CLASS 6

CHAPTER 11

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 **T**

b) A pattern of letter Z as **Z**

c) A pattern of letter U as **U**

d) A pattern of letter V as **V**

e) A pattern of letter E as **E**

f) A pattern of letter S as **S**

g) A pattern of letter A as **A**

Answer:

a) Number of matchsticks required to make a letter T is 2.

Therefore the pattern is 2n.

b) The number of matchsticks required to make a letter Z is 3.

Therefore the pattern is 3n.

c) The number of match sticks required to make a letter  is 3.

Therefore the pattern is 3n.

d) The number of matchsticks required to make a letter V is 2.

Therefore the pattern is 2n.

e) The number of matchsticks required to make a letter E is 5.

Therefore the pattern is 5n

f) The number of matchsticks required to make a letter  is 5.

Therefore the pattern is 5n

g) The number of matchsticks required to make a letter  is 6

Therefore the pattern is 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?

Answer:

The number of matchsticks required to make a letter L is 2.Therefore the pattern for L is 2n.

Among all the letters given above in question 1, only T and V are the two letters which require two matchsticks.

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)

Answer:

Let the number of rows be n.

The number of cadets in each row = 5

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)

Answer:

Let the number of boxes be b.

The number of mangoes in each box = 50

The 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)

Answer:

Let the number of students be s.

Pencils given to each student = 5

Total number of pencils needed = 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)

Answer:

Let the flying time in minutes be t.

Distance covered by the bird in one minute = 1 km

Distance covered by the bird in t minutes = 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 and if there are 10 rows?

Answer:

Let the number of dots in a row = 9

Number of rows = r

The number of dots in r rows = 9r

The number of dots if there are 8 rows = 9 x 8 = 72

The number of dots if there are 10 rows = 9 x 10 = 90

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.

Answer:

Let Radha's age be x years.

Then 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 is l, how many laddus did she make?

Answer:

The number of laddus mother gave to guests and family members = l

The number of ladddus she made = 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?

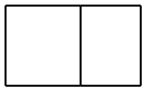
Answer:

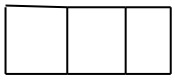
Let the number of oranges in a small box be x.

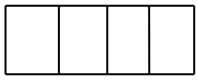
Then the number of oranges in the larger box = 2x + 10

11. a) Look at the following matchstick pattern of squares .The squares are not separate. Two neighbouring 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. (Hint: If you remove the vertical stick at the end, you will get a pattern of Cs)

a) 

b) 

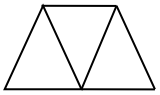
c) 

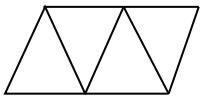
d) 

b) Following figure gives a matchstick pattern of triangles. As in exercise 11(a) above, find the general rule that gives the number of matchsticks in terms of the number of triangles.

a) 

b) 

c) 

d) 

Answer:

a) 3x + 1, x = number of squares

b) 2x + 1, x = number of triangles.

EXERCISE 11.2

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

Answer:

In an equilateral triangle all the three sides are equal.

Let the side of an equilateral triangle be l.

Therefore the perimeter of an equilateral triangle = 3l

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

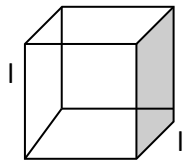
Answer:

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

Let the side of a regular hexagon be l.

Therefore the perimeter of the hexagon = 6l

3. A cube is a three-dimensional figure as shown in figure. 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.



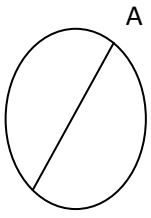
Answer:

Length of an edge = l

Number of edges of a cube = 12

Total length of the edges of a cube = Number of edges x length of one edge = 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).



Answer:

Diameter of a circle is always twice the length of its radius.

So d = 2r

5. To find sum of three numbers 14, 27 and 13, we can have two ways:

a) We may first add 14 and 27 to get 41 and then add 13 to it to get the total sum 54 or

b) 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)

This can be done for any three numbers. This property is known as the **associativity of addition** of numbers. Express this property which we have already studied in the chapter on Whole Numbers, in a general way, by using variables a, b and c.

