Equations in One Variable

Practice set 12.1

Q. 1. A. Each equation is followed by the values of the variable. Decide whether these values are the solutions to that equation.

$x - 4 = 3$, $x = -1, 7, -7$

Answer : Given $x - 4 = 3$

Adding 4 on both sides

So $x = 4 + 3 = 7$

7 is the only solution of this given equation

Q. 1. B. Each equation is followed by the values of the variable. Decide whether these values are the solutions to that equation.

$9m = 81$, $m = 3, 9, -3$

Answer : Given $9m = 81$

Dividing by 9 on both sides

$$m = \frac{81}{9}$$

So, $m = 9$

9 is the only solution of this given equation

Q. 1. C. Each equation is followed by the values of the variable. Decide whether these values are the solutions to that equation.

$2a + 4 = 0$, $a = 2, -2, 1$

Answer : Given $2a + 4 = 0$

Adding -4 on both sides

$2a = -4$

$a = -2$

– 2 is the only solution of this given equation

Q. 1. D. Each equation is followed by the values of the variable. Decide whether these values are the solutions to that equation.

3 – y = 4, y = – 1, 1, 2

Answer : Given 3 – y = 4

Adding – 4 + y on both side

y = – 1

– 1 is the only solution of this given equation

Q. 2. A. Solve the following equations

17p – 2 = 49

Answer : Given 17p – 2 = 49

Adding 2 on both sides

17p = 51

Dividing by 17 on both sides

$$p = \frac{51}{17} = 3$$

Q. 2. B. Solve the following equations

2m + 7 = 9

Answer :

Given $2m + 7 = 9$

Adding – 7 on both sides

$2m = 2$

Dividing by 2 on both sides

$m = 1$

Q. 2. C. Solve the following equations

3x + 12 = 2x – 4

Answer : Given $3x + 12 = 2x – 4$

Adding – 12 – 2x on both sides

$3x – 2x = – 12 – 4$

$X = – 16$

Q. 2. D. Solve the following equations

5(x – 3) = 3(x + 2)

Answer : Given $5(x – 3) = 3(x + 2)$

Expanding the equation

$5x – 15 = 3x + 6$

Adding 15 – 3X on both sides

$5x – 3x = 15 + 6$

$2x = 21$

$x = 21/2$

Q. 2. E. Solve the following equations

$$\frac{9x}{8} + 1 = 10$$

Answer : Given $\frac{9x}{8} + 1 = 10$

$$\frac{9x}{8} = 10 - 1$$

$$\frac{9x}{8} = 9$$

Multiplying $\frac{8}{9}$ on both sides

$$x = \frac{9 \times 8}{9} = 8$$

Q. 2. F. Solve the following equations

$$\frac{y}{7} + \frac{y-4}{3} = 2$$

Answer : Given $\frac{y}{7} + \frac{y-4}{3} = 2$

Taking LCM of 7 and 3, that is 21

Now multiplying both side of given equation by 21

3y + 7(y − 4) = 42

Expanding the given equation

10y − 28 = 42

Adding 28 on both sides

10y = 70

y = 7

Q. 2. G. Solve the following equations

$$13x - 5 = \frac{3}{2}$$

Answer : Given $13x - 5 = \frac{3}{2}$

Multiplying by 2 on both sides

26x – 10 = 3

Adding 10 on both sides

26x = 13

Dividing by 26 on both sides

$$x = \frac{1}{2}$$

Q. 2. H. Solve the following equations

3(y + 8) = 10(y – 4) + 8

Answer : Given 3(y + 8) = 10(y – 4) + 8

Expanding

3y + 24 = 10y – 40 + 8

Adding –3y on both sides

24 = 7y – 40 + 8

Adding 32 on both sides

7y = 56

Dividing by **7** on both sides

y = 8

Q. 2. I. Solve the following equations

$$\frac{x-9}{x-5} = \frac{5}{7}$$

Answer : Given $\frac{x-9}{x-5} = \frac{5}{7}$

Multiplying 7(x – 5) on both sides

7(x – 9) = 5(x – 5)

