Sample Paper - 7

GENERAL INSTRUCTIONS

All questions are compulsory.
The question paper consist of 30 questions divided into four sections A, B, C and D. Section A comprises of 6 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 8 questions of 4 marks each.
There is no overall choice.
Use of calculator is not allowed.

SECTION-A

(1 mark each)

1. Write the first five square numbers.

2. If the sum of the digits of a number is divisible by three, then the number is divisible by which number?

3. Factorise $y^2 - 2y - 15$

4. A polyhedron is having 8 vertices and 12 edges. How many faces of it are there?

5. Express $3^{-5} \times 3^{-4}$ as a power of 3 with positive exponent.

6. The sides of a triangle are $3x+1$, $-x+2$ and $4x+6$, then find its perimeter.

SECTION-B

(2 marks each)

7. If each edge of a cube is doubled
(a) How many times will its surface area increase?
(b) How many times will its volume increase?

8. If 16 shirts of equal size can be made out of 24 m of cloth, how much cloth is needed for making one shirt?

9. Factorise:
(a) $12x+36$
(b) $22y-33z$

10. Evaluate: $\sqrt[3]{1372} \times \sqrt[3]{1458}$

11. On Sunday 845 people went to zoo. On Monday only 169 people went. What is the percent decrease in the people visiting the zoo on Monday.

12. Simplify : $3x(4x-5)+3$ and find its value

(a) $x=3$ (b) $x=\frac{1}{2}$:

SECTION-C

(3 marks each)

13. Simplify: $\left(-\frac{3}{2}\times\frac{4}{5}\right)\div\left(\frac{9}{5}\times\frac{-10}{3}\right)-\left(\frac{1}{2}\times\frac{3}{4}\right)$

14. Observe the following table, where x and y are in inverse variation :

X	**(i)** p_1	**200**	**300**
y	**60**	**30**	**(ii)** p_2

Find the unknown quantities.

15. Amina thinks of a number and subtracts $\frac{5}{2}$ from it. She multiplies the result by 8. The result now obtained is 3 times the same number she thought of. What is the number?

16. Simplify: $\left(\frac{1}{5}\right)^{45}\times\left(\frac{1}{5}\right)^{-60}-\left(\frac{1}{5}\right)^{28}\times\left(\frac{1}{5}\right)^{-43}$

17. A grandfather is ten times older than his granddaughter. He is also 54 years older than her. Find their present age.

18. (a) Construct a rectangle ABCD in which side BC = 5 cm and diagonal BD = 6.2 cm.
(b) Can you draw a rhombus ZEAL, where ZE = 3.5 cm, diagonal EL = 5 cm? Why?

19. The length, breadth and height of a cuboidal reservoir is 7 m, 6 m and 15 m respectively. 8400L of water is pumped out from the reservoir. Find the fall in the water level in the reservoir.

20. (a) Find the compound interest on Rs. 31250 at 8% per annum for $2\frac{3}{4}$ years.

(b) Mohit bought a CD for Rs. 750 and sold it for Rs. 875. Show that his gain percent is $16\frac{2}{3}$%.

21. We know that parallelogram is also quadrilateral. Let us also split such a quadrilateral into two triangles, find their areas and hence that of the parallelogram. Does this agree with the formula that you know already?

22. A table marked at Rs. 15,000 is available for Rs. 14,400. Find the discount given and the discount percentage?

SECTION-D

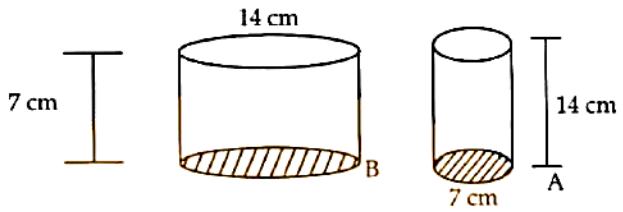
(4 marks each)

23. A 5 m 60 cm high vertical pole casts a shadow 3 m 20 cm long. Find at the same time (a) the length of the shadow cast by another pole 10 m 50 m high (b) the height of a pole which cast a shadow 5 m long.

24. Half of a herd of deer are grazing in the field and three fourths of the remaining are playing nearby. The rest 9 are drinking water from the pond. Find the number of deer in the herd.

