

**BHARATIYA VIDYA BHAVAN, MIDDLE EAST**

**Half - Yearly Exam (2021-2022)**

**Subject: Mathematics (code - 041)**

**Roll No.**

**Class: 8**

**Marks: 80**

**Date: 19 Sep 2021**

**Time: 3 hours**

**General instructions:**

1. This question paper contains 9 pages divided into part A and B.
2. Both Part A and Part B have internal choices.

**Part – A:**

1. It consists of two sections - I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 2 Case Study Based; 1 Source Based and 1 Assertion & Reasoning questions.

**Part – B:**

1. Question No 21 to 26 are Very short answer Type questions of 2 marks each.
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each.
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

<b>Part -A</b>		
<b><u>Section-I</u></b>		
	<b>Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.</b>	
1	A number added to its one fourth is equal to 15. Find the number.  <b>OR</b>  Two supplementary angles differ by $34^\circ$ . Find the angles.	(1)
2	The product of two rational numbers is $-75$ . If one of the numbers is $-30$ , find the other.	(1)



3	Evaluate: $\sqrt[3]{27} + \sqrt[3]{64} - \sqrt[3]{125}$	(1)
4	How many square metres of carpet will be required for a square room of side 7.4 m to be carpeted?	(1)
5	The solution of the equation $3x - 4 = 1 - 2x$ is _____.	(1)
	<b>OR</b>	
	The denominator of a rational number is greater than the numerator by 10. If the numerator is increased by 1 and denominator is decreased by 1, then expression for new denominator is _____.	
6	Estimate the cube root of 54872	(1)
	<b>OR</b>	
	The volume of a cube is $64\text{cm}^3$ . The side of the cube will be ____ cm	
7	Find the least square number, which is exactly divisible by 3, 4, 5, 6 and 8.	(1)
8	9 is subtracted from the product of p and 4, the result is 11. The value of p is _____	(1)
9	The reciprocal of $[\frac{-2}{7} \times \frac{-21}{-32}] =$ _____	(1)
	<b>OR</b>	
	Find the additive inverse of $[\frac{-2}{3} \times \frac{-42}{-48}] =$ _____	
10	The value of $\sqrt{316 + \sqrt{50 + \sqrt{196}}}$ is (a) 18    (b) 19    (c) 17    (d) 16	(1)
11	If a % is the discount per cent on a marked price x, then discount is (a) $\frac{x}{a} \times 100$ (b) $\frac{a}{x} \times 100$ (c) $x \times \frac{a}{100}$ (d) $\frac{100}{x \times a}$	(1)
12	Cube of a number ending in 7 will end in the digit _____	(1)



13	The value of $x$ for which the expressions $5x$ and $3x + \frac{8}{5}$ become equal is (a) $\frac{8}{5}$ (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) $-\frac{8}{5}$	(1)
14	40% of $[100 - 20\% \text{ of } 300]$ is equal to (a) 20      (b) 16      (c) 140      (d) 64	(1)
15	Divide ₹960 between Manu and Swapna in the ratio 5: 7	(1)
16	The units digit in the square of 1294 is _____.  <b>OR</b>  Determine whether 2578 is a perfect square. Justify your answer	(1)
<b><u>Section-II</u></b>		
<b><u>Case - Study Based Questions</u></b>		
<b>Attempt any four sub parts of each question. Each subpart carries 1 mark</b>		
17	Rakesh has a rectangular plot whose length is two times it's breadth. The perimeter of the plot is 6480m. He plans to make a vegetable garden in the form of a square whose perimeter is 1440m	(4)
a)	If $x$ is the breadth of the rectangular plot, then what would be its length  i) $x$ m ii) $(x + 2)$ m iii) $(x - 2)$ m iv) $2x$ m	
b)	Write an equation to find the dimensions of the plot  i) $2(x + x + 2) = 6480$ ii) $x + 2x = 3240$ iii) $2(x + x - 2) = 6480$ iv) $2(x + 2x) = 3240$	
c)	Find the plot's dimensions	

	<p>i) <math>B = 1080 \text{ m}, L = 2160 \text{ m}</math>  ii) <math>B = 2160 \text{ m}, L = 1080 \text{ m}</math>  iii) <math>B = 3240 \text{ m}, L = 6480 \text{ m}</math>  iv) <math>B = 216 \text{ m}, L = 108 \text{ m}</math></p>	
d)	<p>If <math>y</math> is the side of the vegetable garden write an equation to calculate its side.</p> <p>i) <math>y + 4 = 1440</math>  ii) <math>y - 4 = 1440</math>  iii) <math>2y = 1440</math>  iv) <math>4y = 1440</math></p>	
e)	<p>Find the length of the vegetable garden.</p> <p>i) <math>1436 \text{ m}</math>  ii) <math>1346 \text{ m}</math>  iii) <math>360 \text{ m}</math>  iv) <math>720 \text{ m}</math></p>	
18	<p>If the principal is ₹50000 and the rate of interest is 8% per annum compounded annually.</p>	(4)
a)	<p>The interest earned in the first year would be</p> <p>i) ₹ 3500  ii) ₹ 4500  iii) ₹ 4000  iv) ₹ 5000</p>	
b)	<p>What would be the principal for the second year?</p> <p>i) ₹ 50000  ii) ₹ 45000  iii) ₹ 54000  iv) ₹ 50400</p>	
c)	<p>Calculate the interest earned for the second year.</p> <p>i) ₹ 4000  ii) ₹ 4320  iii) ₹ 4230</p>	



