

$$\begin{aligned} ① \quad 7^x &= 3 \\ \log 7^x &= \log 3 \\ \frac{x \cdot \log 7}{\log 7} &= \frac{\log 3}{\log 7} \\ x &= \frac{\log 3}{\log 7} \end{aligned}$$

$$\begin{aligned} \log_7 7^x &= \log_7 3 \\ x &= \log_7 3 \end{aligned}$$

Key Answer Key

$$\begin{aligned} ② \quad 6^{x+2} &= 7^x \\ \log 6^{x+2} &= \log 7^x \\ (x+2)\log 6 &= x \cdot \log 7 \\ x \log 6 + 2\log 6 &= x \log 7 \\ x \log 6 - x \log 7 &= -2\log 6 \\ x(\log 6 - \log 7) &= \frac{-2\log 6}{\log 6 - \log 7} \\ x &= \frac{-2\log 6}{\log 6 - \log 7} \end{aligned}$$

$$\begin{aligned} \log_6 6^{x+2} &= \log_6 7^x \\ x+2 &= x \cdot \log_6 7 \\ x - x \log_6 7 &= -2 \\ \frac{x(1 - \log_6 7)}{1 - \log_6 7} &= \frac{-2}{1 - \log_6 7} \\ x &= \frac{-2}{1 - \log_6 7} \end{aligned}$$

$$③ \quad Pe^{rt} = 15,000 e^{.02(6)} = 16,912$$

$$\begin{aligned} \frac{30,000}{15,000} &= \frac{15,000 e^{.02t}}{15,000} \\ 2 &= e^{.02t} \\ \ln 2 &= \ln e^{.02t} \\ \frac{\ln 2}{.02} &= \frac{.02t}{.02} \\ t &= 34.6 \approx 35 \quad 2055 \end{aligned}$$

$$④ \quad \sin(75) \sin(45+30) = \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

$$\begin{aligned} ⑤ \quad \cos(22.5) &= \cos\left(\frac{45}{2}\right) = \sqrt{\frac{1 + \frac{\sqrt{2}}{2}}{2}} = \frac{\frac{2}{2} + \frac{\sqrt{2}}{2}}{2} = \frac{2 + \sqrt{2}}{2} \cdot \frac{1}{2} \\ &= \frac{2 + \sqrt{2}}{4} = \frac{\sqrt{2 + \sqrt{2}}}{2} \end{aligned}$$

$$b) \quad \cos(15) \cos(45-30) = \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right) = \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} \quad \cos\left(\frac{30}{2}\right)$$

$$\begin{aligned} ⑥ \quad \sin(7.5) &= \sin\left(\frac{30}{2}\right) = \sin(15) \\ \frac{\sqrt{1 - \frac{\sqrt{3}}{2}}}{2} &= \sqrt{\frac{2 - \sqrt{3}}{2}} = \sqrt{\frac{2 - \sqrt{3}}{2} \cdot \frac{1}{2}} = \sqrt{\frac{2 - \sqrt{3}}{4}} = \frac{\sqrt{2 - \sqrt{3}}}{2} \\ \sin\left(\frac{15}{2}\right) &= \sqrt{\frac{1 - \sqrt{\frac{2 + \sqrt{3}}{2}}}{2}} = \sqrt{\frac{2 - \sqrt{2 + \sqrt{3}}}{2} \cdot \frac{1}{2}} = \sqrt{\frac{2 - \sqrt{2 + \sqrt{3}}}{4}} \\ &= \frac{\sqrt{2 - \sqrt{2 + \sqrt{3}}}}{2} \end{aligned}$$

