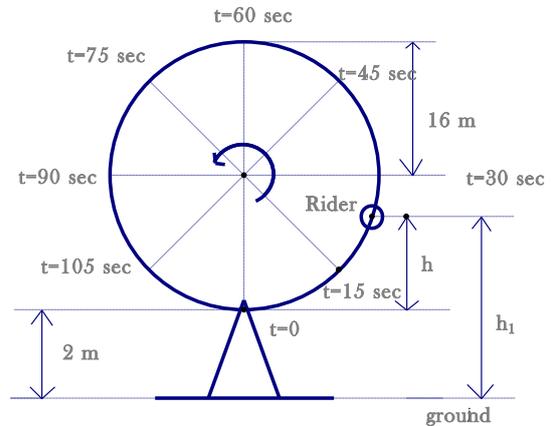




Solutions to Ferris wheel Assignment.

A Ferris wheel with a radius of 16 metres makes one complete revolution in 2 minutes and it is 2 metres off the ground at its lowest point. A rider starts at the bottom of the Ferris Wheel and rotates in the anticlockwise direction.



1. Write parametric equations describing the motion of the rider on the Ferris wheel. Use time, t , in seconds as your parameter.

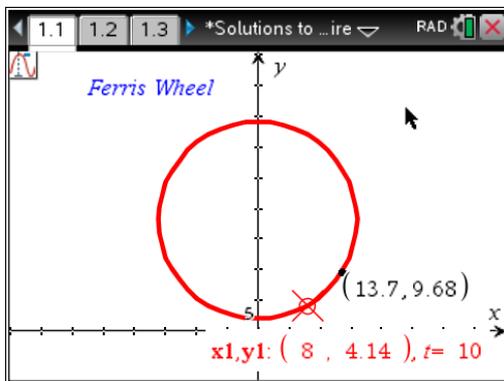
Period = 120 seconds.

$$n = \frac{2\pi}{120} = \frac{\pi}{60}$$

$$x = 16 \sin\left(\frac{\pi t}{60}\right)$$

$$y = 18 - 16 \cos\left(\frac{\pi t}{60}\right)$$

2. Enter your equations (in Parametric Mode) on your calculator, set up the Window and check if your equations follow the conditions described above.



3. Give the Cartesian equation of the Ferris wheel with the x -axis at the ground level and the y -axis passing through the centre of the Ferris wheel.

$$x^2 + (y - 18)^2 = 256$$

Use your calculator to answer Questions 4 & 5. Explain the steps taken to calculate the answers.

4. Find the position of the rider after 10 sec and after 70 sec.

After 10 sec the position is (8, 4.14)

After 70 sec the rider is at (-8, 31.86)

5. Find the times, within the first revolution, when the rider is at the height of 10 metres.

After 20 sec and then after 100 sec.

6. Another Ferris wheel with a diameter of 10 metres completes one full revolution in 90 seconds. The lowest point of the Ferris wheel is 1.5 metres above the ground.

a. Give the parametric and Cartesian equations for this Ferris wheel.

Parametric: $x = 5 \sin\left(\frac{\pi t}{45}\right)$ $y = 6.5 - 5 \cos\left(\frac{\pi t}{45}\right)$	Cartesian: $x^2 + (y - 6.5)^2 = 25$
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b. Hence find the times when a rider is at the height of 8 metres above the ground while completing her first turn.

26.86 and 63.14