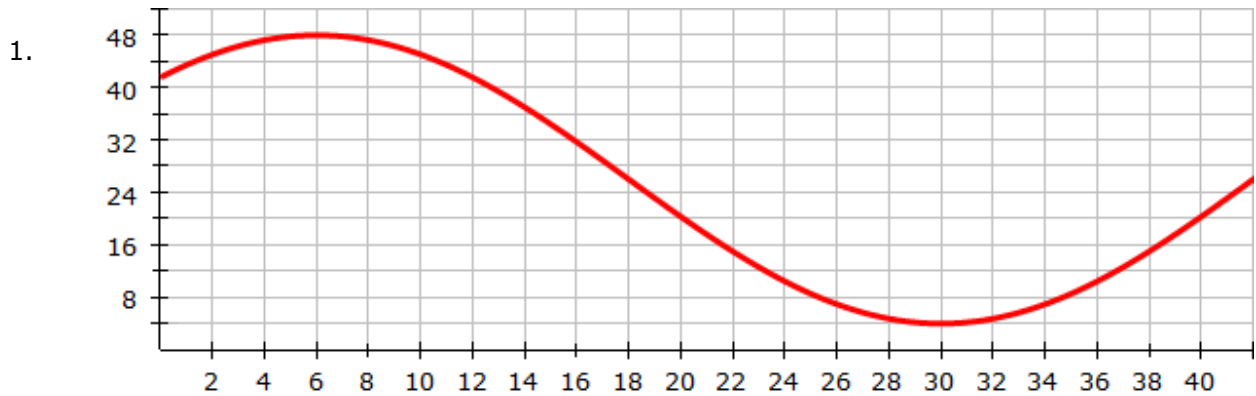
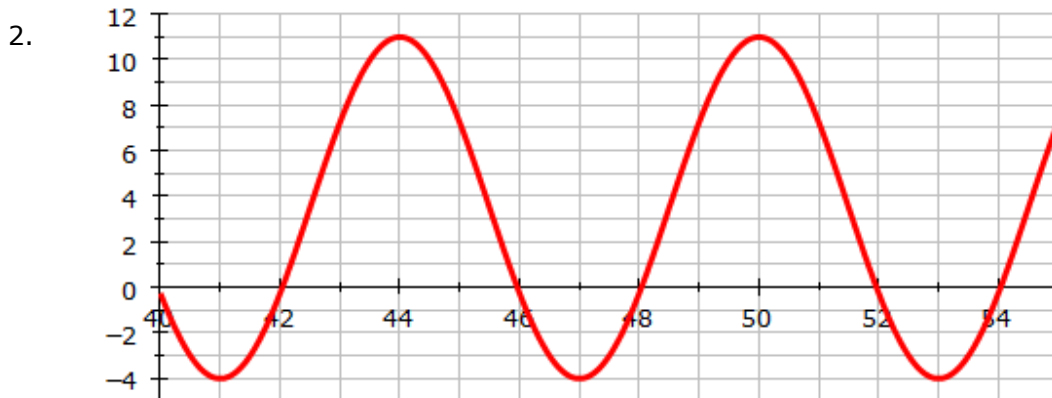


Calculus Trigonometry Practice #6



Write equations for the graph above, and then a general solution for when it is more than 36.



Write equations for the graph above, and then a general solution for when it is less than 0.



Write equations for the graph above, and then a general solution for when it is more than 0.6.

Answers: Calculus Trigonometry Practice #6

Solutions may be done with different trig equations from those shown.

1. y from 4 to 48, so centred on 26, with an amplitude of 22

Peak at $x = 6$, repeating every 2×24 , so $y = 22 \cos\left(\frac{2\pi}{48}(x - 6)\right) + 26$

Sine starts a quarter period before, so $y = 22 \sin\left(\frac{2\pi}{48}(x + 6)\right) + 26$

Solving $36 = 22 \cos\left(\frac{2\pi}{48}(x - 6)\right) + 26$ $x = \cos^{-1}\left(\frac{10}{22}\right) \times \frac{48}{2\pi} + 6 = 14.40$ on down-slope

Need up-slope, other side of peak at $x = 6 \Rightarrow -2.40$ is up solution

Using standard forms: $x = 6 + 48n \pm 8.40$ or $x = 42 + 24n + (-1)^n \times 3.60$

$48n - 50.40 < x < 48n - 33.6$ where $n \in \mathbb{Z}$ and $n = 1$ is first positive solution

2. y from -4 to 11, so centred on 3.5, with an amplitude of 7.5.

Peaks at $x = 44$ and 50 , repeating every 6. Taking that back first positive peak is $x = 2$

$y = 7.5 \cos\left(\frac{2\pi}{6}(x - 2)\right) + 3.5$ or $y = 7.5 \sin\left(\frac{2\pi}{6}(x - 0.5)\right) + 3.5$

Solving $0 = 7.5 \cos\left(\frac{2\pi}{6}(x - 2)\right) + 3.5$ $x = \cos^{-1}\left(\frac{-3.5}{7.5}\right) \times \frac{6}{2\pi} + 2 = 3.9636$ (down)

Need up-slope, other side of peak at $x = 2$ gives 0.0364 is up solution

Using standard forms: $x = 2 + 6n \pm 1.9636$ or $x = 0.5 + 3n + (-1)^n \times -0.4636$

Note we need troughs here though, so $x = 5 + 6n \pm 1.0364$ is better

$6n - 2.0364 < x < 6n + 0.0364$ where $n \in \mathbb{Z}$ and $n = 1$ is first trough after 0

3. y from 0.3 to 0.7, so centred on 0.5, with an amplitude of 0.2

Troughs at $x = 6$ and 13 , so repeating every 7, so $y = -0.2 \cos\left(\frac{2\pi}{7}(x - 6)\right) + 0.5$

More conventionally, from peaks, $y = 0.2 \cos\left(\frac{2\pi}{7}(x - 2.5)\right) + 0.5$

Sine starts a quarter period before, so $y = 0.2 \sin\left(\frac{2\pi}{7}(x - 0.75)\right) + 0.5$

Solving $0.6 = 0.2 \cos\left(\frac{2\pi}{7}(x - 2.5)\right) + 0.5$ $x = \cos^{-1}\left(\frac{0.1}{0.2}\right) \times \frac{7}{2\pi} + 2.5 = 3.667$ (down)

Need up-slope, other side of peak at $x = 2.5$ gives 1.333 is up solution

Using standard forms: $x = 2.5 + 7n \pm 1.167$ or $x = 0.75 + 3.5n + (-1)^n \times 0.5833$

$7n - 5.6667 < x < 7n - 3.3333$ where $n \in \mathbb{Z}$ and $n = 1$ is first peak after 0