Sample Paper - 6

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 marks each)

1. What should be subtracted from $\frac{-5}{12}$ to get 0?

2. Write an expression for "five added to half of x".

3. How many edges does a triangular prism have?

4. The hypotenuse of a right triangle with its legs of lengths 3x and 4x is?

5. Divide 293 by 10, 00,000 and express the result in standard form.

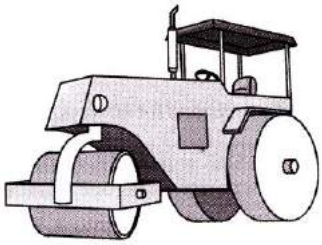
6. Simplify: $\left(\frac{3}{4}x-\frac{4}{3}y\right)^2+2xy$

SECTION-B

(2 marks each)

7. Find ten rational number between $\frac{-2}{5}$ and $\frac{1}{2}$.

8. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of road if the diameter of a road roller is 84 cm and length is 1 m.



9. Factorise the following:

(a) x^4-y^4 (b) $16x^4-81$

10. A private taxi charges a fare of Rs. 260 for a journey of 200 km. How much would it travel for Rs. 279.50?

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

(i) x = 3 (ii) x = $\frac{1}{2}$:

(b) Simplify: $a(a^2+a+1)+5$ and find its value for (a) a = 0 (b) a = 1 (c) $a = -1$.

12. Find three numbers in the ratio 2:3:5, the sum of whose squares is 608.

SECTION-C

(3 marks each)

13. Simplify : $\frac{x}{2}-\frac{3x}{4}+\frac{5x}{6}=21$

14. Two given angles of a parallelogram have equal measure. Find the measure of each of the angles of the parallelogram.

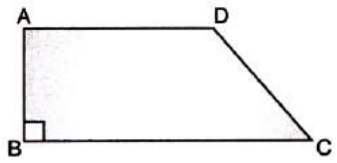
15. Verify that $-(-x) = x$ for

(a) $x=\frac{11}{15}$ (b) $x=-\frac{13}{17}$

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 batch of bottles were packed in 25 boxes with 12 bottles in each box. If the same batch is packed suing 20 bottles in each box, how many boxes would be filled?

18. Length of the fence of a trapezium shaped field ABCD in 120 m. If BC = 48 m, CD = 17 m and AD = 40 m, find the area of this field. Side AB is perpendicular to the parallel sides AD and BC.



19. Volume of a rectangular box (cuboid) with the length = 2ab, breadth 3ac and height = 2ac is?

20. I borrowed Rs. 12000 from Jamshed at 6% per annum simple interest for 2 years. If I borrowed this sum at 6% per annum compound interest, what extra amount would I have to pay?

21. Simplify : $\frac{(-2)^3\times(-2)^7}{3\times4^6}$

22. 6 pipes are required to fill a tank in 1 hour 20 minutes. How long will it take if 5 pipes of the same type are used?

SECTION-D

(4 marks each)

23. In a hostel of 50 girls, there are food provisions for 40 days. If 30 more girls join the hostel, how long will these provisions last?

24. Numbers 1 to 10 are written on ten separate slips (one number on one slip) kept in a box and mixed well. One slip chosen from the box without looking into it. What is the probability of

(a) getting a number 6 ?

(b) getting a number less than 6 ?

(c) getting a number greater than 6 ?

(d) getting a 1-digit number ?

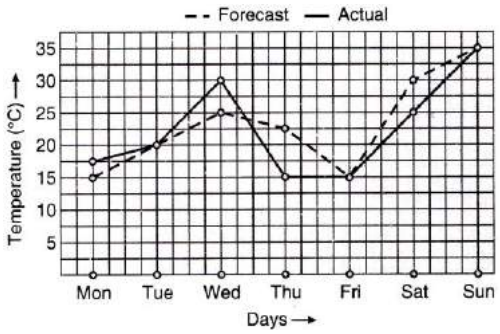
25. The following graph shows the temperature forecast and the actual temperature for each day of a week.

