



CBSE NCERT Solutions for Class 6 Mathematics Chapter 11


Back of Chapter Questions


Exercise 11.1


1 Find the rule which gives the number of matchsticks required to make the following matchstick patterns. Use a variable to write the rule.


(A) A pattern of letter T as 


(B) A pattern of letter Z as 

(C) A pattern of letter U as 

(D) A pattern of letter V as 

(E) A pattern of letter E as 

(F) A pattern of letter S as 

(G) A pattern of letter A as 

Solution:

(A) A pattern of letter T can be shown as 

Here, we can see that two matchsticks are used in making the letter T.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter T = $2n$ (as two matchsticks used in each letter)

Hence, a pattern of letter T = $2n$

(B) A pattern of letter Z can be shown as 

Here, we can see that three matchsticks are used in making the letter Z.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter Z = $3n$ (as three matchsticks used in each letter)

Hence, a pattern of letter Z = $3n$


- (C) A pattern of letter U can be shown as 

Here, we can see that three matchsticks are used in making the letter U.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter U = $3n$ (as three matchsticks used in each letter)

Hence, a pattern of letter U = $3n$


- (D) A pattern of letter V can be shown as 

Here, we can see that two matchsticks are used in making the letter V.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter V = $2n$ (as two matchsticks used in each letter)

Hence, a pattern of letter V = $2n$

- (E) A pattern of letter E can be shown as 

Here, we can see that five matchsticks are used in making the letter E.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter E = $5n$ (as five matchsticks used in each letter)

Hence, a pattern of letter E = $5n$

- (F) A pattern of letter S can be shown as 

Here, we can see that five matchsticks are used in making the letter S.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter S = $5n$ (as five matchsticks used in each letter)

Hence, a pattern of letter S = $5n$

- (G) A pattern of letter A can be shown as 

Here, we can see that two matchsticks are used in making the letter A.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter A = $6n$ (as six matchsticks used in each letter)

Hence, a pattern of letter A = $6n$

2. We already know the rule for the pattern of letters L, C and F. Some of the letters from Q.1 (given above) give us the same rule as that given by L. Which are these? Why does this happen?

Solution:

A pattern of letter L can be explained as below,

Here, we can see that two matchsticks are used in making the letter L.

If we consider 'n' to be the number of letters, then we can write the rule as,

A pattern of letter L = $2n$ (as two matchsticks used in each letter)

Hence, a pattern of letter L = $2n$

Similarly,

From Q.1., the letters 'T' and 'V' have pattern $2n$.

This is because in the letters 'T' and 'V', 2 matchsticks are used in representing these letters.

3. Cadets are marching in a parade. There are 5 cadets in a row. What is the rule which gives the number of cadets, given the number of rows? (Use n for the number of rows.)

Solution:

Given,

Number of rows = n

Number of Cadets in 1 row = $5 \times 1 = 5$

\therefore Number of Cadets in 2 rows = $5 \times 2 = 10$

Number of Cadets in 3 rows = $5 \times 3 = 15$ and so on.

So, Number of Cadets in n rows = $5 \times n = 5n$

Since, we obtain the total number of cadets by multiplying rows and cadets,

Therefore, total number of cadets = $5n$

4. If there are 50 mangoes in a box, how will you write the total number of mangoes in terms of the number of boxes? (Use b for the number of boxes.)

Solution:

Given,

Number of boxes = b

Number of mangoes in 1 box = $50 \times 1 = 50$

∴ Number of mangoes in 2 boxes = $50 \times 2 = 100$

Number of mangoes in 3 boxes = $50 \times 3 = 150$

So, Number of mangoes in b boxes = $50 \times b = 50b$

Since, we obtain the total number of mangoes by multiplying boxes and mangoes,

Therefore, total number of mangoes = $50b$

5. The teacher distributes 5 pencils per student. Can you tell how many pencils are needed, given the number of students? (Use s for the number of students.)

Solution: Given,

Number of students = s

Number of pencils per student = $5 \times 1 = 5$

∴ Number of pencils for 2 students = $5 \times 2 = 10$

Number of pencils for 3 students = $5 \times 3 = 15$

So, Number of pencils in s students = $5 \times s = 5s$

Since, we obtain the total number of pencils by multiplying number of pencils and students,

Therefore, total number of pencils needed are = $5s$

6. A bird flies 1 kilometer in one minute. Can you express the distance covered by the bird in terms of its flying time in minutes? (Use t for flying time in minutes.)

Solution:

As it is already given to us that we have to use 't' for flying time in minutes,

So we get,

Time taken by bird = t min

It is given that a bird flies 1 kilometer in one minute,

So we get,

Speed of bird = 1 km per min

We know that, distance = speed \times time

Therefore, distance covered by bird = speed \times time

$$= 1 \times t = t \text{ km}$$

Hence, distance covered by bird is t km

7. Radha is drawing a dot Rangoli (a beautiful pattern of lines joining dots) with chalk powder. She has 9 dots in a row. How many dots will her Rangoli have for r rows? How many dots are there if there are 8 rows? If there are 10 rows?

Solution:

It is given that there are 9 dots in each row,

So we get,

Number of dots in each row = 9

Number of rows = r

We obtain the total number of dots by multiplying number of dots in each row and number of rows,

Therefore, number of dots = $9 \times r = 9r$

When there are 8 rows, $r = 8$,

Then number of dots = $9 \times 8 = 72$ dots

When there are 10 rows, $r = 10$,

Then number of dots = $9 \times 10 = 90$ dots

Hence, the number of 8 rows and 10 rows are 72 dots and 90 dots respectively.

8. Leela is Radha's younger sister. Leela is 4 years younger than Radha. Can you write Leela's age in terms of Radha's age? Take Radha's age to be x years.

Solution:

As it is already given to us that we have to use 'x' for Radha's age,

So we get,

Radha's age = x years

As Leela is 4 years younger than Radha,

Therefore, leela's age = $(x - 4)$ years

9. Mother has made laddus. She gives some laddus to guests and family members; still 5 laddus remain. If the number of laddus mother gave away is l , how many laddus did she make?

Solution:

Given,

Number of laddus given away = l

Number of laddus remaining = 5

∴ Total number of laddus = laddus given away + remaining laddus

Hence, total number of laddus = $(l + 5)$

10. Oranges are to be transferred from larger boxes into smaller boxes. When a large box is emptied, the oranges from it fill two smaller boxes and still 10 oranges remain outside. If the number of oranges in a small box are taken to be x , what is the number of oranges in the larger box?