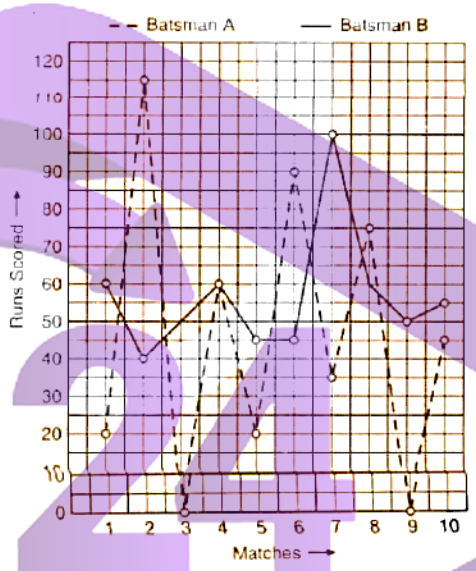
25. The perimeter of a rectangle is 240 cm. If its length is increased by 10% and its breadth is decreased by 20% we get the same perimeter. Find the length and breadth of the rectangle.

26. Diameter of cylinder A is 7 cm and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area.



27. (a) Draw the graph of the function y = 3x + 1.

(b) The given graph represents the total runs scored by two batsmen A and B, during each of the ten different matches in the year 2014.



Study the graph and answer the following questions:

(a) What information is given on the two axes?

(b) Which line shows the runs scored by batsman A?

28. Factorise:

(a) $a^4 - b^4$ (b) $p^4 - 81$

(c) $x^4 - (y+z)^4$ (d) $x^4 - (x-z)^4$

29. Calculate the amount and compound interest on Rs. 10,800 for 3 years at $12\frac{1}{2}$ % per annum compounded is annually.

30. (a) Add : $p\ (p - q)$, $q\ (q - r)$ and $r\ (r - p)$

(b) Add: $2x(z-x-y)$ and $2y(z-y-x)$

(c) Subtract: 31 $(I-4m+5n)$ from $4l(10n-3m+2l)$

(d) Subtract: $3a(a+b+c)-2b\ (a-b+c)$ from $4c\ (-a + b + c)$

Solutions

Section 'A'

(1 mark each)

1. 1,4,9,16,25 **1**

2. If the sum of the digits of a number is divisible by three, then the number will be divisible by 3. **1**

3. $y^2-2y-15$

$y^2-(5-3)y-15$

$y^2-5y+3y-15$ ½

$y(y-5)+3(y-5)$

$(y-5)(y+3)$ ½

4. Number of vertices (V)=8
Number of edges (E) = 12.
Let the number of faces be F
Now, using Euler's formula
F+V=E+2
We have,
F + 8 = 12 + 2
F + 8 = 14
$F=14-8$
F = 6. **1**
Thus, the required number of faces =6 **1**

5. $3^{-5}\times 3^{-4} = 3^{-9} = \frac{1}{3^9}$

6. Let $AB = 3x + 1$
$BC = -x+2$
$AC = 4x + 6$
Since, perimeter of $\Delta ABC = AB + BC + AC$
$=3x+1+(-x+2)+4x+6$
$=3x+1-x+2+4x+6$
$=6x+9$ **1**

Section 'B'

(2 marks each)

7. (a) Let the edge of cube be x
According to question, edge of cube is doubled = 2x
The surface area of cube when edge is doubled = $6l^2$
$= 6\times(2x)^2$
$= 6\times 4x^2$

$= 4x\left(6x^2\right)$

The surface area of cube is 4 time increase. **1**

(b) The volume of cube when edge is doubled

$=(2x)^3$

$=8x^3$

The volume of cube is 8 time increase, when edge is doubled. **1**

8. Cloth needed of 16 shirt $= 24$ m

Cloth needed for 1 shirt $=\frac{24}{16}=\frac{3}{2}$ **1**

$=1.5\text{m}$ **1**

9. (a) We have, $12x = 3\times2\times2\times x$

$=(2\times2\times3)\times x$

$36=2\times2\times3\times3$

$=(2\times2\times3)\times3$ **1**

$\therefore$

$12x+36=\left[(2\times2\times3)\times x\right]+\left[(2\times2\times3)\times3\right]$

$= 2\times2\times3\left[x+3\right]$

$= 12(x+3)$ **1**

(b) We have $22y = 2\times11\times y$

$332=3\times11\times2$

$22y+33z=2\times11\times y+3\times11\times2$

$=11(2y+3z)$ **1**

10.