(a) On which day was the forecast temperature the same as the actual temperature?

(b) What was the maximum forecast temperature during the week?

(c) What was the minimum actual temperature during the week?

(d) On which day did the actual temperature differ the most from the forecast temperature?



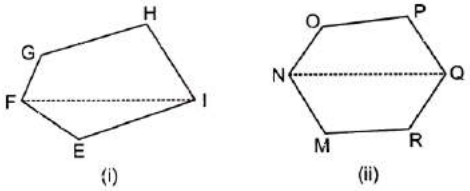
26. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11:4. At the rate Rs. 100 per metre it will cost the village panchayat Rs. 75000 to fence the plot. What are the dimensions of the plot?

27. Calculate the amount and compound interest on.

(a) Rs. 10,800 for 3 years at $12\frac{1}{2}\%$ per annum compounded annually.

(b) Rs.18, 000 for $2\frac{1}{2}$ years at 10% per annum compounded annually.

28. Divide the following polygons into parts (triangles and trapezium) to find out its area.



29. Match each of the entries in Column I with the appropriate entry in Column II:

	Column I	Column II
1.	X and y vary inversely to each other	A. $\frac{x}{y}$ = Constant
2.	Mathematical representation of inverse variation of quantities p and q	B. y will increase in proportion
3.	Mathematical representation of direct variation of quantities m and n	C. xy= constant
4.	When =5,y=2.5and when y=5,x=10	D. $p \propto \frac{1}{q}$
5.	When $x = 10$, $y = 5$ and when x = 20, y = 2.5	E. y will decrease in proportion
6.	x and y vary directly with each other	E x and y directly proportional
7.	If x and y vary inversely then on decreasing x	G. $m \alpha n$
8.	If z and y vary directly then on decreasing x.	H. x and y vary inversely
		$I. p \propto q$
		J. m $\propto \frac{1}{n}$

30. Using $(x+a)(x+b) = x^2 + (a+b)x + ab$, find

(a) 103×104 (b) 5.1×5.2

(c) 103×98 (d) 9.7×9.8

Solutions

Section 'A'

(1 marks each)

1. Let the number to the subtracted is x,

so, $\frac{-5}{12} - x = 0$

Now, multiplying by (–) sign

so, $\frac{5}{12} + x = 0$

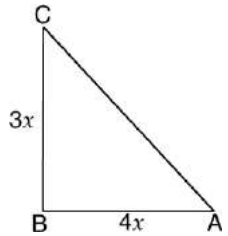
$x = \frac{-5}{12}$ 1

2. $5 + \frac{x}{2}$ 1

3. A triangular prism has 9 edges.

1

4. By Phythagoras theorem,



$(3x)^2 + (4x)^2 = (AC)^2$

$AC = \sqrt{9x^2 + 16x^2}$

$= \sqrt{25x^2} = 5x$

AC = 5x

1

5. $\frac{293}{1000000} = \frac{2.93 \times 10^2}{10^6}$

2.93×10^{-4} 1

6. $\left(\frac{3}{4}x - \frac{4}{3}y\right)^2 + 2xy$

$\Rightarrow \quad \left(\frac{3}{4}x\right)^2 - 2\left(\frac{3}{4}x\right)\left(\frac{4}{3}y\right) + \left(\frac{4}{3}y\right)^2 + 2xy$

½

$\Rightarrow \frac{9}{16}x^2 - 2xy + \frac{16}{9}y^2 + 2xy$

$\Rightarrow \frac{9}{16}x^2 + \frac{16}{9}y^2$ ½

Section 'B'

(2 marks each)

7. 7. L.C.M of 5 and 2 is 10

$\therefore \quad \frac{-2}{5}\times\frac{2}{2} = \frac{-4}{10}$ and $\frac{1}{2}\times\frac{5}{5} = \frac{5}{10}$

