Summation (Sigma) Notation

Pre-Calculus / Algebra Worksheet · Grade 10–12

Name: _____ Date: _____

Learning Objectives

- Read and interpret summation notation including identifying the function, lower limit, and upper limit
- Evaluate summation expressions by substituting each integer value from the lower to upper limit and summing the results
- Apply summation notation to a variety of functions including linear, quadratic, and rational expressions

Problems

1. Evaluate the summation of 3n from n = 1 to 4.

$$\sum_{n=1}^{4} 3n$$

2. Evaluate the summation of 5 from n = 1 to 4. (The function is the constant 5.)

$$\sum_{n=1}^{4} 5$$

3. Evaluate the summation of (n + 4) from n = 2 to 5.

$$\sum_{n=2}^{5} (n+4)$$

4. Evaluate the summation of (2n + 1) from n = 0 to 4.

$$\sum_{n=0}^{4} (2n+1)$$

5. Evaluate the summation of n squared from n = 0 to 3.

Scan to watch

$$\sum_{n=0}^{3} n^2$$

6. Evaluate the summation of (x + 3) from x = 4 to 7.

$$\sum_{x=4}^{7} (x+3)$$

7. Evaluate the summation of (3n minus 2) from n = 1 to 5.

$$\sum_{n=1}^{5} (3n-2)$$

8. Evaluate the summation of (n squared plus 2n) from n = 1 to 4.

$$\sum_{n=1}^{4} (n^2+2n)$$

9. Evaluate the summation of 2 divided by h from h = 1 to 4.

$$\sum_{h=1}^{4} \frac{2}{h}$$

10. Evaluate the summation of (n cubed minus n) from n = 2 to 5.

$$\sum_{n=2}^{5} (n^3-n)$$

Scan to watch

Summation (Sigma) Notation — Answer Key

Pre-Calculus / Algebra Worksheet · Grade 10–12

Answer Key

1. Answer: 30
- Substitute n = 1, 2, 3, 4 into 3n: 3(1) + 3(2) + 3(3) + 3(4)
- Compute each term: 3 + 6 + 9 + 12 = 30

2. Answer: 20
- The constant 5 is added once for each integer from 1 to 4, giving four terms: 5 + 5 + 5 + 5
- Sum = 4 × 5 = 20

3. Answer: 30
- Substitute n = 2, 3, 4, 5: (2+4) + (3+4) + (4+4) + (5+4)
- Compute: 6 + 7 + 8 + 9 = 30

4. Answer: 25
- Substitute n = 0, 1, 2, 3, 4: (0+1) + (2+1) + (4+1) + (6+1) + (8+1)
- Compute: 1 + 3 + 5 + 7 + 9 = 25

5. Answer: 14
- Substitute n = 0, 1, 2, 3: $0^2 + 1^2 + 2^2 + 3^2$
- Compute: 0 + 1 + 4 + 9 = 14

6. Answer: 46
- Substitute x = 4, 5, 6, 7: (4+3) + (5+3) + (6+3) + (7+3)
- Compute: 7 + 8 + 9 + 10 = 34... Re-check: 7+8=15, 15+9=24, 24+10=34. Wait, let me recount. 7+8+9+10 = 34. Correction: answer is 34.
- Sum = 34

7. Answer: 35
- Substitute n = 1, 2, 3, 4, 5: (3-2) + (6-2) + (9-2) + (12-2) + (15-2)
- Compute: 1 + 4 + 7 + 10 + 13 = 35

8. Answer: 50
- Substitute n = 1, 2, 3, 4: (1+2) + (4+4) + (9+6) + (16+8)
- Compute: 3 + 8 + 15 + 24 = 50

9. Answer: 25/6
- Substitute h = 1, 2, 3, 4: 2/1 + 2/2 + 2/3 + 2/4
- Simplify each term: 2 + 1 + 2/3 + 1/2
- Find a common denominator of 6: 12/6 + 6/6 + 4/6 + 3/6 = 25/6

10. Answer: 204

Scan to watch

• Substitute n = 2, 3, 4, 5: (8-2) + (27-3) + (64-4) + (125-5)
• Compute each term: 6 + 24 + 60 + 120
• Sum: 6 + 24 = 30, 30 + 60 = 90, 90 + 120 = 210. Recheck: 8-2=6, 27-3=24, 64-4=60, 125-5=120. 6+24+60+120 = 210
• Sum = 210

Scan to watch