ALGEBRAIC EXPRESSIONS

MODULE 2

FINDING THE VALUE OF AN ALGEBRAIC EXPRESSION:

We know that the value of an algebraic expression depends on the values of the variables forming the expression. There are a number of situations in which we need to find the value of an expression, such as when we wish to check whether a particular value of a variable satisfies a given equation or not.

We find values of expressions, also, when we use formulas from geometry and from everyday mathematics. For example, the area of a square is l^2, where l is the length of a side of the square. If l = 5 cm., the area is 5^2 cm^2 or 25 cm^2; if the side is 10 cm, the area is 10^2 cm^2 or 100 cm^2 and so on.

FOR AN EXAMPLE:

Find the value of the following expressions for $a = 3$, $b = 2$.

(i) $a + b$, we get

$a + b = 3 + 2 = 5$

(ii) $7a - 4b$, we get

$7a - 4b = 7 \times 3 - 4 \times 2 = 21 - 8 = 13$.

USING ALGEBRAIC EXPRESSIONS – FORMULAE AND RULES:

- **Perimeter formulae**
- The perimeter of an equilateral triangle = 3 × the length of its side. If we denote the length of the side of the equilateral triangle by l, then **the perimeter of the equilateral triangle = 3*l***
- Similarly, **the perimeter of a square = 4*l***

  where l = the length of the side of the square.
- **Perimeter of a regular pentagon = 5*l***

  where l = the length of the side of the pentagon and so on.

Area formulae

If we denote the length of a square by *l*, then the area of the square = *l*2

If we denote the length of a rectangle by *l* and its breadth by *b*, then the area of the rectangle = $l \times b = lb$.

Similarly, if *b* stands for the base and *h* for the height of a triangle, then the area of the triangle = b x h/2

Once a formula, that is, the algebraic expression for a given quantity is known, the value of the quantity can be computed as required.

For example, for a square of length 3 cm, the perimeter is obtained by putting the value $l = 3$ cm in the expression of the perimeter of a square, i.e., $4l$. The perimeter of the given square
$= (4 \times 3)$ cm $= 12$ cm.
Similarly, the area of the square is obtained by putting in the value of l (= 3 cm) in the expression for the area of a square, that is, l^2; Area of the given square $= (3)^2$ cm^2 $= 9$ cm^2.

Rules for number patterns

- If a natural number is denoted by n, its successor is $(n + 1)$. We can check this for any natural number. For example, if $n = 10$, its successor is $n + 1 = 11$, which is known.
- If a natural number is denoted by n, $2n$ is an even number and $(2n + 1)$ an odd number. Let us check it for any number, say, 15; $2n = 2 \times n = 2 \times 15 = 30$ is indeed an even number and $2n + 1 = 2 \times 15 + 1 = 30 + 1 = 31$ is indeed an odd number.

Pattern in geometry

- What is the number of diagonals we can draw from one vertex of a quadrilateral? Check it, it is one.
- From one vertex of a pentagon? Check it, it is 2.
- From one vertex of a hexagon? It is 3.
- From one vertex of a heptagon? Check it, it is 4.
- From one vertex of a octagon? It is 5.
- From one vertex of a nonagon? Check it, it is 6.
- From one vertex of a decagon? It is 7.

The number of diagonals we can draw from one vertex of a polygon of n sides is $(n - 3)$. Check it for a heptagon (7 sides) and octagon (8 sides) by drawing figures. What is the number for a triangle (3 sides)? Observe that the diagonals drawn from any one vertex divide the polygon in as many non -overlapping triangles as the number of diagonals that can be drawn from the vertex plus one.

Thank you