) $\left(x + \frac{1}{x}\right) = \sqrt{k + 2}$

    (ii) $x - \frac{1}{x} = \sqrt{k - 2}$
18. If $x - \frac{1}{x} = k$

    $x^2 + \frac{1}{x^2} = k^2 + 2$
19. If $x - \frac{1}{x} = k$

    $x^3 - \frac{1}{x^3} = k^3 + 3k$
20. If $x + \frac{1}{x} = k$ (given)

    $x^5 + \frac{1}{x^5} =$

    $\left(x^2 + \frac{1}{x^2}\right)\left(x^3 + \frac{1}{x^3}\right) - \left(x + \frac{1}{x}\right)$

    $= (k^2 - 2)(k^3 - 3k) - (k)$
    $= k^5 - 3k^3 - 2k^3 + 6k - k$
    $= k^5 - 5k^3 - 5k$
    $= k^3(k^3 - 5) + 5k$
21. $(a+b)^2 - (a-b)^2 = 4ab$
22. $(a+b)^2 + (a-b)^2 = 2(a^2+b^2)$
23. If $x + \frac{1}{x} = 2$
    then $x = 1$ (always)
24. If $x + \frac{1}{x} = -2$
    then $x = -1$ (always)

1. If $\frac{3x+2y}{3x-2y}=\frac{4}{3}$, then find the value of $\frac{x^2+y^2}{x^2-y^2}$

(A) $\frac{185}{205}$ (B) $\frac{205}{187}$

(C) $\frac{14}{3}$ (D) None of these

2. If $x^2+y^2+4x+4y+8=0$, then $(x+y)$ is equal to:

(A) 1 (B) 0

(C) 3 (D) – 4

3. If $x+\frac{1}{x}=6$, then $\frac{3x}{2x^2+2-5x}$ will be:

(A) $\frac{2}{3}$ (B) 0

(C) 1 (D) $\frac{3}{7}$

4. $\frac{\sqrt{x+2}+\sqrt{x-2}}{\sqrt{x+2}-\sqrt{x-2}}=\frac{3}{2}$, then the value of 6x will be:

