

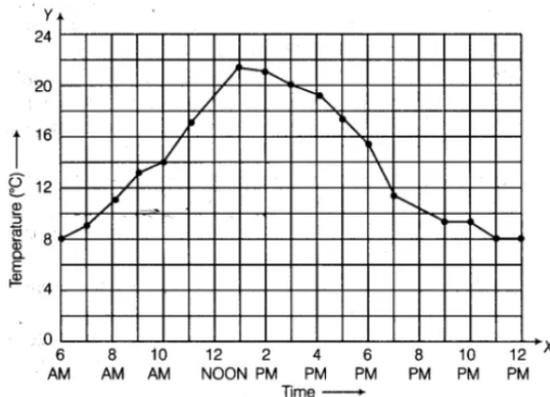
c) 4.325×10^{-1}

d) 43.25×10^{-2}

9. A hostel had provisions for 75 students for 30 days. After 5 days, 15 more students come to the hostel. How long will the remaining provisions last at the same rate? [1]
- a) 18
b) 25
c) 15
d) 20
10. If the rent for grazing 40 cows for 20 days is ₹ 370, how many cows can graze for ₹ 111 for 30 days? [1]
- a) 8
b) 60
c) 30
d) 25

Section B

11. Tell what property allows you to compute $\frac{1}{3} \times \left(6 \times \frac{4}{3}\right)$ as $\left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$ [2]
12. Find out if 10648 is a perfect cube? [2]
13. Find the value of x^{-3} , if $x = (100)^{1-4} \div (100)^0$ [2]
14. A train is moving at a uniform speed of 75 km/hour. How far will it travel in 20 minutes? [2]
15. Factorise $(x + y)^4 - (x - y)^4$ using the identity $a^2 - b^2 = (a + b)(a - b)$. [2]
16. As part of his science project, Prithvi was supposed to record the temperature every hour on Saturday from 6 am to midnight. At noon, he was taking lunch and forgot to record the temperature. At 8:00 pm, his favourite show came on and so forgot again. He recorded the data so collected on a graph sheet as shown below. [2]



- a. Why does it make sense to connect the points in this situation?
- b. Describe the overall trend, or pattern, in the way the temperature changes over the time period shown on the graph.
- c. Estimate the temperature at noon and 8 pm.

Section C

17. Solve the equations and check your result: $x = \frac{4}{5}(x + 10)$ [3]
18. ABCD is a parallelogram. The bisector of angle A intersects CD at X and bisector of angle C intersects AB at Y. Is AXCY a parallelogram? Give reason. [3]
19. Find the least number which must be subtracted from 3250 so as to get a perfect square. Also find the square root of the perfect square so obtained. [3]
20. An article was purchased for ₹1239 including GST of 18%. Find the price of the article before GST was added. [3]
21. The product of two expressions is $x^5 + x^3 + x$. If one of them is $x^2 + x + 1$, find the other. [3]
22. Four times the area of the curved surface of a cylinder is equal to 6 times the sum of the areas of its bases. If its height is 12 cm, find its curved surface area. [3]

23. Find the value of : $(\frac{1}{2})^{-2} + (\frac{1}{3})^{-2} + (\frac{1}{4})^{-2}$

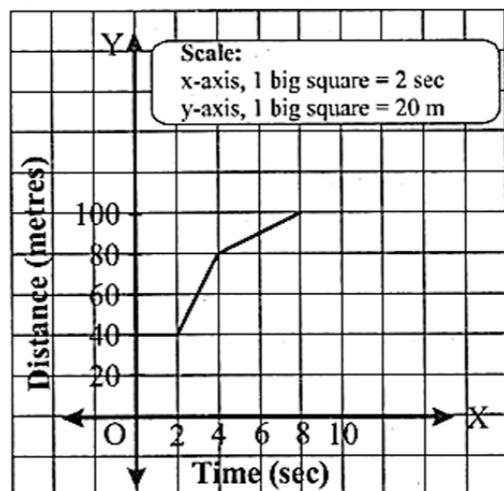
24. Observe the following table and find if the variables (here x and y) are in inverse proportion. [3]

x	100	200	300	400
y	60	30	20	15

Section D

Question No. 25 to 28 are based on the given text. Read the text carefully and answer the questions: [4]

By observing the adjoining distance versus time graph, find:



25. Speed between 0 to 2 seconds.

- a) 4
- b) 0
- c) 5
- d) 2

26. Speed between 2 to 4 seconds.

- a) 20 m/s
- b) 10 m/s
- c) 5 m/s
- d) 0

27. Speed between 4 to 8 seconds.

- a) 10 m/sec
- b) 5 m/sec
- c) 20 m/sec
- d) 15 m/sec

28. Average speed between 0 to 8 seconds.

- a) 12.5 m/s
- b) 11.5 m/s
- c) 9.0 m/s
- d) 7.5 m/s

29. ABCD is a trapezium such that $AB \parallel CD$, $\angle A : \angle D = 2 : 1$, $\angle B = \angle C = 7 : 5$. Find the angles of the trapezium. [4]

30. If 60% people in a city like cricket, 30% like football and the remaining like other games, then what per cent of the people like other games? If the total number of people are 50 lakh, find the exact number who like each type of game. [4]

31. The difference between compound Interest on a certain sum of money at 10% per annum for 2 years is ₹ 500. Find the sum, if the interest is compounded annually. [4]

32. Simplify: $(a + b)(2a - 3b + c) - (2a - 3b)c$ [4]

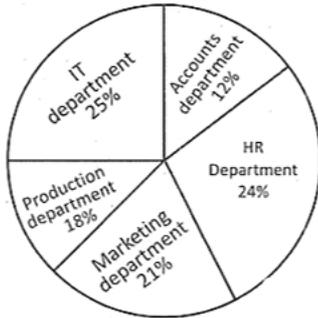
33. Factorise the expression and divide them as directed: $39y^3 (50y^2 - 98) \div 26y^2(5y + 7)$ [4]

Section E

Question No. 34 to 38 are based on the given text. Read the text carefully and answer the questions:

[5]

Read the following pie chart carefully:



Percentage of Employees in different departments of an organization = 3600

34. What is the number of employees of accounts department?

- a) 362
- b) 432
- c) 512
- d) 482

35. The ratio of the number of employees of Production department to HR Department is _____.

- a) 4 : 7
- b) 3 : 8
- c) 3 : 4
- d) 7 : 12

36. If 400 new employees are hired in the marketing department, then find the ratio of number of employees of the marketing department to the number of employees in the IT department.

- a) 19 : 16
- b) 17 : 196
- c) 17 : 15
- d) 289 : 225

37. If 300 employees are shifted from HR department to production department, then new ratio of number of employees of HR department to the production department is _____.

- a) 91 : 37
- b) 97 : 29
- c) 38 : 17
- d) 28 : 59

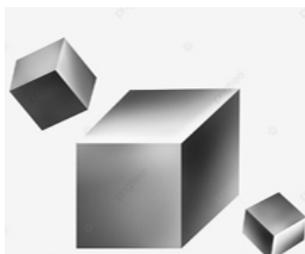
38. If 200 new employees are hired in accounts department and 100 employees of IT department left the organization, then new ratio of number of employees of IT department to accounts department is _____.

- a) 79 : 100
- b) 81 : 100
- c) 85 : 97
- d) 77 : 97

Question No. 39 to 43 are based on the given text. Read the text carefully and answer the questions:

[5]

Three metal cubes of sides 6 cm, 8 cm and 10 cm are melted and recast into a big cube.



39. Volume of the cube with side 6 cm is _____.

40. Find the Volume of the cube with side 8 cm.

a) 384 cm^3

b) 512 cm^3

c) 256 cm^3

d) 64 cm^3

41. Find the Volume of the cube with side 10 cm.

a) 100 cm^3

b) 400 cm^3

c) 1000 cm^3

d) 600 cm^3

42. Find the Volume of the big cube?

a) 1872 cm^3

b) 1782 cm^3

c) 1600 cm^3

d) 1728 cm^3

43. The side of big cube is 14cm.

a) True

b) False

Solution

Section A

1. (a) $\frac{-1}{30}$

Explanation: $\left[\frac{3}{5} + \left(\frac{-5}{12}\right)\right] + \left[\left(\frac{-7}{15}\right) + \frac{5}{20}\right]$
 $= \left[\frac{3 \times 12 + (-5) \times 5}{60}\right] + \left[\frac{-7 \times 4 + 3 \times 5}{60}\right]$
 $= \left[\frac{36 - 25}{60}\right] + \left[\frac{-28 + 15}{60}\right]$
 $= \frac{11}{60} + \left(\frac{-13}{60}\right)$
 $= \frac{11 - 13}{60}$
 $= \frac{-2}{60}$
 $= \frac{-1}{30}$

2. (a) $\frac{7}{3}$

Explanation: $2y + \frac{5}{3} = \frac{26}{3} - y$

or, $2y + y = \frac{26}{3} - \frac{5}{3}$

or, $3y = \frac{21}{3}$

or, $3y = 7$

or, $y = \frac{7}{3}$

3.