Answer:

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

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 x8) + 7 make the other expressions)

Answer:

a) (5 + 8) + 7

b) (5 x8) -7

c) 5 + (8 – 7)

d) (8 + 7) – 5

e) 5 x (7+8)

f) 5 – (7 x 8)

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

a) y + 3

b) (7 x 20) – 8z

c) 5(21 – 7) + 7 x 2

d) 5

e) 3x

f) 5 – 5n

g) (7 x 20) – (5 x 10) – 45 + p

Answer:

It can be observed that c) and d) are 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

Answer:

a) Addition, 1 is added to z

Subtraction, 1 is subtracted from z

Addition, 17 is added to y

Subtraction, 17 is subtracted from y

b) Multiplication, y is multiplied by 17.

Division, y is divided by 17

Multiplication, z is multiplied by 5.

c) Multiplication and addition, y is multiplied by 2 and the result is added to 17.

Multiplication and subtraction, y is multiplied by 2 and 17 is subtracted from the result.

d) Multiplication, m is multiplied by 7

Multiplication and addition, m is multiplied by -7 and the result is added to 3.

Multiplication and subtraction, m is multiplied by -7 and 3 is subtracted from the result.

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

Answer:

a) p + 7

b) p – 7

c) 7p

d) $\frac{p}{7}$

e) –m – 7

f) -5p

g) $\frac{-p}{5}$

h) -5 p

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 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.

Answer:

a) 2m + 11

b) 2m – 11

c) 5y + 3

d) 5y – 3

e) -8y

f) -8y + 5

g) 16 – 5y

h) -5y + 16

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.

Answer:

a) t + 4, t – 4, 4t, $\frac{t}{4}$, $\frac{4}{t}$, 4 – t, 4 + t

b) 2y + 7, 2y – 7, 7y + 2, 7y – 2

EXERCISE 11.4

1. 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 5 years more than 3 times Sarita's age. What is her father's age?

Answer:

a) i) $y + 5$

ii) $y – 3$

iii) $6y$

iv) $6y – 2$

v) $3y + 5$

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?

Answer:

$(3b – 4)$ 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?

Answer:

Let the height of a rectangular box be h cm.

Length = $5h$ cm

Breadth = $5h – 10$ cm

d) Meena, Beena and Leena are climbing the steps to the hill top. Meena is at step s, 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.

Answer:

Let Meena is at step s.

Then Beena's position = $s + 8$

Leena's position = $s – 7$

Total number of steps to the hill top = $4s – 10$

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.

Answer:

The distance from Daspur to Beespur = (5v + 20) km

2. Change the following statements using expressions into statements in ordinary language.

a) A notebook costs p Rs. A book costs 3p Rs.

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.

Answer:

a) A book costs three times the cost of a notebook.

b) Tony's box contains 8 times the marbles on the table.

c) Total number of students in the school is 20 times that of our class.

d) Jaggu's uncle is 4 times older than Jaggu and Jaggu's aunt is 3 years younger than his uncle.

e) 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)

Answer:

a) (x-2) represents 2 years younger to Munnu.

(x + 4) represents 4 years elder to Munnu.

(3x + 7) represents 7 years more than three times Munnu's age.

b) In the future, after n years Sara's age will be (y+n) years.

In the past, n years ago, Sara's age was (y – n) years.

Y + 7 represents 7 years elder to Sara.

Y – 3 represents 3 years younger to Sara.

Y + $4\frac{1}{2}$ represents $4\frac{1}{2}$ years elder to Sara.

Y – $2\frac{1}{2}$ represents $2\frac{1}{2}$ years younger to Sara.

c) Number of students like Cricket is twice the students liking football, i.e. 2n.

Given the number of students liking football is n.

Number of students like Hockey is half of the students liking football, i.e. $\frac{n}{2}$.

