What's Going On?

Checking In

Minds on Sketch Me!

Action! Periodic Functions

Consolidation Periodic or Not?

Learning Goal - I will be able to identify the properties of periodic functions.

Minds on

Sketch Me!

Imagine you are on a Ferris Wheel.

The diameter of the wheel is 100 metres.

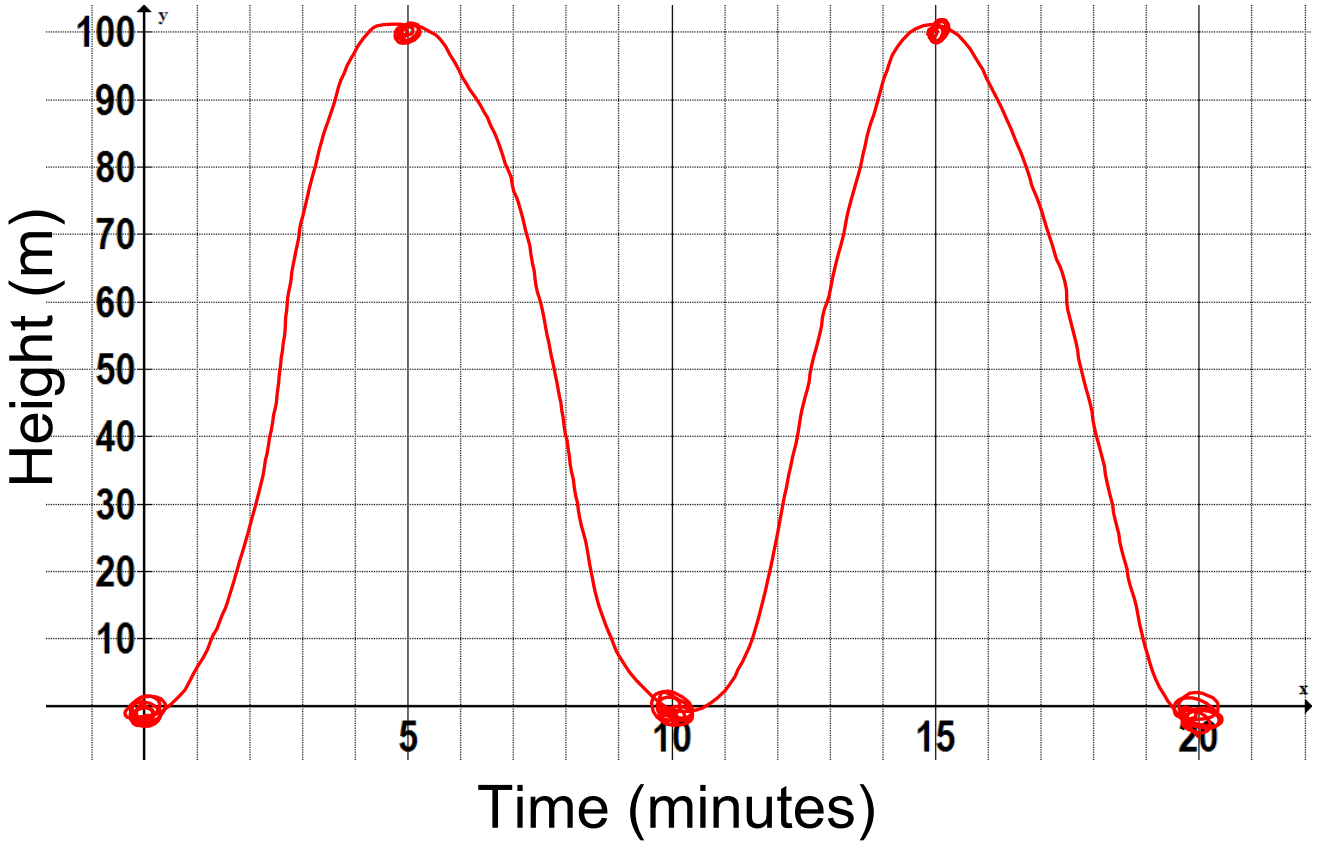
Assume that once you get on, the Ferris Wheel rotates at a constant speed, 2 times.

