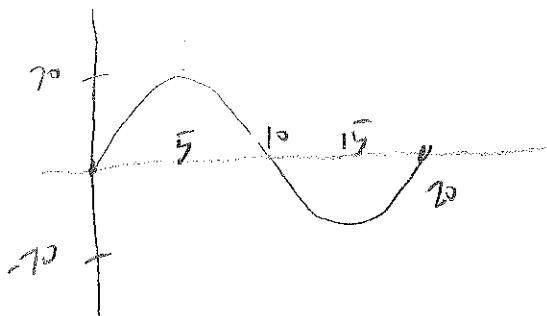# Sections 4.5 – Graphs of Sine & Cosine Functions (Day 4)

Writing the equation of the sinusoid given the graphs or other information

Ex 1: The highest point on a sinusoidal curve is at 70 and the lowest point is at -70. At day zero, the function's value is 0 and then it starts heading upwards. The period is 20 days. Write a sinusoid equation that represents this function. Hint: draw a sketch first.
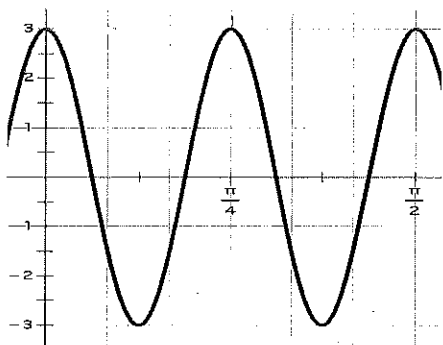
$$20 = \frac{2\pi}{B} \Rightarrow B = \frac{2\pi}{20} = \pi/10$$

$$amp = 70$$

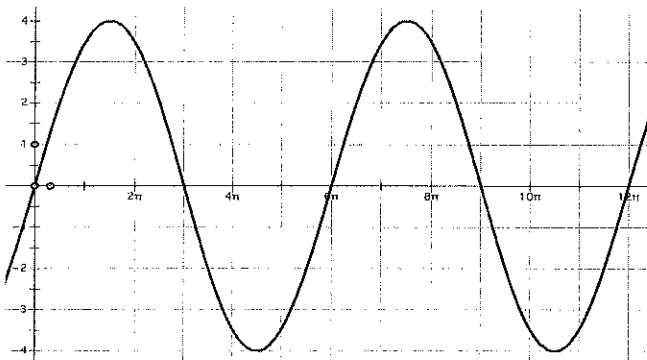$$y = 70 \sin \frac{\pi x}{10}$$

Ex 2: Write an equation for this graph.

$$P = \pi/4 = \frac{2\pi}{B} \Rightarrow B = 8$$

$$amp = 3$$

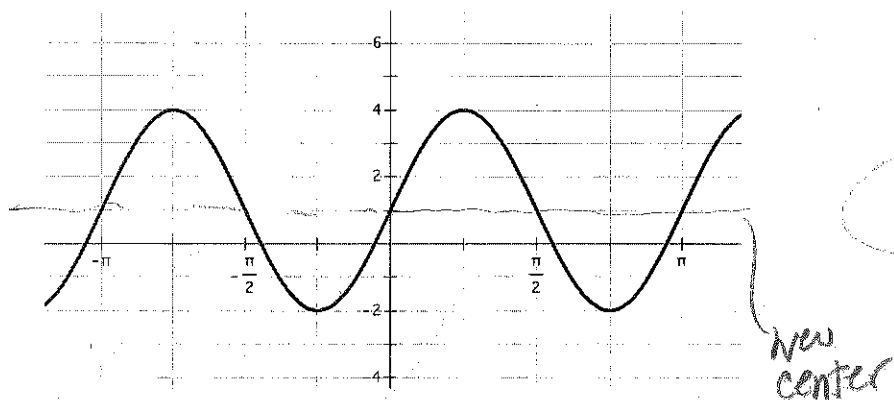$$y = 3 \cos 8x$$

Ex 3: Write an equation for this graph.

$$P = 6\pi = \frac{2\pi}{B} \Rightarrow B = \frac{1}{3}$$

$$amp = 4$$

$$y = 4 \cos \frac{x}{3}$$

Sections 4.5 – Graphs of Sine & Cosine Functions (Day 4)
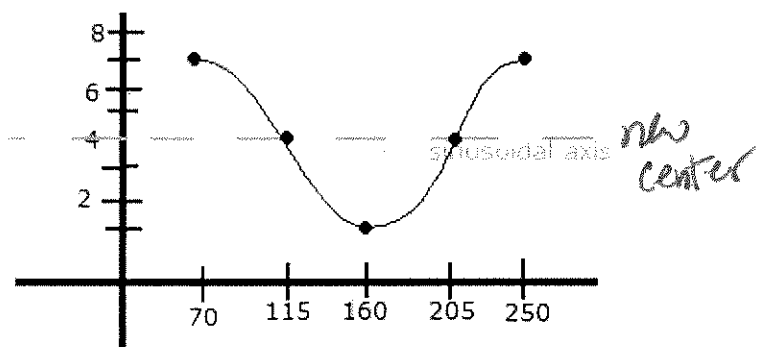
Ex 4: Write an equation for this graph.

$$P = \pi = \frac{2\pi}{B} \Rightarrow B = 2$$
$$a = 3 \quad \text{new center} = 1$$

$$\boxed{y = 3\sin 2x + 1}$$

new center

Ex 5: Write an equation for this graph.   Hint: Draw in the new "axis of oscillation" ("sinusoidal axis" or "midline") first
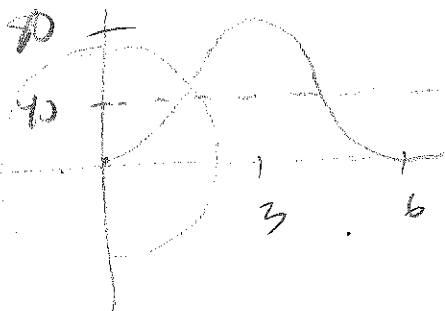

sinusoidal axis   new center

$$\text{new center} = 4$$
$$a = 3$$
$$P = 250 - 70 = 180 = \frac{2\pi}{B}$$
$$\Rightarrow B = \pi/90$$
$$\text{shift right } 70$$

$$\boxed{y = 3\cos\left(\frac{\pi x}{90} - 70\right) + 4}$$

Ex 6: Write an equation of a sinusoidal function that will model the height of a rider on a ferris wheel. Assume the rider gets on the Ferris wheel at ground level and it takes 3 minutes to get to the top of the wheel at a height of 80 feet.

new center = 40
$$a = 40$$
$$P = 6 = \frac{2\pi}{B} \Rightarrow B = \pi/3$$
vertical shift up 40
reflect over new center

$$\boxed{y = -40\cos\left(\frac{\pi x}{3}\right) + 40}$$