Solution:

As it is already given to us that the number of oranges in the small box is 'x',

So we get,

Number of oranges in one box = x

It is given that there are 2 boxes,

So, number of boxes = 2

We get the total number of oranges in the small box by multiplying number of oranges in each box and total number of boxes,

Therefore,

Total number of oranges in boxes = $2 \times x = 2x$

Remaining oranges = 10

We will get the total number of oranges in the larger box by adding the remaining oranges and the oranges in the small box,

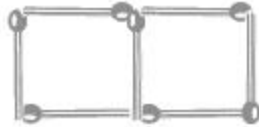
Thus, number of oranges = $2x + 10$

11. (A) Look at the following matchstick pattern of squares. The squares are not separate. Two neighboring squares have a common matchstick. Observe the patterns and find the rule that gives the number of matchsticks in terms of the number of squares.

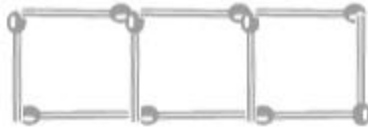
(a)



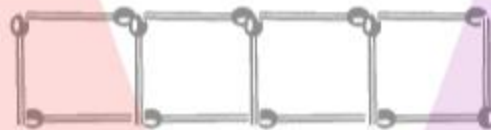
(b)



(c)



(d)



Hint: If you remove the vertical stick at the end, you will get a pattern of Cs.)

(B) Below figures gives a matchstick pattern of triangles. Find the general rule that gives the number of matchsticks in terms of the number of triangles.

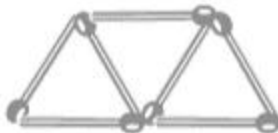
(a)



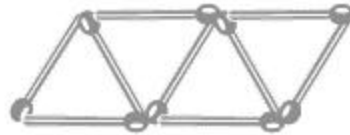
(b)



(c)







(d)



Solution:

(A)

From the given figures, we get 	4 matchsticks
	7 matchsticks
	10 matchsticks
	13 matchsticks

If we remove 1 from each end, then they make a pattern of C's

Now, the matchsticks make a table of 3 i.e., 3,6,9,12 ...





The number of matchsticks for making 'n' C's = $3n$ (as three matchsticks used in each letter)

We had removed one matchstick to obtain the 'C'

So we add it back,

Hence, the required equation = $3x + 1$, where x is number of squares.

(B)

From the given figures, we get	3 match strikes
	
	5 match strikes
	7 match strikes
	9 match strikes

If we remove 1 from each of them,

Then they make table of 2 i.e., 2,4,6,8 ...

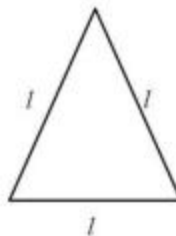
Adding back the 1 that we had removed,

Therefore, the required equation = $2x + 1$, where x is number of triangles.

Exercise 11.2

- The side of an equilateral triangle is shown by l . Express the perimeter of the equilateral triangle using l .

Solution:



Given,

Side of equilateral triangle = l

We know that, perimeter is the sum of sides of the triangle.

Number of sides in a triangle = 3.

Therefore,

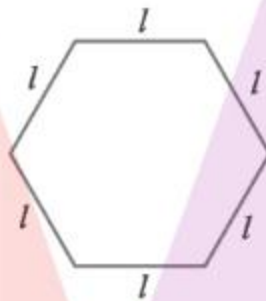
Perimeter of Triangle = Number of sides in a triangle \times side of the triangle

Perimeter of Triangle = $3 \times l = 3l$

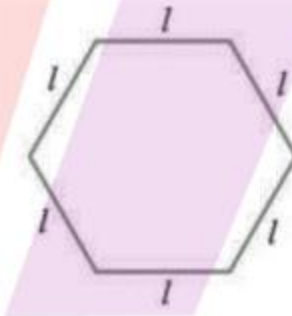
Hence, the perimeter of the equilateral triangle using l is $3l$

2. The side of a regular hexagon is denoted by l . Express the perimeter of the hexagon using l .

Hint: A regular hexagon has all its six sides equal in length.



Solution:



It is given that the side of the hexagon = l

So,

Side of hexagon = l

Perimeter is the sum of sides of the hexagon.

Number of sides in a hexagon = 6.

Therefore,

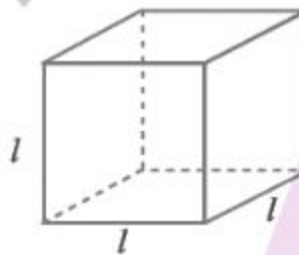
Perimeter of hexagon = Number of sides in a hexagon \times side of the hexagon

$$\text{Perimeter of hexagon} = 6 \times l$$

$$\text{Perimeter of hexagon} = 6l$$

Hence, the perimeter of a regular hexagon using l is $6l$

3. A cube is a three-dimensional figure as shown in Fig. It has six faces and all of them are identical squares. The length of an edge of the cube is given by l . Find the formula for the total length of the edges of a cube.



Solution:

It is given that the length of one edge of cube = l

So,

Length of one edge of cube = l

From the figure we see that there are 12 edges,

Number of edges in the cube = 12

Therefore,

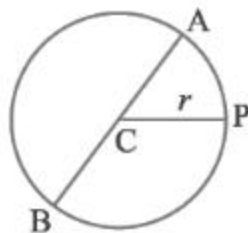
Total length = Number of edges in the cube \times length of one edge of cube

$$\text{Total length} = 12 \times l$$

$$\text{Total length} = 12l$$

Hence, the formula for the total length of the edges of a cube is $12l$

4. The diameter of a circle is a line which joins two points on the circle and also passes through the centre of the circle. (In the adjoining figure AB is a diameter of the circle; C is its centre.) Express the diameter of the circle (d) in terms of its radius (r).



Solution:

From the figure, we see that,

CP is the radius.

AC and BC are also radii.

$$\therefore \text{Diameter AB} = \text{AC} + \text{BC}$$

$$\text{Diameter} = r + r$$

$$\text{Diameter} = 2r$$

Since the length of diameter is double the length of radius.