	iv) ₹ 4032	
d)	Is the interest earned for the first year same as that of the second year?  i) No ii) Yes	
e)	What would be the total interest earned for two years if it were simple interest per annum?  i) ₹ 5800 ii) ₹ 8320 iii) ₹ 8000 iv) ₹ 5280	
19	<b><u>Source-Based Question</u></b>  <b>Attempt all four sub parts of the question. Each subpart carries 1 mark.</b>	(4)
a)	Express 81 as the sum of two consecutive integers  i) 40 + 41 ii) 50 + 31 iii) 36 + 45 iv) 72 + 9	
b)	The difference between the squares of two consecutive natural numbers is  i) Sum of the two numbers ii) Difference of the two numbers iii) Twice the sum of two numbers iv) Twice the difference of two numbers	
c)	Identify the property of a perfect square from the following  i) A number ending in 3 or 7 ii) A number ending with odd number of zeros iii) A number ending with even number of zeros iv) A number ending in 2	



d)	<p>Which of the following is a Pythagorean triplet?</p> <p>i) <math>(n, n^2 - 1, n^2 + 1)</math>  ii) <math>(n - 1, n^2 - 1, n^2 + 1)</math>  iii) <math>(2n, n^2 - 1, n^2 + 1)</math>  iv) <math>(n + 1, n^2 - 1, n^2 + 1)</math></p>	
20	<p><b>Following questions consists of two statements – Assertion(A) and Reason(R). Answer these questions selecting the appropriate option given below:</b></p> <p>(a) Both(A) and (R) are true and (R) is the correct explanation for (A).  (b) Both(A) and (R) are correct but (R) is not the correct explanation for (A).  (c) (A) is true but (R) is false.  (d) (A) is false but (R) is true.</p>	
a)	<p><b>Assertion(A):</b> A number of the form <math>\frac{p}{q}</math> is said to be a rational number if <math>p</math> and <math>q</math> are integers and <math>q \neq 0</math></p> <p><b>Reason(R):</b> Every whole number is a rational number.</p>	(1)
b)	<p><b>Assertion(A):</b> The rational number 0 is the additive identity for rational numbers.</p> <p><b>Reason(R):</b> When 0 is added to a rational number we get the same rational number.</p>	(1)
c)	<p><b>Assertion(A):</b> 2 is a rational number</p> <p><b>Reason(R):</b> The square roots of all positive integers are irrational</p>	(1)
d)	<p><b>Assertion(A):</b> The reciprocal of the rational number <math>\frac{-5}{6}</math> is <math>\frac{-6}{5}</math></p> <p><b>Reason(R):</b> The reciprocal of the rational number <math>\frac{a}{b}</math> is <math>\frac{c}{d}</math> if <math>\frac{a}{b} \times \frac{c}{d} = 1</math></p>	(1)
<b>Part –B</b>		
<b><u>Section III</u></b>		
<p><b>All questions are compulsory. In case of internal choices, attempt anyone.</b></p>		



21	Three numbers are in the ratio 1:2:3 and the sum of their cubes is 4500. Find the numbers.	(2)
22	A hall has a capacity of 2704 seats. If the number of rows is equal to the number of seats in each row, then find the number of seats in each row.  <b>OR</b>  Write the Pythagorean triplet whose one of the numbers is 17.	(2)
23	The student at St. Joseph's school voted for a new school mascot. 60% of the students voted to be the Falcons. If there are 595 students in St. Joseph's school, how many students voted not to be the Falcons?	(2)
24	Is 8788 a perfect cube? If not, find the smallest number by which it should be divided to get a perfect cube.	(2)
25	The sum of three consecutive odd natural numbers is 69. Find the prime number out of these numbers.  <b>OR</b>  Solve $\frac{3x+2}{2x-3} = -\frac{3}{4}$	(2)
26	Subtract the additive inverse of $\frac{2}{7}$ from the multiplicative inverse of $\frac{-3}{5}$ .	(2)
	<b><u>Section IV</u></b>  <b>All questions are compulsory. In case of internal choices, attempt anyone.</b>	(2)
27	Find the greatest number of three digits that is a perfect square.	(3)
28	Simplify using suitable property of rational numbers $\frac{-2}{3} \times \frac{-1}{7} + \frac{-1}{5} + \frac{3}{5} \times \frac{-2}{3}$  <b>OR</b>  Verify the associative property $a \times (b \times c) = (a \times c) \times b$ , where $a = -1$ , $b = \frac{-1}{2}$ , $c = \frac{-3}{4}$	(3)



