

Maharashtra Board Solutions Class 9-Maths (Part 1): Chapter 5.2- Linear Equations in Two Variables

BOOK SOLUTIONS
CLASS 9
MATHS

CHAPTER 5.2
**Linear Equations in Two
Variables**

Maharashtra Board Solutions→



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Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 5.2- Linear Equations in Two Variables

Class 9: Maths Chapter 5.2 solutions. Complete Class 9 Maths Chapter 5.2 Notes.

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Maharashtra Board 9th Maths Chapter 5.2, Class 9 Maths Chapter 5.2 solutions

Question 1.

In an envelope there are some ₹5 notes and some ₹10 notes. Total amount of these notes together is ₹350. Number of ₹5 notes are less by 10 than twice the number of ₹10 notes. Then find the number of ₹5 and ₹10 notes.

Solution:

Let the number of ₹5 notes be 'x' and the number of ₹10 notes be 'y'

Total amount of x notes of ₹ 5 = ₹ 5x

Total amount of y notes of ₹ 10 = ₹ 10y

∴ Total amount = 5x + 10y

According to the first condition,

total amount of the notes together is ₹350.

∴ $5x + 10y = 350$...(i)

According to the second condition,

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Number of ₹ 5 notes are less by 10 than twice the number of ₹ 10 notes.

$$\therefore x = 2y - 10$$

$$\therefore x - 2y = -10 \dots\dots(ii)$$

Multiplying equation (ii) by 5,

$$5x - 10y = -50 \dots(iii)$$

Adding equations (i) and (iii),

$$5x + 10y = 350$$

$$+ 5x - 10y = -50$$

$$10x = 300$$

$$\therefore x = 30$$

$$\therefore x = 30$$

Substituting $x = 30$ in equation (ii),

$$x - 2y = -10$$

$$30 - 2y = -10$$

$$\therefore 30 + 10 = 2y$$

$$\therefore 40 = 2y$$

$$\therefore y = 20$$

$$\therefore y = 20$$

There are 30 notes of ₹ 5 and 20 notes of ₹ 10 in the envelope.

Question 2.

The denominator of a fraction is 1 less than twice its numerator. If 1 is added to numerator and denominator respectively, the ratio of numerator to denominator is 3 : 5. Find the fraction.

Solution:

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Let the numerator of the fraction be 'x' and its denominator be 'y'.

Then, the required fraction is $\frac{x}{y}$.

According to the first condition,

the denominator is 1 less than twice its numerator.

$$\therefore y = 2x - 1$$

$$\therefore 2x - y = 1 \dots(i)$$

According to the second condition,

if 1 is added to the numerator and the denominator, the ratio of numerator to denominator is $\frac{3}{5}$.

$$\therefore \frac{x+1}{y+1} = \frac{3}{5}$$

$$\therefore y + 1 = 5$$

$$\therefore 5(x + 1) = 3(y + 1)$$

$$\therefore 5x + 5 = 3y + 3$$

$$\therefore 5x - 3y = 3 - 5$$

$$\therefore 5x - 3y = -2 \dots(ii)$$

Multiplying equation (i) by 3,

$$6x - 3y = 3 \dots(iii)$$

Subtracting equation (ii) from (iii),

$$\begin{array}{r} 6x - 3y = 3 \\ 5x - 3y = -2 \\ \hline - \quad + \quad + \\ x \quad \quad = 5 \end{array}$$

Substituting $x = 5$ in equation (i),

$$\therefore 2x - y = 1$$

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$$\therefore 2(5) - y = 1$$

$$\therefore 10 - y = 1$$

$$\therefore y = 10 - 1 = 9$$

$\therefore$ The required fraction is $\frac{5}{9}$.

Question 3.

The sum of ages of Priyanka and Deepika is 34 years. Priyanka is elder to Deepika by 6 years. Then find their present ages.

Solution:

Let the present age of Priyanka be 'x' years and that of Deepika be 'y' years.