It takes you 10 minutes to get all the way around once and back to the ground.

Sketch a graph of your height off the ground vs. time.

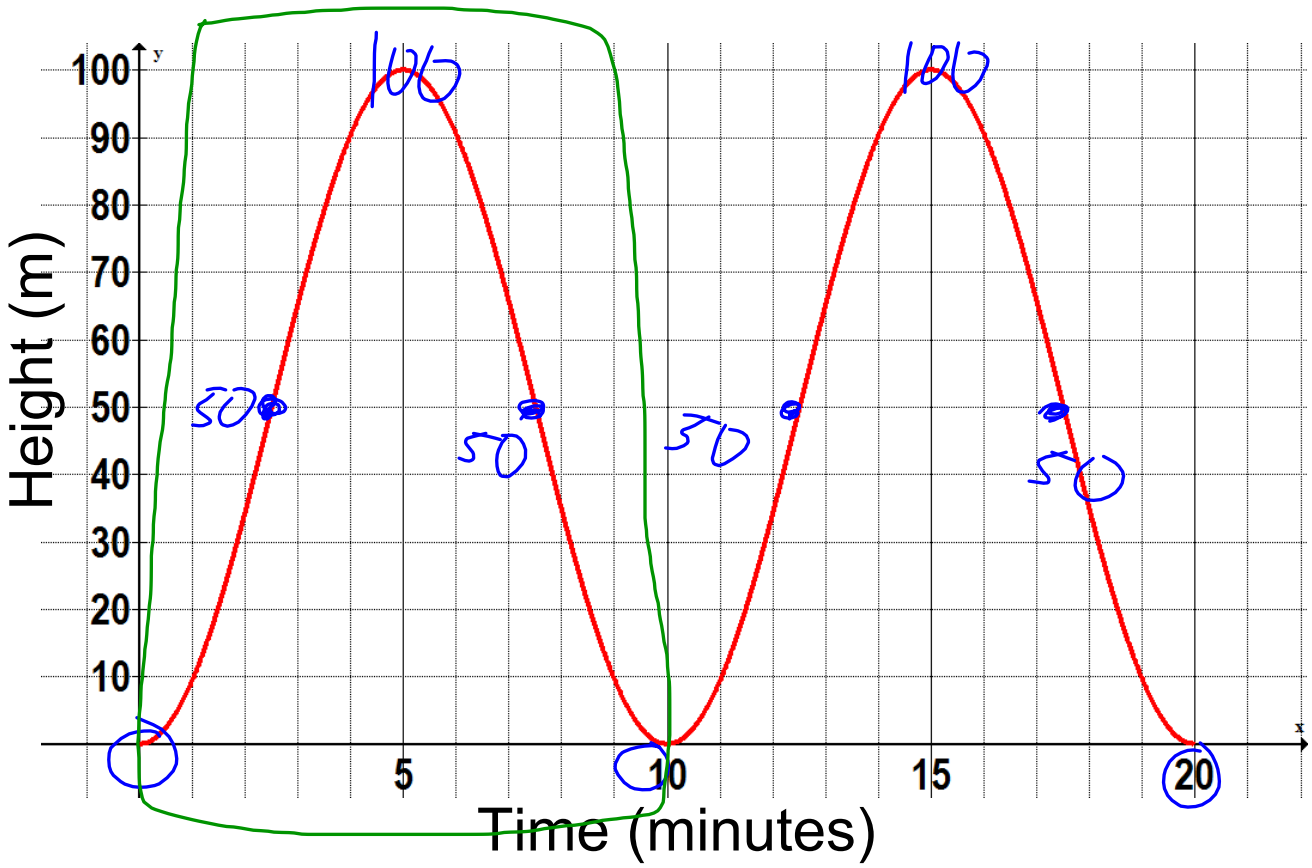
Minds on

Sketch Me!



