Chapter-11

Algebra

2 MARKS QUESTIONS

1. 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?

Solutions:

We know that T requires only two matchsticks. So, the pattern for letter T is 2n. Among all the letters given in question 1, only T and V are the letters which require two matchsticks. Hence, (a) and (d).

2. 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)

Solutions:

Let n be the number of rows

Number of cadets in a row = 5

Total number of cadets = number of cadets in a row × number of rows

= 5n

3. 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.)

Solutions:

Let b be the number of boxes

Number of mangoes in a box = 50

Total number of mangoes = number of mangoes in a box × number of boxes

= 50b

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

Solutions:

Let s be the number of students

Pencils given to each student = 5

Total number of pencils = number of pencils given to each student × number of students

= 5s

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

Solutions:

Let t minutes be the flying time

Distance covered in one minute = 1 km

Distance covered in t minutes = Distance covered in one minute × Flying time

= 1 × t

= t km

6. 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?

Solutions:

Number of dots in a row = 9

Number of rows = r

Total number of dots in r rows = Number of dots in a row × number of rows

= 9r

Number of dots in 8 rows = 8 × 9

= 72

Number of dots in 10 rows = 10 × 9

= 90

7. 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.

Solutions:

Let Radha's age be x years

Leela's age = 4 years younger than Radha

= (x – 4) years

8. 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?

Solutions:

Number of laddus mother gave = l

Remaining laddus = 5

Total number of laddus = number of laddus given away by mother + number of laddus remaining

= (l + 5) laddus

9. 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?

Solutions:

Number of oranges in a small box = x

Number of oranges in two small boxes = 2x

Number of oranges remained = 10

Number of oranges in large box = number of oranges in two small boxes + number of oranges remained

= 2x + 10

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

Solutions:

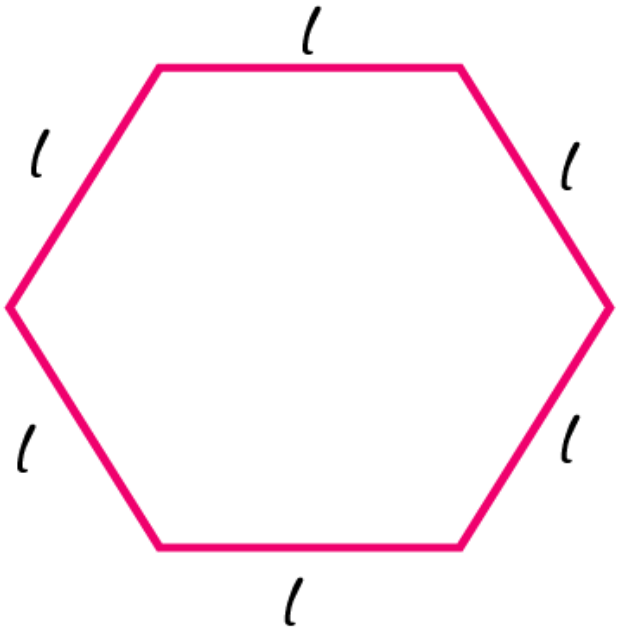
Side of equilateral triangle = l

Perimeter = l + l + l

= 3l

11. The side of the regular hexagon (Fig 11.10) is denoted by l. Express the perimeter of the hexagon using l.

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



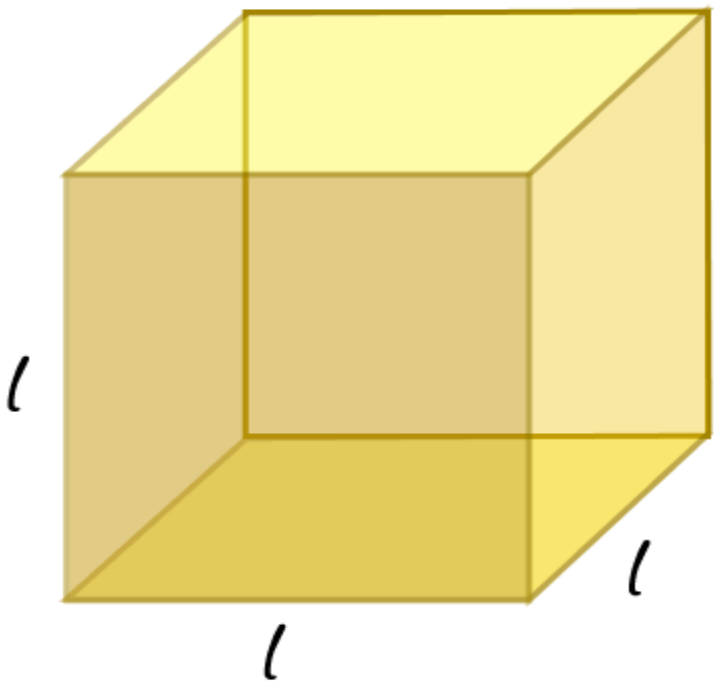
Solutions:

Side of a regular hexagon = l

Perimeter = l + l + l + l + l + 1

= 6l

12. A cube is three dimensional figure as shown in Fig 11.11. 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.



Solutions:

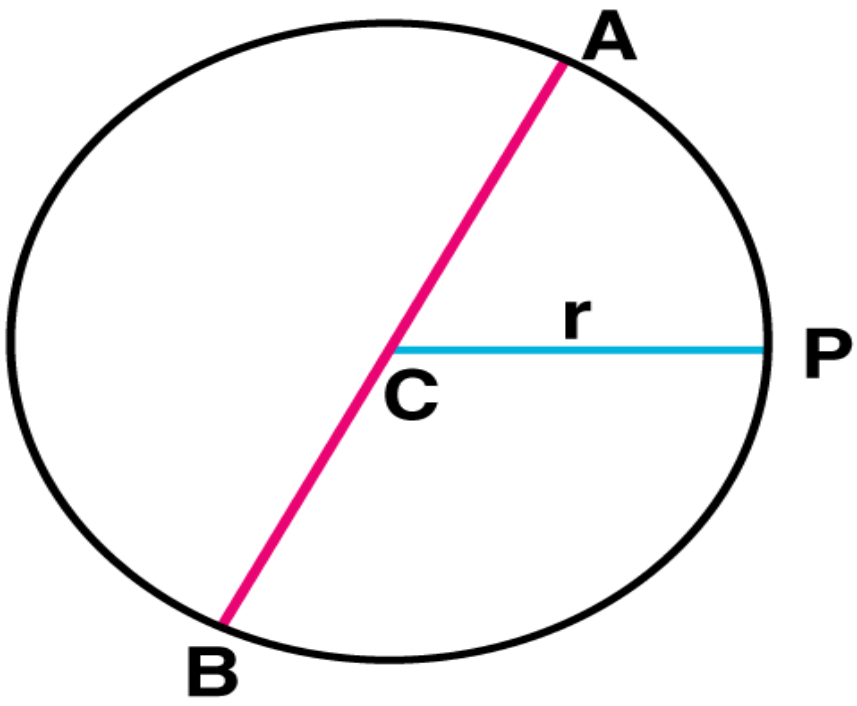
Length of an edge of the cube = l

Number of edges = 12

Total length of the edges = Number of edges × length of an edge

=12l

13. 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 (Fig 11.2) AB is a diameter of a circle; C is its centre.) Express the diameter of the circle (d) in terms of its radius (r).



Solutions:

Diameter = AB

= AC + CB

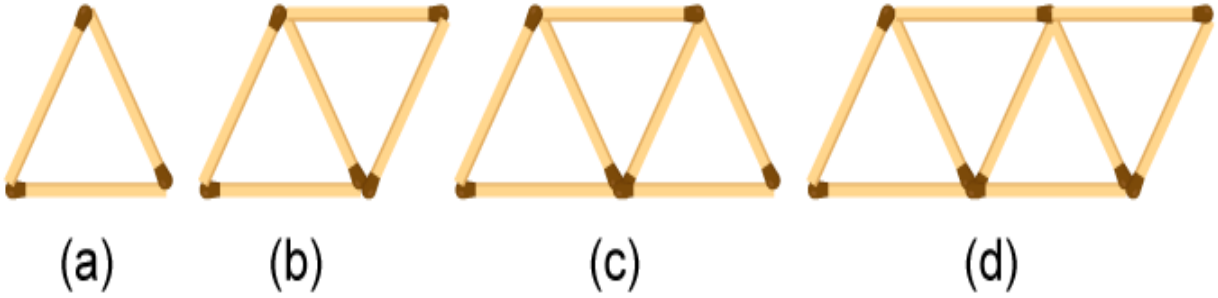
= r + r

= 2r

Hence, the diameter of the circle in terms of its radius is 2r

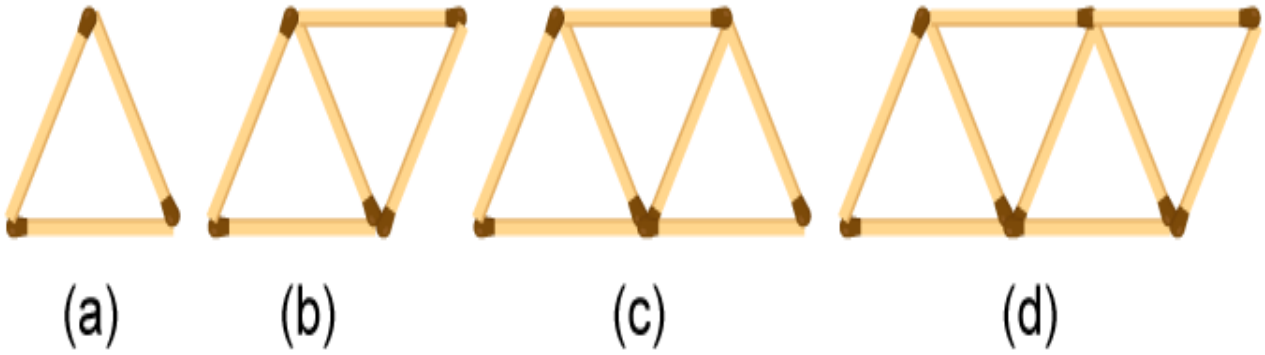
4 MARKS QUESTIONS

1. (a) Look at the following matchstick pattern of squares (Fig 11.6). 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 vertical stick at the end, you will get a pattern of Cs)

(b) Fig 11.7 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.



Solutions:

(a) We may observe that in the given matchstick pattern, the number of matchsticks are 4, 7, 10 and 13, which is 1 more than the thrice of the number of squares in the pattern

Therefore, the pattern is 3x + 1, where x is the number of squares

(b) We may observe that in the given matchstick pattern, the number of matchsticks are 3, 5, 7 and 9 which is 1 more than the twice of the number of triangles in the pattern.

Therefore, the pattern is 2x + 1, where x is the number of triangles.

2. 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

Solutions:

(a) 7 is added to p is (p + 7)

(b) 7 subtracted from p is (p – 7)

(c) p multiplied by 7 is (7p)

(d) p divided by 7 is (p / 7)

(e) 7 subtracted from –m is (-m – 7)

(f) –p multiplied by 5 is (-5p)

(g) –p divided by 5 is (–p / 5)

(h) p multiplied by -5 is (-5p)

3. 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.

Solutions:

(a) 11 added to 2m is (2m + 11)

(b) 11 subtracted from 2m is (2m – 11)

(c) 5 times y to which 3 is added is (5y + 3)

(d) 5 times y from which 3 is subtracted is (5y – 3)

(e) y is multiplied by -8 is (-8y)

(f) y is multiplied by -8 and then 5 is added to the result is (-8y + 5)

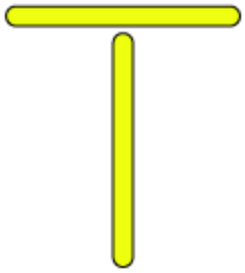
(g) y is multiplied by 5 and the result is subtracted from 16 is (16 – 5y)