According to the first condition,

Priyanka's age + Deepika's age = 34 years

$$\therefore x + y = 34 \dots(i)$$

According to the second condition,

Priyanka is elder to Deepika by 6 years.

$$\therefore x = y + 6$$

$$\therefore x - y = 6 \dots(ii)$$

Adding equations (i) and (ii),

$$\begin{array}{r} x + y = 34 \\ + \quad x - y = 6 \\ \hline 2x = 40 \end{array}$$

$$\therefore x = 20$$

Substituting $x = 20$ in equation (i),

$$x + y = 34$$

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$$\therefore 20 + y = 34$$

$$\therefore y = 34 - 20 = 14$$

$\therefore$ The present age of Priyanka is 20 years and that of Deepika is 14 years.

Question 4.

The total number of lions and peacocks in a certain zoo is 50. The total number of their legs is 140. Then find the number of lions and peacocks in the zoo.

Solution:

Let the number of lions in the zoo be 'x' and the number of peacocks be 'y'.

According to the first condition,

the total number of lions and peacocks is 50.

$$\therefore x + y = 50 \dots(i)$$

Lion has 4 legs and Peacock has 2 legs.

According to the second condition,

the total number of their legs is 140.

$$\therefore 4x + 2y = 140$$

Dividing both sides by 2,

$$2x + y = 70 \dots(ii)$$

Subtracting equation (i) from (ii),

$$\begin{array}{r} 2x + y = 70 \\ x + y = 50 \\ \hline x = 20 \end{array}$$

Substituting $x = 20$ in equation (i),

$$x + y = 50$$

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$$\therefore 20 + y = 50$$

$$\therefore y = 50 - 20 = 30$$

$\therefore$ The number of lions and peacocks in the zoo are 20 and 30 respectively.

Question 5.

Sanjay gets fixed monthly income. Every year there is a certain increment in his salary. After 4 years, his monthly salary was ₹ 4500 and after 10 years his monthly salary became ₹ 5400, then find his original salary and yearly increment.

Solution:

Let the original salary of Sanjay be ₹ 'x' and his yearly increment be ₹ 'y'.

According to the first condition, after 4 years his monthly salary was ₹ 4500

$$\therefore x + 4y = 4500 \dots(i)$$

According to the second condition,

after 10 years his monthly salary became ₹ 5400

$$\therefore x + 10y = 5400 \dots(ii)$$

Subtracting equation (i) from (ii),

$$\begin{array}{r} x + 10y = 5400 \\ x + 4y = 4500 \\ \hline -6y = 900 \\ \therefore y = \frac{900}{-6} \end{array}$$

$$\therefore y = 150$$

Substituting $y = 150$ in equation (i),

$$x + 4y = 4500$$

$$\therefore x + 4(150) = 4500$$

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$$\therefore x + 600 = 4500$$

$$\therefore x = 4500 - 600 = 3900$$

$\therefore$ The original salary of Sanjay is ₹ 3900 and his yearly increment is ₹ 150.

Question 6.

The price of 3 chairs and 2 tables is ₹ 4500 and price of 5 chairs and 3 tables is ₹ 7000, then find the price of 2 chairs and 2 tables.

Solution:

Let the price of one chair be ₹ 'x' and that of one table be ₹ 'y'.

According to the first condition,

the price of 3 chairs and 2 tables is ₹ 4500

$$\therefore 3x + 2y = 4500 \dots(i)$$

According to the second condition, the price of 5 chairs and 3 tables is ₹ 7000

$$\therefore 5x + 3y = 7000 \dots(ii)$$

Multiplying equation (i) by 3,

$$9x + 6y = 13500 \dots(iii)$$

Multiplying equation (ii) by 2,

$$10x + 6y = 14000 \dots(iv)$$

Subtracting equation (iii) from (iv),

$$\begin{array}{r} 10x + 6y = 14000 \\ 9x + 6y = 13500 \\ \hline x = 500 \end{array}$$

Substituting $x = 500$ in equation (i),

$$3x + 2y = 4500$$

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$$\therefore 3(500) + 2y = 4500$$

$$\therefore 1500 + 2y = 4500$$

$$\therefore 2y = 4500 - 1500$$

$$\therefore 2y = 3000$$

$$\therefore y = 1500$$

$$\therefore y = 1500$$

$$\therefore \text{Price of 2 chairs and 2 tables} = 2x + 2y$$

$$= 2(500) + 2(1500)$$

$$= 1000 + 3000 = ₹ 4000$$

$\therefore$ The price of 2 chairs and 2 tables is ₹ 4000.