Minds on

Sketch Me!



Action!

Periodic Functions

Periodic Function

A function whose graph repeats at regular intervals; the y-values in the table of values show a repetitive pattern when the x-values change by the same increment.

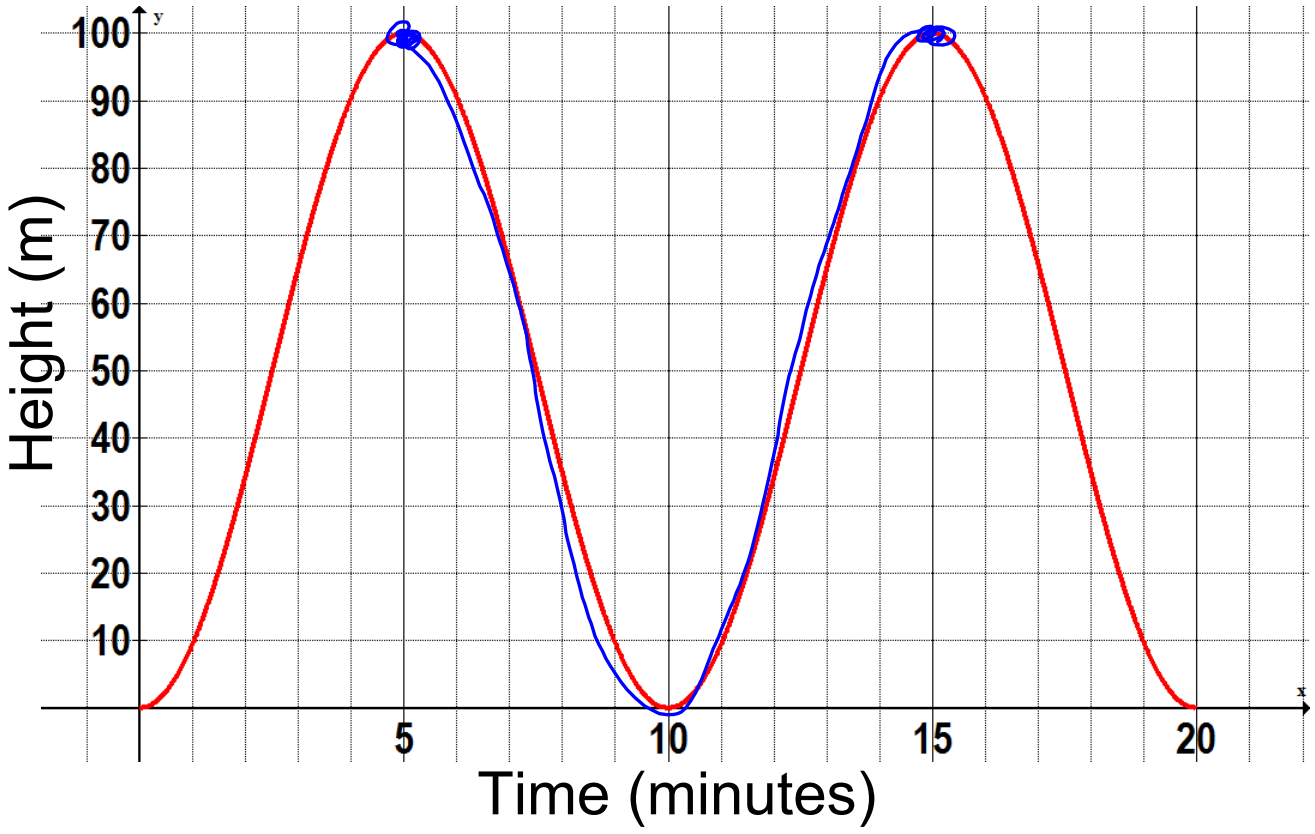
Definitions