Therefore, the diameter of the circle (d) in terms of its radius (r) is $2r$

5. To find sum of three numbers 14, 27 and 13, we can have two ways:
- We may first add 14 and 27 to get 41 and then add 13 to it to get the total sum 54 or
 - We may add 27 and 13 to get 40 and then add 14 to get the sum 54. Thus, $(14 + 27) + 13 = 14 + (27 + 13)$

Solution:

We can see that:

$$(14 + 27) + 13 = 14 + (27 + 13)$$

Now, if we replace the numbers with variables, we get,

$$(a + b) + c = a + (b + c)$$

This can be done for any three numbers. This property is known as the associativity of addition of numbers.

Exercise 11.3

1. Make up as many expressions with numbers (no variables) as you can from three numbers 5, 7 and 8. Every number should be used not more than once. Use only addition, subtraction and multiplication.

Hint: Three possible expressions are $5 + (8 - 7)$, $5 - (8 - 7)$, $(5 \times 8) + 7$; make the other expressions.)

Solution:

Given, only addition, subtraction and multiplication must be used.

By using associativity property of numbers, we get,

The expressions can be:

- Expressions using number operations with addition and subtraction operators: $5 + (8 - 7)$

- (b) Expressions using number operations with subtraction and addition operators: $5 - (7 + 8)$
- (c) Expressions using number operations with multiplication and subtraction operators: $(8 \times 5) - 7$
- (d) Expressions using number operations with multiplication and addition operators: $(8 \times 7) + 5$
- (e) Expressions using number operations with subtraction and multiplication operators: $(8 - 5) \times 7$
- (f) Expressions using number operations with addition and multiplication operators: $5 + (7 \times 8)$
- (g) Expressions using number operations with multiplication and addition operators: $5 \times (7 + 8)$
- (h) Expressions using number operations with addition and subtraction operators: $(8 + 7) - 5$

Hence, these are the few expressions with numbers which we can form from the given three numbers.

2. Which out of the following are expressions with numbers only?

- (a) $y + 3$
- (b) $(7 \times 20) - 8z$
- (c) $5(21 - 7) + 7 \times 2$
- (d) 5
- (e) $3x$
- (f) $5 - 5n$
- (g) $(7 \times 20) - (5 \times 10) - 45 + p$

Solution:

- (a) Given, y is added to 3
Hence, it has a variable ' y '
- (b) In the given expression it has a variable ' z '
- (c) In the given expression there is no variable
- (d) Given, 5 is a number
Hence, there is no variable
- (e) Given, 3 is multiplied by x

Hence, it has a variable 'x'

- (f) Given, 5 is subtracted by $5n$

Hence, it has a variable 'n'

- (g) In the given expression it has a variable 'p'

So, we see that (c) and (d) are the only expression with numbers.

Hence, (c) and (d) are the expressions with numbers only.

3. Identify the operations (addition, subtraction, division, multiplication) in forming the following expressions and tell how the expressions have been formed.

- (a) $z + 1, z - 1, y + 17, y - 17$

- (b) $17y, \frac{y}{17}, 5z$

- (c) $2y + 17, 2y - 17$

- (d) $7m, -7m + 3, -7m - 3$

Solution:

- (a) (i) Given, $z + 1$

Here, z is added to 1

Hence, addition operation is used in the given expression.

- (ii) Given, $z - 1$

Here, 1 is subtracted from z

Hence, subtraction operation is used in the given expression.

- (iii) Given, $y + 17$

Here, y is added to 17

Hence, addition operation is used in the given expression.

- (iv) Given, $y - 17$

Here, 17 is subtracted from y

Hence, subtraction operation is used in the given expression.

- (b) (i) Given, $17y$

Here, 17 is multiplied by y

Hence, multiplication operation is used in the given expression.

- (ii) Given, $\frac{y}{17}$

Here, y is divided by 17

Hence, division operation is used in the given expression.

(iii) Given, $5z$

Here, 5 is multiplied by z

Hence, multiplication operation is used in the given expression.

(c) (i) Given, $2y + 17$

Here, 2 is multiplied by y and then added to 17

Therefore, multiplication (2 and y) and then addition operation is used in the given expression.

(ii) Given, $2y - 17$

Here, 2 is multiplied by y and then 17 is subtracted from the result.

Therefore, multiplication (2 and y) and then subtraction operation is used in the given expression.

(d) (i) Given, $7m$

Here, 7 is multiplied by m

Hence, multiplication operation is used in the given expression

(ii) Given, $-7m + 3$

Here, -7 is multiplied by m and then added to 3

Therefore, multiplication (-7 and m) and then addition operation is used in the given expression.

(iii) Given, $-7m - 3$

Here, -7 is multiplied by m and then 3 is subtracted from the result.

Therefore, multiplication (-7 and m) and then subtraction operation is used in the given expression.

4. Give expressions for the following cases.

(a) 7 added to p

(b) 7 subtracted from p

(c) p multiplied by 7

(d) p divided by 7

(e) 7 subtracted from $-m$

- (f) $-p$ multiplied by 5
- (g) $-p$ divided by 5
- (h) p multiplied by -5

Solution:

- (a) When 7 is added to p , we get,
 $p + 7$
- (b) When 7 is subtracted from p , we get,
 $p - 7$
- (c) When p is multiplied by 7, we get,
 $7 \times p = 7p$
- (d) When p is divided by 7, we get,
 $\frac{p}{7}$
- (e) When 7 is subtracted from $-m$, we get,
 $-m - 7$
- (f) When $-p$ is multiplied by 5, we get,
 $(-p) \times 5 = -5p$
- (g) When $-p$ is divided by 5, we get,
 $\frac{(-p)}{5} = -\frac{p}{5}$
- (h) When p is multiplied by -5 , we get,
 $p \times (-5) = -5p$

5. Give expressions in the following cases.

- (a) 11 added to $2m$
- (b) 11 subtracted from $2m$
- (c) 5 times y to which 3 is added
- (d) 5 times y from which 3 is subtracted
- (e) y is multiplied by -8
- (f) y is multiplied by -8 and then 5 is added to the result
- (g) y is multiplied by 5 and the result is subtracted from 16

(h) y is multiplied by -5 and the result is added to 16.