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

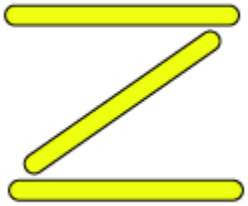
7 MARKS QUESTIONS

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

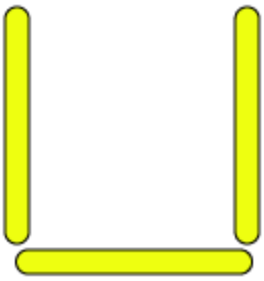
(a) A pattern of letter T as



(b) A pattern of letter Z as

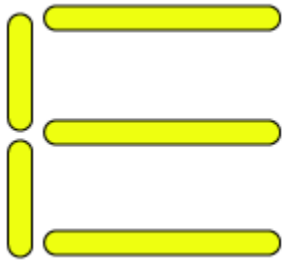


(c) A pattern of letter U as

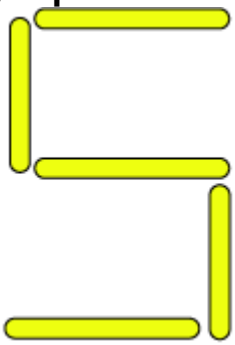


(d) A pattern of letter Vas

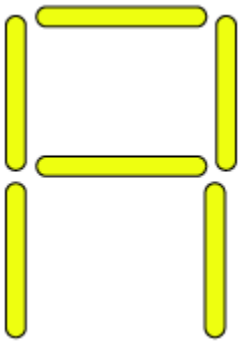
(e) A pattern of letter E as



(f) A pattern of letter S as

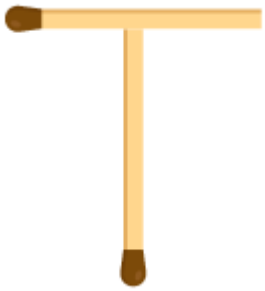


(g) A pattern of letter A as



Solutions:

(a)



From the figure we observe that two matchsticks are required to make a letter T. Hence, the pattern is 2n

(b)

From the figure we observe that three matchsticks are required to make a letter Z. Hence, the pattern is 3n

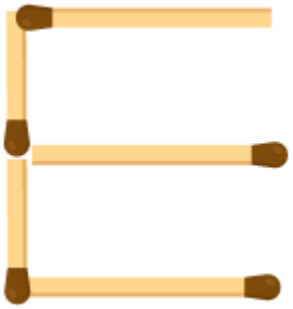
(c)

From the figure we observe that three matchsticks are required to make a letter U. Hence, the pattern is 3n

(d)

From the figure we observe that two matchsticks are required to make a letter V. Hence, the pattern is 2n

(e)



From the figure we observe that 5 matchsticks are required to make a letter E. Hence, the pattern is 5n

(f)

From the figure we observe that 5 matchsticks are required to make a letter S. Hence, the pattern is 5n

(g)

From the figure we observe that 6 matchsticks are required to make a letter A. Hence, the pattern is 6n

2. 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, y / 17, 5z

(c) 2y + 17, 2y – 17

(d) 7m, -7m + 3, -7m – 3

Solutions:

(a) z + 1 = 1 is added to z = Addition

z – 1 = 1 is subtracted from z = Subtraction

y + 17 = 17 is added to y = Addition

y – 17 = 17 is subtracted from y = Subtraction

(b) 17y = y is multiplied by 17 = Multiplication

y / 17 = y is divided by 17 = Division

5z = z is multiplied by 5 = Multiplication

(c) 2y + 17 = y is multiplied by 2 and 17 is added to the result = Multiplication and addition

2y – 17 = y is multiplied by 2 and 17 is subtracted from the result = Multiplication and subtraction

(d) 7m = m is multiplied by 7 = multiplication

-7m + 3 = m is multiplied by -7 and 3 is added to the result = Multiplication and addition

-7m – 3 = m is multiplied by -7 and 3 is subtracted from the result = Multiplication and subtraction

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

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 shows? What may n / 2 show?

Solutions:

(a) (x – 2) represents the person whose age is (x – 2) years and he is 2 years younger to Munnu

(x + 4) represents the person whose age is (x + 4) years and he is 4 years elder than Munnu

(3x + 7) represents the person whose age is (3x + 7) years, elder to Munnu and his age is 7 years more than the three times of the age of Munnu

(b) In future

After n years since now, Sara's age will be (y + n) years

In past

n years ago, Sara's age was (y – n) years

(y + 7) represents the person whose age is (y + 7) years and is 7 years elder to Sara

(y – 3) represents the person whose age is (y – 3) years and is 3 years younger to Sara

$y + 4\frac{1}{2}$ represents the person whose age is $y + 4\frac{1}{2}$ years and is $4\frac{1}{2}$years elder to Sara

$y - 2\frac{1}{2}$ represents the person whose age is $y - 2\frac{1}{2}$ years and is $2\frac{1}{2}$years younger to Sara

(c) 2n shows the number of students who like either football or some other game like tennis whereas n / 2 shows the number of students who like tennis out of the total number of students who like football.