(c) $\sqrt{3} : 1$

Explanation: Let ABCD be the Rhombus where $\angle BAD = 60^\circ$

$\triangle ABD$ is Isosceles triangle

$\Rightarrow \angle ABD = \angle ADB$

Then by angle sum property

$\angle A = \angle 1 = \angle 2 = 60^\circ$

$\Rightarrow \triangle ABCD$ is an equilateral triangle

Let $BD = x$

Then by phthagorus theorem in $\triangle ABO$

$(AO)^2 = AB^2 - OB^2$

$= x^2 - \left(\frac{x}{2}\right)^2 = \frac{\sqrt{3}}{2}x$

$AC = 2 \times OA = 2 \times \frac{\sqrt{3}}{2}x = \sqrt{3}x$

$\Rightarrow AC : BD = \sqrt{3}x : x = \sqrt{3} : 1$

4.

(d) 2 min 24 sec

Explanation: Let the side of square field = 'a' m

\therefore Area of square field = a^2 sq. m

$a^2 = 22500 \text{ m}^2$

$\Rightarrow a = 150 \text{ m}$

Speed of cycling = 15 km / hr

$= \frac{15 \times 1000}{60 \times 60} = \frac{25}{6} \text{ m/s.}$

Now, total distance to be covered along the boundary = $4 \times 150 = 600 \text{ m}$

$\therefore \frac{25}{6} \text{ m}$ is covered in 1 sec.

$\therefore 600 \text{ m}$ is covered in $\frac{600}{25} \times 6 = 144 \text{ sec} = 2 \text{ min } 24 \text{ sec.}$

5. (a) 19710

Explanation: The given five digit number is 1b6a3

We know that, the greatest single digit perfect cube is 8.

$$\therefore a = 8$$

$$\text{Also, } b = 2 \times (8) - 7 = 9$$

So, the five digit number = 19683

$$\text{Now, } 19683 + \sqrt[3]{19683} = 19683 + 27 = 19710$$

6.

(b) 0% gain or loss

Explanation: Let CP of goods be ₹x.

$$\therefore \text{MP} = x \times \frac{125}{100} = \frac{5x}{4}$$

$$\text{SP} = \text{MP} \times \frac{100 - \text{discount \%}}{100}$$

$$= \frac{5x}{4} \times \frac{80}{100} = x$$

$$\text{SP} = \text{CP}$$

\therefore Neither profit nor loss i.e., profit or loss = 0%

7.

(c) $12p^3 + 15p^2 + 21p$

Explanation: $3p \times (4p^2 + 5p + 7)$

$$3p(4p^2 + 5p + 7)$$

Open the brackets we get,

$$12p^3 + 15p^2 + 21p$$

8.

(c) 4.325×10^{-1}

Explanation: Standard form of 4325×10^{-4}

$$= 4.325 \times 10^3 \times 10^{-4}$$

$$= 4.325 \times 10^{-1}$$

9.

(d) 20

Explanation: Total number of students = $(75 + 15) = 90$ students

Number of days left = $(30 - 6)$ days = 24 days

For 75 students the remaining food would be continued for 24 days

For 1 student the remaining food would be continued for (24×75) days

For 90 students the remaining food would be continued for $(24 \times \frac{75}{90})$ days = $(24 \times \frac{5}{6})$ days = (4×5) days = 20 days

10. **(a)** 8

Explanation:

Rent (in ₹)	No. of days	No. of cows
370	20	40
111	30	x

Rent is in inverse variation with number of days but rent is indirect variation with number of cows

$$\left. \begin{array}{l} 370 : 111 \\ 30 : 20 \end{array} \right\} :: 40 : x$$

$$x = 40 \times \frac{111}{370} \times \frac{20}{30} = 8.$$

Section B

11. Since $a \times (b \times c) = (a \times b) \times c$ shows the associative property of multiplications.

$$\text{therefore, } \frac{1}{3} \times \left(6 \times \frac{4}{3}\right) = \left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$$

Shows the associative property of multiplication.

$$\begin{array}{r|l}
 2 & 10648 \\
 \hline
 2 & 5324 \\
 \hline
 2 & 2662 \\
 \hline
 11 & 1331 \\
 \hline
 11 & 121 \\
 \hline
 & 11
 \end{array}$$

By prime factorisation,

$$10648 = \underline{2} \times \underline{2} \times \underline{2} \times \underline{11} \times \underline{11} \times \underline{11} \text{ [grouping the factors in triplets]}$$

$$= 2^3 \times 11^3 \text{ [by laws of exponents]}$$

$$= (2 \times 11)^3$$

$$= 22^3 \text{ which is a perfect cube.}$$

Therefore, 10648 is a perfect cube.

