ODM EDUCATIONAL GROUP
Changing your Tomorrow

SUBSTITUTION

SUBJECT : MATHEMATICS

CHAPTER NUMBER:20

CHAPTER NAME :SUBSTITUTION

SUBTOPIC : Basic Concepts

PERIOD NO: 1

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Learning outcomes

- Students will be able to find the value of the algebraic expression by substituting the given value.
- Students will be able to solve sums applying the above concept.

SUBSTITUTION

Students will Learn substitution with the help of a video .
https://www.youtube.com/watch?v=u-h57Hpf-So(4.25)

SUBSTITUTION

$$x + \frac{x}{2}$$

$$x = 5$$

$$5 + \frac{5}{2}$$

SUBSTITUTION

$a = 2, b = 5, c = 8$

$\therefore \quad 3ab + 10bc - 2abc$

$= 3 \times 2 \times 5 + 10 \times 5 \times 8 - 2 \times 2 \times 5 \times 8$

$= 30 + 400 - 160 = 430 - 160$

$= \mathbf{270}$

Evaluation Question EX-20 A

1. Fill in the following blanks, when:

x = 3, y = 6, z = 18, a = 2, b = 8, c = 32 and d = 0.

(i) x + y = ……. **(ii) y − x = …….**

(iii) y / x = ……. **(iv) c ÷ b = …….**

(v) z ÷ x = …….

Solution:(i) x + y = ……..

x + y = 3 + 6= 9

(ii) y − x = …….

y − x = 6 − 3= 3

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Evaluation Question EX-20 A

(iii) y / x = …….

y / x= 6 / 3= 2

(iv) c ÷ b = ……

c ÷ b = 32 ÷ 8=32 / 8 = 4

(v) z ÷ x = …….

Z ÷ x = 18 ÷ 3= 6

Evaluation Question EX-20 A

2 Find the value of:

(i) p + 2q + 3r, when p = 1, q = 5 and r = 2

(ii) 2a + 4b + 5c, when a = 5, b = 10 and c = 20

(iii) 3a – 2b, when a = 8 and b = 10

(iv) 5x + 3y – 6z, when x = 3, y = 5 and z = 4

(v) 2p – 3q + 4r – 8s, when p = 10, q = 8, r = 6 and s = 2

Solution:

(i) p + 2q + 3r, when p = 1, q = 5 and r = 2

P + 2q + 3r = 1 + 2 × 5 + 3 × 2

= 1 + 10 + 6= 17

Evaluation Question EX-20 A

(ii) $2a + 4b + 5c$, when $a = 5$, $b = 10$ and $c = 20$

The value of $2a + 4b + 5c$ is calculated as shown below

$2a + 4b + 5c = 2 \times 5 + 4 \times 10 + 5 \times 20$

$= 10 + 40 + 100 = 150$

Therefore, $2a + 4b + 5c = 150$

(iii) $3a - 2b$, when $a = 8$ and $b = 10$

The value of $3a - 2b$ is calculated as shown below

$3a - 2b = 3 \times 8 - 2 \times 10$

$= 24 - 20 = 4$

Therefore, $3a - 2b = 4$

Evaluation Question EX-20 A

3. Find the value of:

(i) 4pq × 2r, when p = 5, q = 3 and r = 1 / 2

(ii) yx / z, when x = 8, y = 4 and z = 16

(iii) (a + b − c) / 2a, when a = 5, b = 7 and c = 2

Solution:

(i) 4pq × 2r, when p = 5, q = 3 and r = 1 / 2

The value of 4pq × 2r is calculated as below

4pq × 2r = 4 × 5 × 3 × 2 × (1 / 2)

= 4 × 5 × 3= 60

∴ 4pq × 2r = 60

- (ii) yx / z, when x = 8, y = 4 and z = 16

Evaluation Question EX-20 A

(ii) yx / z, when x = 8, y = 4 and z = 16

The value of yx / z is calculated as below

yx / z = (4 × 8) / 16

= 32 / 16= 2

∴ yx / z = 2

(iii) (a + b – c) / 2a, when a = 5, b = 7 and c = 2

The value of (a + b – c) / 2a is calculated as below

(a + b – c) / 2a = (5 + 7 – 2) / (2 × 5)

= 10 / 10= 1

- **4. If a = 3, b = 0, c = 2 and d = 1, find the value of:**
- **(i) 3a + 2b = 6c + 4d**