29	Find the difference between Compound Interest and Simple Interest on Rs 4500 at 5% per annum for 3 years.	(3)
30	a) The next two numbers in the number pattern 1, 4, 9, 16, 25 ... are _____  b) What is the smallest number by which 8192 must be divided so that quotient is a perfect cube?  <b>OR</b>  Three numbers are in the ratio 2: 3: 4. The sum of their squares is 1044. Find the numbers.	(3)
31	A lady bought an air-conditioner for Rs 15,200 and spent Rs 300 and Rs 500 on its transportation and repair respectively. At what price should she sell it to make a gain of 15%?	(3)
32	Solve and check your answer $\frac{3x}{4} - \frac{(x-1)}{2} = \frac{(x-2)}{3}$	(3)
33	The ages of Sita and Suresh are in the ratio 7: 5. Ten years hence, the ratio of their ages will be 9: 7. Find their present ages.	(3)
	<b><u>Section V</u></b>	(3)
	<b>All questions are compulsory. In case of internal choices, attempt anyone.</b>	
34	a) Divide the sum of $\frac{-7}{8}$ and $\frac{5}{9}$ by their product b) By what number should we multiply $\frac{3}{7}$ so that the product is $\frac{-12}{35}$ ?  <b>OR</b>  a) Find 8 rational numbers between $\frac{-2}{5}$ and $\frac{-3}{4}$ b) Find $(x + y) \div (x - y)$ , if $x = \frac{-2}{3}$ and $y = \frac{-3}{2}$	(5)
35	a) Find the discount on an item marked at ₹ 800 and sold for ₹ 721.	(5)



	<p>b) The price of a cycle is ₹800. It is now increased by 20%. Find the new sale price of the cycle.</p> <p>c) The list price of a bag is ₹ 220. Calculate the Sales price if a discount of 15% is offered to its customers for the purchase.</p>	
36	<p>a) Sum of the digits of a two-digit number is 11. The given number is less than the number obtained by interchanging the digits by 9. Find the number.</p> <p>b) Solve <math>\frac{6x+1}{3} + \frac{1}{2} = \frac{x-3}{6}</math></p>	(5)



VIII

HYE - 2021-22 (BVB)

1) Let the number be  $x$ .

$$\text{Then, } \frac{1}{4}x + x = 15$$

$$\Rightarrow \frac{x+4x}{4} = 15$$

$$\Rightarrow 5x = 15 \times 4$$

$$\Rightarrow x = \frac{15 \times 4}{5} = 12 //$$

$\therefore$  The required number is 12

1) OR

Let the supplementary be  $x$  and  $180^\circ - x$ 

$$\text{Then, } x - (180^\circ - x) = 34^\circ$$

$$\Rightarrow x - 180^\circ + x = 34^\circ$$

$$2x = 34^\circ + 180^\circ = 214$$

$$\therefore x = \frac{214}{2} = 107 //$$

$\therefore$  The angles are  $x = 107^\circ$   
and  $180^\circ - x = 73^\circ$

2) Let the other number be  $x$ .

$$\text{Then, } x \times -30 = -75$$

$$\therefore x = \frac{-75}{-30} = 2.5$$

$\therefore$  The other number is 2.5

3)

$$\sqrt[3]{27} = 3$$

$$\sqrt[3]{64} = 4$$

$$\sqrt[3]{125} = 5$$

$$\therefore \sqrt[3]{27} + \sqrt[3]{64} - \sqrt[3]{125}$$

$$= 3 + 4 - 5$$

$$= 7 - 5$$

$$= \underline{\underline{2}}$$

4)

$$\text{Area of square carpet} = \text{Side} \times \text{Side}$$

$$= 7.4 \times 7.4$$

$$= \underline{\underline{54.76 \text{ m}^2}}$$

5)

$$3x - 4 = 1 - 2x$$

$$\Rightarrow 3x + 2x = 1 + 4$$

$$\Rightarrow 5x = 5$$

$$\therefore x = \frac{5}{5} = \underline{\underline{1}}$$



6)  $\sqrt[3]{54872}$

Since the given number ends with 2, its cube root ends with 8.

Also,  $3^3 < 54 < 4^3$

So, the ten's place is 3

Hence  $\sqrt[3]{54872} = \underline{\underline{38}}$

5) OR Let the numerator of the rational number be  $x$ .