Expanding

7x – 63 = 5x – 25

Adding 63 – 5x on both sides

2x = 38

Dividing by 2 on both sides

x = 19

Q. 2. J. Solve the following equations

$$\frac{y-4}{3} + 3y = 4$$

Answer : Given $\frac{y-4}{3} + 3y = 4$

Multiplying by **3** on both sides

y – 4 + 9y = 12

10y – 4 = 12

Adding 4 on both sides

10y = 16

Dividing by 10 on both sides

$$y = \frac{16}{10} = \frac{8}{5}$$

Q. 2. K. Solve the following equations

$$\frac{b + (b + 1) + (b + 2)}{4} = 21$$

Answer : Given $\frac{b + (b + 1) + (b + 2)}{4} = 21$

Multiplying by 4 on both sides

b + (b + 1) + (b + 2) = 84

Adding – 3 on both sides

3b + 3 = 84

Dividing both side by 3

3b = 81

b = 27

Practice set 12.2

Q. 1. Mother is 25 years older than her son. Find son's age if after 8 years ratio of son's age to mother's age will be 4/9

Answer : let the age of son be x, so age of mother is x + 25

After 8 years, gather e of son is x + 8 and age of mother is x + 25 + 8

So according to give conditions $\left[\frac{x + 8}{x + 25 + 8}\right] = \frac{4}{9}$

Now solving the equation

Multiplying both sides by $\frac{9}{4}$

$$\frac{9}{4}\left[\frac{x + 8}{x + 25 + 8}\right] = 1$$

Multiplying both sides by 4(x + 25 + 8)

9(x + 8) = 4(x + 33)

Expanding the equation

9x + 72 = 4x + 132

Adding – 4x – 72 on both sides

5x = 60

Dividing by 10 on both sides

x = 12

So, age of son is 12 years

Q. 2. The denominator of a fraction is greater than its numerator by 12. If the numerator is decreased by 2 and the denominator is increased by 7, the new fraction is equivalent with 1/2. Find the fraction.

Answer : let the numerator be x, so d the enominator is x + 12

New numerator is x – 2, new the denominator is x + 12 + 7

So according to given conditions $\frac{x-2}{x + 12 + 7} = \frac{1}{2}$

Multiplying both sides by 2

$$\frac{2(x - 2)}{x + 12 + 7} = 1$$

Multiplying by x + 19 on both sides

2(x – 2) = x + 19

2x – 4 = x + 19

Adding – x on both sides

x – 4 = 19

Adding 4 on both sides

x = 23

So, numerator is 23 and denominator is 12 + 23 = 35

Required fraction is $\frac{23}{35}$

Q. 3. The ratio of weights of copper and zinc in brass is 13:7. Find the weight of zinc in a brass utensil weighing 700 gm.

Answer : Let the weight of zinc be x

Copper/zinc = copper/x = 13/7

Copper = 13x/7

So according to given conditions

x + 13x/7 = 700

Multiplying both side by 7

7x + 13x = 4900

20x = 4900

Dividing both side by 20

x = 245

So, weight of zinc is 245g

Q. 4. Find three consecutive whole numbers whose sum is more than 45 but less than 54.

Answer : Let the lowest number be X, so other numbers are x + 1

And x + 2

According to given conditions 45 < x + (x + 1) + (x + 2) < 54

Solving this equation, we have 45 < 3x + 3 < 54

Adding – 3 on both sides

42 < 3x < 51

Dividing by 3 on both sides

14 < x < 17

So x = 15 or x = 16

So consecutive numbers are 15,16,17 or 16,17,18

Q. 5. In a two-digit number, a digit at the ten's place is twice the digit at unit's place. If the number obtained by interchanging the digits is added to the original number, the sum is 66. Find the number

Answer : Let the number at digit place be X

So, da igit at tens place is 2x.