Evaluation Question EX-20 A

4. If a = 3, b = 0, c = 2 and d = 1, find the value of:

(i) 3a + 2b − 6c + 4d **(ii) 6a − 3b − 4c − 2d**

(iii) ab − bc + cd − da **(iv) abc − bcd + cda**

(v) $a^2 + 2b^2 - 3c^2$

Solution:(i) 3a + 2b − 6c + 4d

The value of 3a + 2b − 6c + 4d is calculated as shown below

3a + 2b − 6c + 4d = 3 × 3 + 2 × 0 − 6 × 2 + 4 × 1

On further calculation, we get

= 9 + 0 − 12 + 4= 9 − 12 + 4

= 13 − 12= 1

- Therefore, 3a + 2b − 6c + 4d = 1

Evaluation Question EX-20 A

(ii) $6a - 3b - 4c - 2d$

The value of $6a - 3b - 4c - 2d$ is calculated as shown below

$6a - 3b - 4c - 2d = 6 \times 3 - 3 \times 0 - 4 \times 2 - 2 \times 1$

$= 18 - 0 - 8 - 2$

$= 18 - 10 = 8$

Therefore, $6a - 3b - 4c - 2d = 8$

(iii) $ab - bc + cd - da$

$ab - bc + cd - da = 3 \times 0 - 0 \times 2 + 2 \times 1 - 1 \times 3$

$= 0 - 0 + 2 - 3 = 2 - 3 = -1$

Therefore, $ab - bc + cd - da = -1$

Evaluation Question EX-20 A

5. Find the value of $5x^2 - 3x + 2$, when x = 2

Solution:

The value of $5x^2 - 3x + 2$ when x = 2 is calculated as below

$5x^2 - 3x + 2 = 5 \times (2)^2 - 3 \times (2) + 2$

On simplification, we get

$= 5 \times 4 - 3 \times 2 + 2$

$= 20 - 6 + 2$

$= 22 - 6 = 16$

- Hence, the value of $5x^2 - 3x + 2$ when x = 2 is 16

Evaluation Question EX-20 A

6. Find the value of $3x^3 - 4x^2 + 5x - 6$, when $x = -1$

Solution:

The value of $3x^3 - 4x^2 + 5x - 6$ when $x = -1$ is calculated as below

$3x^3 - 4x^2 + 5x - 6 = 3 \times (-1)^3 - 4 \times (-1)^2 + 5 \times (-1) - 6$

On simplification, we get

$= -3 - 4 - 5 - 6$

$= -18$

Hence, the value of $3x^3 - 4x^2 + 5x - 6$ when $x = -1$ is -18

Evaluation Question EX-20 A

7. Show that the value of $x^3 - 8x^2 + 12x - 5$ is zero, when x = 1

Solution:

The value of $x^3 - 8x^2 + 12x - 5 = 0$ when x = 1 is calculated as below

$x^3 - 8x^2 + 12x - 5 = (1)^3 - 8 \times (1)^2 + 12 \times (1) - 5$

On simplification, we get

$= 1 - 8 \times 1 + 12 \times 1 - 5$

$= 1 - 8 + 12 - 5$

$= 0$

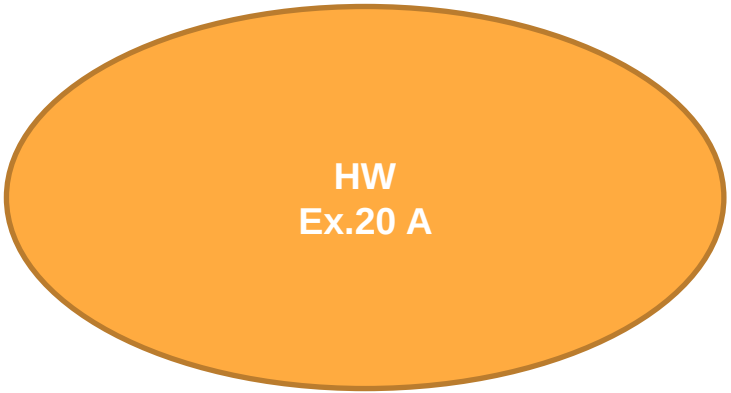
The value of $x^3 - 8x^2 + 12x - 5 = 0$ when x = 1

Hence, proved

Additional Homework

1. If m = 2, find the difference between the values of $4m^3$ and $3m^4$.

2. **If a = 3, find the values of a^2 and 2^a**



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