Then, the denominator is  $x+10$

Thus, the original fraction is  $\frac{x}{x+10}$

Now,  $\frac{x+1}{x+10-1} = \frac{x+1}{x+9}$

$\therefore$  The new denominator is  $x+9$  //

6) OR volume of a cube = side  $\times$  side  $\times$  side =  $64 \text{ cm}^3$

$\therefore$  Each side =  $\sqrt[3]{64} = 4 \text{ cm}$  //

7) LCM(3, 4, 5, 6, 8)  
 $= 2 \times 2 \times 3 \times 5 \times 2$   
 $= 120$

$$\begin{array}{r|l} 2 & 3, 4, 5, 6, 8 \\ 2 & 3, 2, 5, 3, 4 \\ 3 & 3, 1, 5, 3, 2 \\ 5 & 1, 1, 5, 1, 2 \\ 2 & 1, 1, 1, 1, 2 \\ & 1, 1, 1, 1, 1 \end{array}$$

$120 = 2 \times 2 \times \textcircled{3} \times \textcircled{5} \times \textcircled{2}$

Thus, 3, 5 and 2 are the factors of 120 which are unpaired.

$\therefore$  The required least square number =  $120 \times 3 \times 5 \times 2$   
 $= \underline{\underline{3600}}$

8)  $p \times 4 - 9 = 11$   
 $4p - 9 = 11$   
 $4p = 11 + 9$   
 $4p = 20$   
 $\therefore p = \frac{20}{4} = \underline{\underline{5}}$

9)  $-\frac{2}{7} \times \frac{-2+3}{-3216} = -\frac{3}{16}$  |  $\therefore$  The reciprocal is  $-\frac{16}{3}$  //



9) OR

$$-\frac{2}{3}x + \frac{42}{48} = -\frac{7}{12}$$

$\therefore$  The additive inverse =  $\frac{7}{12}$

10)

$$\sqrt{196} = 14$$

$$\sqrt{50+14} = \sqrt{64} = 8$$

$$\sqrt{316+8} = \sqrt{324} = \underline{18} \text{ (a)}$$

11)

$$\text{discount \%} = \frac{\text{discount}}{\text{M.P}} \times 100$$

$$a = \frac{\text{discount}}{x} \times 100$$

$$\therefore \text{discount} = \frac{ax}{100} = x \times \frac{a}{100} \text{ (c)}$$

12)

$$7^3 = 343$$

ans: 3

13)

$$5x = 3x + \frac{8}{5}$$

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

$$2x = \frac{8}{5}$$

$$\therefore x = \frac{8}{5 \times 2} = \frac{4}{5} \text{ (c)}$$

14)

40% of (100 - 20% of 300)