Again, $\frac{-4}{10}\times\frac{2}{2} = \frac{-8}{20}$ and $\frac{5}{10}\times\frac{2}{2} = \frac{10}{20}$ 1

$\therefore$ Ten rational numbers between $\frac{-2}{5}$ and $\frac{1}{2}$ are

$\frac{-7}{20}, \frac{-6}{20}, \frac{-5}{20}, \frac{-4}{20}, \frac{-3}{20}, \frac{-2}{20}, 0, \frac{1}{20}, \frac{1}{20}$ 1

8. Diameter of road roller = 84 cm

r = $\frac{84}{2} = 42$ cm

= 0.42 m

Length of road roller = 1 m 1

The shape of road roller is cylindrical, then

1 revolution to move once over level the road

= 1 surface area of road roller

$= 2\pi rh$

$= 2\times\frac{22}{7}\times 0.42\times 1$

$= 2.64\ m^2$

The area of 750 revolutions to level the road by a road roller

$= 750\times 2.64$

$= 1980\ m^2$ 1

9. (a) $x^4 - y^4 = \left(x^2\right)^2 - \left(y^2\right)^2$

$= \left(x^2 + y^2\right)\left(x^2 - y^2\right)$

$= \left(x^2 + y^2\right)(x+y)(x-y)$ 1

(b) $16x^4 - 81 = \left(4x^2\right)^2 - (9)^2$

$= \left(4x^2 + 9\right)\left(4x^2 - 9\right)$

$= \left(4x^2 + 9\right)\left[(2x)^2 - (3)^2\right]$

$= \left(4x^2 + 9\right)(2x+3)(2x-3)$ 1

10. Let the distance travelled by a taxi = x km, then

Fare (in Rupees)	260	279.50
Distance (in km)	200	x

Clearly, the taxi will travel more for more money, then by direct variation. 1

$\frac{260}{279.50} = \frac{200}{x}$

$\Rightarrow \quad x = \frac{200 \times 279.50}{260}$

$\Rightarrow \quad x = 215$ 1

Hence, the taxi will travel, $3x(4x-5)+3 = 215$ km

11. (a) $3x\ (4x-5)+3$

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

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

$= 12(9) - 45 + 3$

$= 108 - 45 + 3 = 66$

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

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

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

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

(b) $a(a^2 + a + 1) + 5 = (a \times a^2) + (a \times a) + (a \times 1) + 5$

$= a^3 + a^2 + a + 5$

For a = 0 $= (0)^3 + (0)^2 + (0) + 5$

= 5

For a = 1 $(1)^3 + (1)^2 + (1) + 5$

$= 1 + 1 + 1 + 5$

= 8

For $a = -1$ $(-1)^3 + (-1)^2 + (-1) + 5$

$= -1 + 1 - 1 + 5$

= 4 1

12. Let the numbers be 2x, 3x and 5x

$\therefore (2x)^2 + (3x)^2 + (5x)^2 = 608$

$4x^2 + 9x^2 + 25x^2 = 608$

$38\,x^2 = 608$

$x^2 = \frac{608}{38} = 16$ 1½

x = 4

So, the number are 8, 12 and 20. ½

Section 'C'

(3 marks each)

13. $\frac{x}{2} - \frac{3x}{4} + \frac{5x}{6} = 21$

or, $\frac{6x - 9x + 10x}{12} = 21$

or, $7x = 21 \times 12$ 1

or, $x = \frac{21 \times 12}{7}$

or, x = 36 2

14. Let ABCD be a parallelogram such that adjacent angles

$\angle A = \angle B$ 1

Since, $\angle A + \angle B = 180°$

$\Rightarrow \quad 2\angle A = 180°$

$\therefore \quad \angle A = \angle B = \frac{180°}{2} = 90°$

Since, opposite angles of a parallelogram are equal. 1

$\therefore \quad \angle A = \angle C = 90°$

and $\angle B = \angle D = 90°$

Thus, $\angle A = 90°, \angle B = 90°,$

$\angle C = 90° and \angle D = 90°$ 1

15. (a) we have $x = \frac{11}{15}$

The additive inverse of $x = \frac{11}{15}$ is $-x = -\frac{11}{15}$,

Since $\frac{11}{15} + \left(\frac{-11}{15}\right) = 0.$

The same equality $\frac{11}{15} + \left(\frac{-11}{15}\right) = 0.$, shows that the additive inverse of $\frac{-11}{15}$ *is* $\frac{11}{15}$ or $\left(\frac{-11}{15}\right)$. 1½