13. Given, $x = (100)^{1-4} \div (100)^0$

$$\Rightarrow x = (100)^{-3} \div (100)^0$$

$$\Rightarrow x = (100)^{-3-0} \text{ [}\therefore a^m \div a^n = (a)^{m-n}\text{]}$$

$$\Rightarrow x = (100)^{-3}$$

$$\text{So, } x^{-3} = [(100)^{-3}]^{-3} = (100)^9 \text{ [}\therefore (a^m)^n = (a)^{mn}\text{]}$$

14. Let the distance travelled (in km) in 20 minutes be x .

$$\text{Time} = 20 \text{ min} = \frac{20}{60} \text{ hr}$$

$$\text{Speed} = 75 \text{ km/hr}$$

$$\text{Now, distance} = \text{speed} \times \text{time}$$

$$x = 75 \times \frac{20}{60} = 25$$

So, the train will cover a distance of 25 km in 20 minutes.

15. We have, $(x + y)^4 - (x - y)^4 = [(x + y)^2]^2 - [(x - y)^2]^2$

$$= [(x + y)^2 + (x - y)^2][(x + y)^2 - (x - y)^2] \text{ using the identity } [a^2 - b^2 = (a + b)(a - b)]$$

$$= (x^2 + y^2 + 2xy + x^2 + y^2 - 2xy)(x + y + x - y)(x + y - x + y) \text{ again using the identity } [a^2 - b^2 = (a + b)(a - b)]$$

$$= (2x^2 + 2y^2)(2x)(2y)$$

$$= 2(x^2 + y^2)(2x)(2y)$$

$$= 8xy(x^2 + y^2)$$

16. After observing the graph carefully, it can be concluded that

a. By doing this, it is simpler to understand a change in the temperature.

b. Initially, the temperature at 6 AM: 8°C

This temperature started increasing strictly till 1 PM and after that, it decreased to 8°C till 12 PM.

c. At 12 PM, 19°C and also at 8 PM, 10°C .

Section C

17. $x = \frac{4}{5}(x + 10)$

$$5x = 4(x + 10) \dots \text{ [Multiplying both sides by 5]}$$

$$\therefore 5x = 4x + 10$$

$$\therefore 5x - 4x = 10 \dots \text{ [Transposing 4x to L.H.S.]}$$

$$\therefore x = 10 \text{ this is the required solution.}$$

Verification

$$\text{L.H.S.} = 40$$

$$\text{R.H.S.} = \frac{4}{5}(x + 10)$$

$$\frac{4}{5} = (40 + 10) = \frac{4}{5}(50) = 4(10) = 40$$

Therefore, L.H.S. = R.H.S.

18. Given, ABCD is a parallelogram.

So, $\angle A = \angle C$ [\therefore opposite angles of a parallelogram are equal]

$$= 8\pi rh = 12\pi r^2$$

$$= 2h = 3r$$

$$\Rightarrow r = \frac{2}{3}h$$

$$\therefore r = \frac{2}{3} \times 12 = 8\text{cm} [\because h = 12\text{ cm, given}]$$

$$\therefore \text{Curved surface area of the cylinder} = 2\pi rh$$

$$= 2 \times \frac{22}{7} \times 8 \times 12 = \frac{44 \times 8 \times 12}{7}$$

$$= 603.428\text{ cm}^2$$

$$23. \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^2$$

$$= \frac{1^{-2}}{2^{-2}} + \frac{1^{-2}}{3^2} + \frac{1^2}{4}$$

$$= \frac{2^2}{1^2} + \frac{3^2}{1^2} + \frac{4^2}{1^2}$$

$$\frac{4}{1} + \frac{9}{1} + \frac{16}{1}$$

$$= 4 + 9 + 16$$

$$= 29$$

$$24. x_1 y_1 = 100 \times 60 = 6000$$

$$x_2 y_2 = 200 \times 30 = 6000$$

$$x_3 y_3 = 300 \times 20 = 6000$$

$$x_4 y_4 = 400 \times 15 = 6000$$

$$\text{As } x_1 y_1 = x_2 y_2 = x_3 y_3 = x_4 y_4$$

So,

Hence, x and y are in inverse proportion.