$$y = 4 \sin(5x - \pi)$$

$$A = 4$$

$$PS = -\frac{\pi}{5}$$

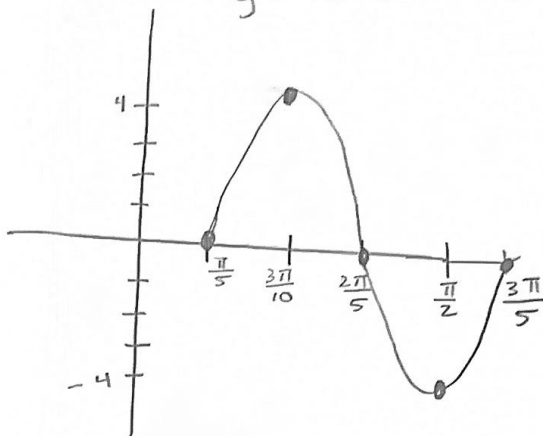
$$P = \frac{2\pi}{5}$$

$$\text{increment} = \frac{2\pi}{5} \cdot \frac{1}{4} = \frac{2\pi}{20} = \frac{\pi}{10}$$

$$\frac{2\pi}{5} \quad \frac{8\pi}{20}$$

$$\frac{3\pi}{10} \quad \frac{6\pi}{20}$$

$$y = 4 \sin(5x - \pi)$$



$$\frac{\pi}{5} + \frac{\pi}{10} = \frac{2\pi}{10} + \frac{\pi}{10} = \frac{3\pi}{10}$$

$$\frac{3\pi}{10} + \frac{\pi}{10} = \frac{4\pi}{10} = \frac{2\pi}{5}$$

$$\frac{4\pi}{10} + \frac{\pi}{10} = \frac{5\pi}{10} = \frac{\pi}{2}$$

$$\frac{5\pi}{10} + \frac{\pi}{10} = \frac{6\pi}{10} = \frac{3\pi}{5}$$



$$a) \tan(x) - 1 = 0$$

$$\tan(x) = 1$$

$$\arctan(1) = 45, 225$$

$$x = 45 + \pi n$$

$$b) \frac{2 \sin(x)}{2} = \frac{1}{2}$$

$$\sin(x) = \frac{1}{2}$$

$$\arcsin\left(\frac{1}{2}\right) = 30, 150$$

$$30 + 2\pi n$$

$$150 + 2\pi n$$

$$c) 2 \cos(x) + \sqrt{3} = 0$$

$$2 \cos(x) + \sqrt{3} = 0$$

$$2 \frac{\cos(x)}{2} = \frac{\sqrt{3}}{2}$$

$$\cos(x) = \frac{\sqrt{3}}{2}$$

$$\arccos\left(\frac{\sqrt{3}}{2}\right) = 30, 210$$

$$30 + 2\pi n$$

$$210 + 2\pi n$$

$$b) \sec(x) \cdot \cot(x)$$

$$\frac{1}{\cos(x)} \cdot \frac{\cos(x)}{\sin(x)} = \frac{1}{\sin(x)}$$

$$= \csc(x)$$

$$e) \frac{\cot(x)}{\csc(x)} = \frac{\cos(x)}{\sin(x)} \cdot \frac{\sin(x)}{1}$$

$$= \cos(x)$$

$$\frac{2 \cos \theta}{\sin 2\theta} = \frac{2 \cos \theta}{2 \sin \theta \cos \theta} = \frac{1}{\sin \theta} = \csc \theta$$

$$a) \frac{\cos^2(x) - 1}{\sin(x)} = \frac{\sin^2(x)}{\sin(x)} = \sin(x)$$

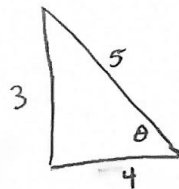
$$b) \frac{1 - \sin^2(x)}{\cot(x)} = \frac{\cos^2(x)}{\frac{\cos(x)}{\sin(x)}} = \frac{\cos^2(x)}{1} \cdot \frac{\sin(x)}{\cos(x)} = \cos(x) \cdot \sin(x)$$

$$x^2 + 3^2 = 5^2$$

$$x^2 + 9 = 25$$

$$\sqrt{x^2} = 16$$

$$x = 4$$



$$\sin(2\theta) = 2 \sin(\theta) \cos(\theta) \quad \sin\left(-\frac{3}{5}\right)$$