i.e., $-(-x) = x$ Hence Verified

(b) The additive inverse of x = $\frac{-13}{17}$ is $-x = \frac{13}{17}$, since $\frac{-13}{17} + \frac{13}{17} = 0.$

The same equality $\frac{-13}{17} + \frac{13}{17} = 0.$ shows that the additive inverse of $\frac{13}{17}$ is $-\frac{13}{17}$ i.e., $-(-x) = x$ 1½

Hence Verified

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

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

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

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

$\Rightarrow 0$ 1

17. Let the boxes be x, when the same batch is packed using 20 bottles.
We have the following tables

No. of boxes	x	25
No. of bottles	20	12

1

This is a case of inverse proportion.

$x \times 20 = 25 \times 12$

$\Rightarrow \quad x = \frac{25 \times 12}{20}$

$= 15$

Thus, 15 boxes would be filled, when the same batch is packed using 20 bottles.

2

18. Sides of a trapezium are BC = 48 m, CD = 17 m and AD = 40 m, AB =?
Length of the fence of a trapezium shaped = 120 m
Perimeter of trapezium

= Length of fence of trapezium ABCD shaped

$AB + BC + CD + AD = 120$

$AB + 48 + 17 + 40 = 120$

$AB + 105 = 120$

$AB = 120 - 105$

$AB = 15\ m.$ 1

Two parallel sides of trapezium,

AD = 40 m, BC = 48 m.

Perpendicular height between them,

AB = 15 m

Then, the area of trapezium field

$= \frac{1}{2} \times h \times$ (sum of parallel sides)

$= \frac{1}{2} \times 15 \times (40 + 48)$

$= \frac{1}{2} \times 15 \times 88$

$= 660\ m^{2.}$

19. Length of box = 2ab
Breath of box = 3ac
Height of box = 2ac 1
Volume of box $= l \times b \times h$
$= 2ab \times 3ac \times 2ac$
$= 12a^3bc^2$ 2

20. Here, P = 12000, R = 6% p.a.
T = 2 years
S. I. = $\frac{P \times R \times T}{100}$
$= \frac{12000 \times 6 \times 2}{100} = Rs.1440$
Amount (A) $= P + S.I. = 12000 + 1440$
=Rs. 13440
Again in second case,
$A = P\left(1 + \frac{R}{100}\right)^n$
$= 12000\left(1 + \frac{6}{100}\right)^2$
$= 12000\left(\frac{53}{50}\right)^2$
$= 12000 \times \frac{53}{50} \times \frac{53}{50}$
= Rs.13483.20
I pay extra amount $= A_2 - A_1$
= Rs. 13483.20 – Rs.13440
= Rs. 43.20

21. $\frac{(-2)^3 \times (-2)^7}{3 \times 4^6} = \frac{(-2)^{3+7}}{3 \times (2^2)^6}$ 1
$= \frac{(-2)^{10}}{3 \times (2)^{12}}$
$= \frac{(-1)^{10}(2)^{10}}{3 \times (2)^{12}}$
$= \frac{1 \times (2)^{10-12}}{3}$
$= \frac{2^{-2}}{3}$
$= \frac{1}{3 \times 2^2}$
$= \frac{1}{12}$

1

22.

No. of pipes	5	6
Time taken	x min.	80 min.

1

Let x be the time taken to fill the tank with 5 pipes.

