S1. Ans.(b)

Sol. Let the maximum marks = x

Case (i) Pass marks = 32% of x + 16

Case (ii) Pass marks = 36% of x – 10

From Case (i) & Case (ii), we get,

32% of x + 16 = 36% of x – 10

Or, 4% of x = 26

Or, $\frac{4}{100} \times x = 26$

$\Rightarrow x = \frac{26 \times 100}{4} = 650$

So,

$\text{Pass\%} = 32\% + \left(\frac{16}{650} \times 100\right)\%$

$= 32\% + 2\frac{6}{13}\% = 34\frac{6}{13}\%$

S2. Ans.(b)

Sol. We know hat

$10\% = \frac{1}{10}$ and $40\% = \frac{4}{10}$

So,

Price of tickets	No. of seats	Income
Initial value → 10	× 10	= 100
Final value → 14	× 9	= 126

So, increase % is = 126 – 100 = 26%

S3. Ans.(b)

Sol.

Average age of the couple is 25 years

The sum = 2 × 25

= 50 years

After 3 years, sum = 50 + 2 × 3

= 56 years

Age of baby = 2 years

Then average $(\bar{x}) = \frac{\Sigma x}{n}$

$= \frac{56+2}{3} = 58/3 = 19\frac{1}{3}$ years

S4. Ans.(c)

Sol. Let minors be x

Consumption by adults = 8 × 15 = 120

Total Consumption = (x + 8) × 10.8

Average consumption by minors

$$= \frac{(8+x)10.8-120}{x} = 6 \Rightarrow x = 7$$

S5. Ans.(a)

Sol. Cost of raw material = 4x

Cost of labour = 3x

Cost of miscellaneous = 2x

Total cost = 4x + 3x + 2x

= 9x

$$\text{Amount} = \frac{4x\times110}{100} + \frac{3x\times108}{100} + \frac{2x\times95}{100}$$

= 9.54x

$$\text{Percentage rise} = \frac{9.54x-9x}{9x}\times100 = 6\%$$

S6. Ans.(d)

Sol. Total marks = 50 × 65

$$\text{New average} = \frac{65\times50-83+38}{50} = 64.1$$

Alternate method:-

Diff. in wrong marks

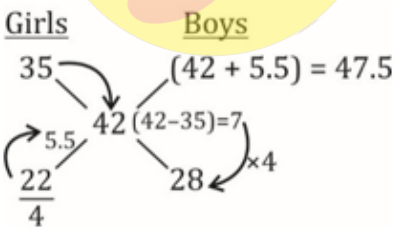
(38 – 83) = - 45

Divide by no. of students= $\frac{-45}{50} = -0.9$

Now, New average = 65 – 0.9 = 64.1

S7. Ans.(c)

Sol.



Alternate METHOD:

Total marks = 50 × 42 = 2100

Girls marks = 22 × 35 = 770

$$\text{Boys} = \frac{(2100-770)}{28} = 47.5$$

S8. Ans.(c)

Sol. Sum of 8 numbers = 20 × 8 = 160

$(15\frac{1}{2})\times2+(21\frac{1}{3})\times3+x+x+4+x+7=160$

31 + 64 + 3x + 11 = 160

3x = 160 – 106 ⇒ x = 54/3 ⇒ x = 18

8th Number = x + 7

= 18 + 7 = 25

S9. Ans.(a)

Sol.

	Side	Surface area
Old →	a	a^2
New →	1.25a	$1.5625a^2$

$\therefore$ % area $= \frac{0.5625}{1} \times 100$

= 56.25%

S10. Ans.(b)

Sol.

$\text{Req. Percent} = 100\times\frac{90}{100}\times\frac{70}{100}\times\frac{50}{100}=31.5$

Means total discount = 100 – 31.5 = 68.5

S11. Ans.(c)

Sol. Let the first CP of the commodity be Rs. 100

$\therefore$ First SP = Rs. 110

Second CP = Rs. 90

Gain $= 16\frac{2}{3}\% = \frac{50}{3}\%$

$\because$ Second SP

$= \left(100+\frac{50}{3}\right)\%$ of Rs. $90 = \frac{350}{3\times100}\times90 =$ Rs. 105

⇒ Difference of SPs = Rs. (110 – 105) = Rs. 5

⇒ If the difference is Rs. 5, then CP = Rs. 100

So, If the difference be Rs. 2, then

$\text{CP} = \frac{100}{5}\times2 =$ Rs. 40

S12. Ans.(b)

Sol. Let the MP = Rs. 1 per kg then

Weight	MP	Rate
100	100	1
96	$\frac{80}{SP}$	$\frac{80}{96}$

Effective discount $= 1-\frac{80}{96}=\frac{16}{96}$

% discount $= \frac{16}{96}\times100 = 16.66\%$

S13. Ans.(c)

Sol. Let cost of 100 Articles is Rs. 100

(∴ 1 Article = Rs.1)

50% of 100 Article → 50 Articles → 20% Profit → Rs.60

Rest (50%) → 50 Articles → 40% Profit → 70

Rs.60 + 70 = 130

If 100 articles $\xrightarrow{25\%\text{Profit}}$ Rs.125 SP

→ Diff = 5 unit = 100

1 unit = 20

S14. Ans.(c)

Sol. For the first trader,

Let the CP of the article = Rs. 100

⇒ SP = Rs. 120

Now, For the second trader,

SP of the article = Rs. 120

& Gain = 20%

Let the CP be Rs. x.

