

Alpha CIPHERING Answers and Solutions

ANSWERS

0. π

1. $\frac{13}{4} = 3\frac{3}{4} = 3.75$

2. $\frac{\pi}{2}$

3. 40

4. 120

5. 17

6. 48

7. 41

8. $\frac{2}{3}$

9. 9

10. -792

11. 5

12. -70

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SOLUTIONS

$$0. (\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x) = (\cos^2 x - \sin^2 x) = \cos 2x \rightarrow \frac{2\pi}{2} = \pi$$

$$1. k^{k^{\frac{3}{2}}} = (k^{\frac{3}{2}})^k \rightarrow k^{\frac{3}{2}} = \frac{3}{2}k \rightarrow k^{\frac{1}{2}} = \frac{3}{2} \rightarrow k = \frac{9}{4}. \text{ The base can also equal 1 so final answer is}$$

$$\frac{13}{4} = 3\frac{3}{4} = 3.75$$

$$\frac{\cos x - 1}{-\sin x} - 1 = 0 \rightarrow \cos x - 1 = -\sin x \rightarrow \cos x + \sin x = 1$$

$$2. \cos^2 x + \sin^2 x + \sin 2x = 1 \rightarrow \sin 2x = 0 \rightarrow 2x = 0 + n\pi$$

$$x = 0 + \frac{n\pi}{2} \rightarrow x = \frac{\pi}{2}$$

$$\frac{4}{B+4} = \frac{L}{100} \rightarrow \frac{4}{2B+4} = \frac{L-15}{100}$$

$$3. \frac{400}{B+4} = \frac{400}{2B+4} + 15 \rightarrow \frac{400}{B+4} = \frac{400 + 30B + 60}{2B+4}$$

$$\frac{40}{B+4} = \frac{3B+46}{2B+4} \rightarrow 3B^2 - 22B + 24 = 0$$

$$(3B-4)(B-6) = 0 \rightarrow B = 6 \rightarrow L = 40$$

$$4. \cos \theta = \frac{2(-2-\sqrt{3})+1(-1+2\sqrt{3})}{\sqrt{2^2+1^2} \cdot \sqrt{(-2-\sqrt{3})^2+(-1+2\sqrt{3})^2}} = \frac{-5}{\sqrt{5} \cdot \sqrt{7+4\sqrt{3}+13-4\sqrt{3}}}$$

$$\frac{-5}{\sqrt{5} \cdot 2\sqrt{5}} = \frac{-1}{2} \rightarrow \theta = 120$$

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$$2+8i = a+bi + \sqrt{a^2+b^2} \rightarrow b=8$$

$$5. 2 = a + \sqrt{a^2+64} \rightarrow a^2+64 = 4+a^2-4a \rightarrow 4a = -60 \rightarrow a = -15$$

$$\sqrt{(-15)^2+8^2} = 17$$

$$2\cos^2 16x + \cos 16 - 1 = 0 \rightarrow (2\cos 16x - 1)(\cos 16x + 1) = 0$$

$$6. \cos 16x = \frac{1}{2} \rightarrow 32$$

$$\cos 16x = -1 \rightarrow 16$$

$$16+32 = 48$$

$$7. \text{ Draw a picture. } 28(52) = x(x+30) \rightarrow x^2 + 30x - 28(52) = 0$$

$$(x+56)(x-26) = 0 \rightarrow x = 26 \rightarrow 15+26 = 41$$

$$y^2 = 4px^2 \rightarrow \text{vertex} = (0,0) \rightarrow \text{Foci} = (1,0)$$

$$8. \text{ Draw some good pictures } (x-3)^2 = 8(y+5) \rightarrow 4p = 8 \rightarrow p = 2 \rightarrow \text{vertex} = (3,-5) \rightarrow \text{foci} = (3,-3)$$

$$m = \frac{-3}{2} \rightarrow \frac{2}{3}$$

$$9. 104 = 4 + (n-5)d \rightarrow 100 = (n-5)d \rightarrow 100 = 2^2 \cdot 5^2 \text{ since 100 has 9 factors there are 9 possibilities for } d \text{ and } n-5$$

$$10. \text{ If the 3}^{\text{rd}} \text{ and the 11}^{\text{th}} \text{ are the same then so is the first and 13}^{\text{th}}. \text{ This means 13 terms so the exponent is 12: Therefore } {}_{12}C_5(L)^5(-U)^7 = -792$$

$$11. \text{ The exponent can be zero which gives values of } k \text{ equal to 3 and 4. The base can be 1 which gives } k=5 \text{ and the base could equal } -1 \text{ and the exponent is even which gives } k=7. \text{ So } h=3+2+1-1=5$$

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$$12. \begin{vmatrix} 3 & 4 & -2 & 1 \\ 3 & 1 & 0 & -3 \\ 0 & -3 & 2 & 3 \\ 2 & -1 & 0 & -4 \end{vmatrix} = \begin{vmatrix} 3 & 1 & 0 & 4 \\ 3 & 1 & 0 & -3 \\ 0 & -3 & 2 & 3 \\ 2 & -1 & 0 & -4 \end{vmatrix} = 2 \begin{vmatrix} 3 & 1 & 4 \\ 3 & 1 & -3 \\ 2 & -1 & 0 \end{vmatrix} = 2 \begin{vmatrix} 5 & 0 & 4 \\ 5 & 0 & -3 \\ 2 & -1 & 0 \end{vmatrix}$$

$$2(1)(-15 - 20) = -70$$