$$= \frac{40}{100} \times \left(100 - \frac{20}{100} \times 300\right)$$

$$= \frac{4}{10} (100 - 60)$$

$$= \frac{4}{10} \times 40 = 16 \text{ (b)}$$



15) Let the shares be  $5x$  and  $7x$

Then,  $5x + 7x = 960$

$12x = 960$

$x = \frac{960}{12} = 80 //$

$\therefore$  Manu's share =  $5x = 5 \times 80 = \text{Rs } 400$

Swapna's share =  $7x = 7 \times 80 = \text{Rs } 560$

16) 1294

$4^2 = 16$

$\therefore$  The unit digit in the square of 1294 is 6

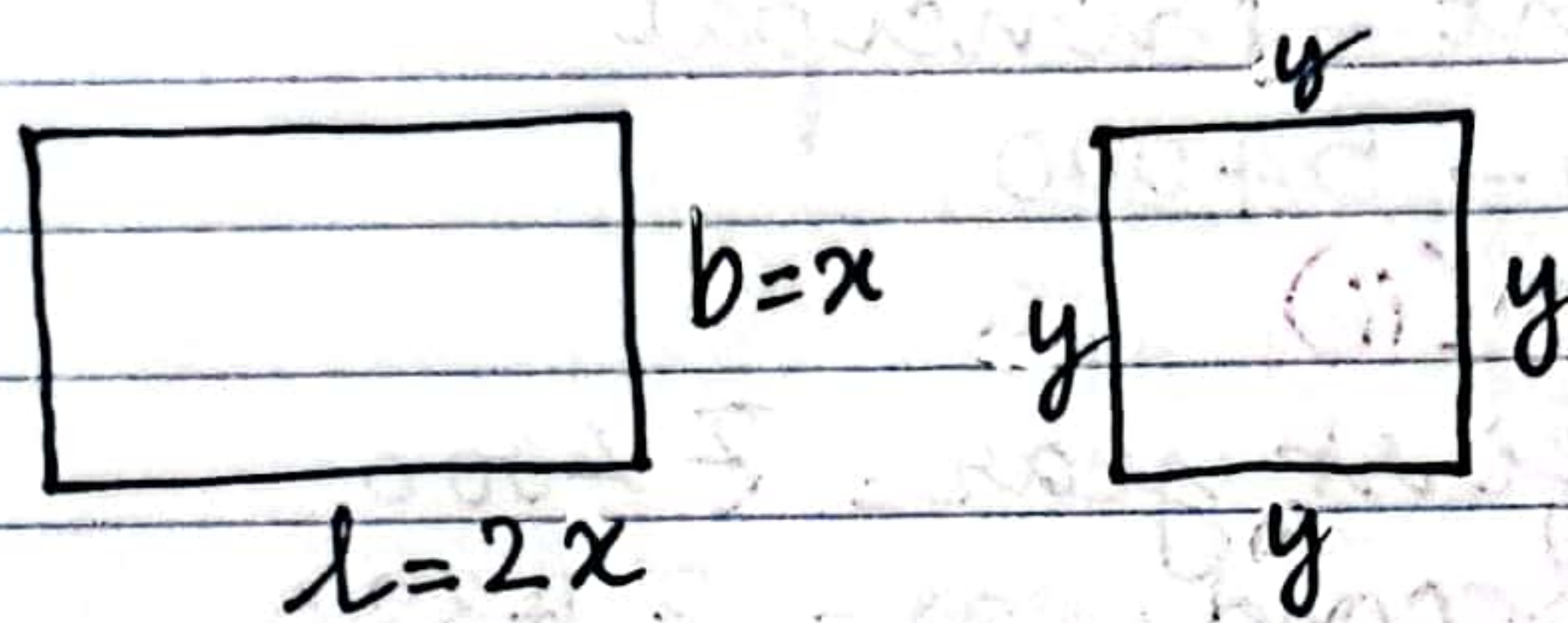
16) OR

$2578 = 2 \times 2 \times 2 \times 2 \times 7 \times 23$

Since the factors 7 and 23 are not in pairs, the given number is not a perfect square.

$$\begin{array}{r} 2 \overline{) 2578} \\ \underline{2} \phantom{00} \\ 1288 \\ 2 \overline{) 1288} \\ \underline{2} \phantom{00} \\ 644 \\ 2 \overline{) 644} \\ \underline{2} \phantom{00} \\ 322 \\ 2 \overline{) 322} \\ \underline{2} \phantom{00} \\ 161 \\ 7 \overline{) 161} \\ \underline{7} \phantom{00} \\ 23 \end{array}$$

17)



(a) length =  $2x$  m (iv)

(b) Perimeter =  $2(l+b) = 6480$

$\Rightarrow 2(2x+x) = 6480$

$\Rightarrow 2x+x = \frac{6480}{2} = 3240$

$\Rightarrow x + 2x = 3240$  (ii)

(c)  $x + 2x = 3240$

$3x = 3240$

$x = \frac{3240}{3} = 1080$  m

$\therefore l = 2x = 1080 \times 2 = 2160$  m

$b = x = 1080$  m (i)

(d) Perimeter =  $4 \times \text{Side} = 1440$  m

$\Rightarrow 4y = 1440$  m (iv)

(e)  $4y = 1440$

$y = \frac{1440}{4} = 360$  m (iii)



18)  $P = \text{Rs } 50,000$

$R = 8\%$

(a)  $\text{Amount} = P \left(1 + \frac{R}{100}\right)^n = 50000 \left(1 + \frac{8}{100}\right)^1$

$= 50000 \times \frac{108}{100} = \text{Rs } 54,000$

$\therefore \text{Interest} = \text{Amount} - \text{Principal}$   
 $= 54000 - 50000$   
 $= \text{Rs } 4000 \text{ (iii)}$

(b) Principal for the second year = ₹ 54,000 (iii)

(c) Amount earned for second year =  $P \left(1 + \frac{R}{100}\right)^n$

$= 54000 \left(1 + \frac{8}{100}\right)^1$

$= 54000 \times \frac{108}{100} = ₹ 58,320$

$\therefore \text{Interest} = \text{Amount} - \text{Principal}$   
 $= 58320 - 54000$   
 $= ₹ 4320 \text{ (ii)}$

(a) Interest earned for first year = ₹ 4000  
Interest earned for second year = ₹ 4320

No (i)

(b)  $S.I = \frac{PRT}{100} = \frac{50000 \times 8 \times 2}{100} = ₹ 8000 \text{ (iii)}$

19(a)  $\frac{81-1}{2} + \frac{81+1}{2} = \frac{80}{2} + \frac{82}{2}$

$= 40 + 41 \text{ (i)}$

(b) eg:-  $a^2 - b^2 = (a+b)(a-b)$   
 $81^2 - 80^2 = (81+80)(81-80)$   
 $= (81+80) \times 1$   
 $= 81+80$

Sum of the two numbers (i)

(c) A number ending with even number of zeroes (iii)

(d)  $(2n, n^2-1, n^2+1)$  (iii)

20 (a) (b)

(b) (a)

(c) (c)

(d) (a)



21) Let the numbers be  $1x, 2x$  and  $3x$ .