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 x 3) – 19 = 8

e) 5 x 4 – 8 = 2x

f) x – 2 = 0

g) 2m $<$ 30

h) 2n + 1 = 11

i) 7 = (11 x 5) – (12 x4)

j) 7 = (11 x 2) + p

k) 20 = 5y

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

m) z + 12 > 24

n) 20 – (10 – 5) = 3 x 5

Answer:

a) 17 = x + 7 is an equation with variable x.

b) (t-7)>5 is not an equation.

c) $\frac{4}{2}$ = 2 is a numerical equation.

d) (7 x 3) – 19 = 8 is a numerical equation.

e) An equation with variable x.

f) An equation with variable x.

g) An inequality, not an equation.

h) An equation with variable n.

i) It is a numerical equation.

j) An equation with variable p.

k) An equation with variable y.

l) An inequality, not an equation.

m) An inequality, not an equation.

n) It is a numerical equation.

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	

Answer:

a) No

b) Yes

c) No

d) No

e) No

f) Yes

g) No

h) No

i) Yes

j) Yes

k) No

l) No

m) No

n) No

o) No

p) No

q) Yes

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)

Answer:

a) 5m = 60

m = 60÷5 = 12

b) n + 12 = 20

n= 20 – 12 = 8

c) p – 5 =5

p = 5 + 5 =10

d) $\frac{q}{2}$ =7

q = 7 x 2 = 14

e)r – 4 = 0

r = 0 + 4 = 4

f)x +4 = 2

x = 2 – 4 = -2

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 -- -- --
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 -- -- -- -- -- --
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 -- -- -- --
$\frac{z}{3}$	----------

d) Complete the table and find the solution to the equation m – 7 = 3

m	5 6 7 8 9 10 11 12 13 -- -- -- --
m - 7	----------

Answer:

a) When m = 1, m + 10 = 1 + 10 = 11

When m=2, m + 10 = 2 + 10 = 12

When m = 3, m + 10 = 3 + 10 = 13

When m= 4, m + 10 = 4 + 10 = 14

When m = 5, m + 10 = 5 + 10 = 15

When m = 6, m + 10 = 6 + 10 =16

Therefore m = 6, then the equation satisfied.

b)When t = 3, 5t = 5 x 3 = 15

When t = 4, 5t = 5 x 4 = 20

When t= 5, 5t = 5 x 5 = 25

When t = 6, 5t = 5 x 6 = 30

When t =7, 5t = 5 x 7 = 35

Therefore t = 7, then the equation satisfied.

c) When z = 8, $\frac{z}{3}$= $2\frac{2}{3}$

When z = 9, $\frac{z}{3}$ = $\frac{9}{3}$ = 3

When z = 10, $\frac{z}{3}$ = $3\frac{1}{3}$

When z = 11, $\frac{z}{3}$ = $\frac{11}{3}$ = $3\frac{2}{3}$

When z = 12, $\frac{z}{3}$ = $\frac{12}{3}$ = 4

Therefore z = 12, then the equation satisfied.

d) When m = 5, 5 – 7 =-2

When m =6, 5 – 6 = -1

When m= 7, 7 – 7 =0

When m =8, 8 – 7 = 1

When m =9, 9 -7 = 2

When m = 10, 10 -7 = 3

Therefore m = 10, then the equation satisfied.

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!

Answer:

There are 4 corners in a square. Counting every corner thrice means 4 x 3 = 12

Let the number be x.

Then given 12 + x = 34

Therefore x = 34 – 12 = 22

ii) For each day of the week

Make an up count from me

If you make no mistake

You will get twenty three!

Answer:

There are 7 days in a week. Let the number be y.

Given y + 7 = 23

Therefore, y = 23 – 7 = 16

iii) I am a special number

Take away from me a six!

A whole cricket team

You will still be able to fix!

Answer:

A Cricket team has 11 members. Let the variable be p.

Given p – 6 = 11

Therefore, p = 11 + 6 = 17

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!

Answer:

Let the variable be q.

Given 22 – q = q

Therefore, 22 = q +q = 2q.

So q = 11.
