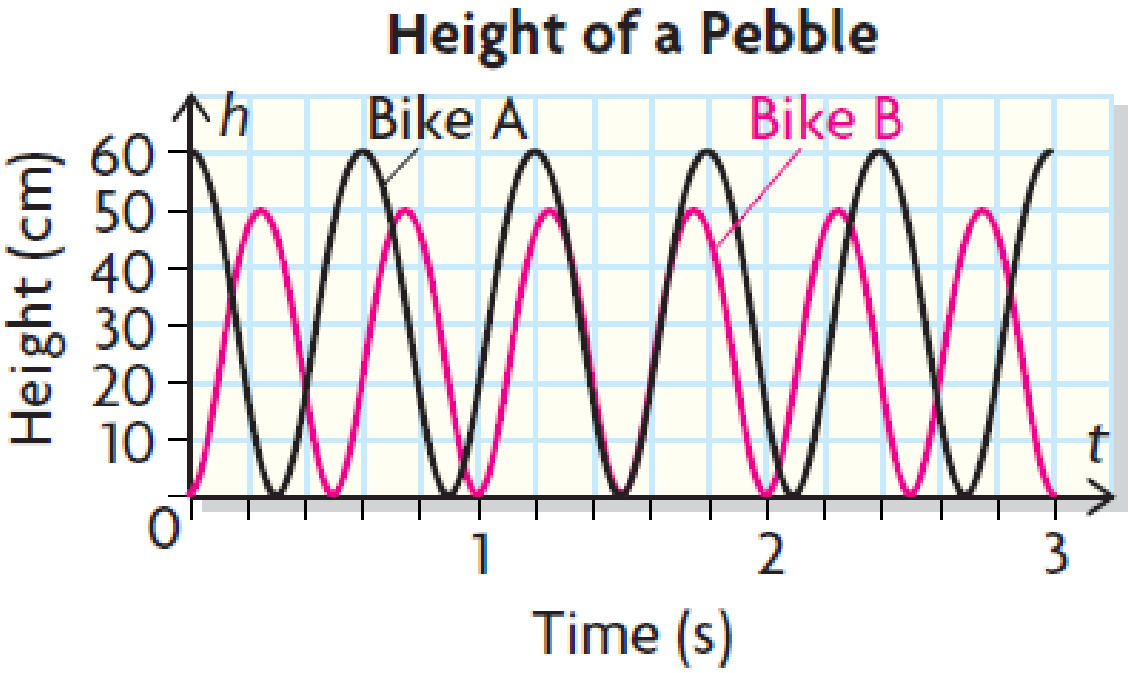
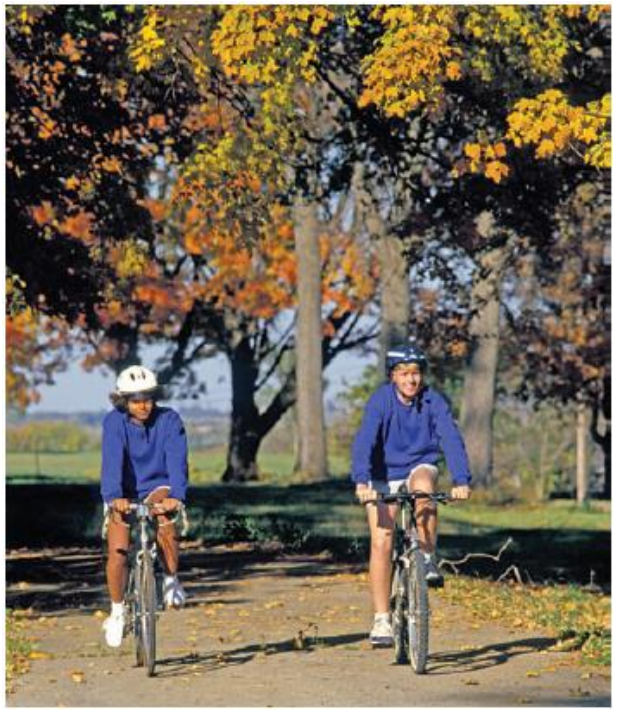
6.3 – Interpreting Sinusoidal Functions