Solution:

(a) When 11 is added to $2m$, we get,

$$2m + 11$$

(b) When 11 is subtracted from $2m$, we get,

$$2m - 11$$

(c) When 5 times y is added to 3, we get,

$$(5 \times y) + 3$$

$$= 5y + 3$$

(d) When 3 is subtracted from 5 times y , we get,

$$(5 \times y) - 3$$

$$= 5y - 3$$

(e) When y is multiplied by -8 , we get,

$$y \times (-8)$$

$$= -8y$$

(f) When y is multiplied by -8 and then 5 is added to the result, we get,

$$(y \times (-8)) + 5$$

$$= -8y + 5$$

(g) When y is multiplied by 5 and the result is subtracted from 16, we get,

$$16 - (y \times 5)$$

$$= 16 - 5y$$

(h) When y is multiplied by -5 and the result is then added to 16, we get,

$$(y \times (-5)) + 16$$

$$= -5y + 16$$

$$= 16 - 5y$$

6. (a) Form expressions using t and 4. Use not more than one number operation. Every expression must have t in it.
- (b) Form expressions using y , 2 and 7. Every expression must have y in it. Use only two number operations. These should be different.

Solution:

- (a) Given, every expression must have t and 4 where more than one number operation should not be used.

- (i) Expressions using addition operation:

$$t + 4$$

$$4 + t$$

- (ii) Expressions using subtraction operation:

$$t - 4$$

$$4 - t$$

- (iii) Expressions using multiplication operation:

$$4 \times t$$

$$t \times 4$$

- (iv) Expressions using addition operation:

$$\frac{t}{4}$$

$$\frac{4}{t}$$

- (b) Given, every expression must have y, 2 and 7 where more than two number operation should not be used.

- (i) Expressions using multiplication and addition operation:

$$(2 \times y) + 7$$

$$(7 \times y) + 2$$

- (ii) Expressions using multiplication and subtraction operation:

$$(2 \times y) - 7$$

$$(7 \times y) - 2$$

- (iii) Expressions using addition and subtraction operation:

$$y + (2 - 7)$$

$$y + (7 - 2)$$

- (iv) Expressions using addition and multiplication operation:

$$y + (2 \times 7)$$

- (v) Expressions using addition and division operation:

$$y + \frac{2}{7}$$

$$y + \frac{7}{2}$$

(vi) Expressions using subtraction and multiplication operation:

$$y - (2 \times 7)$$

(vii) Expressions using subtraction and addition operation:

$$y - (2 + 7)$$

(viii) Expressions using subtraction and division operation:

$$y - \frac{7}{2}$$

Exercise 11.4

I. Answer the following:

- (a) Take Sarita's present age to be y years
 - (i) What will be her age 5 years from now?
 - (ii) What was her age 3 years back?
 - (iii) Sarita's grandfather is 6 times her age. What is the age of her grandfather?
 - (iv) Grandmother is 2 years younger than grandfather. What is grandmother's age?
 - (v) Sarita's father's age is 5 years more than 3 times Sarita's age. What is her father's age?
- (b) The length of a rectangular hall is 4 meters less than 3 times the breadth of the hall. What is the length, if the breadth is b meters?
- (c) A rectangular box has height h cm. Its length is 5 times the height and breadth is 10 cm less than the length. Express the length and the breadth of the box in terms of the height.
- (d) Meena, Beena and Leena are climbing the steps to the hill top. Meena is at steps, Beena is 8 steps ahead and Leena 7 steps behind. Where are Beena and Meena? The total number of steps to the hill top is 10 less than 4 times what Meena has reached. Express the total number of steps using s .
- (e) A bus travels at v km per hour. It is going from Daspur to Beespur. After the bus has travelled 5 hours, Beespur is still 20 km away. What is the distance from Daspur to Beespur? Express it using v .

**Solution:**

- (a) Given, sarita's age to be 'y' years.

Sarita's age = y years

- (i) Age 5 years from now means we have to add 5 years to y.

Therefore, age 5 years from now = $(y + 5)$ years

- (ii) Age 3 years back means we have to subtract 3 years from y.

Therefore, age 5 years back = $(y - 3)$ years

- (iii) Given, sarita's grandfather is 6 times her age,

So, we have to multiply 6 with y

⇒ Age of grandfather = $6 \times$ Sarita's age

Age of grandfather = $6 \times y = 6y$

Therefore, age of grandfather = $6y$

- (iv) Given, grandmother is 2 years younger than grandfather,

So, we have to subtract 2 from grandfather's age

Age of grandfather = $6y$

⇒ Age of grandmother = Age of grandfather - 2

$$\text{Age of grandmother} = 6y - 2$$

$$\text{Therefore, age of grandfather} = (6y - 2)$$

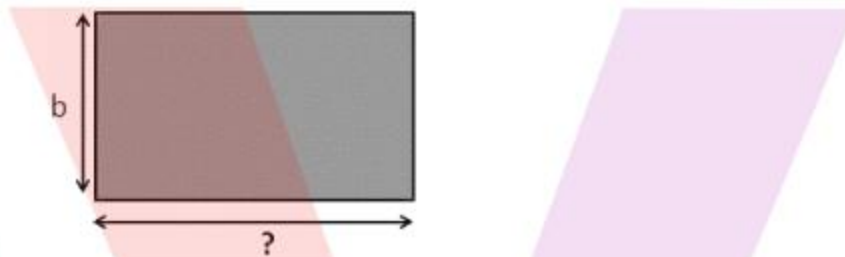
- (v) Given, sarita's father's age is 5 years more than 3 times Sarita's age.

$$3 \text{ times Sarita's age} = 3 \times y = 3y$$

$$5 \text{ years more than } 3 \text{ times Sarita's age} = 5 + (3 \times \text{Age of Sarita})$$

$$\Rightarrow \text{Age of Sarita's father} = (5 + 3y) \text{ years}$$

$$\text{Therefore, age of Sarita's father} = (3y + 5) \text{ years}$$



(b)

It is given that,

$$\text{Breadth of the hall} = b \text{ m}$$

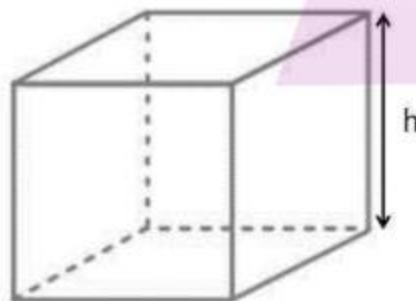
The length of a rectangular hall is 4 meters less than 3 times the breadth of the hall,

So,

$$3 \text{ times the breadth} = 3b$$

$$4 \text{ meters less than } 3 \text{ times the breadth} = 3b - 4$$

$$\text{Therefore, length of the hall} = 3b - 4 \text{ meter}$$



(c)