2	1372
2	686
7	343
7	49
7	7
	1

2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

1

Since

$\sqrt[3]{1372}\times\sqrt[3]{1458}=\sqrt[3]{\underline{2\times2}\times\underline{7\times7\times7}\times2\times\underline{3\times3\times3}\times\underline{3\times3\times3}}$

$=\sqrt{2^3\times7^3\times3^3\times3^3}$

$=2\times7\times3\times3$

$=126$ **1**

11. People went to the Zoo on Sunday = 845

People went to the Zoo on Monday =169

Decrease in the people = $845-169=676$

Decrease value of Monday = Decrease % of 845

1

$$676=\frac{x}{100}\times 845$$

$$\frac{676\times 100}{845}=x$$

$$x=80$$

$\therefore$ 80%people decreased on Monday. **1**

12. $3x(4x-5)+3 \quad =3x(4x-5)+3$

$=12x^2-15x+3$

(a) For x=3, $\quad =12(3)^2-15(3)+3$

$=12(9)-45+3$

$=108-45+3=66$ **1**

(b) For $x=\frac{1}{2}$, $\quad =12\left(\frac{1}{2}\right)^2-15\left(\frac{1}{2}\right)+3$

$=3-\frac{15}{2}+3$

$=6-\frac{15}{2}$

$=\frac{12-15}{2}=\frac{-3}{2}$ **1**

Section 'C'

(3 marks each)

13. $\left(-\frac{3}{2}\times\frac{4}{5}\right)\div\left(\frac{9}{5}\times\frac{-10}{3}\right)-\left(\frac{1}{2}\times\frac{3}{4}\right)=\left(-\frac{3\times 2}{5}\right)\div(3\times-2)-\left(\frac{3}{8}\right)$

1

$=-\frac{6}{5}\div(-6)-\frac{3}{8}$ **1**

$=-\frac{6}{5}\times-\frac{1}{6}-\frac{3}{8}$

$=\frac{1}{5}-\frac{3}{8}$

$=\frac{8-15}{40}=\frac{-7}{40}$ **1**

14. Let $\quad x_1=p_1, x_2=200, x_3=300$

and $\quad y_1=60, y_2=30, y_3=p_2$

Since, x and y are in inverse variation. **1**

(a) $\therefore \quad x_1y_1 = x_2y_2$

$\Rightarrow \quad p_1 \times 60 = 200 \times 30$

$\therefore \quad p_1 = \frac{200 \times 30}{60} = 100$ **1**

(b) Also, $x_2y_2 = x_3y_3$

$\Rightarrow \quad 200 \times 30 = 300 \times p_2$

$\therefore \quad p_2 = \frac{200 \times 30}{300} = 20$ **1**

15. Let the number be x.

According to question,

$8\left(x - \frac{5}{2}\right) = 3x$ **1**

or, $8x - 20 = 3x$

or, $8x - 3x = 20$

[Transposing 3x to LHS and 20 to RHS]

1

or, $5x = 20$

[Dividing both sides by 5]

or, $x = \frac{20}{5}$

or, $x = 4$ **1**

Hence, the required number is 4.

16. $\left(\frac{1}{5}\right)^{45} \times \left(\frac{1}{5}\right)^{-60} - \left(\frac{1}{5}\right)^{28} \times \left(\frac{1}{5}\right)^{-43}$

$\Rightarrow \quad \left(\frac{1}{5}\right)^{45-60} - \left(\frac{1}{5}\right)^{28-43}$ **1**

$\Rightarrow \quad \left(\frac{1}{5}\right)^{-15} - \left(\frac{1}{5}\right)^{-15}$ **1**

$\Rightarrow (5)^{15} - (5)^{15}$ **1**

$\Rightarrow 0$

17. Let the present age of granddaughter be x.

and the present age of grandfather = 10 x **1**

According to question,

$10x = x + 54$

or, $10x - x = 54$

or, $9x = 54$

or, $x = \frac{54}{9}$ *or*, $x = 6$ years **1**

Hence, granddaughter's age = 6 years

and grandfather's age

= $6 \times 10 = 60$ years **1**

18. (a) Steps of Construction:

(i) Draw BC = 5 cm.

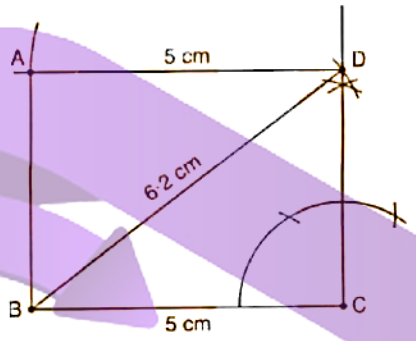
(ii) Draw $CN \perp BC$.

(iii) With B as a centre and radius 6.2 cm, draw an are, cutting CN at D.