$\therefore \frac{120-x}{120} \times 100 = 20$

$\therefore 120 - x = 20 \times \frac{6}{5} = 24$

$\therefore x = 120 - 24 = \text{Rs. } 96$

∴ Gain = Rs. 24

Now when difference of gains = Rs. 4,

Then SP = Rs. 120

So, When the difference = Rs. 85,

Then SP = $\frac{120}{4} \times 85 = \text{Rs. } 2550$

S15. Ans.(a)

Sol. The mixture and allegation method is apply on cost price and selling price.

Rs.		Piece
8500	10	1000
500 unit profit		
9000	9	850

Actual profit percentage = $\frac{500}{8500} \times 100 = 5\frac{15}{17}\%$

S16. Ans.(b)

Sol. Selling price of laptop paid by customer

$= 25000 \times \frac{90}{100} \times \frac{114}{100} = 25650$

S17. Ans.(a)

Sol.

Let x = number of months for which C joined the business.
So, Ratio of shares of Profit
= 30,000 × 12 : 40,000 × 8 : 50,000 × x
= 32 : 36 : 5x
C's share = $\frac{5x}{36+32+5x} = \frac{5x}{68+5x}$
Given, $\frac{5x}{68+5x} = \frac{15000}{49000} \Rightarrow x = 6$
⇒ C joined the business (i.e. 6-4) = 2 months after joining of B

S18. Ans.(a)

Sol.

CP = 100%
SP at 30% profit = 130%
SP at 4% loss = 96%
Difference = 130 – 96 = 34%
34% = 1020

$96\% = \frac{1020}{34} \times 96 = 2880$

So, selling price of the stationery = 2880

S19. Ans.(c)

Sol.

120% = 90% = 150%=k
Ratio of CP = 15 : 20 : 12
∴ 47 units = 1880

$1 \text{ unit} = \frac{1880}{47} = 40$

∴ CP of a pen = 15 × 40 = 600
CP of a marker = 20 × 40 = 800
CP of a book = 12 × 40 = 480

S20. Ans.(b)

Sol.

If loss is double of profit earned and diff. Between both price
= 3400 – 2800 = 600
So, 600 must be divided to find CP.
Ratio of loss and profit = 2 : 1
So, CP of the goat = 2800 + (200 × 2)
= 2800 + 400
= 3200

S21. Ans.(a)

Sol.

If α and β are roots of eqn. and given (Given $\alpha+\beta=8$) & $\alpha-\beta=2\sqrt{5}$
Therefore finding value of $\alpha\beta$ from given equation

$\alpha+\beta=8$
$\alpha^2+\beta^2+2\alpha\beta=64$ ... (i) $\Big|\ \alpha-\beta=2\sqrt{5}$
$\alpha^2+\beta^2-2\alpha\beta=20$ ... (ii)

Suibtract Eq (i) from eq (ii)
$4\alpha\beta=44$
$\alpha\beta=11$ and hence,
$\alpha^4\beta^4=(11)^4=14641$
$\alpha^2+\beta^2=64-22=42$.....(3)
Again squaring eq (3) from both side
$\alpha^4+\beta^4+2\alpha^2\beta^2=(42)^2$ (put value of $\alpha^2\beta^2=11\times11=121$)
$\alpha^4+\beta^4=(42)^2-2\times121=1522$
So, eqn. having roots α^4 & β^4 is
$x^2-(\alpha^4+\beta^4)x+\alpha^4\beta^4=0$
$x^2-1522x+14641=0$

S22. Ans.(b)

Sol.

Eqn. Given = $Px^2-Qx+R=0$, a & b are roots
Then $a+b=\frac{Q}{P}$ ..... (1) & $a\times b=\frac{R}{P}$.....(2)
(as sum of roots=$-\frac{b}{a}$ & product of roots = $\frac{c}{a}$)
Squaring both side of eq 1
$a^2+b^2+2ab=\frac{Q^2}{P^2}$ (put value of $a\times b=\frac{R}{P}$)

$a^2+b^2=\frac{Q^2}{P^2}-\frac{2R}{P}=\frac{Q^2-2RP}{P^2}$
Hence Value of $\frac{1}{a^2}+\frac{1}{b^2}+\frac{a}{b}+\frac{b}{a}$
$=\frac{a^2+b^2}{a^2b^2}+\frac{a^2+b^2}{ab}$
$\Rightarrow\frac{\frac{Q^2-2RP}{P^2}}{\frac{R^2}{P^2}}+\frac{\frac{Q^2-2RP}{P^2}}{\frac{R}{P}}$
$\Rightarrow\frac{P(Q^2-2PR)+R(Q^2-2PR)}{PR^2}$
$\Rightarrow\frac{(P+R)(Q^2-2PR)}{PR^2}$

