

1. Find the exact value of $\sin(\frac{\pi}{12})$.

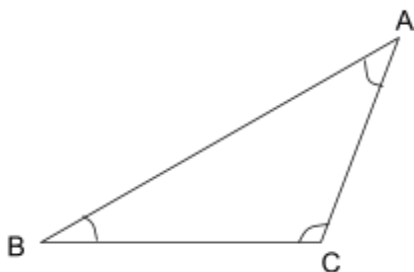
2. if the expression $\frac{13-12i}{2+6i}$ is written in form $a + bi$, what is the value of $a - b$?

3. Find the exact value of x given that

$$x = \sqrt{5 + \sqrt{5 + \sqrt{5 + \sqrt{5 + \sqrt{5 + \dots}}}}}$$

4. What is the coefficient of the 4th term in the expansion of $(2x^7 - 9)^5$ where terms are ordered by decreasing power?

5. In the graphic below Angle C = 120 degrees, segment BC has length 5, and segment AC has length 7. What is the length of segment AB?



6. What is the minor axis of the conic section with equation $x^2 + 16y^2 - 72x - 64y + 64 = 0$

7. Find the zero(es) of $f(x) = 1 - x + \cos(2\sin^{-1}(x))$

8. What is the ones digit of $3^{3939} - 3^{2019}$?

9. What is the value of $f(-2)$ given that $f(x) = 2x^8 + 7x^7 - 6x^5 + 4x^3 - 12x^2 + 3$

10. If $f(x) = \frac{3x-12}{4x+3}$, then what is the value of $f^{-1}(3)$?

Tiebreakers:

1. Given $\frac{((3!)!)!}{3!} = k * n!$, what is $k + n$?

2. What is the value of 2019 in binary?

Answers:

Warm-Up: 10

1. $\frac{\sqrt{6}-\sqrt{2}}{4}$

2. $-37/16$

3. $\frac{1+\sqrt{21}}{2}$

4. -324

5. $\sqrt{109}$

6. 3

7. -1

8. 0

9. -269

10. -7/3

11. 839

12. 11111100011