It is given that,

$$\text{Height of the box} = h \text{ cm}$$

Also,

Length of the box = 5 times the height

Therefore,

Length of the box = $5h$ cm

Now,

Breadth of the box = 10 cm less than length

Therefore, breadth of the box = $(5h - 10)$ cm

(d) It is given that,

Meena's position = s steps

Beena's position = 8 steps ahead of Meena

Therefore,

Beena's position = $(s + 8)$ steps

Leena's position = 7 behind Meena

\Rightarrow Leena's position = $(s - 7)$ steps

Also,

The total number of steps to the hill top is 10 less than 4 times what Meena has reached, so we get,

Total number of steps = $4 \times (\text{Meena's position}) - 10$

Therefore, total number of steps = $4s - 10$



(e)

Given: Speed of the bus = v km/h

We know that,

Distance = Speed \times Time

Distance travelled in 5 hours = $v \times 5$ km

Distance travelled in 5 hours = $5v$ km

After the bus has travelled 5 hours, Beespur is still 20 km away,

Remaining distance = 20 km

We need to add the remaining distance to get the total distance,

Therefore, total distance = $(5v + 20) \text{ km}$

2. Change the following statements using expressions into statements in ordinary language. (For example, Given Salim scores r runs in a cricket match, Nalin scores $(r + 15)$ runs. In ordinary language – Nalin scores 15 runs more than Salim.)

- (a) A notebook costs ₹ p . A book costs ₹ $3p$.
- (b) Tony puts q marbles on the table. He has $8q$ marbles in his box.
- (c) Our class has n students. The school has $20n$ students.
- (d) Jaggu is z years old. His uncle is $4z$ years old and his aunt is $(4z - 3)$ years old.
- (e) In an arrangement of dots there are r rows. Each row contains 5 dots.

Solution:

- (a) It is given that,
 Cost of notebook = p
 Cost of book = $3p$
 So, in other words,
 Cost of book = $3 \times$ Cost of notebook
 Therefore, a book cost 3 times the cost of a notebook.
- (b) It is given that,
 Marbles on the table = q
 Marbles in the box = $8q$
 So, in other words,
 Marbles in the box = $8 \times$ Marbles on the table
 Therefore, the number of marbles in box is 8 times the marble on the table.
- (c) It is given that,
 Number of students in the class = n
 Number of students in the school = $20n$
 So, in other words,
 Number of students in the school = $20 \times$ students in the class

Therefore, total number of students in the school is 20 times that in our class.

(d) It is given that,

Jaggu's age = z years

Jaggu's uncle's age = $4z$ years

Jaggu's aunt's age = $(4z - 3)$ years

So, in other words,

Jaggu's uncle's age = $4 \times$ Jaggu's age

Jaggu's aunt's age = Jaggu's uncle's age $- 3$

Therefore, jaggu's uncle's age is 4 times the age of jaggu and jaggu's aunt is 3 years younger than his uncle.



(e)

We see that,

Total number of dots = $5 \times$ Number of rows

Therefore, the total number of dots is 5 times the number of rows

3. (a) Given Munnu's age to be x years, can you guess what $(x - 2)$ may show?

Hint: Think of Munnu's younger brother.)

Can you guess what $(x + 4)$ may show? What $(3x + 7)$ may show?

(b) Given Sara's age today to be y years. Think of her age in the future or in the past.

What will the following expression indicate? $y + 7, y - 3, y + 4\frac{1}{2}, y - 2\frac{1}{2}$.

(c) Given n students in the class like football, what may $2n$ show? What may $\frac{n}{2}$ show?

Hint: Think of games other than football

Solution:

- (a) Given: Munna's age = x years
 $(x - 2)$ is smaller than x
 So, $(x - 2)$ can be the age of Munnu's younger brother.
 $(x + 4)$ is bigger than x
 So, $(x + 4)$ can be the age of Munnu's elder brother.
 $(3x + 7)$ is very much bigger than x
 So, $(3x + 7)$ can be Munnu's father's age.
 Therefore, $(x + 4)$ and $(3x + 7)$ show munna's elder brother and father's ages respectively.
- (b) Given: Sara's age = y years
 $(y + 7)$ is larger than Sara's age
 So, $(y + 7)$ can be the age of Sara 7 years from now.
 $(y - 3)$ is smaller than Sara's age
 So, $(y - 3)$ can be the age of Sara 3 years ago.
 $(y + 4\frac{1}{2})$ is larger than Sara's age
 So, $(y + 4\frac{1}{2})$ can be the age of Sara 4 years and 6 months from now.
 $(y - 2\frac{1}{2})$ is smaller than Sara's age
 Therefore, $(y - 2\frac{1}{2})$ can be the age of Sara 2 years and 6 months ago.
- (c) Given,
 Number of students who like football = n
 $2n$ is a number which is more than n
 So, $2n$ can represent the number of students who like other games, for example cricket.
 $\frac{n}{2}$ is a number which is less than n
 Therefore, $\frac{n}{2}$ can represent the number of students who like other games, for example volleyball.

Exercise 11.5

1. State which of the following are equations (with a variable). Give reason for your answer. Identify the variable from the equations with a variable.

- (a) $17 = x + 7$
 (b) $(t - 7) > 5$
 (c) $\frac{4}{2} = 2$
 (d) $(7 \times 3) - 19 = 8$
 (e) $5 \times 4 - 8 = 2x$
 (f) $x - 2 = 0$
 (g) $2m < 30$
 (h) $2n + 1 = 11$
 (i) $7 = (11 \times 5) - (12 \times 4)$
 (j) $7 = (11 \times 2) + p$
 (k) $20 = 5y$
 (l) $\frac{3q}{2} < 5$
 (m) $z + 12 > 24$
 (n) $20 - (10 - 5) = 3 \times 5$
 (o) $7 - x = 5$

Solution:

An equation has a '=' sign.

In other words, the left hand side of the equation should be equal to the right hand side.

Using this, we can classify whether it is an equation or not.

- (a) Given, $17 = x + 7$

It has an '=' sign.

The variable here is 'x'.

Therefore, it is an equation with variable 'x'.

- (b) Given, $(t - 7) > 5$

It does not have an '=' sign.

The variable here is 't'.

Hence, it is not an equation.

(c) Given, $\frac{4}{2} = 2$

It has an '=' sign.

There is no variable here.

Therefore, it is an equation with no variable.

(d) Given, $(7 \times 3) - 19 = 8$

It has an '=' sign.