$$2 \left(-\frac{3}{5}\right) \left(-\frac{4}{5}\right)$$

$$\left(-\frac{6}{5}\right) \left(-\frac{4}{5}\right) = \frac{24}{25}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\left(-\frac{3}{5}\right)^2 + \cos^2 \theta = 1$$

$$\frac{9}{25} + \cos^2 \theta = 1$$

$$\cos^2 \theta = 1 - \frac{9}{25}$$

$$\sqrt{\cos^2 \theta} = \frac{25 - 9}{25} = \frac{16}{25}$$

$$\cos \theta = -\frac{4}{5}$$

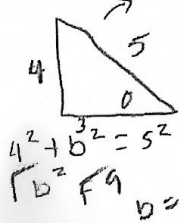
$$\tan^2(x) \cos(x) - \sec(x) = -\cos(x)$$

$$\frac{\sin^2(x)}{\cos^2(x)} \cdot \frac{\cos(x)}{1} - \frac{1}{\cos(x)}$$

$$\frac{\sin^2(x)}{\cos(x)} - \frac{1}{\cos(x)} = -\cos(x)$$

$$-\cos(x) = -\cos(x)$$

if  $\sin A = \frac{4}{5}$       $\tan B = \frac{5}{12}$



$$\sin(A+B) = \sin(A)\cos(B) + \cos(A)\sin(B)$$

$$= \left(\frac{4}{5}\right)\left(\frac{12}{13}\right) + \left(\frac{3}{5}\right)\left(\frac{5}{13}\right)$$

$$\frac{48}{65} + \frac{15}{65} = \frac{63}{65}$$

$$\frac{2\cos\theta}{\sin 2\theta} = \frac{2\cos\theta}{2\sin\theta\cos\theta} = \frac{1}{\sin\theta} = \csc\theta$$

$$\cos(x-y)$$

$$\cos(15) = \cos(45-30)$$

$$\cos(x-y) = \cos(x)\cos(y) - \sin(x)\sin(y)$$

$$\cos(45)\cos(30) - \sin(45)\sin(30)$$

$$\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right)$$

$$\frac{\sqrt{6}}{2} - \frac{\sqrt{2}}{2} = \frac{\sqrt{6} - \sqrt{2}}{2}$$

$$\sin\left(\frac{\theta}{2}\right) = \sqrt{\frac{1 - \cos\theta}{2}}$$

$$\cos = -\frac{4}{5}$$

$$\sqrt{\frac{1 - \left(-\frac{4}{5}\right)}{2}} = \frac{\frac{5}{5} + \frac{4}{5}}{2} = \frac{9}{5} \cdot \frac{1}{2} = \sqrt{\frac{9}{10}}$$

$$= \frac{3}{\sqrt{10}} = \frac{-3\sqrt{10}}{10}$$

$$\sin^2(x) + \cos^2(x) = 1$$

$$\sin^2(x) - 1 = -\cos(x)$$

$$\sin^2(x) + \cos^2(x) = 1$$

$$\left(\frac{4}{5}\right)^2 + \cos^2(x) = 1$$

$$\frac{16}{25} + \cos^2(x) = 1$$

$$\cos(x) = \frac{3}{5}$$

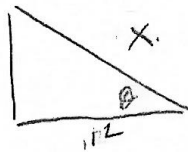
Soh Cah Toa

$$5^2 + 12^2 = x^2$$

$$25 + 144 = x^2$$

$$\sqrt{169} = \sqrt{x^2}$$

$$x = 13$$



$$\sec^2(x) = 1 + \tan^2(x)$$

$$\sec^2(x) = 1 + \left(\frac{5}{12}\right)^2$$

$$\sec^2(x) = 1 + \frac{25}{144}$$

$$\sqrt{\sec^2(x)} = \sqrt{\frac{169}{144}}$$

$$\sec(x) = \frac{13}{12}$$

$$\cos(x) = \frac{12}{13}$$

$$\frac{180 - 270}{2} \text{ 3rd}$$

$$90 - 135 \text{ 2nd}$$