S23. Ans.(b)

Sol. Given equation is

$x^2 - 16x + 59 = 0$.....(1)

let x-6=k

hence, x=k+6 , put value of x=k+6 in eq 1

$(k + 6)^2 - 16(k + 6) + 59 = 0$

$36 + k^2 + 12k - 16k - 96 + 59 = 0$

$\Rightarrow k^2 - 4k - 1 = 0$

$\Rightarrow k^2 - 1 = 4k$

$\Rightarrow \boxed{k - \frac{1}{k} = 4}$

So, $k^2 + \frac{1}{k^2} = (4)^2 + 2$

$$\boxed{(x-6)^2 + \frac{1}{(x-6)^2} = 18}$$

S24. Ans.(d)

Sol. ATQ,

$x = y - z$

$\Rightarrow x - y + z = 0$

If $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

$\therefore x^3 + (-y)^3 + (z)^3$

$= 3x(-y)(z) = -3xyz$

S25. Ans.(a)

Sol.

$$\frac{1}{(a-1)(b-1)(c-1)} + \frac{1}{(b-1)(c-1)(d-1)} + \frac{1}{(c-1)(d-1)(a-1)} + \frac{1}{(d-1)(a-1)(b-1)}$$

$$= \frac{d-1+a-1+b-1+c-1}{(a-1)(b-1)(c-1)(d-1)}$$

$$= \frac{(a+b+c+d)-4}{(a-1)(b-1)(c-1)(d-1)} = 0$$

S26. Ans.(b)

Sol. ATQ,

$$p = \frac{1}{p-7}$$

$\Rightarrow p^2 - 7p = 1$

$\Rightarrow p^2 - 1 = 7p$

$\Rightarrow p - \frac{1}{p} = 7$

Square both sides

$$p^2 + \frac{1}{p^2} - 2 = 49$$

$$\Rightarrow p^2 + \frac{1}{p^2} = 51$$

$$\Rightarrow p^2 + \frac{1}{p^2} + 2 = 53$$

$$\Rightarrow \left(p + \frac{1}{p}\right)^2 = 53$$

$$\Rightarrow \left(p + \frac{1}{p}\right) = \sqrt{53}$$

S27. Ans.(d)

Sol. ATQ,

$$p + \frac{1}{q} = q + \frac{1}{r} = r + \frac{1}{p}$$

$$\text{Put } p = \frac{1}{2}, q = 2, r = -1$$

$$\therefore \frac{1}{2} + \frac{1}{2} = 2 - 1 = -1 + 2$$

$$\Rightarrow 1 = 1 = 1 \text{ (Satisfies)}$$

$$\therefore p + q + r = \frac{1}{2} + 2 - 1 = \frac{3}{2}$$

Also, put

$$p = -\frac{1}{2}, q = -2, r = 1$$

$$-\frac{1}{2} - \frac{1}{2} = -2 + 1 = 1 - 2$$

$$\Rightarrow -1 = -1 = -1 \text{ (satisfies)}$$

$$\therefore p + q + r = -\frac{1}{2} - 2 + 1 = -\frac{3}{2}$$

S28. Ans.(c)

Sol. ATQ,

$mx + ny = 1$

Let $m = n = 1$

$\therefore x + y = 1$ ..(i)

And,

$$nx + my = \frac{3mn}{2m^2 + n^2}$$

Put, $m = n = 1$

$$x + y = \frac{3 \times 1 \times 1}{2 + 1} = 1$$

Now $x = y = 1/2$ satisfies both eqn .(i) & (ii)

$\therefore$ Value of $(x^2 + y^2)(2m^2 + 2n^2)$

$= (1/4 + 1/4)(2 + 2)$

$= 2$

S29. Ans.(a)

Sol. Given equation is

$Ax^2 - A^2x + AB = 0$, A & B are roots

So,

$A + B = \frac{A^2}{A}$ & $A \times B = \frac{AB}{A}$

$A + B = A$ & $\boxed{A = 1}$

On putting value of A=1

$\boxed{B = 0}$

A & B = 1, 0

S30. Ans.(a)

Sol. Given equation is

$x^2 - x - 1 = 0$

If α & β are roots of eq

$\alpha + \beta = 1$ .....(1) & $\alpha \times \beta = -1$

squaring eq 1 from both sides

$\alpha^2 + \beta^2 + 2(-1) = 1$

$\alpha^2 + \beta^2 = 3$

again squaring both side above eq

$\alpha^4 + \beta^4 = 9 - 2 = 7$

Again squaring one more time both sides

$\alpha^8 + \beta^8 + 2\alpha^4\beta^4 = (7)^2$

$\boxed{\alpha^8 + \beta^8 = 49 - 2 = 47}$