Period → 10 minutes

- the length of one cycle

- the change in independent variable corresponding to one cycle

- the portion of the graph that repeats



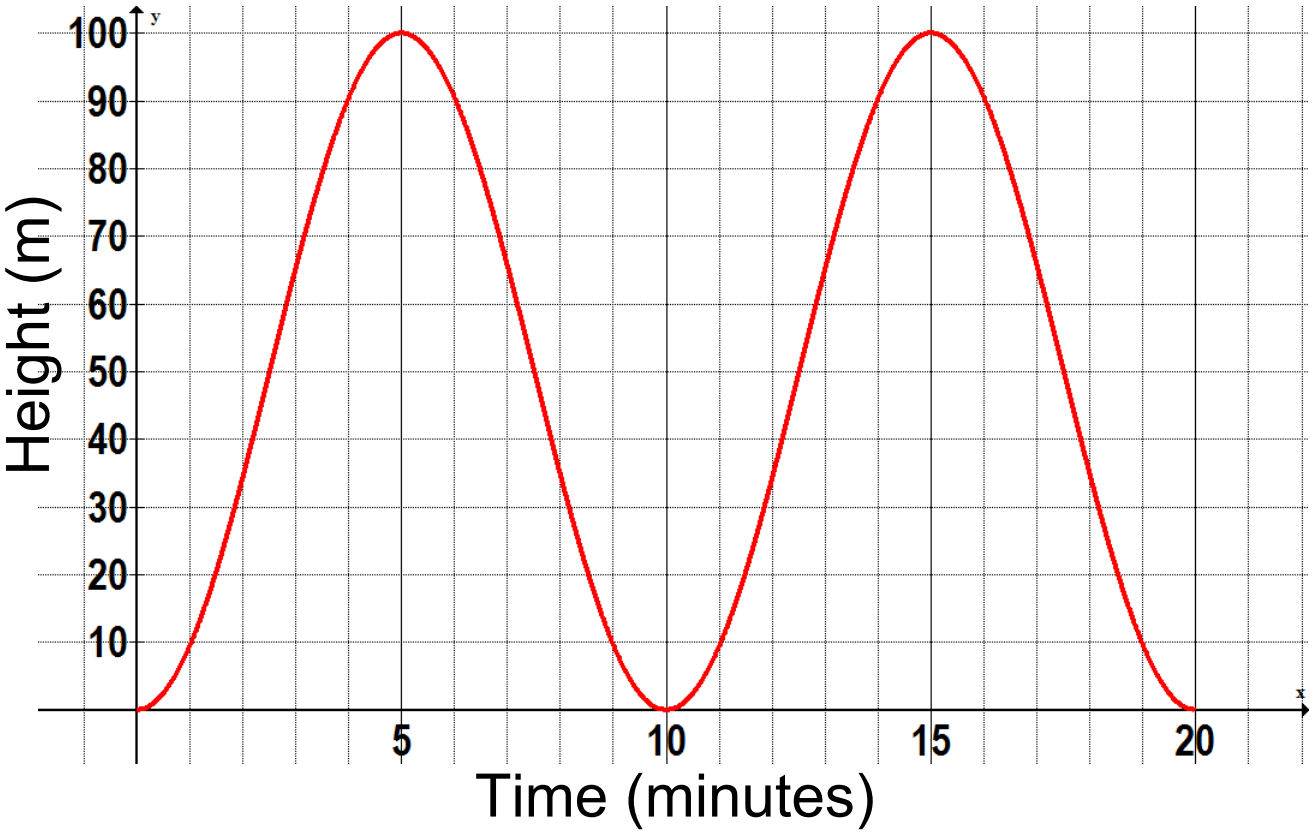
Definitions

Peak → 100m

The maximum point on a graph.

Trough → 0m

The minimum point on a graph.