Then,  $(1x)^3 + (2x)^3 + (3x)^3 = 4500$

$$1x^3 + 8x^3 + 27x^3 = 4500$$

$$36x^3 = 4500$$

$$x^3 = \frac{4500}{36} = 125$$

$$x = \sqrt[3]{125} = 5$$

$\therefore$  The numbers are  $x = 5$

$$2x = 5 \times 2 = 10$$

$$3x = 5 \times 3 = 15$$

22) Let the no. of rows = no. of seats in each row =  $x$

Then,  $x \times x = 2704$

$$x^2 = 2704$$

$$x = \sqrt{2704}$$

$$= \underline{\underline{52}}$$

$$\begin{array}{r} 52 \\ 5 \overline{) 2704} \\ \underline{25} \phantom{00} \\ 204 \\ 10 \overline{) 204} \\ \underline{204} \\ 0 \end{array}$$

$\therefore$  No. of seats in each row = 52

22) OR We know that  $(2m, m^2-1, m^2+1)$  forms a Pythagorean triplet.

Then,  $m^2+1 = 17$

$$m^2 = 17-1$$

$$m^2 = 16$$

$$\therefore m = \sqrt{16} = 4$$

Thus,  $2m = 4 \times 2 = 8$

$$m^2-1 = 4^2-1 = 16-1 = 15$$

$$m^2+1 = 17$$

$\therefore (8, 15, 17)$  is the required Pythagorean triplet.

23) % of students did not vote for falcons =  $(100-60)\% = 40\%$

Then, 40% of 595 = no. of students who do not vote for falcons

$$= \frac{40}{100} \times 595$$

$$= 119 \times 2 = 238 \text{ students} //$$

24)  $8788 = 2 \times 2 \times 13 \times 13 \times 13$

Since the factor 2 is not in triplet, the given number is not a perfect cube.

$$\begin{array}{r} 2 \overline{) 8788} \\ \underline{2} \phantom{000} \\ 2 \overline{) 4394} \\ \underline{2} \phantom{00} \\ 13 \overline{) 2197} \\ \underline{13} \phantom{00} \\ 13 \overline{) 169} \\ \underline{13} \\ 13 \end{array}$$



Thus the smallest number to be divided

$$= 2 \times 2 = 4$$

$$\frac{8788}{4} = 2197$$

$$\therefore \sqrt[3]{2197} = \underline{\underline{13}}$$

25) Let the three consecutive odd natural numbers be  $x, x+2$  and  $x+4$

$$\text{Then, } x + x + 2 + x + 4 = 69$$

$$3x + 6 = 69$$

$$3x = 69 - 6 = 63$$

$$\therefore x = \frac{63}{3} = 21 //$$

$\therefore$  The numbers are 21, 23, 25

Hence, Prime number = 23 //

25) OR

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

$$\Rightarrow 4(3x+2) = -3(2x-3)$$

$$\Rightarrow 12x + 8 = -6x + 9$$

$$\Rightarrow 12x + 6x = 9 - 8$$

$$\Rightarrow 18x = 1$$

$$\therefore x = \frac{1}{18} //$$

26) Additive inverse of  $\frac{2}{7} = -\frac{2}{7}$

Multiplicative inverse of  $-\frac{3}{5} = -\frac{5}{3}$

$$\text{Then, } -\frac{5}{3} - \left(-\frac{2}{7}\right) = -\frac{5 \times 7}{3 \times 7} + \frac{2 \times 3}{7 \times 3} = -\frac{35 + 6}{21}$$

$$= -\frac{29}{21}$$

27) Greatest 3 digit number = 999

$\therefore$  The required greatest 3 digit perfect square number

$$= 999 - 38 = 961 //$$

$$\begin{array}{r} 31 \\ 3 \overline{) 999} \\ \underline{9} \phantom{00} \\ 99 \\ 6 \overline{) 99} \\ \underline{61} \\ 38 \end{array}$$



$$\begin{aligned}
 28) & \left(-\frac{2}{3}x - \frac{1}{7}\right) + \left(-\frac{1}{5}\right) + \left(\frac{3}{5}x - \frac{2}{3}\right) \\
 & = \left(-\frac{2}{3}x - \frac{1}{7}\right) + \left(\frac{3}{5}x - \frac{2}{3}\right) + -\frac{1}{5} \\
 & = -\frac{2}{3}x \left(-\frac{1 \times 5}{7 \times 5} + \frac{3 \times 7}{5 \times 7}\right) - \frac{1}{5} \\
 & = -\frac{2}{3}x \left(\frac{-5 + 21}{35}\right) - \frac{1}{5} \\
 & = -\frac{2}{3}x \frac{16}{35} - \frac{1}{5} \\
 & = \frac{-32}{105} - \frac{1 \times 21}{5 \times 21} = \frac{-32 - 21}{105} = \underline{\underline{-\frac{53}{105}}}
 \end{aligned}$$

