

F.BF.B.6: Sigma Notation 2

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 ${}_n C_r$ represents the number of combinations of n items taken r at a time, what is the value of $\sum_{r=1}^3 {}_4 C_r$?

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

6 What is the value of $\sum_{r=0}^3 {}_3 C_r$?

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

7 The value of $\sum_{r=2}^4 {}_5 C_r$ is

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

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

9 The value of $\sum_{x=4}^8 i^x$, where i is the imaginary unit, is

- 1) 1
- 2) -1
- 3) i
- 4) $-i$

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

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

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

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

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

13 The summation $2 \sum_{n=3}^6 \cos \left(\frac{\pi}{n-2} \right)$ equals

- 1) $-\frac{2 + \sqrt{2}}{2}$
- 2) $-2 + \sqrt{2}$
- 3) $-\frac{1 + \sqrt{2}}{2}$
- 4) $-1 + \sqrt{2}$

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

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

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

F.BF.B.6: Sigma Notation 2**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
Σ				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
Σ				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
Σ				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	$\frac{(-1)^{2-1}}{(2(2)-1)!}$	$\frac{-1}{3!}$	$\frac{-1}{6}$
Σ			$\frac{5}{6}$

REF: 060624b

9 ANS: 1

$$i^4 + i^5 + i^6 + i^7 + i^8 = 1 + i + -1 + -i + 1 = 1$$

REF: 081612a2

10 ANS: 4

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

REF: 010304b

11 ANS:

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

REF: 010825b

12 ANS: 2

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

REF: 011617a2

13 ANS: 4

$$2 \left(\cos \frac{\pi}{3-2} + \cos \frac{\pi}{4-2} + \cos \frac{\pi}{5-2} + \cos \frac{\pi}{6-2} \right) = 2 \left(-1 + 0 + \frac{1}{2} + \frac{\sqrt{2}}{2} \right) = 2 \left(-\frac{1}{2} + \frac{\sqrt{2}}{2} \right) = -1 + \sqrt{2}$$

REF: 061605a2

14 ANS:

1

REF: 068111siii

15 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
Σ		0

REF: 010922b

16 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
Σ			4

REF: 060523b