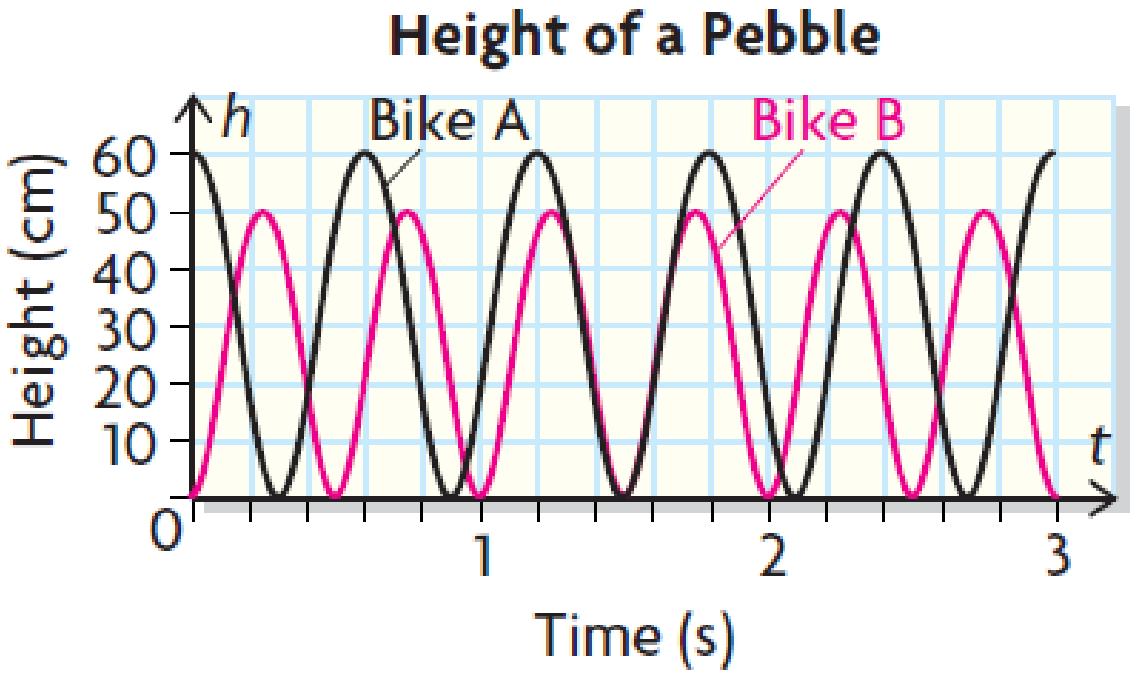
- GOAL – Relate details of sinusoidal phenomena to their graphs.
- Two students are riding their bikes. A pebble is stuck in the tire of each bike. The two graphs show the heights of the pebbles above the ground in terms of time.





What information about the bikes can you gather from the graphs of these functions?

Ex. #1 cont'd…



- **Bike A**

❖ Pebble was initially at its highest height of 60cm

❖The diameter of the wheel is 60cm

❖ The wheel takes 0.6s to complete 1 revolution

❖The period is 0.6s

❖ The equation of the axis is $h = 30$

Bike B

❖ Pebble was initially at its lowest height of 0cm

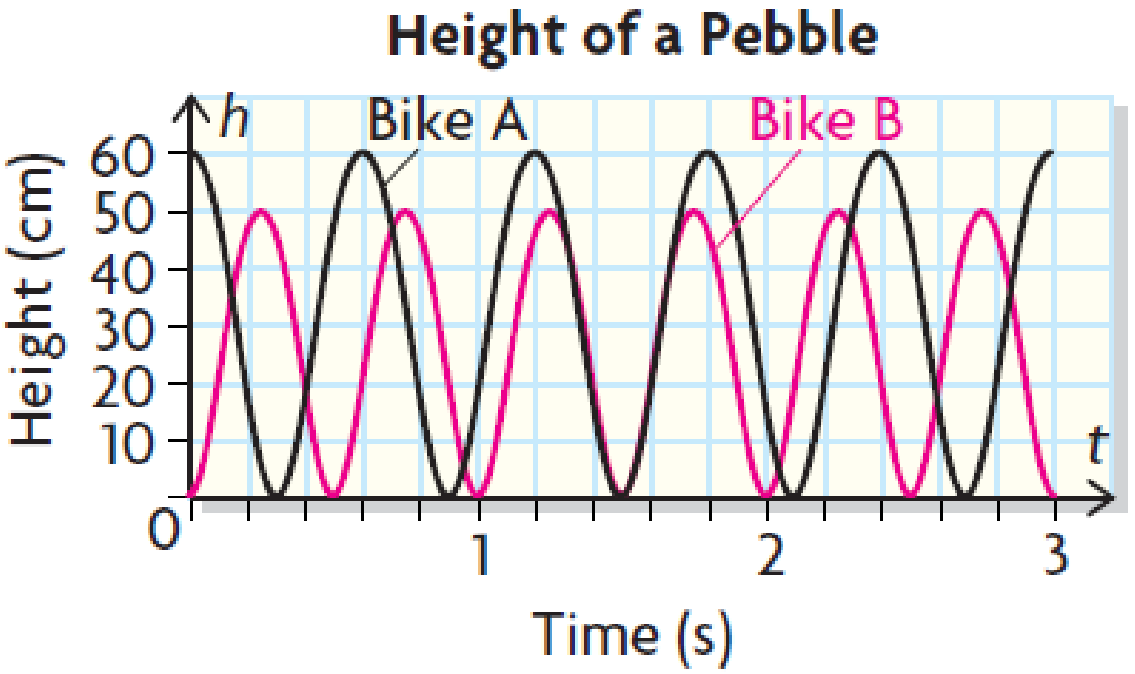
❖ *The diameter of the wheel is 50cm*

❖ The wheel takes 0.5s to complete 1 revolution

❖ *The period is 0.5s*

❖ The equation of the axis is $h = 25$

Ex. #1 cont'd…How fast were they riding?



