

Given:

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

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sum_{i=1}^n i^3 = \left(\frac{n(n+1)}{2}\right)^2$$

Evaluate:

1. $\sum_{i=1}^{42} i^2$

2. $\sum_{i=1}^{16} i^3$

3. $\sum_{i=1}^{80} 4i$

4. $\sum_{i=1}^{25} 6$

5. $\sum_{i=6}^{35} i$

6. $\sum_{i=70}^{93} i^3$

7. $\sum_{i=-7}^{19} i^2$

8. $\sum_{i=-40}^{-25} 5i$

9. $\sum_{p=1}^{20} (p+3)$

10. $\sum_{k=1}^{18} (2k^2 - 3k + 2)$

11. $\sum_{i=1}^{12} (4i^3 - 6i^2 + 2i - 3)$

12. $\sum_{j=15}^{33} (j^2 - 3j + 2)$

13. $\sum_{k=40}^{60} (k^2 - 5k)$

14. $\sum_{k=86}^{100} (12k^2 - 10k)$

15. $\sum_{i=1}^{25} (i+1)(i+2)$

16. $\sum_{i=15}^{23} i^2(i-3)$

17. $3 + 7 + 11 + 15 + 19 + \dots + 399$

18. $17 + 27 + 37 + 47 + \dots$ (to 35 terms)

Find and simplify a formula for each of the following sums:

19. $\sum_{k=1}^n (-4k + 50)$

20. $\sum_{j=1}^n (j^2 + 2j - 1)$

21. $\sum_{i=1}^n i(2i^2 - 1)$

22. $\sum_{i=1}^{n+3} i$

23. $\sum_{i=1}^{2n} i^2$

24. $(2)(8) + (5)(6) + (8)(4) + (11)(2) + \dots$ (to n terms)

25. $(1)(2)(2) + (2)(3)(5) + (3)(4)(8) + \dots + n(n+1)(3n-1)$

26. $(1)(2)(2) + (2)(3)(5) + (3)(4)(8) + \dots + (n+1)(n+2)(3n+2)$

Answers:

1. 25585

2. 18496

3. 12960

4. 150

5. 615

6. 13273416

7. 2610

8. -2600

9. 270

10. 3741

11. 20556

12. 10184

13. 48020

14. 1546230

15. 6550

16. 55224

17. 20100

18. 6545

19. $48n - 2n^2$

20. $\frac{2n^3 + 9n^2 + n}{6}$

21. $\frac{n^4 + 2n^3 - n}{2}$

22. $\frac{n^2 + 7n + 12}{2}$

23. $\frac{8n^3 + 6n^2 + n}{3}$

24. $-2n^3 + 13n^2 + 5n$

25. $\frac{9n^4 + 26n^3 + 15n^2 - 2n}{12}$

26. $\frac{9n^4 + 62n^3 + 147n^2 + 142n + 48}{12}$