(A) $\frac{13}{6}$ (B) $\frac{6}{13}$

(C) 13 (D) None of these

5. If $x+\frac{1}{x}=3$ then the value of $x^4+\frac{1}{x^4}$ will be:

(A) 49 (B) 47

(C) 45 (D) 42

6. $\frac{1}{(a-b)(b-c)}+\frac{1}{(b-c)(c-a)}+\frac{1}{(c-a)(a-b)}=?$

(A) 1 (B) – 1

(C) 0 (D) None of these

7. If $x+y=2xy$ and $x-y=4xy$, then the value of y^2 will be:

(A) $-\frac{1}{9}$ (B) $\frac{1}{9}$

(C) $-\frac{1}{3}$ (D) $\frac{1}{3}$

8. If $x=(\sqrt{2}+1)$ and $y=(1-\sqrt{2})$, then the value of (x^2+y^2+xy) will be:

(A) 7 (B) 8

(C) 6 (D) 5

9. If x^3+3x^2-kx+4 is divided by $(x-2)$, the remainder is k. The value of k is equal to

(A) 8 (B) 2

(C) 4 (D) 6

10. If $a=-5$, $b=-6$, $c=10$, then the value of $\frac{a^3+b^3+c^3-3abc}{(ab+bc+ca-a^2-b^2-c^2)}$

(A) – 1 (B) 1

(C) 18 (D) 21

11. If $a^{\frac{1}{3}}=11$, then the value of (a^2-331a) will be:

(A) 1331331 (B) 1331000

(C) 1334331 (D) 1330030

12. If $x+\frac{1}{16x}=1$, then $64x^3+\frac{1}{64x^3}$ will be:

(A) 40 (B) 52

(C) 64 (D) 76

13. If $2^x = 3^y = 6^{-z}$, then $\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$ is equal to:

(A) 0 (B) 1

(C) $\frac{3}{2}$ (D) $-\frac{1}{2}$

14. If $x^a \cdot x^b \cdot x^c = 1$, then $a^3 + b^3 + c^3$ is equal to:

(A) 9 (B) abc

(C) a + b + c (D) 3abc

15. If $3^{2x-y} = 3^{x+y} = \sqrt{27}$, then the value of y is:

(A) $\frac{1}{2}$ (B) $\frac{3}{2}$

(C) 2 (D) $\frac{3}{4}$

16. If $a + \frac{1}{a} = 6$, then the value of $a^4 + \frac{1}{a^4}$ will be:

(A) 1154 (B) 1158

(C) 1160 (D) 1164

17. If $\left(a+\frac{1}{a}\right)^2 = 3$, then $a^3 + \frac{1}{a^3}$ will be

(A) $\frac{10\sqrt{3}}{3}$ (B) 0

(C) $3\sqrt{3}$ (D) $6\sqrt{3}$

18. If $a = \frac{x}{x+y}$ and $b = \frac{y}{x-y}$, then $\frac{ab}{a+b}$ is:

(A) $\frac{xy}{x^2+y^2}$ (B) $\frac{x^2+y^2}{xy}$

(C) $\frac{x}{x+y}$ (D) $\left(\frac{y}{x+y}\right)^2$

19. If a + b = 2c, then the value of $\frac{a}{a-c}+\frac{c}{b-c}$ is:

(A) – 1 (B) 1

(C) 2 (D) – 2

20. If $P = \frac{x^2-36}{x^2-49}$ and $Q = \frac{x+6}{x+7}$, then the value of $\frac{P}{Q}$ is:

(A) $\frac{x-6}{x-7}$ (B) $\frac{x-6}{x+7}$

(C) $\frac{x-7}{x+6}$ (D) $\frac{x+6}{x-7}$

21. If $x + \frac{1}{x} = 2$ and x is a real number, then the value of $x^{17} + \frac{1}{x^{19}}$ is:

(A) 1 (B) 0

(C) 2 (D) – 2

22. If $x + \frac{1}{4x} = \frac{3}{2}$, then the value of $8x^3 + \frac{1}{8x^3}$ is:

(A) 18 (B) 36

(C) 24 (D) 16

23. If $x = \frac{4ab}{a+b}$ and $a \neq b$, then $\frac{x+2a}{x-2a}+\frac{x+2b}{x-2b}$ will be:

(A) a (B) b

(C) 2ab (D) 2

24. If $m + \frac{1}{m-2} = 4$, then $(m-2)^2 + \frac{1}{(m-2)^2}$ will be:

(A) -2 (B) 0

(C) 2 (D) 4

25. If $a^2 = b + c$, $b^2 = c + a$ and $c^2 = a + b$, then the value of $\frac{1}{1+a} + \frac{1}{1+b} + \frac{1}{1+c}$ will be:

(A) abc (B) $a^2b^2c^2$

(C) 1 (D) 0

26. If $2x + \frac{1}{3x} = 5$, then the value of $\frac{5x}{6x^2+20x+1}$ is

(A) $\frac{1}{4}$ (B) $\frac{1}{6}$

(C) $\frac{1}{5}$ (D) $\frac{1}{7}$

27. If $a + b + c = 0$, then the value of $\frac{(a^2+b^2+c^2)^2}{a^2b^2+b^2c^2+c^2a^2}$ is

(A) 1 (B) 2

(C) 3 (D) 4

28. What is the HCF of polynomials $x^4 - 3x + 2$, $x^3 - 3x^2 + 3x - 1$ and $x^4 - 1$?

(A) $x - 1$ (B) $x + 1$

(C) $x^2 - 1$ (D) None of these

29. If $x = \sqrt{\frac{\sqrt{5}+1}{\sqrt{5}-1}}$, then the value of $5x^2 - 5x - 1$ will be:

(A) 0 (B) 3

(C) 4 (D) 5

30. If $\frac{a}{b} + \frac{b}{a} = 1$ and $a, b \neq 0$, then the value of $a^3 + b^3$ is:

(A) 0 (B) 1

(C) -1 (D) 2

31. If $x + \frac{1}{x} = \sqrt{3}$, then $x^{18} + x^{12} + x^6 + 1$ is equal to:

(A) 0 (B) 1

(C) 2 (D) 3

32. Find the value of x that will satisfy the equation $\sqrt{2x+3} + \sqrt{2x-1} = 2$

(A) 3 (B) 2

(C) 1 (D) $\frac{1}{2}$

33. Simplify $\frac{2x^4 - 162}{(x^2+9)(2x-6)}$.

(A) $\frac{x^2-9}{x^2+9}$ (B) $x + 3$

(C) $x - 3$ (D) $\frac{x+3}{x-3}$

34. In the following two equations the value of x will be

$\frac{2x}{3} + \frac{y}{2} = 4$ and $\frac{x}{3} - \frac{y}{2} = 1$

(A) -5 (B) 5

(C) 4 (D) -4

35. If $x + \frac{1}{x} = 2$ and $x \neq 0$, then the value of $x^2 + \frac{1}{x^3}$ is:

(A) 1 (B) 2

(C) 3 (D) 4

36. If $x = a^{2/3} - a^{-2/3}$, then the value of $x^3 + 3x$

(A) $a^2 - \frac{1}{a^2}$ (B) $a^2 + \frac{1}{a^2}$

(C) $a + \frac{1}{a}$ (D) $a - \frac{1}{a}$

37. If α and β are the roots of the equation $x^2 + px + q = 0$, then the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ will be

(A) $\frac{p^2 - 2q}{q}$ (B) $\frac{p^2 + 2q}{q}$

(C) $\frac{-p^2 - 2q}{q}$ (D) $\frac{-p^2 + 2q}{q}$

38. $\frac{a^2 - b^2 - 2bc - c^2}{a^2 + b^2 + 2ab - c^2}$ is equal to:

(A) $\frac{a+b+c}{a-b+c}$ (B) $\frac{a-b-c}{a+b-c}$

(C) $\frac{a-b-c}{a-b+c}$ (D) $\frac{a-b+c}{a+b+c}$

39. If $a^3 - b^3 - c^3 - 3abc = 0$ then, which one is correct:

(A) $a = b = c$ (B) $a + b + c = 0$

(C) $a + c = b$ (D) $a = b + c$

40. If $xy(x + y) = 1$, then $\frac{1}{x^3y^3} - x^3 - y^3$ is equal to:

(A) 0 (B) 1

(C) 3 (D) – 2

41. If $ax + by = 6$, $bx - ay = 2$ and $x^2 + y^2 = 4$ then the value of (a^2+b^2) would be-

(A) 2 (B) 4

(C) 5 (D) 10

42. If $a + \frac{1}{a+2} = 0$, then the value of $(a+2)^3 + \frac{1}{(a+2)^3}$ is.

(A) 6 (B) 4

(C) 3 (D) 2

43. If $a^3 - b^3 = 56$ and $a - b = 2$, then the value of (a^2+b^2) is

(A) -12 (B) 20

(C) 18 (D) -10

44. If $a + \frac{1}{a} = 1$, then the value of a^3 is-

(A) 2 (B) -1

(C) 4 (D) -2

45. If $x^4 + \frac{1}{x^4} = 23$, then the value of $\left(x - \frac{1}{x}\right)^2$ will be-

(A) 7 (B) -7

(C) -3 (D) 3

46. If $x + \frac{1}{x} = 3$, then the value of $x^5 + \frac{1}{x^5}$ is-

(A) 123 (B) 126

(C) 113 (D) 129

47. If $a+b+1 = 0$, then the value of $(a^3+b^3+1-3ab)$

(A) 3 (B) 0

(C) -1 (D) 1

48. If $(a-b)=3$, $(b-c)=5$ and $(c-a)=1$, then the value of $\frac{a^3+b^3+c^3-3abc}{a+b+c}$

(A) 17.5 (B) 20.5

(C) 10.5 (D) 15.5