What's Going On?

Checking In

Minds on Another Ferris Wheel

Action! Problem Solving

Consolidation Clear / Unclear

Learning Goal - I will be able to problem solve with sinusoidal functions.

Minds on

Another Ferris Wheel!

Mahew is riding a Ferris wheel at a constant speed of 10 km/h. The boarding height for the wheel is 1 m, and the wheel has a radius of 7 m. What is the equaon of the funcon that describes Mahew's height in terms of me, assuming Mahew starts at the highest point on the wheel?

How long does one rotation take?

$C = 2\pi r$

$= 14\pi$

$= 43.96\,m$

$a = 7$

$k = 22.6$

$d = 0$

$c = 4$

Convert km/h into m/s

$10\ km/h \Rightarrow 10000\ m/h$

$\div 60$

$166.67\ m/min$

$\div 60$

$2.78\ m/s$

$t \times s = d \times t$

$\frac{t}{t} = \frac{d}{t}$

$t = \frac{d}{s}$

$$\text{time for one rotation} = \frac{43.69}{2.76}$$

$$t = 15.8\ s$$

$$\text{Period} = 15.8\ s$$

$$\text{Period} = \frac{360}{k}$$

$$k = \frac{360}{\text{period}}$$

$$k = \frac{360}{15.8}$$

$$k = 22.8$$

Because Matt starts at the highest point, we use cosine and we don't need to shift!! $d = 0$

$$\therefore h = 7\cos(22.8t) + 6$$

Action!

Problem Solving

A group of students is tracking a friend, John, who is riding a Ferris wheel. They know that John reaches the maximum height of 11 m at 10 s and then reaches the minimum height of 1 m at 55 s. How can you develop the equaon of a sinusoidal funcon that models John's height above the ground to determine his height at 78 s?

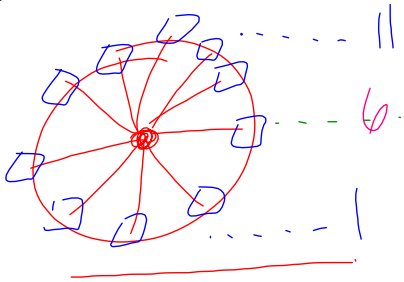
Using cos

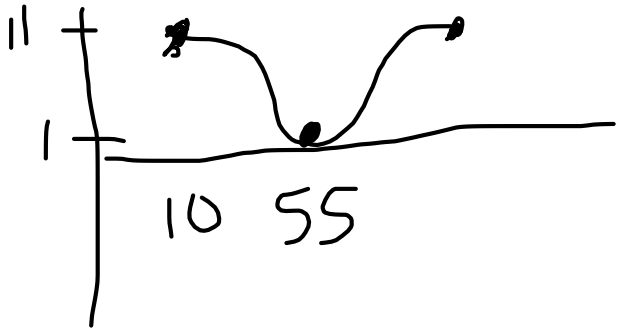
$a = 5$

$k = 4$ ← $\frac{360}{90}$

$d = 10$

$c = 6$





$$per = \frac{360}{k}$$

$$90 = \frac{360}{k} \quad k = 4$$

$$h = 5\cos(4(t-b)) + 6$$

$$h = 5\cos(4(t-10)) + 6$$

78

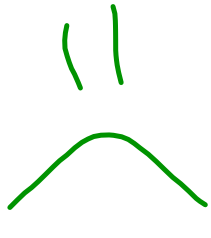
$$h = 5\cos(4(68)) + 6$$

$$h = 5\cos(272) + 6$$

$$h = 5(0.03) + 6$$

$$\boxed{h = 6.17\text{ m}}$$

$\Rightarrow 6.2\text{m}$



Action!

Problem Solving

The top of a flagpole sways back and forth in high winds. The top sways 10 cm to the right (+10 cm) and 10 cm to the le (-10 cm) of its resng posion and moves back and forth 240 mes every minute. At t = 0, the pole was momentarily at its resng posion. Then it started moving to the right. Determine the equaon of a sinusoidal funcon that describes the distance the top of the pole is from its resng posion in terms of me.

$\frac{240 \text{ cycles}}{60 \text{ s}} = \frac{1 \text{ cycle}}{?}$

period = 0.25 s

using sin

$a = 10$

$\frac{360}{k} = 0.25$

$k = 1440$

$d = 0$

$c = 0$

$p(t) = 10 \times \sin(1440t)$

Consolidation

Clear / Unclear