Section D

$$25. \text{ (b) } 0$$

Explanation: 0 (zero)

$$26. \text{ (a) } 20\text{ m/s}$$

Explanation: 20 m/s

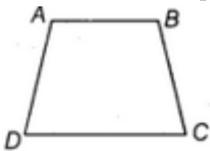
$$27. \text{ (b) } 5\text{ m/sec}$$

Explanation: 5 m/s

$$28. \text{ (d) } 7.5\text{ m/s}$$

Explanation: 7.5 m/s

$$29. \text{ Let ABCD be a trapezium, where } AB \parallel CD.$$



Let the angles A and D be of measures $2x$ and x , respectively

$$\text{then } 2x + x = 180^\circ$$

[\because in trapezium, the angles on either side of the base are supplementary]

$$\Rightarrow 3x = 180^\circ$$

$$\Rightarrow x = 60^\circ$$

$$\therefore \angle A = 2x = 60^\circ = 120^\circ, \angle D = 60^\circ$$

Again, let the angles B and C be $7x$ and $5x$ respectively. Then $7x + 5x = 180^\circ$

$$\Rightarrow 12x = 180^\circ$$

$$\Rightarrow x = 15^\circ$$

Thus, $\angle B = 7 \times 15 = 105^\circ$ and $\angle C = 5 \times 15 = 75^\circ$

$$30. \text{ Number of people who like cricket} = 60\%$$

$$\text{Number of people who like football} = 30\%$$

$$\text{Number of people who like other games}$$

$$= 100\% - (60\% + 30\%)$$

$$= 100\% - 90\%$$

$$= 10\%$$

Total number of people = 50 lakhs = 50,00,000

Now number of people who like cricket

$$= 60\% \text{ of } 50,00,000$$

$$= \frac{60}{100} \times 5000000$$

$$= 30,00,000 \text{ or, } 30 \text{ lakh}$$

Number of people who like football

$$= 30\% \text{ of } 50,00,000$$

$$= \frac{30}{100} \times 5000000$$

$$= 15,00,000 \text{ or, } 15 \text{ lakh}$$

Number of people who like the other games

$$= 10\% \text{ of } 50,00,000$$

$$= \frac{10}{100} \times 5000000$$

$$= 5,00,000 \text{ or, } 5 \text{ lakh}$$

31. Let Principal (P) = ₹ x

Rate of interest (R) = 10%

Time period (T) = 2 years

$$\text{C.I.} - \text{S.I.} = ₹ 500$$

$$\text{C.I.} = A - P$$

$$= P \left(1 + \frac{R}{100} \right)^T - P$$

$$= x \left(1 + \frac{10}{100} \right)^2 - x$$

$$= x \left(\frac{11}{10} \right)^2 - x$$

$$= \frac{121x}{100} - x = \frac{121x - 100x}{100} = \frac{21x}{100}$$

$$\text{S.I.} = \frac{P \times T \times R}{100}$$

$$= \frac{x \times 2 \times 10}{100} = \frac{x}{5}$$

$$\text{Now, C.I.} - \text{S.I.} = \frac{21x}{100} - \frac{x}{5} = 500$$

$$= \frac{21x}{100} - \frac{x}{5} = 500$$

$$= \frac{x}{100} = 500$$

$$x = 500 \times 100 = 50000$$

Therefore, x = 50,000.

i.e., Principal (P) = ₹ 50,000.

32. (a + b)(2a - 3b + c) - (2a - 3b)c

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

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

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

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

33. $39y^3(50y^2 - 98) \div 26y^2(5y + 7)$

$$= \frac{39y^3(50y^2 - 98)}{26y^2(5y + 7)}$$

$$= \frac{39y^3 \times 2 \times (25y^2 - 49)}{26y^2(5y + 7)}$$

$$= \frac{39y^3 \times 2 \times \{(5y)^2 - (7)^2\}}{26y^2(5y + 7)}$$

$$= \frac{39y^3 \times 2 \times (5y + 7)(5y - 7)}{26y^2(5y + 7)} \dots \text{ [Using Identity III]}$$

$$= 3y(5y - 7)$$

Section E

34. (b) 432

Explanation: 432

35. (c) 3 : 4
Explanation: 3 : 4
36. (d) 289 : 225
Explanation: 289 : 225
37. (b) 97 : 29
Explanation: 97 : 29
38. (a) 79 : 100
Explanation: 79 : 100
39. 1. 216 cm³
40. (b) 512 cm³
Explanation: 512 cm³
41. (c) 1000 cm³
Explanation: 1000 cm³
42. (d) 1728 cm³
Explanation: 1728 cm³
43. (b) False
Explanation: False