

MHF 4UI UNIT 5

Trigonometric Functions

Day 8

Applications of Sinusoidal Functions

Rearranging (Isolating) Equations

B.E.D.M.A.S

S.A.M.D.E.B

$$y = 4 \frac{(3x - 2)^2}{5} - 3$$

(1) Move all additions/subtractions to other side of equation

$$y + 3 = 4 \frac{(3x - 2)^2}{5}$$

(2) Move all multiplications/divisions to other side of equation

$$\frac{y + 3}{4} = \frac{(3x - 2)^2}{5}$$

$$5 \frac{(y + 3)}{4} = (3x - 2)^2$$

(3) Move exponents to other side

$$\sqrt{5 \frac{(y + 3)}{4}} = 3x - 2$$

(4) Move bracketed items to other side

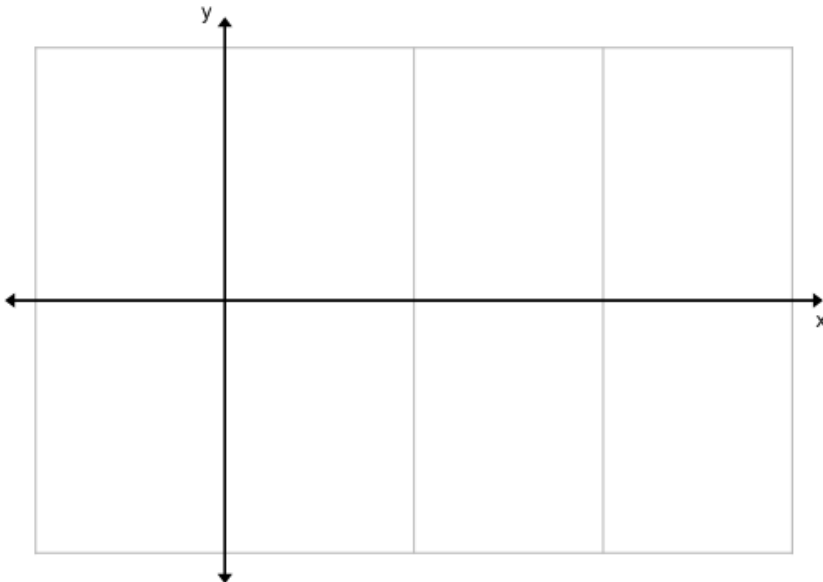
$$\sqrt{5 \frac{(y + 3)}{4}} + 2 = 3x$$

$$\frac{\left(\sqrt{5 \frac{(y + 3)}{4}} + 2 \right)}{3} = x$$

Example 1: Pebble in the tire problem:

When you stop your car at a traffic light, a pebble becomes wedged between the tire treads. When you start off the height of the pebble from the pavement varies sinusoidally with the distance travelled. The period is the circumference of the wheel. The diameter is 60 cm.

a) Sketch a graph of this function:



b) Write an equation for this function.... Is it possible to get an equation with no phase shift?

c) Predict the distance from the pavement when you have gone 37 cm.

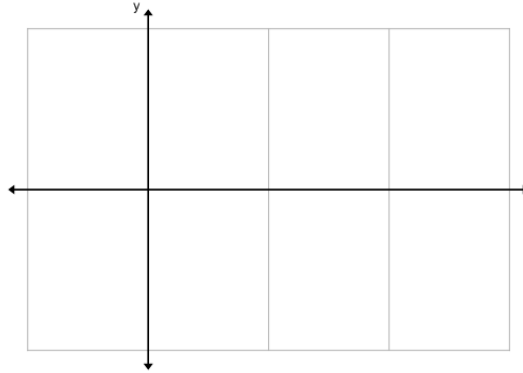
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Example 2: Tide problem:

At a certain point on the beach, a post sticks out of the sand. The post sticks out of the ground 76cm. The depth of the water at the post varies sinusoidally with time due to the motion of the tides and is given by the equation:

$$d = 60 \cos \frac{2\pi(t-2)}{12} + 40$$

a) Sketch the graph:



b) Solve the equation for t in terms of d:

c) What is the earliest time of day the water level is just at the top of the post?

d) At the time calculated in c) is the post going under the water or emerging from it?

e) Between what times will the post be completely buried?

Example 3: Suppose that you have determined that x and y are related by the following equation:

$$y = 5 \cos \frac{2\pi(x+4)}{20} + 2$$

Determine the coordinates of points A, B, C and D