Number is 10×2x + x = 21x

Now interchanging the digits, at digit place we have 2x and at tens place x. number is 10×x + 2x = 12x

According to the given condition's 12x + 21x = 66

33x = 66

Dividing both side by 33

X = 2

Digit at tens place is 2 × 2 = 4

Number is 42

Q. 6. Some tickets of Rs.200 and some of Rs.100, of a drama in a theatre were sold. The number of tickets for Rs.200 sold was 20 more than the number of tickets for Rs.100. The total amount received by the theatre by the sale of tickets was Rs.37000. Find the number of Rs.100 tickets sold.

Answer : Let the number of Rs.100 ticket sold be x

Number of Rs.200 ticket sold is x + 20

According to given conditions 100x + 200(x + 20) = 37000

300x + 4000 = 37000

Adding - 4000 on both sides

300x = 33000

Dividing both side by 300

x = 110

Number of Rs.100 tickets sold are 110

Q. 7. Of the three consecutive natural numbers, five times the smallest number is 9 more than four times the greatest number, find the numbers.

Answer : let the numbers be x,x + 1,x + 2 of which **X** being the smallest. According to given conditions 5x = 9 + 4(x + 2)

Expanding

5x = 9 + 4x + 8

Adding - 4x on both sides

x = 17

So, numbers are 17,18,19

Q. 8. Raju sold a bicycle to Amit at 8% profit. Amit repaired it spending Rs.54. Then he sold the bicycle to Nikhil for Rs.1134 with no loss and no profit. Find the cost price of the bicycle for which Raju purchased it.

Answer : Let the cost of the cycle for Raju be **X**

$$\text{Profit made by selling} = \frac{8}{100}x$$

$$\text{Total selling price} = x + \left(\frac{8}{100}\right)x$$

$$\text{For Amit total cost including repair} = x + \left(\frac{8}{100}\right)x + 54$$

So according to given conditions total cost = total selling price

$$x + \left(\frac{8}{100}\right)x + 54 = 1134$$

Adding -54 on both sides

$$x + \left(\frac{8}{100}\right)x = 1080$$

Multiplying by 100 on both side

100x + 8x = 108000

108x = 108000

Dividing by 108 on both side

x = 1000

So, cost of cycle to Raju is Rs.1000

Q. 9. A Cricket player scored 180 runs in the first match and 257 runs in the second match. Find the number of runs he should score in the third match so that the average of runs in the three matches be 230.

Answer : Let the runs required in third match be **X**

So according to given conditions $\dfrac{257 + 180 + x}{3} = 230$

Multiplying both side by **3**

257 + 180 + x = 690

Subtracting **180** from both sides

257 + x = 510

Subtracting 257 from both sides

x = 253

Therefore 253 runs are required.

Q. 10. Sudhir's present age is 5 more than three times the age of Viru. Anil's age is half the age of Sudhir. If the ratio of the sum of Sudhir's and Viru's age to three times Anil's age is 5:6, then find Viru's age.

Answer : Let the age of Viru be x

Sudhir age = 3x + 5

Anil age $= \dfrac{3x + 5}{2}$

According to given conditions, $\dfrac{x + 3x + 5}{\frac{3(3x+5)}{2}} = \dfrac{5}{6}$

$\dfrac{2(4x + 5)}{3(3x + 5)} = \dfrac{5}{6}$

Multiplying $\dfrac{6}{5}$ on both side

$\dfrac{2(4x + 5)}{3(3x + 5)} = 1$

Multiplying 3(3x + 5) on both sides

2(4x + 5) = 3(3x + 5)

Expanding

8x + 10 = 9x + 15

Adding – 8x on both side
X + 15 = 10

Adding – 5 on both side
x = – 5

But since age cannot be negative so, x = 5

Hence age is 5 years.