There is no variable here.

Therefore, it is an equation with no variable.

(e) Given, $5 \times 4 - 8 = 2x$

It has an '=' sign.

The variable here is 'x'.

Hence, it is an equation with variable 'x'.

(f) Given, $x - 2 = 0$

It has an '=' sign.

The variable here is 'x'.

Therefore, it is an equation with variable 'x'.

(g) Given, $2m < 30$

It does not have an '=' sign.

The variable here is 'm'.

Hence, it is not an equation.

(h) Given, $2n + 1 = 11$

It has an '=' sign.

The variable here is 'n'.

Therefore, it is an equation with variable 'n'.

(i) Given, $7 = (11 \times 5) - (12 \times 4)$

It has an '=' sign.

There is no variable here.

Hence, it is an equation with no variable.

(j) Given, $7 = (11 \times 2) + p$

It has an '=' sign.

The variable here is 'p'.

Therefore, it is an equation with variable 'p'.

(k) Given, $20 = 5y$

It has an '=' sign.

The variable here is 'y'.

Hence, it is an equation with variable 'y'.

(l) Given, $\frac{3q}{2} < 5$

It does not have an '=' sign.

The variable here is 'q'.

Therefore, it is not an equation.

(m) Given, $z + 12 > 24$

It does not have an '=' sign.

The variable here is 'z'.

Hence, it is not an equation.

(n) Given, $20 - (10 - 5) = 3 \times 5$

It has an '=' sign.

There is no variable here.

Therefore, it is an equation with no variable.

(o) Given, $7 - x = 5$

It has an '=' sign.

The variable here is 'x'.

Therefore, it is an equation with variable 'x'.

2. Complete the entries in the third column of the table.

S. No.	Equation	Value of variable	Equation satisfied Yes/No
(a)	$10y = 80$	$y = 10$	

(b)	$10y = 80$	$y = 8$
(c)	$10y = 80$	$y = 5$
(d)	$4l = 20$	$l = 20$
(e)	$4l = 20$	$l = 80$
(f)	$4l = 20$	$l = 5$
(g)	$b + 5 = 9$	$b = 5$
(h)	$b + 5 = 9$	$b = 9$
(i)	$b + 5 = 9$	$b = 4$
(j)	$h - 8 = 5$	$h = 13$
(k)	$h - 8 = 5$	$h = 8$
(l)	$h - 8 = 5$	$h = 0$
(m)	$p + 3 = 1$	$p = 3$
(n)	$p + 3 = 1$	$p = 1$
(o)	$p + 3 = 1$	$p = 0$
(p)	$p + 3 = 1$	$p = -1$
(q)	$p + 3 = 1$	$p = -2$

Solution:

(a) From the given table,

$$10y = 80$$

Substituting $y = 10$

$$\Rightarrow 10 \times 10 = 80$$

$$\Rightarrow 100 = 80$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Therefore, the equation is not satisfied.

(b) From the given table,

$$10y = 80$$

Substituting $y = 8$

$$\Rightarrow 10 \times 8 = 80$$

$$\Rightarrow 80 = 80$$

$$\Rightarrow \text{L.H.S} = \text{R.H.S}$$

Thus, the equation is satisfied.

- (c) From the given table,

$$10y = 80$$

Substituting $y = 5$

$$\Rightarrow 10 \times 5 = 80$$

$$\Rightarrow 50 = 80$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Hence, the equation is not satisfied.

- (d) From the given table,

$$4l = 20$$

Substituting $l = 20$

$$\Rightarrow 4 \times 20 = 20$$

$$\Rightarrow 80 = 20$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Therefore, the equation is not satisfied.

- (e) From the given table,

$$4l = 20$$

Substituting $l = 80$

$$\Rightarrow 4 \times 80 = 20$$

$$\Rightarrow 320 = 20$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Thus, the equation is not satisfied.

- (f) From the given table,

$$4l = 20$$

Substituting $l = 5$

$$\Rightarrow 4 \times 5 = 20$$

$$\Rightarrow 20 = 20$$

$$\Rightarrow \text{L.H.S} = \text{R.H.S}$$

Hence, the equation is satisfied.

(g) From the given table,

$$b + 5 = 9$$

Substituting $b = 5$

$$\Rightarrow 5 + 5 = 9$$

$$\Rightarrow 10 = 9$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Therefore, the equation is not satisfied.

(h) From the given table,

$$b + 5 = 9$$

Substituting $b = 9$

$$\Rightarrow 9 + 5 = 9$$

$$\Rightarrow 14 = 9$$

$$\Rightarrow \text{L.H.S} \neq \text{R.H.S}$$

Thus, the equation is not satisfied.

(i) From the given table,

$$b + 5 = 9$$

Substituting $b = 4$

$$\Rightarrow 4 + 5 = 9$$

$$\Rightarrow 9 = 9$$

$$\Rightarrow \text{L.H.S} = \text{R.H.S}$$

Therefore, the equation is satisfied.

(j) From the given table,

$$h - 8 = 5$$

Substituting $h = 13$

$$\Rightarrow 13 - 8 = 5$$

$$\Rightarrow 5 = 5$$

$$\Rightarrow \text{L.H.S} = \text{R.H.S}$$

Hence, the equation is satisfied.

- (k) From the given table,
 $h - 8 = 5$
Substituting $h = 8$
 $\Rightarrow 8 - 8 = 5$
 $\Rightarrow 0 = 5$
 $\Rightarrow \text{L.H.S} \neq \text{R.H.S}$
Therefore, the equation is not satisfied.

- (l) From the given table,
 $h - 8 = 5$
Substituting $h = 0$
 $\Rightarrow 0 - 8 = 5$
 $\Rightarrow -8 = 5$
 $\Rightarrow \text{L.H.S} \neq \text{R.H.S}$
Therefore, the equation is not satisfied.

- (m) From the given table,
 $p + 3 = 1$
Substituting $p = 3$
 $\Rightarrow 3 + 3 = 1$
 $\Rightarrow 6 = 1$
 $\Rightarrow \text{L.H.S} \neq \text{R.H.S}$
Thus, the equation is not satisfied.

- (n) From the given table,
 $p + 3 = 1$
Substituting $p = 1$
 $\Rightarrow 1 + 3 = 1$
 $\Rightarrow 4 = 1$
 $\Rightarrow \text{L.H.S} \neq \text{R.H.S}$
Hence, the equation is not satisfied.