- **Bike A**

$$C_A = 2\pi r_A$$
$$C_A = 2\pi(30)$$
$$C_A = 60\pi$$
$$C_A \doteq 188.5 \text{ cm}$$
$$C_A \doteq 1.885 \text{ m}$$
$$s_A = \frac{d}{t}$$
$$s_A = \frac{1.885}{0.6}$$
$$s_A \doteq 3.14 \text{ m/s}$$

Bike B

$$C_B = 2\pi r_B$$
$$C_B = 2\pi(25)$$
$$C_B = 50\pi$$
$$C_B \doteq 157.1 \text{ cm}$$
$$C_B \doteq 1.571 \text{ m}$$
$$s_B = \frac{d}{t}$$
$$s_B = \frac{1.571}{0.5}$$
$$s_B \doteq 3.14 \text{ m/s}$$

Example #2

- Annette's shop teacher was discussing table saws. The teacher produced two different graphs for two different types of saw. In each case, the graphs show the height of one tooth on the circular blade relative to the cutting surface of the saw in terms of time.

What information about the table saws can Annette gather from the graphs?

Table Saw A

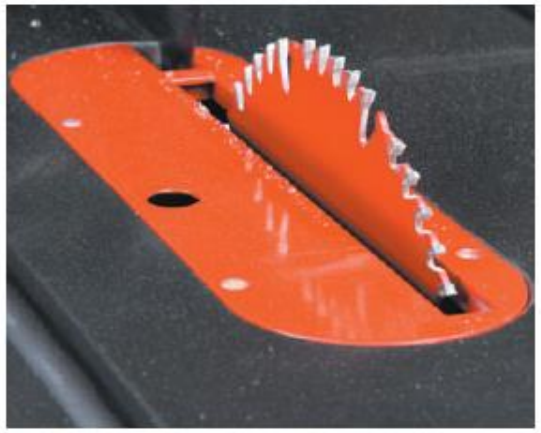


Table Saw B

Table Saw A

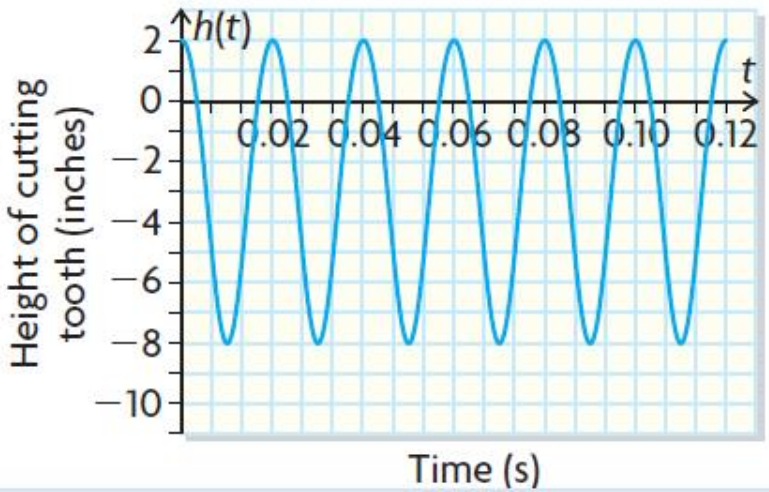
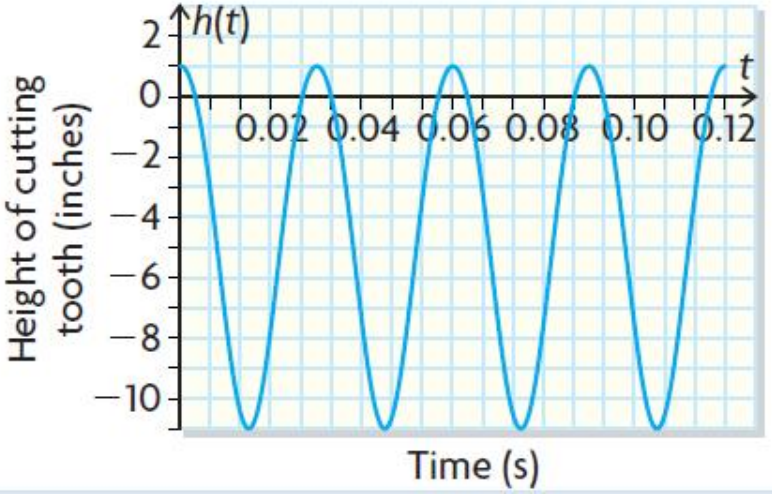
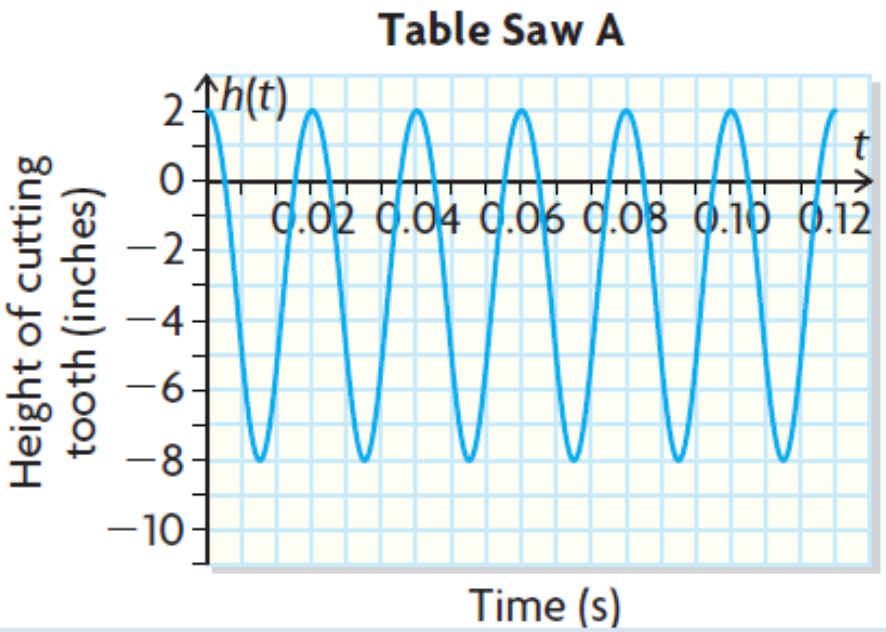
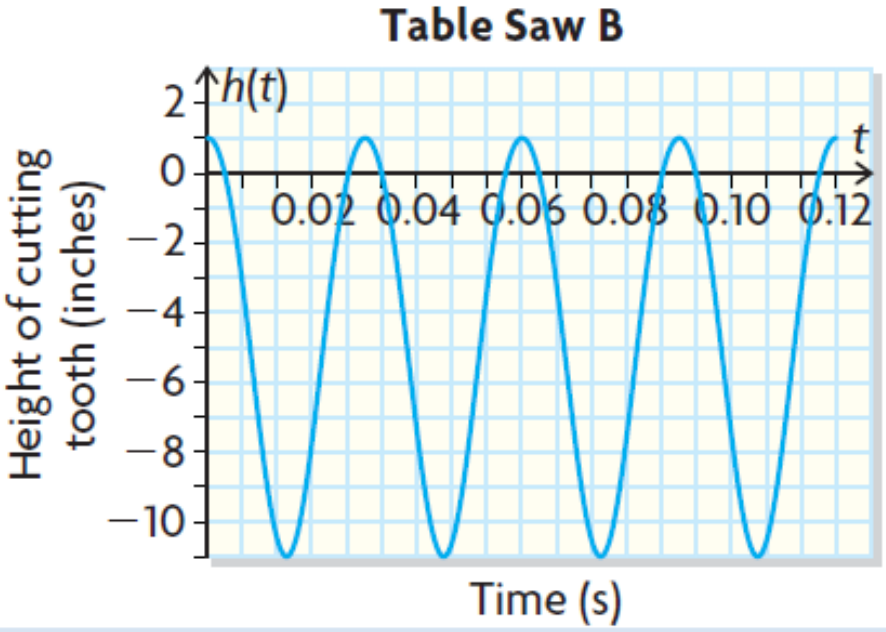


Table Saw B







- **Table Saw A**

- ❖ The blade is higher than that on Saw B
- ❖ The blade takes 0.02s to complete one revolution
- ❖ The axle for the blade is 3 inches below the cutting surface
- ❖ The radius of the circular cutting blade is 5 inches

Table Saw B

- ❖ The blade takes 0.03s to complete one revolution
- ❖ The axle for the blade is 5 inches below the cutting surface
- ❖ The radius of the circular cutting blade is 6 inches

In Summary…

- The sine and cosine functions can be used as models to solve problems that involve many types of repetitive motions and trends.