(iv) Join BD.

(v) With D as centre and radius 5 cm, draw an are.

(vi) With B as centre and radius equal to CD draw another arc, cutting the previous arc at A. 1



(vii) Join AB and AD, then ABCD is a required rectangle. **1**

(b) Yes, we can draw a rhombus ZEAL because all the four sides of a rhombus are equal in length. **1**

19. Here, l = 7 m, b = 6 m, h = 15 m

Volume of cuboid $= l \times b \times h$

$= 7 \times 6 \times 15$

$= 630\ m^3$ ½

Since, $1\ m^3 = 1000\ L$

∴ Capacity of water in reservoir $= 630 \times 1000$

= 630000 L ½

Since, 8400 L water 5 pumped our

∴ Water left in reservoir = 630000 – 8400

= 621600 L

$= 621.6\ m^3$ **1**

$$Water\ level = \frac{Volume}{Base\ Area}$$

$$= \frac{624.6}{7 \times 6}$$

= 14.8 m ½

Fall in water level = 15 – 14.8

= 0.2 m or 20 cm ½

20. (a) Since, P = Rs. 31250, n = $2\frac{3}{4}$ years, R = 8% p.a.

Then, $A = 31250\left(1+\frac{8}{100}\right)^2 \times \left(1+\frac{\frac{3}{4}\times 8}{100}\right)$ **1**

$$= 31250 \times \left(\frac{27}{25}\right)^2 \times \left(\frac{53}{50}\right)$$

$$= 31250 \times \frac{27}{25} \times \frac{27}{25} \times \frac{53}{50} = Rs.38637$$

Hence, C.I. $= 38637 - 31250 =$ Rs. 7387 ½

(b) Since, C.P. = Rs. 750 and S.P = Rs. 875

C.P. < S.P.

Gain = Rs. (875 - 750) = Rs. 125

Then, $\text{Gain}\% = \left(\frac{Gain}{C.P.} \times 100\right)$

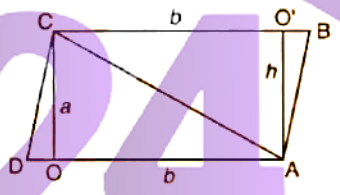
$$= \frac{125}{750} \times 100$$

$$= \frac{50}{3}\% = 16\frac{2}{3}\% \qquad 1^{1/2}$$

21. AD = BC = b

CO = AO' = h

ABCD is parallelogram divided into 2 triangles i.e., $\Delta ABC + \Delta ACD$



The area of parallelogram ABCD also divided into two parts = Area of ΔABC + *Area of* ΔACD

Area of $\Delta ABC = \frac{1}{2} \times BC \times AO'$

{Base BC = b, height = h}

$$= \frac{1}{2} \times b \times h = \frac{1}{2} bh \qquad \mathbf{1}\text{... (i)}$$

Area of $\Delta ACD = \frac{1}{2} \times AD \times OC$

{Base AD = b, height = h}

$$= \frac{1}{2} \times b \times h \qquad \mathbf{1}\text{ ...(ii)}$$

On adding eq. (i) & (ii) we get,

Area of Δ ABC + Area of Δ ACD $= \frac{1}{2}$bh + $\frac{1}{2}$bh

Area of AABC + Area of Δ ACD = bh ...(iii)

We know that,

Area of parallelogram ABCD = $b \times h$ ...(iv)

Area of parallelogram ABCD = Area of Δ ABC + Area of Δ ACD

bh = bh

L.H.S. = R.H.S. **1**

22. The marked price of table = Rs. 15,000

The selling price of tale = Rs. 4,400

According to condition,

Discount value = Marked price − Selling price

=Rs. 15,000 − Rs. 14,400

Discount value = Rs. 600 **1**

Let us suppose that the discount % of table = x %

Discount value = Discount % of marked price

Rs. 600 =x% of Rs. 15,000 **1**

$$\text{Rs. } 600 = \frac{x}{100} \times \text{ Rs. } 15{,}000$$

$$x = \frac{600 \times 100}{15{,}000} = 4\%$$

The discount value of table = Rs. 600

& The discount percent of table =4%

1

Section 'D'

(4 mark each)

23. (a) Let the length of the shadow be x m.

Height	5 m 60 cm	10 m 50 cm
Length	3 m 20 cm	x

1

5 m 60 cm = 5.60 m

3 m 20 cm = 3.20 m

10 m 50 cm = 10.50 m

$$\therefore \quad \frac{5.60}{3.20} = \frac{10.50}{x}$$

$$\Rightarrow \quad x = \frac{10.50 \times 3.20}{5.60}$$

$$\Rightarrow \quad x = 6\text{m}$$ **1**

(b) Let the height of a pole be y m.