Question 7.

The sum of the digits in a two-digit number is 9. The number obtained by interchanging the digits exceeds the original number by 27. Find the two-digit number.

Solution:

Let the digit in unit's place be 'x' and the digit in ten's place be 'y'.

	Digit in tens place	Digit in units place	Number	Sum of the digits
Original number	y	x	$10y + x$	$y + x$
Number obtained by interchangin g the digits	x	y	$10x + y$	$x + y$

According to the first condition.

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the sum of the digits in a two-digit number is 9

$$x + y = 9 \dots(i)$$

According to the second condition,

the number obtained by interchanging the digits exceeds the original number by 27

$$\therefore 10x + y = 10y + x + 27$$

$$\therefore 10x - x + y - 10y = 27$$

$$\therefore 9x - 9y = 27$$

Dividing both sides by 9,

$$x - y = 3 \dots\dots(ii)$$

Adding equations (i) and (ii),

$$\begin{array}{r} x + y = 9 \\ + x - y = 3 \\ \hline 2x = 12 \\ \therefore x = \frac{12}{2} \end{array}$$

$$\therefore x = 6$$

Substituting $x = 6$ in equation (i),

$$x + y = 9$$

$$\therefore 6 + y = 9$$

$$\therefore y = 9 - 6 = 3$$

$$\therefore \text{Original number} = 10y + x = 10(3) + 6$$

$$= 30 + 6 = 36$$

$\therefore$ The two digit number is 36.

Question 8.

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In $\triangle ABC$, the measure of $\angle A$ is equal to the sum of the measures of $\angle B$ and $\angle C$. Also the ratio of measures of $\angle B$ and $\angle C$ is 4 : 5. Then find the measures of angles of the triangle.

Solution:

Let the measure of $\angle B$ be ' x° ' and that of $\angle C$ be ' y° '.

According to the first condition,

$$m\angle A = m\angle B + m\angle C$$

$$\therefore m\angle A = x^\circ + y^\circ$$

In $\triangle ABC$,

$$m\angle A + m\angle B + m\angle C = 180^\circ \dots [\text{Sum of the measures of the angles of a triangle is } 180^\circ]$$

$$\therefore x + y + x + y = 180 ,$$

$$\therefore 2x + 2y = 180$$

Dividing both sides by 2,

$$x + y = 90 \dots (i)$$

According to the second condition,

the ratio of the measures of $\angle B$ and $\angle C$ is 4 : 5.

$$\therefore xy = 45$$

$$\therefore 5x = 4y$$

$$\therefore 5x - 4y = 0 \dots (ii)$$

Multiplying equation (i) by 4,

$$4x + 4y = 360 \dots (iii)$$

Adding equations (ii) and (iii),

$$\begin{array}{rcl} 5x - 4y & = & 0 \\ + 4x + 4y & = & 360 \\ \hline 9x & = & 360 \end{array}$$
$$\therefore x = \frac{360}{9}$$

$$\therefore x = 40$$

Substituting $x = 40$ in equation (i),

$$x + y = 90$$

$$\therefore 40 + y = 90$$

$$\therefore y = 90 - 40$$

$$\therefore y = 50$$

$$\therefore m\angle A = x^\circ + y^\circ = 40^\circ + 50^\circ = 90^\circ$$

$\therefore$ The measures of $\angle A$, $\angle B$ and $\angle C$ are 90° , 40° , and 50° respectively.

Question 9.

Divide a rope of length 560 cm into 2 parts such that twice the length of the smaller part is equal to 13 of the larger part. Then find the length of the larger part.

Solution:

Let the length of the smaller part of the rope be 'x' cm and that of the larger part be 'y' cm.

