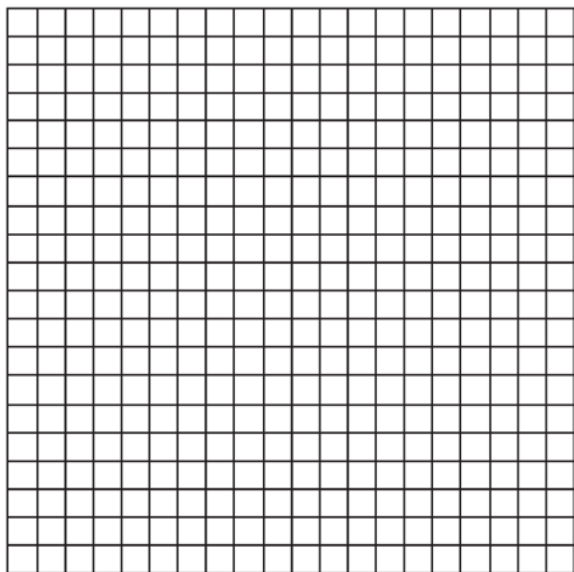
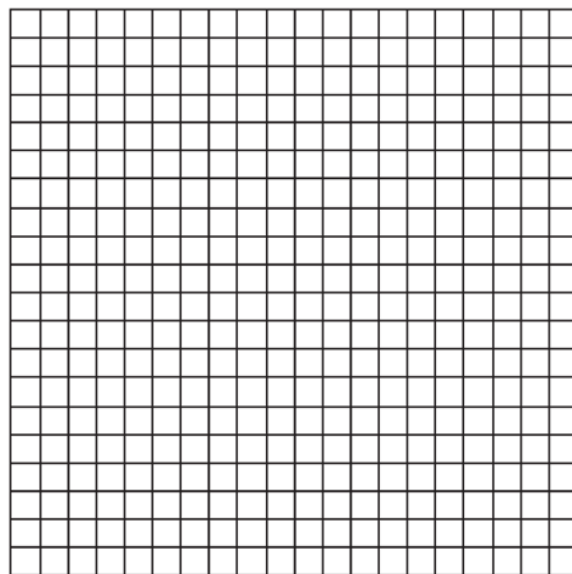


A2.A.68: Trigonometric Equations 8: Solve trigonometric equations for all values of the variable from 0° to 360°

- 1 Find all values of x in the interval $0^\circ \leq x < 360^\circ$ that satisfy the equation $3 \cos 2x = \cos x + 2$. Express your answers to the *nearest degree*. [The use of the grid is optional.]



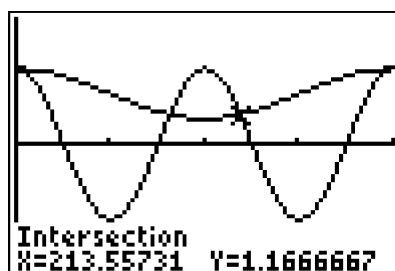
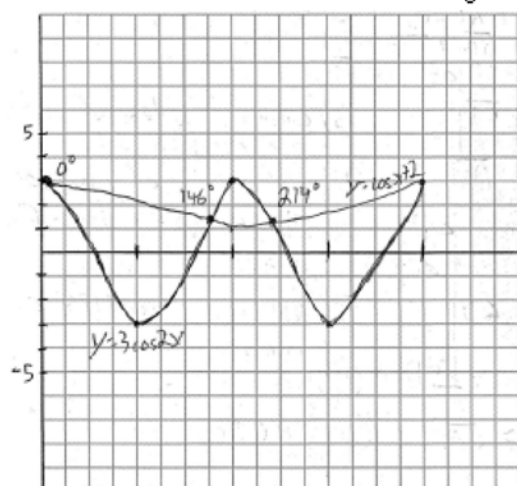
- 2 The average annual snowfall in a certain region is modeled by the function $S(t) = 20 + 10 \cos\left(\frac{\pi}{5}t\right)$, where S represents the annual snowfall, in inches, and t represents the number of years since 1970. What is the minimum annual snowfall, in inches, for this region? In which years between 1970 and 2000 did the minimum amount of snow fall? [The use of the grid is optional.]



A2.A.68: Trigonometric Equations 8: Solve trigonometric equations for all values of the variable from 0° to 360°
Answer Section

1 ANS:

$$\begin{aligned}
 3\cos 2x &= \cos x + 2 \\
 3(2\cos^2 x - 1) &= \cos x + 2 & \cos x &= -\frac{5}{6} \\
 6\cos^2 x - 3 &= \cos x + 2 & \cos x &= 1 \\
 6\cos^2 x - \cos x - 5 &= 0 & x &= \cos^{-1} -\frac{5}{6} & x &= \cos^{-1} 1 \\
 6x^2 - x - 5 &= 0 & x &\approx 146^\circ, 214^\circ & x &= 0^\circ \\
 (6x+5)(x-1) &= 0 \\
 x &= -\frac{5}{6} \quad x=1
 \end{aligned}$$



PTS: 6

REF: 080833b

2 ANS:

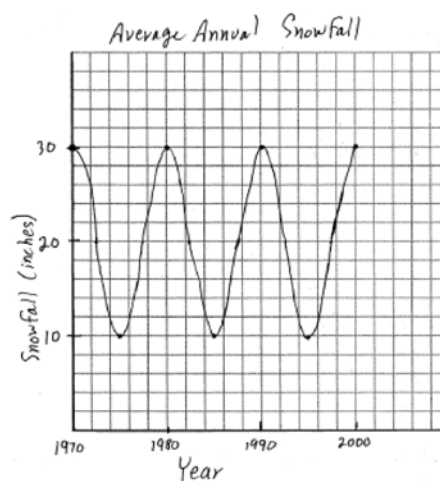
$$20 + 10 \cos \frac{\pi}{5} t = 10$$

$$10 \cos \frac{\pi}{5} t = -10$$

10, 1975, 1985, 1995. The minimum of the cosine function is -1 . $20 + 10(-1) = 10$. $\cos \frac{\pi}{5} t = -1$

$$\frac{\pi}{5} t = \cos^{-1} -1$$

$$\cos^{-1} -1 = \pi, 3\pi, 5\pi$$



$$\frac{\pi}{5} t = \pi \quad \frac{\pi}{5} t = 3\pi \quad \frac{\pi}{5} t = 5\pi$$

$$t = 5 \text{ (1975)} \quad t = 15 \text{ (1985)} \quad t = 25 \text{ (1995)}$$

PTS: 4

REF: 060731b