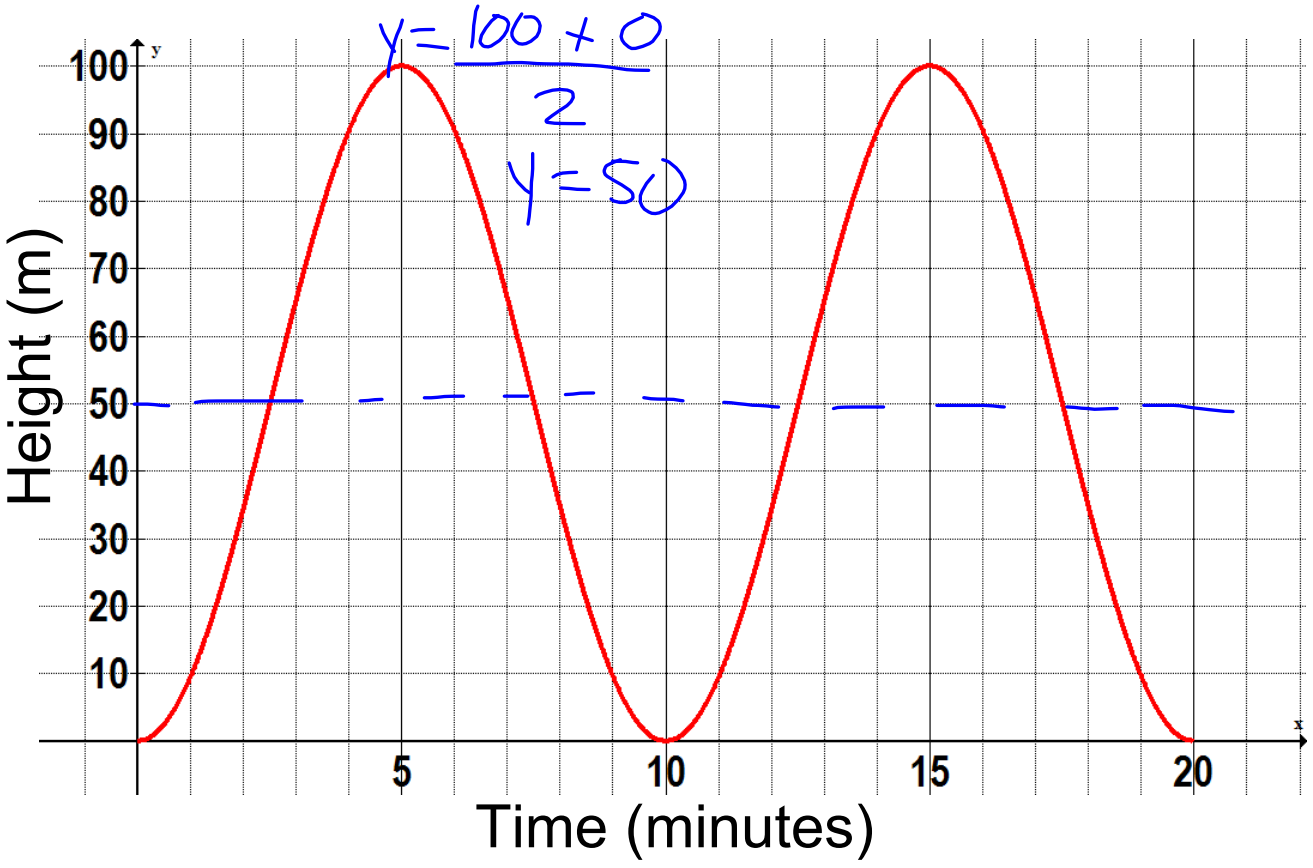


Equation of the Axis

The equation of the horizontal line halfway between the maximum and the minimum.

Determined by the equation:

$$y = \frac{\max value + \min value}{2}$$



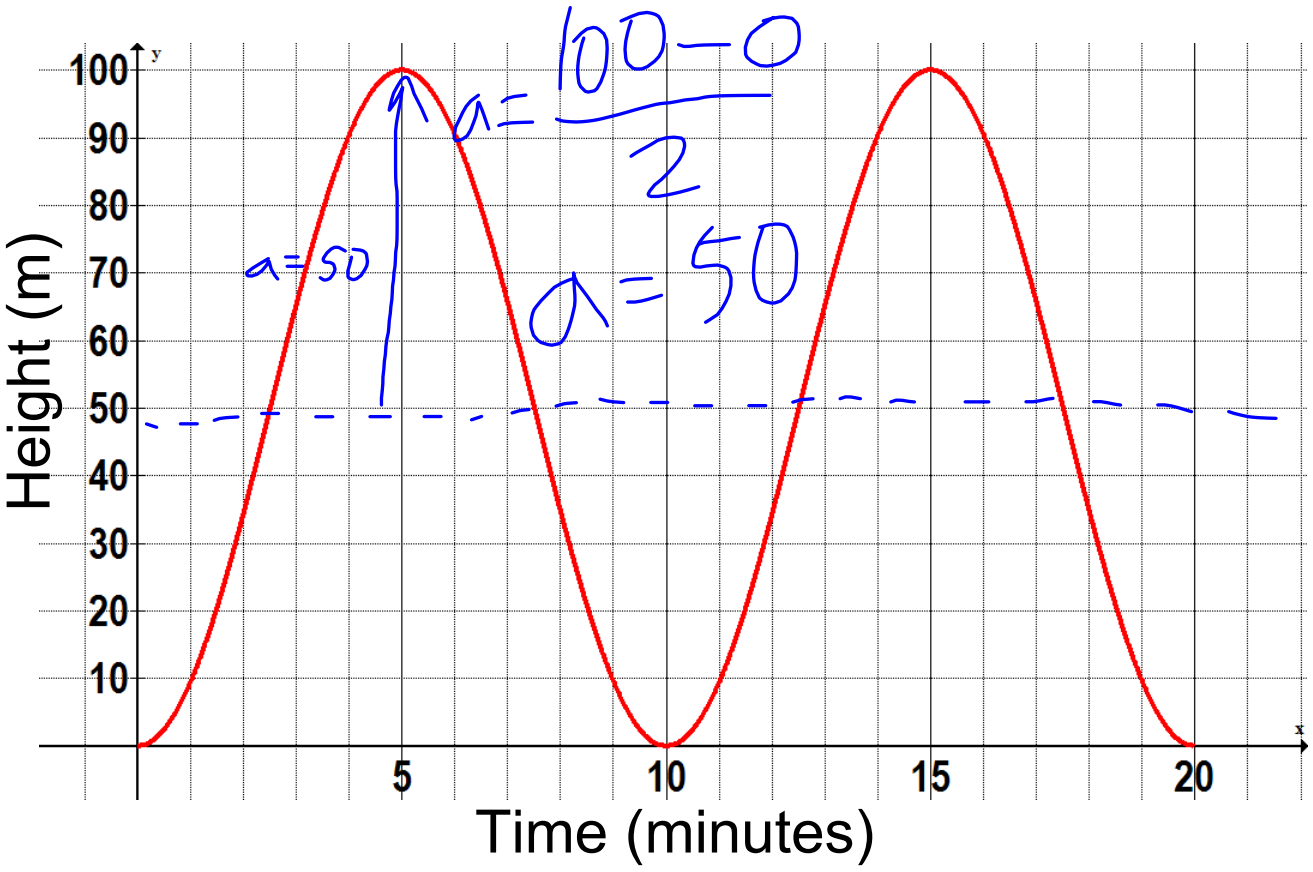
Amplitude

Half the difference between the maximum and minimum values.