So, $\frac{6}{5} \times 80 = x$

$\Rightarrow \quad x = 16 \times 6$

$\Rightarrow \quad x = 96 \; min$

or x = 1 hour 36 minutes. 2

Section 'D'

(4 marks each)

23. Number of gives added = 30

$\therefore$ Now total number of girls = 50 + 30 = 80

For more number of girls, the food will last less number of days

$\therefore$ It is a case of inverse proportion 2

$50 \times 40 = 80 \times x$

$x = \frac{50 \times 40}{80} = 25$ 2

Therefore, the food will now last for 25 days. 2

24. (a) Probability of getting a number $6\frac{1}{10}$

1

(b) $\because$ Numbers less than 6 = 1, 2, 3, 4, 5

$\therefore$ Favourable outcomes = 5

and Total outcomes = 10

Hence, the probability of getting a number less than 6

1

$= \frac{5}{10}$

$= \frac{1}{2}$

(c) $\because$ Number greater then 6 = 7, 8, 9, 10

Favourable outcomes = 4

and Total outcomes =10

Hence, the probability of getting a number greater than 6

$= \frac{4}{10}$

$= \frac{2}{5}$

(d) $\because$ 1 digit numbers = 1, 2, 3, 4, 5, 6, 7, 8, 9

1

$\therefore$ Favourable outcomes = 9

and Total outcomes = 10

Hence, the probability of getting a 1 digit number

$= \frac{9}{10}$ 1

25. (a) The days were Tuesday, Friday and Sunday when the forecast temperature was same as the actual temperature. 1

(b) The maximum forecast temperature was $35°C$ during the week. 1

(c) The minimum actual temperature was $15°C$ during the week.

(d) The day was Thursday, when the actual temperature differ the most form the forecast temperature.

1

26. Let the length and breadth of the plot be 11 x and 4x, respectively.

$\therefore$ Perimeter of the plot $= \frac{Total\ cost}{Cost\ of\ 1\ meter}$

$= \frac{75000}{100} = 750m$

We know that perimeter of rectangle $= 2(l+b)$

$\therefore$ According to question,

$2(11x+4x) = 750$

or, $15x = \frac{750}{2}$

or, 15x = 375

or, $x = \frac{375}{15}$

or, x = 25

Hence, length of plot $= 11 \times 25 = 275$ m

and breadth of the plot $4 \times 25 = 100$ m. 2

27. Here, Principal (P) = Rs. 10,800

Rate (R) = $12\frac{1}{2}\% = \frac{25}{2}\%$

Number of years (n) = 3

We have, A = $P\left(1 \times \frac{R}{100}\right)^n$ 1

= 10,800 $\left(1 + \frac{25}{2 \times 100}\right)^3$ 1

$= 10{,}800\left(1+\frac{1}{2\times 4}\right)^3$ $= 10{,}800\left(1+\frac{1}{8}\right)^3$ $= 10{,}800\left(\frac{9}{8}\right)^3$

$=10{,}800\times\frac{9}{8}\times\frac{9}{8}\times\frac{9}{8}$

= Rs. 15377.34

C. I. = A – P = Rs. 15377.36 – Rs. 10800

= Rs. 4577.34 2

(b) Here, Principal (P) = Rs. 18000

Rate (R) = 10%, Time (n) = $\frac{1}{2}$ years

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

1

$=18000\left(1+\frac{10}{100}\right)^2$

$=18000\left(1+\frac{1}{10}\right)^2$

$=18000\left(\frac{11}{10}\right)^2$

$=18000\times\frac{11}{10}\times\frac{11}{10}$

= Rs. 21780

Interest for $\frac{1}{2}$ on Rs. 21,780 rate of 10%

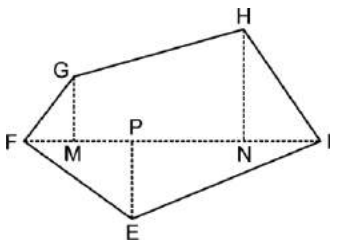
$=\frac{1}{2}\times\frac{21780\times10\times1}{100}=$ Rs. 1089

