

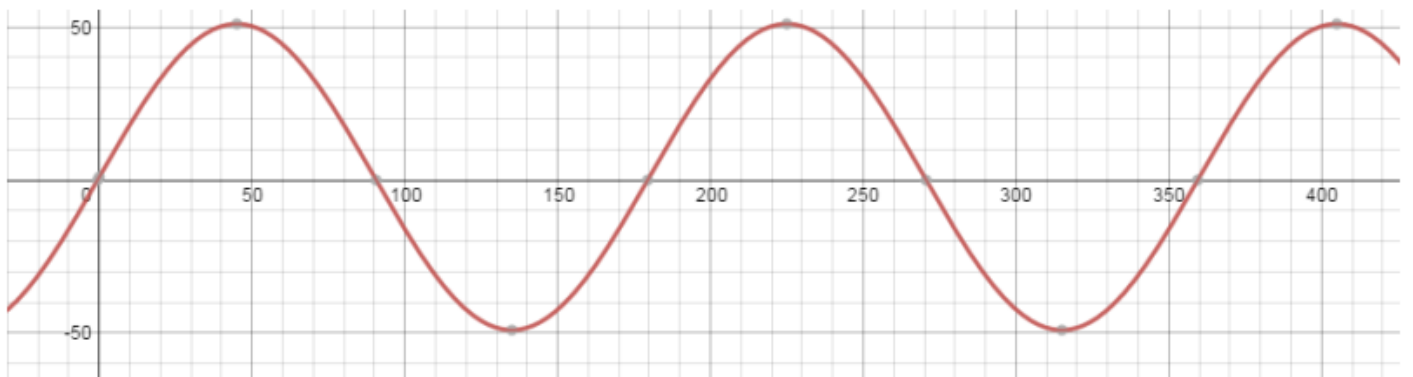
Finding Equation of a Sinusoidal Function

Warmup

Draw a rough sketch of the graph of $y = -4 \cos(5x) + 8$. Verify in desmos.

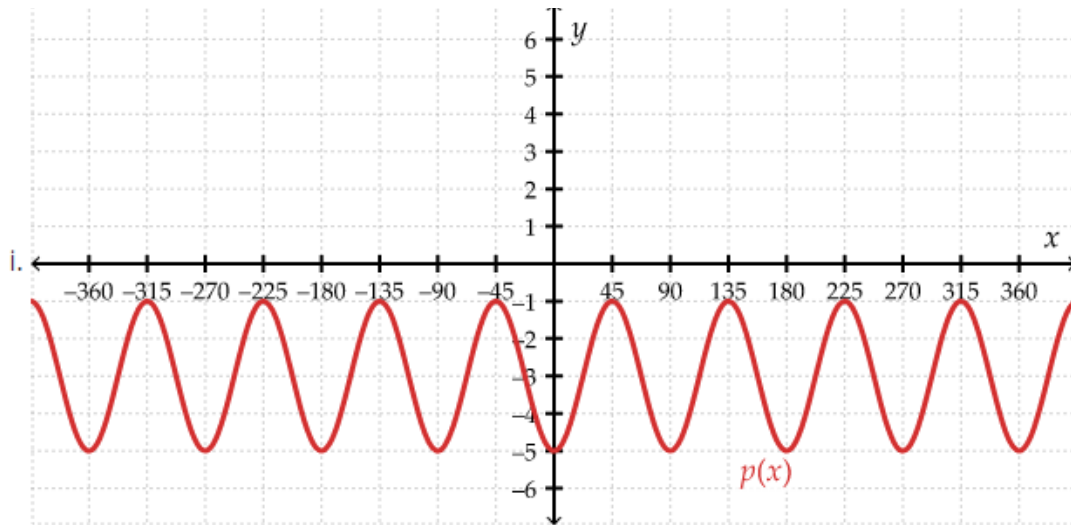
Example 1

Find an equation for the sinusoidal function pictured below.



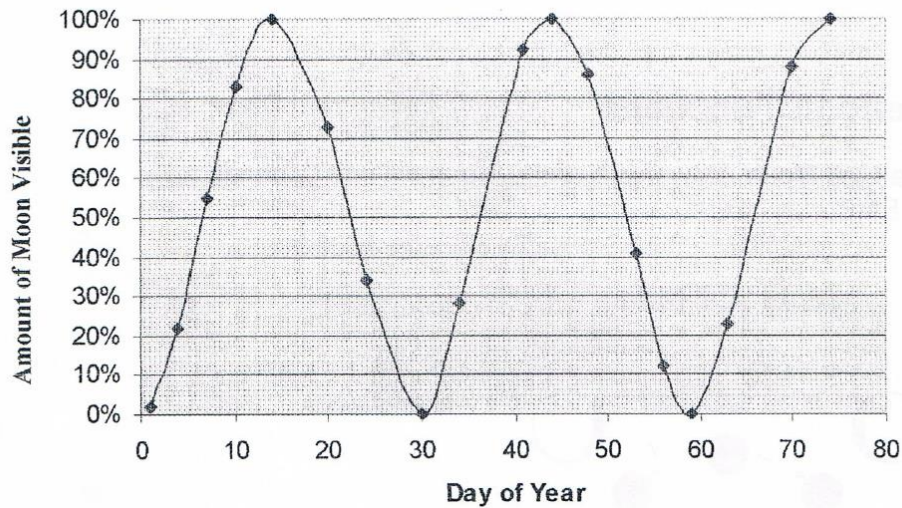
Example 2

Find the equation of $p(x)$ given its graph pictured below.



