CHAPTER 8
INTRODUCTION TO ALGEBRA

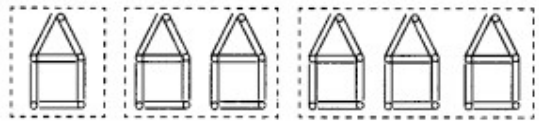
Question 1.
Six less than a number equals to two. What is the number?
Solution:
Let the number be 'x'.
According to condition, we have $x - 6 = 2$
By inspections, we have $8 - 6 = 2$
$\therefore x = 8$
Thus, the required number is 8.

Question 2.
Write an algebraic expression for each of the following:
(a) 3 subtracted from a number y.
(b) 5 is added to three times a number x.
Solution:
(a) The required expression is $y - 3$
(b) The required expression is $5 + 3x$

Question 3.
Write an algebraic expression for the following expressions:
(a) The sum of a number x and 4 is doubled.
(b) One fourth of a number x is added to one third of the same number.
Solution:
(a) The required expression is $2 \times (x + 4)$
(b) The required expression is $\frac{1}{4}x + \frac{1}{3}x$

Question 4.
Think of a number x. Multiply it by 3 and add 5 to the product and subtract y subsequently. Find the resulting number.
Solution:
Required number is $(3x + 5)$
Now we have to subtract y from the result i.e., $3x + 5 - y$

Question 5.
Here is a pattern of houses with matchsticks:



Write the general rule for this pattern.
Solution:
One house is made of 6 matchsticks i.e. 6×1
Two houses are made of 12 matchsticks i.e. 6×2
Three houses are made of 18 matchsticks i.e. 6×3
$\therefore$ Rule is $6n$ where n represents the number of houses.

Question 6.
If the side of an equilateral triangle is x, find its perimeter.
Solution:
We know that the three sides of an equilateral triangle are equal.
∴ x + x + x = 3x.
Thus, the required perimeter = 3x units.

Question 7.
If x = 3, find the value of the following:
(i) x + 5
(ii) 2x – 3
(iii) x – 7
(iv) $x/3$ – 1
Solution:
Given that x = 3
(i)x + 5 = 3 + 5 = 8
(ii) 2x – 3 = 2 x 3 – 3 = 6 – 3 = 3
(iii) x – 7 = 3- 7 = -4
(iv) $x/3$ – 1 = $3/3$ -1 = 1 – 1 = 0

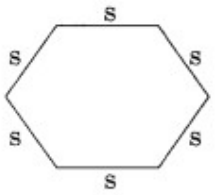
Question 8.
If x = 2, y = 3 and 2 = 5, find the value of;
(a) 2x + y + z
(b) 4x -y + z
(c) x – y + z
Solution:
(a) Given that: x – 2, y = 3 and z = 5
∴ 2x + y + 2 = 2 x 2 + 3 + 5
= 4 + 3 + 5 = 12
(b) 4x – y + z = 4 x 2 – 3 + 5
= 8 – 3 + 5 = 5 + 5 = 10
(c) x – y + z = 2 – 3 + 5 = -1 + 5 = 4

Question 9.
State which of the following are equations with a variable?
(a) 12 = x – 5
(b) 2x > 7
(c) $x2$ = 5
(d) 5 + 7 = 3 + 9
(e) 7 = (11 x 5) – (12 x 4)
Solution:
(a) 12 = x – 5 is an equation with a variable x.
(b) 2x > 7 is not an equation because it does not have '=' sign.
(c) $x2$ = 5 is an equation with a variable x.
(d) 5 + 7 = 3 + 9 is not an equation because it has no variable.
(e) 7 = (11 x 5) – (12 x 4) is not an equation because it has no variable.

Question 10.
Think of a number, add 2 to it and then multiply the sum by 6, the result is 42.
Solution:
Let the number be x.
∴ Sum of x and 2 = x + 2

Now by multiplying the sum by 6, we get
6 × (x + 2) = 42
⇒ 6 × x + 6 × 2 = 42
⇒ 6x + 12 = 42
By inspection, we get
6 × 5 + 12 = 42
⇒ 30 + 12 = 42
∴ 42 = 42
So, the required number = 5

Question 11.
The side of a regular hexagon is s cm. Find its perimeter.
Solution:
Each side of a regular hexagon = s
∴ its perimeter = s + s + s + s + s + s = 6s cm



Question 12.
If a = 3, b = 12 and c = 14, find the value of

$$\frac{2ab-bc}{3ac}.$$

Solution:

$$\text{Given that } a = 3, b = \frac{1}{2} \text{ and } c = \frac{1}{4}$$

$$\therefore \quad \frac{2ab-bc}{3ac} = \frac{2\times 3\times \frac{1}{2} - \frac{1}{2}\times\frac{1}{4}}{3\times 3\times \frac{1}{4}}$$

$$= \frac{\frac{6}{2} - \frac{1}{8}}{\frac{9}{4}} = \frac{\frac{6\times 4}{2\times 4} - \frac{1\times 1}{8\times 1}}{\frac{9}{4}}$$

$$= \frac{\frac{24-1}{8}}{\frac{9}{4}} = \frac{23}{8}\times\frac{4}{9} = \frac{23}{2\times 9} = \frac{23}{18}$$

Question 13.
Complete the table and find the solution of the equation 19 – x = 13

x	2	3	4	5	6	7	8	9	10	----
$19 - x$										

Solution:
By inspection, we have

x	2	3	4	5	⑥	7	8	9	10	----
$19-x$	17	16	15	14	⑬	12	11	10	9	----

Thus, the required solution is 6.

Question 14.
If x = -12, y = 14 and z = 0, find the value of the given expressions
(a) 8z + 2x -y
(b) z – y + 3x
Solution:

$$(a)\ 8z + 2x - y = 8 \times 0 + 2\left(-\frac{1}{2}\right) - \frac{1}{4}$$

$$= 0 - 1 - \frac{1}{4}$$

$$= \frac{-1\times 4 - 1\times 1}{4} = \frac{-4-1}{4} = \frac{-5}{4}$$

$$(b)\ z - y + 3x = 0 - \frac{1}{4} + 3\left(-\frac{1}{2}\right)$$

$$= 0 - \frac{1}{4} - \frac{3}{2} = \frac{-1\times 1}{4\times 1} - \frac{3\times 2}{2\times 2}$$

$$= \frac{-1-6}{4} = \frac{-7}{4}$$

Question 15.
Fill in the blanks:
(a) 5 added to -5 = …….
(b) If x = 3, then 3x – 5 = …….
(c) If x = 1 and y = 2, then 2x + 3y = …….
(d) If 10x – 6 = 14, then x = …….
(e) 4 less than a number x = …….
Solution:
(a) 0
(b) 4
(c) 8
(d) 2
(e) x – 4

Question 16.
A starts his car from Delhi at 6.00 am to Amritsar. The uniform speed of his car is x km/h. At 12.00 noon, he finds that he is still 50 km away from Amritsar. Find the distance between Delhi and Amritsar.
Solution:
Time taken by A to reach Amritsar = 12.00 noon – 6.00 am = 6 hour.
The uniform speed of the car = x km/ hr

∴ Total distance covered by A = Time x speed = 6x km.
∴ Distance between Delhi and Amritsar = (6x + 50) km.

Question 17.

Anshika's Score in Science is 15 more than the two-third of her score in Sanskrit. If she scores x marks in Sanskrit, find her score in Science.

Solution:

Anshika's score in Sanskrit = x
∴ Her marks in Science = $\frac{2}{3}$x +15
∴ Thus, Anshika's score in Science = $\frac{2}{3}$x + 15