According to the first condition,

total length of the rope is 560 cm.

$$\therefore x + y = 560 \dots(i)$$

Twice the length of the smaller part = $2x$

13rd length of the larger part = $13y$

According to the second condition,

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$$2x = 133$$

$$\therefore 6x = y$$

$$\therefore 6x - y = 0 \dots\dots(ii)$$

Adding equations (i) and (ii),

$$\begin{array}{r} x + y = 560 \\ + 6x - y = 0 \\ \hline 7x = 560 \\ \therefore x = \frac{560}{7} \end{array}$$

$$\therefore x = 80$$

Substituting $x = 80$ in equation (ii),

$$6x - y = 0$$

$$\therefore 6(80) - y = 0$$

$$\therefore 480 - y = 0$$

$$\therefore y = 480$$

$\therefore$ The length of the larger part of the rope is 480 cm.

Question 10.

In a competitive examination, there were 60 questions. The correct answer would carry 2 marks, and for incorrect answer 1 mark would be subtracted. Yashwant had attempted all the questions and he got total 90 marks. Then how many questions he got wrong?

Solution:

Let us suppose that Yashwant got 'x' questions right and 'y' questions wrong.

According to the first condition, total number of questions in the examination are 60.

$$\therefore x + y = 60 \dots(i)$$

Yashwant got 2 marks for each correct answer and 1 mark was deducted for each wrong answer.

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$\therefore$ He got $2x - y$ marks.

According to the second condition,

he got 90 marks.

$$2x - y = 90 \dots (ii)$$

Adding equations (i) and (ii),

$$\begin{array}{rcl} x + y & = & 60 \\ + 2x - y & = & 90 \\ \hline 3x & = & 150 \\ \therefore x & = & \frac{150}{3} \end{array}$$

$$\therefore x = 50$$

Substituting $x = 50$ in equation (i),

$$50 + y = 60$$

$$\therefore y = 60 - 50 = 10$$

$\therefore$ Yashwant got 10 questions wrong.

Maharashtra Board Class 9 Maths Chapter 5 Linear Equations in Two Variables Practice Set 5.2 Intext Questions and Activities

Question 1.

The population of a certain town was 50,000. In a year, male population was increased by 5% and female population was increased by 3%. Now the population became 52020. Then what was the number of males and females in the previous year? (Textbook pg. no. 89)

Solution:

Step 1: Read the given word problem carefully and try to understand it.

Step 2: Make assumptions using two variables x and y .

Let the number of males in previous year be

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'x' and the number of females be 'y'.

Step 3: From the given information, form mathematical statements using the above variables.

According to the first condition,

the total population of town was 50,000.

$$\therefore x + y = 50000 \dots(i)$$

Male population increased by 5%.

$$\therefore \text{Number of males} = x + 5\% \text{ of } x, 5$$

$$\begin{aligned} &= x + x \times \frac{5}{100} \\ &= \frac{100x + 5x}{100} \\ &= \frac{105}{100} x \end{aligned}$$

Female population increased by 3%.

$$\therefore \text{Number of females} = y + 3\% \text{ of } y$$

$$\begin{aligned} &= y + y \times \frac{3}{100} \\ &= \frac{100y + 3y}{100} \\ &= \frac{103}{100} y \end{aligned}$$

According to the second condition,

in a year population became 52020

$$\therefore 105100x + 103100y = 52020$$

$$\therefore 105x + 103y = 520200 \dots(ii)$$

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Multiplying equation (i) by 103,

$$103x + 103y = 5150000 \dots(iii)$$

Step 4: Here, we use elimination method.

Subtracting equation (iii) from (ii),

$$\begin{array}{r} 105x + 103y = 5202000 \\ 103x + 103y = 5150000 \\ \hline -2x \qquad \qquad = 52000 \\ \therefore x = \frac{52000}{2} \end{array}$$

$$\therefore x = 26000$$

Substituting $x = 26000$ in equation (i),

$$\therefore 26000 + y = 50000$$

$$\therefore y = 50000 - 26000$$

$$\therefore y = 24000$$

$$\therefore \text{Number of males} = x = 26000$$

$$\therefore \text{Number of females} = y = 24000$$

Step 5: Write the answer.

The number of males and females in the previous year were 26,000 and 24,000 respectively.

Step 6: Verify your result using smart check.



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- Chapter 7.5- Statistics

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The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the

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concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

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As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

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