Height (m)	5.60 cm	y
Length (m)	3.20 cm	5

1

$$\frac{5.60}{3.20} = \frac{y}{5}$$

$$\Rightarrow \ y = \frac{5.60 \times 5}{3.20} = 8.75$$

or $\quad y = 8$ m 75 cm **1**

24. Let the total number of deer in the herd be x.

According to question,

$$\frac{x}{2} + \frac{3}{4}\left(x - \frac{x}{2}\right) + 9 = x$$ **1**

or, $\quad \frac{x}{2} + \frac{3}{4} \times \frac{x}{2} + 9 = x$

or, $\frac{x}{2}+\frac{3x}{8}+9=x$

or, $7x + 72 = 8x$

or, $7x-8x=-72$

or, $-x = -72$ *or*, $x = 72$

Hence, the required number of deers in the herd are 72. **2**

25. Let the length of rectangle be x

The breadth of a rectangle be b.

Perimeter of a rectangle = 2 (x + b)

2 (x + b) = Perimeter

2 (x + b) = 240

$x+b=\frac{240}{2}$

x+b=120

or, $b=120-x$ ½

New length = x + 10% of x

$=x+\frac{10x}{100}=x+\frac{x}{10}$

$=\frac{11x}{10}$ ½

New breadth

$=(120-x)-20\%\ of\ (120-x)$

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

$=120-x-\frac{1}{5}(120-x)$

$=120-x-\frac{120}{5}+\frac{x}{5}$

$=120-x-24+\frac{x}{5}$

$=96-x+\frac{x}{5}$ **1**

$=\frac{480-5x+x}{5}$

$=\frac{480-4x}{5}$ **1**

According to condition,

or, $2\left(\frac{11x}{10}+\frac{480-4x}{5}\right)=240$

or, $\frac{11x}{10}+\frac{480-4x}{5}=120$

$\frac{11x+960-8x}{10}=120$

$\frac{3x+960}{10}=120$

$3x+960=1200$

$3x = 1200 - 960$

$3x = 240$

$x = \frac{240}{3} = 80$ ½

Hence,

length = x = 80 cm

breadth $= 120 - x = 120 - 80 = 40\ cm$ ½

26. Volume of cylinder B is greater because it contains more thickness in comparison to A. **1**

For cylinder B, r = = 7 cm, h = 7 cm

Volume of cylinder $B = \pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 7$

$= 1078\ cm^3$.

Surface area of cylinder $B = 2\pi rh$

$= 2 \times \frac{22}{7} \times 7 \times 7$

For cylinder A, $= 308\ cm^2$

radius of cylinder A = 3.5 cm, /i = 14 cm

Volume $A = \pi r^2 h$

$= \frac{22}{7} \times (3.5)^2 \times 14$

$= 539 cm^2$

Surface area of cylinder $A = 2\pi rh$

$= 2 \times \frac{22}{7} \times 3.5 \times 14$

$= 308\ cm^2$

Volume of cylinder B > volume of cylinder A.

Surface area of both cylinders are same. **1**

27. (a) Let y = 3x +1 ....(1)

Putting x = 0,1,2, in equation (i)

at x = 0 then

$y = 3 \times 0 + 1 = 1$

at x = 1 then

$y = 3 \times 1 + 1 = 3 + 1 = 4$

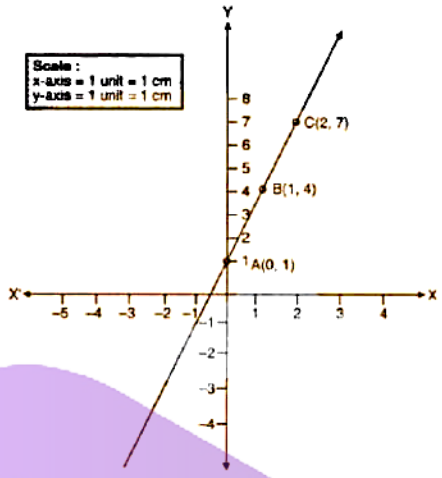
ata x = 2 then

$y = 3 \times 2 + 1 = 6 + 1 = 7$

Thus

X	0	1	2
Y	1	4	7

1



1

(b) **(i)** The horizontal axis (or the x-axis) indicates the matches played during the year 2014. The vertical axis (or the y-axis) shows the total runs scored in each match. **1**

(ii) The dotted line shows the runs scored by Batsman A. (This is already indicated at the top of the graph).