Example 3

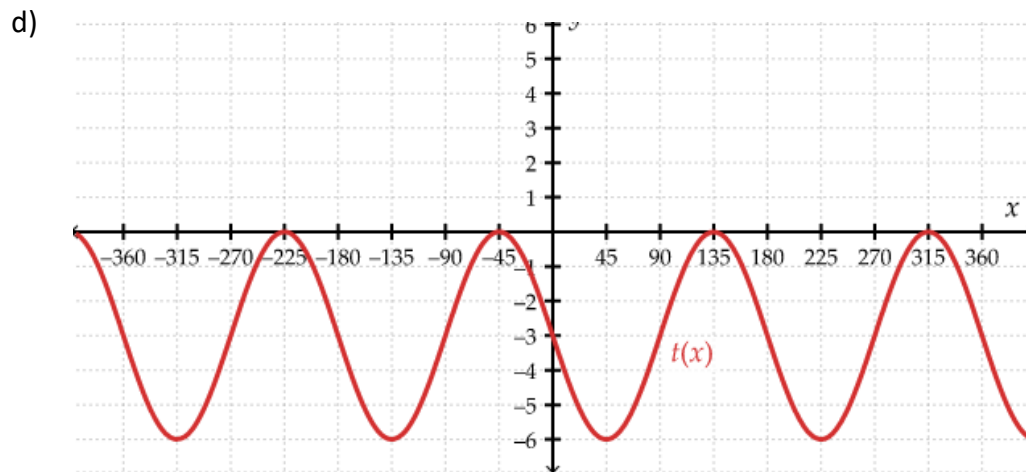
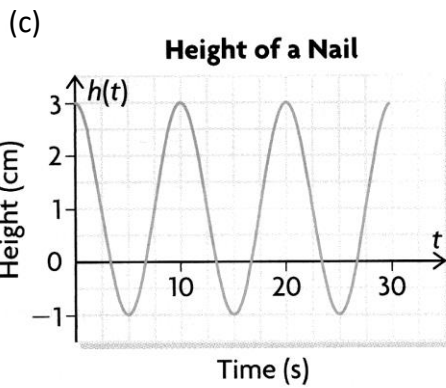
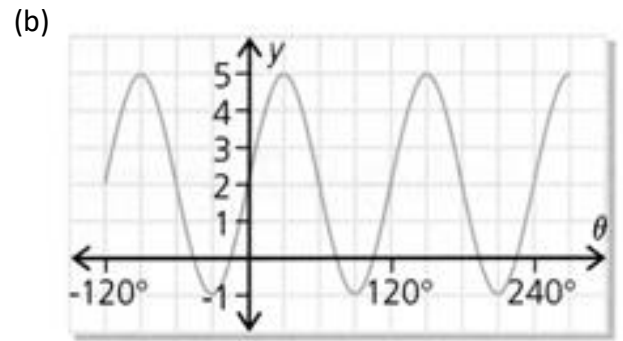
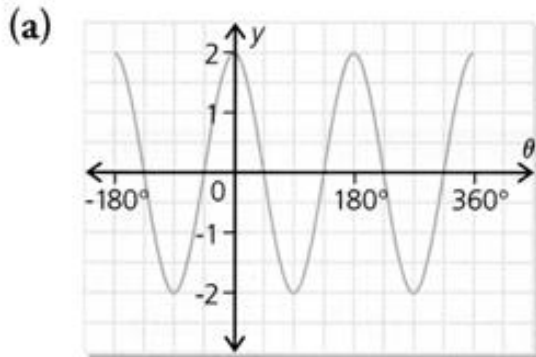
The graph below shows the relationship between the day of the year and the amount of visible moon, for a specific year.



Find an equation for this relationship. Use your equation to predict the amount of visible moon on day 150.

Assigned Problems

1. Find an equation for each sinusoidal curve below.



2. Use your equation for 1 c) to predict the height of a nail after 57 seconds.

3. Find the equation of a sinusoidal function that has the following characteristics:

- An amplitude of 15.
- A period of 30.
- An axis at $y = 10$.

Is this more than one solution to this question?

4. Find the equation of a sinusoidal function that has the following characteristics:

- An amplitude of 4.
- A period of 12.
- A maximum value of 10.
- Goes through the point $(0, 10)$

Is this more than one solution to this question?

5. Find the equation of a sinusoidal function that has the following characteristics:

- Sine function.
- A period of 15
- A range of $\{y \in \mathbb{R} \mid 50 \leq y \leq 100\}$

ANSWERS

1. a) $y = 2 \cos(2x)$ b) $y = 3 \sin 3\theta + 2$ c) $h(t) = -2 \cos 36t + 1$

d) $t(x) = -3 \sin(2x) - 3$

2. $\approx 1.62 \text{ cm}$

3. $y = 15 \sin(12x) + 10$. There are more answers: $y = 15 \cos(12x) + 10$ or $y = -15 \sin(12x) + 10$ also work.

4. $y = 4 \cos(30x) + 6$. This is really the only answer as this function starts at its maximum, must be cosine.

5. $y = 25 \sin(24x) + 75$