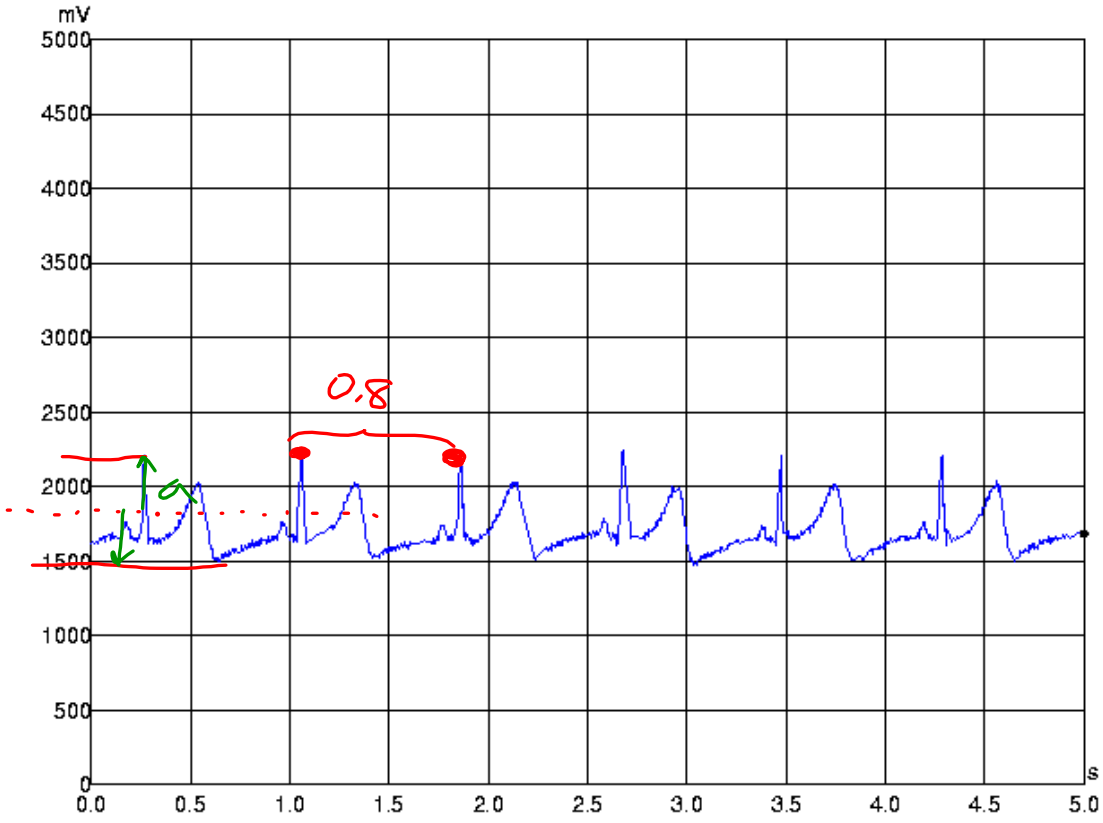
The vertical distance from the function's axis to the maximum or minimum value.

Determined by the equation:

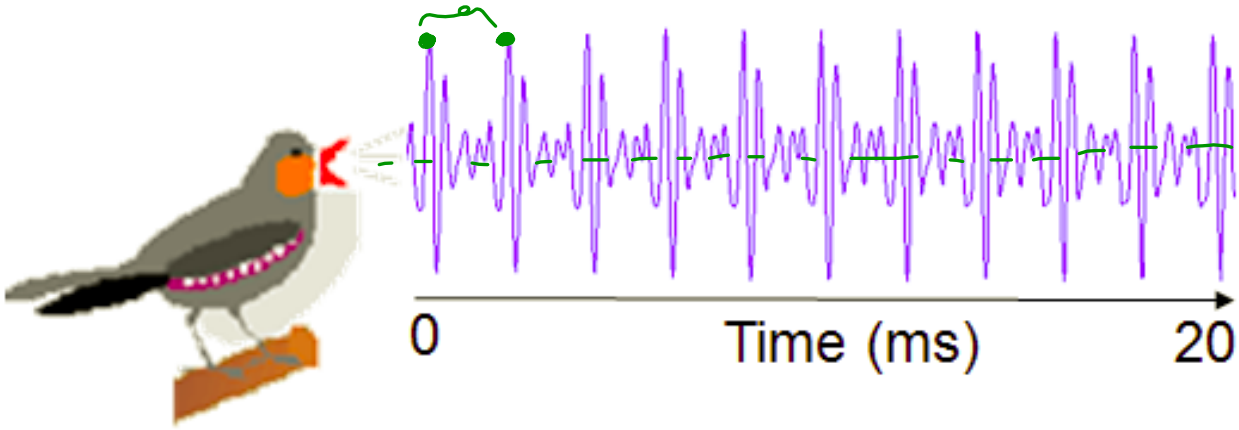
$$a = \frac{\max value - \min value}{2}$$