1

28. (a) $a^4 - b^4 = (a^2)^2 - (b^2)^2$

$= (a^2 - b^2)(a^2 + b^2)$

$= (a - b)(a + b)(a^2 + b^2)$ **1**

(b) $p^4 - 81 = (p^2)^2 - (9)^2$

$= (p^2 - 9)(p^2 + 9)$

$= [(p)^2 - (3)^2](p^2 + 9)$

$= (p - 3)(p + 3)(p^2 + 9)$ **1**

(c) $x^4 - (y + z)^4 = (x^2)^2 - \{(y + z)^2\}^2$

$= \{x^2 - (y + z)^2\}\{x^2 + (y + z)^2\}$

$= \{x - (y + z)\}\{x + (y + z)\}\{x^2 + (y + z)^2\}$ **1**

$= (x - y - z)(x + y + z)\{x^2 + (y + z)^2\}$

(d) $x^4 - (x - z)^4 = (x^2)^2 - \{(x - z)^2\}^2$

$= \{x^2 - (x - z)^2\}\{x^2 + (x - z)^2\}$

$= (x - x + z)(x + x - z)\{x^2 + (x - z)^2\}$ **1**

29. Here, P = Rs.10800, T =3 years,

$R = 12\frac{1}{2}\%$

p.a. $= \frac{25}{2}\%$ p.a.

We have,

$$A = P\left(1 + \frac{R}{100}\right)^n$$ **1**

$= Rs.10800\left(1 + \frac{25}{2 \times 100}\right)^3$

[∵ Interest compounded annually, ∴ n = 3]

$= Rs.10800\left(\frac{225}{200}\right)^3$ **1**

$= Rs.10800 \times \frac{225}{200} \times \frac{225}{200} \times \frac{225}{200}$

$= Rs.\frac{675 \times 9 \times 9 \times 9}{4 \times 8}$

$= Rs.\frac{492075}{32}$

∴ Amount = Rs. 15377.34

= Rs. 15377.34 **1**

Now, Compound Interest

= Rs. 15377.34 – Rs.10800

= Rs. 4577.34 **1**

30. (a) First expression $= p(p-q) = p^2 - pq$

Second expression $= q(q-r) = q^2 - qr$

Third expression $= r(r-p) = r^2 - rp$

Now, adding three expression

$$\begin{array}{r} p^2 - pq \\ + \quad + q^2 - qr \\ + \quad + r^2 - rp \\ \hline p^2 - pq + q^2 - qr + r^2 - rp \end{array}$$

Therefore, $p^2 + q^2 + r^2 - (pq + qr + rp)$

31. (b) First expression

$= 2x(z - x - y) = 2xz - 2x^2 - 2xy$

Second expression

$= 2y(z - y - x) = 2yz - 2y^2 - 2xy$

Now, adding the two expressions

$$\begin{array}{r} 2xz - 2x^2 - 2xy \\ + \quad -2xy + 2yz - 2y^2 \\ \hline 2xz - 2x^2 - 4xy + 2yz - 2y^2 \end{array}$$

Therefore, $-2x^2 - 2y^2 - 4xy + 2xz + 2yz$

32. (c) We have, $3l(l - 4m + 5n)$

$= 3l^2 - 12lm + 15ln$

and $l(10n - 3m + 2l) = 40ln - 12lm + 8l^2$

$$\begin{array}{rl} & 15ln - 12lm + 3l^2 \\ \text{Now,} & (-) \quad (+) \quad (-) \\ & \hline & 25ln + 0 + 5l^2 \end{array}$$

1

Therefore, $5l^2 + 25ln$

33. (d) We have, $3a(a+b+c)-2b\ (a-b+c)$

$=3a^2+3ab+3ac-(2ab-2b^2+2bc)$

$=3a^2+3ab+3ac-2ab+2b^2-2bc)$

$=3a^2+2b^2+ab+3ac-2bc$

and $4c(-a+b+c)=-4ac+4bc+4c^2$

Now,

$-4ac+4bc+4c^2-(3a^2+2b^2+ab+3ac-2bc)$

$=-4ac+4bc+4c^2-3a^2-2b^2-ab-3ac+2bc)$

$=-3a^2-2b^2+4c^2-ab-7ac+6bc$

Therefore, $-3a^2-2b^2+4c^2-ab+6bc-7ac$ **1**