- (o) From the given table,

$$p + 3 = 1$$

Substituting $p = 0$

$$\Rightarrow 0 + 3 = 1$$

$$\Rightarrow 3 = 1$$

\Rightarrow L.H.S \neq R.H.S

Thus, the equation is not satisfied.

(p) From the given table,

$$p + 3 = 1$$

Substituting $p = -1$

$$\Rightarrow (-1) + 3 = 1$$

$$\Rightarrow 3 - 1 = 1$$

$$\Rightarrow 2 = 1$$

L.H.S \neq R.H.S

Hence, the equation is not satisfied.

(q) From the given table,

$$p + 3 = 1$$

Substituting $p = -2$

$$\Rightarrow (-2) + 3 = 1$$

$$\Rightarrow 3 - 2 = 1$$

$$\Rightarrow 1 = 1$$

\Rightarrow L.H.S = R.H.S

Therefore, the equation is satisfied

Now, putting these values in the form of a table, we get,

S. No	Equation	Value of variable	Equation satisfied Yes / No	Sol. Of L.H.S
(a)	$10y = 80$	$y = 10$	No	$10 \times 10 = 100$
(b)	$10y = 80$	$y = 8$	Yes	$10 \times 8 = 80$
(c)	$10y = 80$	$y = 5$	No	$10 \times 5 = 50$
(d)	$4l = 20$	$l = 20$	No	$4 \times 20 = 80$

(e)	$4l = 20$	$l = 80$	No	$4 \times 80 = 320$
(f)	$4l = 20$	$l = 5$	Yes	$4 \times 5 = 20$
(g)	$b + 5 = 9$	$b = 5$	No	$5 + 5 = 10$
(h)	$b + 5 = 9$	$b = 9$	No	$9 + 5 = 14$
(i)	$b + 5 = 9$	$b = 4$	Yes	$4 + 5 = 9$
(j)	$h - 8 = 5$	$h = 13$	Yes	$13 - 8 = 5$
(k)	$h - 8 = 5$	$h = 8$	No	$8 - 8 = 0$
(l)	$h - 8 = 5$	$h = 0$	No	$0 - 8 = -8$
(m)	$p + 3 = 1$	$p = 3$	No	$3 + 3 = 6$
(n)	$p + 3 = 1$	$p = 1$	No	$1 + 3 = 4$
(o)	$p + 3 = 1$	$p = 0$	No	$0 + 3 = 3$
(p)	$p + 3 = 1$	$p = -1$	No	$-1 + 3 = 2$
(q)	$p + 3 = 1$	$p = -2$	Yes	$-2 + 3 = 1$

3. Pick out the solution from the values given in the bracket next to each equation. Show that the other values do not satisfy the equation.

- (a) $5m = 60$ (10, 5, 12, 15)
 (b) $n + 12 = 20$ (12, 8, 20, 0)
 (c) $p - 5 = 5$ (0, 10, 5 - 5)
 (d) $\frac{q}{2} = 7$ (7, 2, 10, 14)
 (e) $r - 4 = 0$ (4, - 4, 8, 0)
 (f) $x + 4 = 2$ (- 2, 0, 2, 4)

Solution:

- (a) Given, $5m = 60$
 Substituting the given values in L.H.S,
 For $m = 10$, For $m = 5$,
 $\Rightarrow 5 \times 10 = 50$ $5 \times 5 = 25$
 $\therefore L.H.S \neq R.H.S \therefore L.H.S \neq R.H.S$
 $\therefore m = 10$ is not the solution. $\therefore m = 5$ is not the solution.
 For $m = 12$, For $m = 5$,

$$5 \times 12 = 60 \Rightarrow 5 \times 12 = 75$$

$$\therefore L.H.S = R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore m = 12$ is a solution. $\therefore m = 15$ is not the solution

Therefore, $m = 12$ is the value that satisfies the given equation.

(b) Given, $n + 12 = 20$

Substituting the given values in L.H.S,

For $n = 12$, For $n = 8$,

$$\Rightarrow 12 + 12 = 50 \Rightarrow 8 + 12 = 20$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S = R.H.S$$

$\therefore n = 12$ is not the solution. $\therefore n = 8$ is a solution.

For $n = 20$, For $n = 0$,

$$\Rightarrow 20 + 12 = 32 \Rightarrow 0 + 12 = 12$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore n = 20$ is not the solution. $\therefore n = 0$ is not the solution

Hence, $n = 8$ is the value that satisfies the given equation.

(c) Given, $p - 5 = 5$

Substituting the given values in L.H.S,

For $p = 0$, For $p = 10$,

$$\Rightarrow 0 - 5 = -5 \Rightarrow 10 - 5 = 5$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S = R.H.S$$

$\therefore p = 0$ is not the solution. $\therefore p = 10$ is a solution.

For $p = 5$, For $p = -5$,

$$\Rightarrow 5 - 5 = 0 \Rightarrow -5 - 5 = -10$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore p = 5$ is not the solution. $\therefore p = -5$ is not the solution

Therefore, $p = 10$ is the value that satisfies the given equation.

(d) Given, $\frac{q}{2} = 7$

Substituting the given values in L.H.S.,

For $q = 7$, For $q = 2$,

$$\Rightarrow \frac{7}{2} = 7 \Rightarrow \frac{2}{2} = 1$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore q = 7$ is not the solution. $\therefore q = 2$ is not the solution

For $q = 10$, For $q = 14$,

$$\Rightarrow \frac{10}{2} = 5 \Rightarrow \frac{14}{2} = 7$$

$$\therefore L.H.S. \neq R.H.S \therefore L.H.S. = R.H.S$$

$\therefore q = 10$ is not the solution. $\therefore q = 14$ is a solution

Hence, $q = 14$ is the value that satisfies the given equation.

(e) Given, $r - 4 = 0$

Substituting the given values in L.H.S.,

For $r = 4$, For $r = -4$,

$$\Rightarrow 4 - 4 = 0 \Rightarrow -4 - 4 = -8$$

$$\therefore L.H.S = R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore r = 4$ is a solution. $\therefore r = -4$ is not the solution.

For $r = 8$, For $r = 0$,

$$\Rightarrow -8 - 4 = -12 \Rightarrow 0 - 4 = -4$$

$$\therefore L.H.S \neq R.H.S \therefore L.H.S \neq R.H.S$$

$\therefore r = 8$ is not the solution. $\therefore r = 0$ is not the solution.