$$\begin{aligned}
 28) \text{ OR } \text{LHS, } a \times (b \times c) & = -1 \times \left(-\frac{1}{2}x - \frac{3}{4}\right) \\
 & = -1 \times \frac{3}{8} = \underline{\underline{-\frac{3}{8}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{RHS, } (a \times c) \times b & = \left(-1 \times -\frac{3}{4}\right) \times -\frac{1}{2} \\
 & = \frac{3}{4} \times -\frac{1}{2} = \underline{\underline{-\frac{3}{8}}}
 \end{aligned}$$

$\therefore \text{LHS} = \text{RHS}$   
 Hence verified.

$$\begin{aligned}
 29) & P = \text{Rs } 4500 \\
 & R = 5\% \\
 & T = 3 \text{ years}
 \end{aligned}$$

$$\begin{aligned}
 \text{Amount} & = P \left(1 + \frac{R}{100}\right)^T = 4500 \left(1 + \frac{5}{100}\right)^3 \\
 & = 4500 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} \\
 & = \underline{\underline{\frac{45 \times 10.5 \times 10.5 \times 10.5}{10}}}
 \end{aligned}$$

$$= \text{₹ } 5209.3125 = \text{₹ } 5209.31 //$$

$$\begin{aligned}
 \text{C.I} & = \text{Amount} - \text{Principal} = 5209.31 - 4500 \\
 & = \text{Rs } 709.31 //
 \end{aligned}$$



$$S.I = \frac{PRT}{100} = \frac{4500 \times 5 \times 3}{100} = ₹ 675 //$$

$$\begin{aligned} \therefore \text{Difference between C.I and S.I} &= 709.31 - 675 \\ &= ₹ \underline{\underline{34.31}} \end{aligned}$$

30) (a) 1, 4, 9, 16, 25, 36, 49

(b)  $8192 = \underline{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} \times \underline{2 \times 2 \times 2 \times 2 \times 2}$

Thus, the required smallest number to be divided = 2

$$\therefore \frac{8192}{2} = 4096$$

$$\sqrt[3]{4096} = 16$$

2	8192
2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2

30) OR Let the three numbers be  $2x$ ,  $3x$  and  $4x$ .

$$\text{Then, } (2x)^2 + (3x)^2 + (4x)^2 = 1044$$

$$4x^2 + 9x^2 + 16x^2 = 1044$$

$$29x^2 = 1044$$

$$\therefore x^2 = \frac{1044}{29} = 36$$

$$\therefore x = \sqrt{36} = 6 //$$

Hence, the numbers are  $2x = 2 \times 6 = 12$ ,

$$3x = 3 \times 6 = 18$$

$$\text{and } 4x = 4 \times 6 = 24$$

31) Total C.P =  $15200 + 300 + 500 = ₹ 16,000$

$$\text{gain \%} = 15\%$$

$$S.P = \frac{100 + \text{gain \%}}{100} \times C.P$$

$$\begin{aligned} &= \frac{(100 + 15)}{100} \times 16000 = 115 \times 160 \\ &= ₹ 18,400 \end{aligned}$$



$$32) \quad \frac{3x}{4} - \frac{(x-1)^{x^2}}{2 \times 2} = \frac{x-2}{3}$$

$$\Rightarrow \frac{3x - 2(x-1)}{4} = \frac{x-2}{3}$$

$$\Rightarrow \frac{3x - 2x + 2}{4} = \frac{x-2}{3}$$

$$\Rightarrow \frac{x+2}{4} = \frac{x-2}{3}$$

$$\Rightarrow 3(x+2) = 4(x-2)$$

$$\Rightarrow 3x + 6 = 4x - 8$$

$$\Rightarrow 3x - 4x = -8 - 6$$

$$-x = -14$$

$$x = 14 //$$

Checking :-

$$\text{LHS, } \frac{3 \times 14}{4} - \frac{(14-1)}{2} = \frac{42}{4} - \frac{13}{2} = \frac{21-13}{2} = \frac{8}{2} = 4 //$$

$$\text{RHS, } \frac{14-2}{3} = \frac{12}{3} = 4 //$$

Thus 14 is the solution of the given equation.