Total amount for $2\frac{1}{2}$ years = Rs. 21780 + Rs. 1089

= Rs. 22869

$C.I. = A - P$ =Rs. 22869 – Rs 18000 = Rs. 4869 2

28. (a) Given, a polygon EFGHI and FI is a diagonal of it. To find the area, we have to divide this polygon into triangle and trapezium. So, firstly draw perpendicular from opposite vertical on FI i.e. from points G, H and E to FI. Thus, we get perpendiculars GM, HN and EP respectively on FI and polygon is divided into 5 parts, out of which four are triangles and one is trapezium.



$\therefore$ Area of polygon EFGHI = Area of ΔGMF + Area of trapezium GMNH + Area of ΔHNI + Area of ΔEPI + Area of ΔEPF

$\left(\frac{1}{2}\times FM\times GM\right)+\left[\frac{1}{2}(GM+HN)\times MN\right]+$

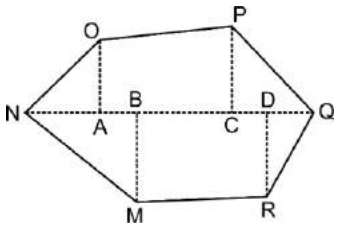
$\frac{1}{2}\times NI\times HN+\left(\frac{1}{2}\times PI\times EP\right)+\left(\frac{1}{2}\times PF\times EP\right)$

$\left[\because \text{ area of triangle } \frac{1}{2}\times \text{ base height and } \right.$

$\left. \text{area of trapezium } =\frac{1}{2}(\text{sum of parallel sides})\times \text{height}\right]$

2

(b) Given, polygon is MNOPQR and NQ is a diagonal of it. Then, draw perpendiculars on diagonal QN from vertices O, M, P and R i.e. draw $OA\perp NQ,\ MB\perp NQ,\ PC\perp NQ$ and $RD\perp NQ$.



Thus, polygon is divided into 6 parts, out of which four are triangles and two are trapeziums.

$\therefore$ Area of polygon MNOPQR = Area of ΔOAN + Area of trapezium CPOA + Area of ΔPCQ + Area of ΔRDQ + Area of trapezium MBDR + Area of ΔMBN

$=\left(\frac{1}{2}\times AN\times AO\right)+\left[\frac{1}{2}\times(OA+PC)\times AC\right]$ 2

$+\left(\frac{1}{2}\times QC\times PC\right)+\left(\frac{1}{2}\times QD\times RD\right)+$

$\left[\frac{1}{2}\times(DR+MB)\times BD\right]+\left(\frac{1}{2}\times BN\times BM\right)$

29. $1.\to H,$ $2.\to D,$ $3.\to G,$

$4.\to F,$ $5.\to C,$ $6.\to A,$

$7.\to B,$ $8.\to E.$

30. (a) $103\times104=(100+3)(100+4)$

$=(100)^2+(3+4)\times100+3\times4$

$=\ 10000+700+12$

$=\ 10712$ 1

(b) $5.1\times5.2=(5+0.1)(5+0.2)$

$=(5)^2+(0.1+0.2)\times5+(0.1\times0.2)$

$=\ 25+0.3\times5+0.02$

$=25+1.5+0.02$

$=\ 26.52$ 1

(c) $103\times98=(100+3)(100-2)$

$=(100)^2+\{3+(-2)\}\times100+(3\times(-2))$

$= 10000 + (3-2)\times 100 - 6$

$= 10000 + 1\times 100 - 6$

$= 10000 + 100 - 6$

$= 10094$ 1

(d) $9.7\times 9.8 = (10-0.3)(10-0.2)$

$= (10)^2 + (-0.3 + -0.2)\times 10 + \{(-0.3)(-0.2)\}$

$= 100 + (-0.3 - 0.2) - 10 + \{+0.06\}$

$= 100 - 0.5\times 10 - 0.06$

$= 100 - 5 + 0.06$

$= 95.06$ 1