Therefore, $r = 4$ is the value that satisfies the given equation.

(f) Given, $x + 4 = 2$

Substituting the given values in L.H.S.,

For $x = -2$, For $x = 0$,

$$\Rightarrow -2 + 4 = 2 \Rightarrow 0 + 4 = 4$$

$$\therefore L.H.S = R.H.S. \therefore L.H.S \neq R.H.S.$$

$\therefore x = -2$ is a solution. $\therefore x = 0$ is not the solution.

For $x = 2$, For $x = 4$,

$$\Rightarrow 2 + 4 = 6 \Rightarrow 4 + 4 = 8$$

$$\therefore L.H.S \neq R.H.S. \therefore L.H.S \neq R.H.S.$$

$\therefore x = 2$ is not the solution. $\therefore x = 4$ is not the solution.

Hence, $x = -2$ is the value that satisfies the given equation.

4. (a) Complete the table and by inspection of the table find the solution to the equation $m + 10 = 16$.

m	1	2	3	4	5	6	7	8	9	10	11	12	13
$m + 10$													

- (b) Complete the table and by inspection of the table, find the solution to the equation $5t = 35$.

t	3	4	5	6	7	8	9	10	11	12	13	14	15	16
$5t$														

- (c) Complete the table and find the solution of the equation $\frac{z}{3} = 4$ using the table.

z	8	9	10	11	12	13	14	15	16	17	18	19	20
$\frac{z}{3}$													

- (d) Complete the table and find the solution to the equation $m - 7 = 3$.

m	5	6	7	8	9	10	11	12	13	14	15
$m - 7$											

Solution:

- (a) Given, $m + 10 = 16$

By substituting the values of m in $m + 10$ we get,

m	1	2	3	4	5	6	7	8	9	10	11	12	13
$m + 10$	11	12	13	14	15	16	17	18	19	20	21	22	23

\therefore At $m = 6$,

$$\Rightarrow m + 10 = 16$$

$\therefore L.H.S = R.H.S.$

Therefore, $m = 6$ is the value that satisfies the given equation.

- (b) Given, $5t = 35$

By substituting the values of t in $5t$ we get,

t	3	4	5	6	7	8	9	10	11	12	13	14	15	16
-----	---	---	---	---	---	---	---	----	----	----	----	----	----	----

5t	15	20	25	30	35	40	45	50	55	60	65	70	75	80
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

∴ At $t = 7$,

$$\Rightarrow 5t = 35$$

∴ $L.H.S = R.H.S.$

Therefore, $t = 7$ is the value that satisfies the given equation.

(c) Given, $\frac{z}{3} = 4$

By substituting the values of z in $\frac{z}{3}$ we get,

z	8	9	10	11	12	13	14	15	16	17	18	19	20
$\frac{z}{3}$	$2\frac{2}{3}$	3	$3\frac{1}{3}$	$3\frac{2}{3}$	4	$4\frac{1}{3}$	$4\frac{2}{3}$	5	$5\frac{1}{3}$	$5\frac{2}{3}$	6	$6\frac{1}{3}$	$6\frac{2}{3}$

∴ At $z = 12$,

$$\Rightarrow \frac{z}{3} = 4$$

∴ $L.H.S = R.H.S.$

Therefore, $z = 12$ is the value that satisfies the given equation.

(d) Given,

By substituting the values of m in $m - 7$ we get,

m	5	6	7	8	9	10	11	12	13	14	15
$m - 7$	-2	-1	0	1	2	3	4	5	6	7	8

∴ At $m = 10$,

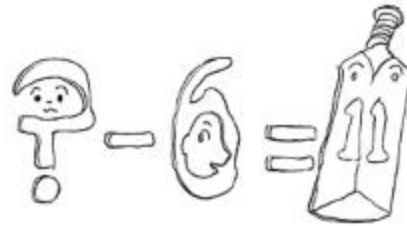
$$\Rightarrow m - 7 = 3$$

∴ $L.H.S = R.H.S.$

Hence, $m = 10$ is the value that satisfies the given equation.

5. Solve the following riddles, you may yourself construct such riddles

Who am I?



- (i) Go round a square
Counting every corner
Thrice and no more!
Add the count to me
To get exactly thirty four!
- (ii) For each day of the week
Make an upcount from me
If you make no mistake
You will get twenty three!
- (iii) I am a special number
Take away from me a six!
A whole cricket team
You will still be able to fix!
- (iv) Tell me who I am
I shall give a pretty clue!
You will get me back
If you take me out of twenty two!

Solution:

- (i) Let us consider the variable to be x ,

We know that a square has 4 corners and it is given that we go around it thrice,

So, our count becomes $3 \times 4 = 12$

It is given that,

Variable + Count = 12

$\Rightarrow x + 12 = 34$

We will try to solve this by trial and error,

x	$x + 12$	Equation Satisfied
0	12	No
1	13	No
2	14	No
3	15	No
4	16	No
5	17	No
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
20	32	No
21	33	No
22	34	Yes

We see that the equation is satisfied at $x = 22$

Therefore, the answer is 22.

(ii) Let us consider the variable to be y ,

We know that a week has 7 days,

So our count = 7

It is given that,

Variable + Count = 23

$\Rightarrow y + 7 = 23$

We will try to solve this by trial and error,

y	$y + 7$	Equation Satisfied
0	7	No
1	8	No
2	9	No
3	10	No
4	11	No
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
13	20	No
14	21	No
15	22	No
16	23	Yes

We see that the equation is satisfied at $y = 16$

Therefore, the answer is 16.

(iii) Let us consider the variable to be y ,

We know that a cricket team has 11 players,

It is given that,

$$\text{Variable} - 6 = 11$$

$$\Rightarrow z - 6 = 11$$

We will try to solve this by trial and error,

z	$z - 6$	Equation Satisfied
0	-6	No
1	-5	No
2	-4	No
3	-3	No
4	-2	No

.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
14	8	No
15	9	No
16	10	No
17	11	Yes

We see that the equation is satisfied at $z = 17$

Therefore, the answer is 17.

(iv) Let us consider the variable to be y ,

It is given that,

$$22 - t = t$$

We will try to solve this by trial and error,

t	$22 - t$	Equation Satisfied
0	22	No
1	21	No
2	20	No
3	19	No
4	18	No
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
8	14	No
9	13	No
10	12	No
11	11	Yes

We see that the equation is satisfied at $t = 11$

Therefore, the answer is 11.

