

**A2.N.10: Sigma Notation 2: Know and apply sigma notation**

1 Simplify:  $\sum_{a=1}^4 (x - a^2)$ .

2 The expression  $4 + \sum_{k=2}^5 3(k - x)$  is equal to

- 1)  $58 - 4x$
- 2)  $46 - 4x$
- 3)  $58 - 12x$
- 4)  $46 - 12x$

3 What is the value of  $\sum_{x=0}^2 (3 - 2a)^x$ ?

- 1)  $4a^2 - 2a + 12$
- 2)  $4a^2 - 2a + 13$
- 3)  $4a^2 - 14a + 12$
- 4)  $4a^2 - 14a + 13$

4 Which expression is equivalent to  $\sum_{n=1}^4 (a - n)^2$ ?

- 1)  $2a^2 + 17$
- 2)  $4a^2 + 30$
- 3)  $2a^2 - 10a + 17$
- 4)  $4a^2 - 20a + 30$

5 If  ${}_nC_r$  represents the number of combinations of  $n$

items taken  $r$  at a time, what is the value of  $\sum_{r=1}^3 {}_4C_r$ ?

- 1) 24
- 2) 14
- 3) 6
- 4) 4

6 What is the value of  $\sum_{r=0}^3 {}_3C_r$ ?

- 1) 8
- 2) 9
- 3) 3
- 4) 4

7 The value of  $\sum_{r=2}^4 {}_5C_r$  is

- 1) 5
- 2) 10
- 3) 25
- 4) 45

8 Evaluate:  $\sum_{k=1}^2 \frac{(-1)^{k-1}}{(2k-1)!}$

9 What is the value of  $\sum_{b=0}^3 (2 - (b)i)$ ?

- 1)  $2 - 5i$
- 2)  $2 - 6i$
- 3)  $8 - 5i$
- 4)  $8 - 6i$

10 If  $i = \sqrt{-1}$ , what is the value of the expression  $\sum_{n=1}^{20} i^{4n}$ ?

11 What is the value of  $\sum_{n=1}^3 \cos \frac{n\pi}{2}$ ?

- 1) 1
- 2) -1
- 3) 0
- 4)  $-\frac{1}{2}$

12 Find the value of  $\sum_{k=1}^2 \left( \sin \frac{k\pi}{2} \right)$

13 Evaluate:  $\sum_{n=1}^3 \left( \sin \frac{n\pi}{2} \right)$

14 Evaluate:  $\sum_{k=0}^3 (3 \cos k\pi + 1)$

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### Answer Section

1 ANS:

$$x - 1 + x - 4 + x - 9 + x - 16 = 4x - 30$$

REF: 081535a2

2 ANS: 4

$$4 + 3(2 - x) + 3(3 - x) + 3(4 - x) + 3(5 - x)$$

$$4 + 6 - 3x + 9 - 3x + 12 - 3x + 15 - 3x$$

$$46 - 12x$$

REF: 061315a2

3 ANS: 4

$$(3 - 2a)^0 + (3 - 2a)^1 + (3 - 2a)^2 = 1 + 3 - 2a + 9 - 12a + 4a^2 = 4a^2 - 14a + 13$$

REF: 061526a2

4 ANS: 4

$$(a - 1)^2 + (a - 2)^2 + (a - 3)^2 + (a - 4)^2$$

$$(a^2 - 2a + 1) + (a^2 - 4a + 4) + (a^2 - 6a + 9) + (a^2 - 8a + 16)$$

$$4a^2 - 20a + 30$$

REF: 011414a2

5 ANS: 2

$r$	${}_4C_r$	$\frac{{}_4P_r}{r!}$		
1	${}_4C_1$	$\frac{{}_4P_1}{1!}$	$\frac{4}{1}$	4
2	${}_4C_2$	$\frac{{}_4P_2}{2!}$	$\frac{4 \times 3}{2 \times 1}$	6
3	${}_4C_3$	$\frac{{}_4P_3}{3!}$	$\frac{4 \times 3 \times 2}{3 \times 2 \times 1}$	4
$\Sigma$				14

REF: 080213b

6 ANS: 1

$r$	${}_3C_r$	$\frac{{}_3P_r}{r!}$		
0	${}_3C_0$	$\frac{{}_3P_0}{0!}$	$\frac{1}{1}$	1
1	${}_3C_1$	$\frac{{}_3P_1}{1!}$	$\frac{3}{1}$	3
2	${}_3C_2$	$\frac{{}_3P_2}{2!}$	$\frac{3 \times 2}{2}$	3
3	${}_3C_3$	$\frac{{}_3P_3}{3!}$	$\frac{3 \times 2}{3 \times 2}$	1
$\Sigma$				8

REF: 061007b

7 ANS: 3

$r$	${}_5C_r$	$\frac{{}_5P_r}{r!}$		
2	${}_5C_2$	$\frac{{}_5P_2}{2!}$	$\frac{5 \times 4}{2 \times 1}$	10
3	${}_5C_3$	$\frac{{}_5P_3}{3!}$	$\frac{5 \times 4 \times 3}{3 \times 2 \times 1}$	10
4	${}_5C_4$	$\frac{{}_5P_4}{4!}$	$\frac{5 \times 4 \times 3 \times 2}{4 \times 3 \times 2 \times 1}$	5
$\Sigma$				25

REF: 010505b

8 ANS:

$k$	$\frac{(-1)^{k-1}}{(2k-1)!}$		
1	$\frac{(-1)^{1-1}}{(2(1)-1)!}$	$\frac{1}{1!}$	1
2	$\frac{(-1)^{2-1}}{(2(2)-1)!}$	$\frac{-1}{3!}$	$\frac{-1}{6}$
$\Sigma$			$\frac{5}{6}$

REF: 060624b

9 ANS: 4

$b$	$2 - (b)i$
0	$2 - (0)i$
1	$2 - (1)i$
2	$2 - (2)i$
3	$2 - (3)i$
$\Sigma$	$8 - (6)i$

REF: 010304b

10 ANS:

20. Since  $i^{4n} = 1$ ,  $\sum_{n=1}^{20} i^{4n} = 20$ .

REF: 010825b

11 ANS: 2

$$\cos \frac{\pi}{2} + \cos \pi + \cos \frac{3\pi}{2} = 0 + -1 + 0 = -1$$

REF: 011617a2

12 ANS:

1

REF: 068111siii

13 ANS:

$n$	$\sin \frac{n\pi}{2}$	
1	$\sin \frac{1\pi}{2}$	1
2	$\sin \frac{2\pi}{2}$	0
3	$\sin \frac{3\pi}{2}$	-1
$\Sigma$		0

REF: 010922b

14 ANS:

$k$	$3\cos k\pi + 1$		
0	$3\cos 0 + 1$	$3 + 1$	4
1	$3\cos \pi + 1$	$-3 + 1$	-2
2	$3\cos 2\pi + 1$	$3 + 1$	4
3	$3\cos 3\pi + 1$	$-3 + 1$	-2
$\Sigma$			4

REF: 060523b