33) Let the present ages of Sita and Suresh be  $7x$  and  $5x$ .  
After ten years, age of Sita =  $7x + 10$   
age of Suresh =  $5x + 10$

$$\text{Then, } \frac{7x+10}{5x+10} = \frac{9}{7}$$

$$7(7x+10) = 9(5x+10)$$

$$49x + 70 = 45x + 90$$

$$49x - 45x = 90 - 70$$

$$4x = 20$$

$$\therefore x = \frac{20}{4} = 5 //$$

$\therefore$  The present ages are  $7 \times 5 = 35$  years  
and  $5 \times 5 = 25$  years

$$34) \text{ (a) } -\frac{7 \times 9}{8 \times 9} + \frac{5 \times 8}{9 \times 8} = \frac{-63 + 40}{72} = \frac{-23}{72}$$

$$-\frac{7}{8} \times \frac{5}{9} = \frac{-35}{72}$$



$$\begin{aligned} \text{Thus, } & -\frac{23}{72} \div -\frac{35}{72} \\ & = -\frac{23}{72} \times -\frac{72}{35} \\ & = \frac{23}{35} \end{aligned}$$

Let the number be  $x$

$$\begin{aligned} \text{(b) } & x \times \frac{3}{7} = -\frac{12}{35} \\ \therefore x & = -\frac{12}{35} \times \frac{7}{3} = -\frac{4}{5} \\ \text{Hence, the required} & \text{ number is } -\frac{4}{5} \end{aligned}$$

34) OR

$$\begin{aligned} \text{(a) } & -\frac{2 \times 4}{5 \times 4} \quad -\frac{3 \times 5}{4 \times 5} \\ & -\frac{8 \times 10}{20 \times 10} \quad -\frac{15 \times 10}{20 \times 10} \\ & -\frac{80}{200} \quad -\frac{150}{200} \end{aligned}$$

$\therefore$  8 rational numbers between  $-\frac{2}{5}$  and  $-\frac{3}{4}$

$$\begin{aligned} \text{are } & -\frac{81}{200}, -\frac{83}{200}, -\frac{87}{200}, -\frac{89}{200}, -\frac{91}{200}, -\frac{93}{200}, \\ & -\frac{97}{200} \text{ and } -\frac{109}{200} \end{aligned}$$

$$\text{(b) } x + y = -\frac{2 \times 2}{3 \times 2} - \frac{3 \times 3}{2 \times 3} = -\frac{4}{6} - \frac{9}{6} = -\frac{13}{6}$$

$$x - y = -\frac{2}{3} - \left(-\frac{3}{2}\right) = -\frac{2 \times 2}{3 \times 2} + \frac{3 \times 3}{2 \times 3} = -\frac{4}{6} + \frac{9}{6} = \frac{5}{6}$$

$$\therefore (x + y) \div (x - y) = \frac{-13}{6} \div \frac{5}{6}$$

$$= -\frac{13}{6} \times \frac{6}{5} = -\frac{13}{5}$$

$$\text{35) (a) M.P.} = ₹ 800$$

$$S.P. = ₹ 721$$

$$\begin{aligned} \text{discount} & = \text{M.P.} - \text{S.P.} = 800 - 721 \\ & = ₹ 79 \end{aligned}$$

$$\text{(b) C.P.} = ₹ 800$$

$$\% \text{ increase} = 20\%$$

$$\begin{aligned} \text{New sale price} & = 800 + 20\% \text{ of } 800 \\ & = 800 + \frac{20}{100} \times 800 \end{aligned}$$

$$= 800 + 160$$

$$= ₹ 960$$



$$(c) M.P = ₹ 220$$

$$\text{discount \%} = 15\%$$

$$S.P = \frac{100 - \text{discount \%}}{100} \times M.P$$

$$= \frac{100 - 15}{100} \times 220 = \frac{85 \times 22}{10} = \frac{1870}{10}$$

$$= \underline{\underline{₹ 187}}$$

36) (a) Let the digit in the one's place be  $x$  and that in the ten's place be  $11-x$ .

$$\text{Original number} = 10(11-x) + x = 110 - 10x + x \\ = 110 - 9x$$

$$\text{Reversed number} = 10x + 11 - x = 9x + 11$$

$$\text{Then, } 110 - 9x = 9x + 11 - 9$$

$$-9x - 9x = 11 - 9 - 110$$

$$-18x = -108$$

$$x = \frac{108}{18} = \underline{\underline{6}}$$

$$\text{Hence, the number} = 110 - 9x = 110 - 9 \times 6 \\ = 110 - 54 \\ = \underline{\underline{56}}$$

$$(b) \frac{(6x+1)^{x^2}}{3 \times 2} + \frac{1^{x^3}}{2 \times 3} = \frac{x-3}{6}$$

$$\frac{2(6x+1) + 3}{6} = \frac{x-3}{6}$$

$$\frac{12x + 2 + 3}{6} = \frac{x-3}{6}$$

$$\frac{12x + 5}{6} = \frac{x-3}{6}$$

$$12x - x = -3 - 5$$

$$11x = -8$$

$$x = \underline{\underline{-\frac{8}{11}}}$$

//