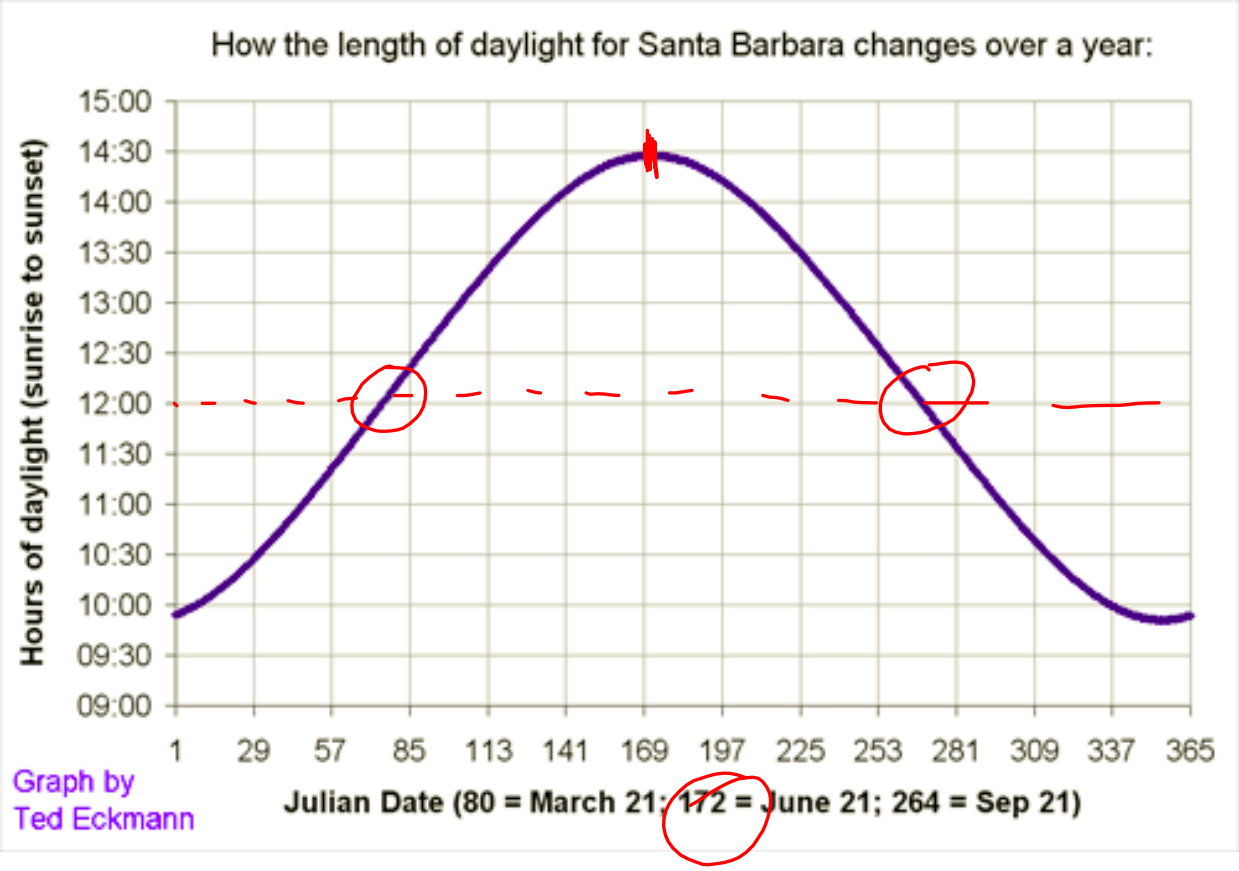
Heart Rate


mV
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
s
0,8
a

Bird Call

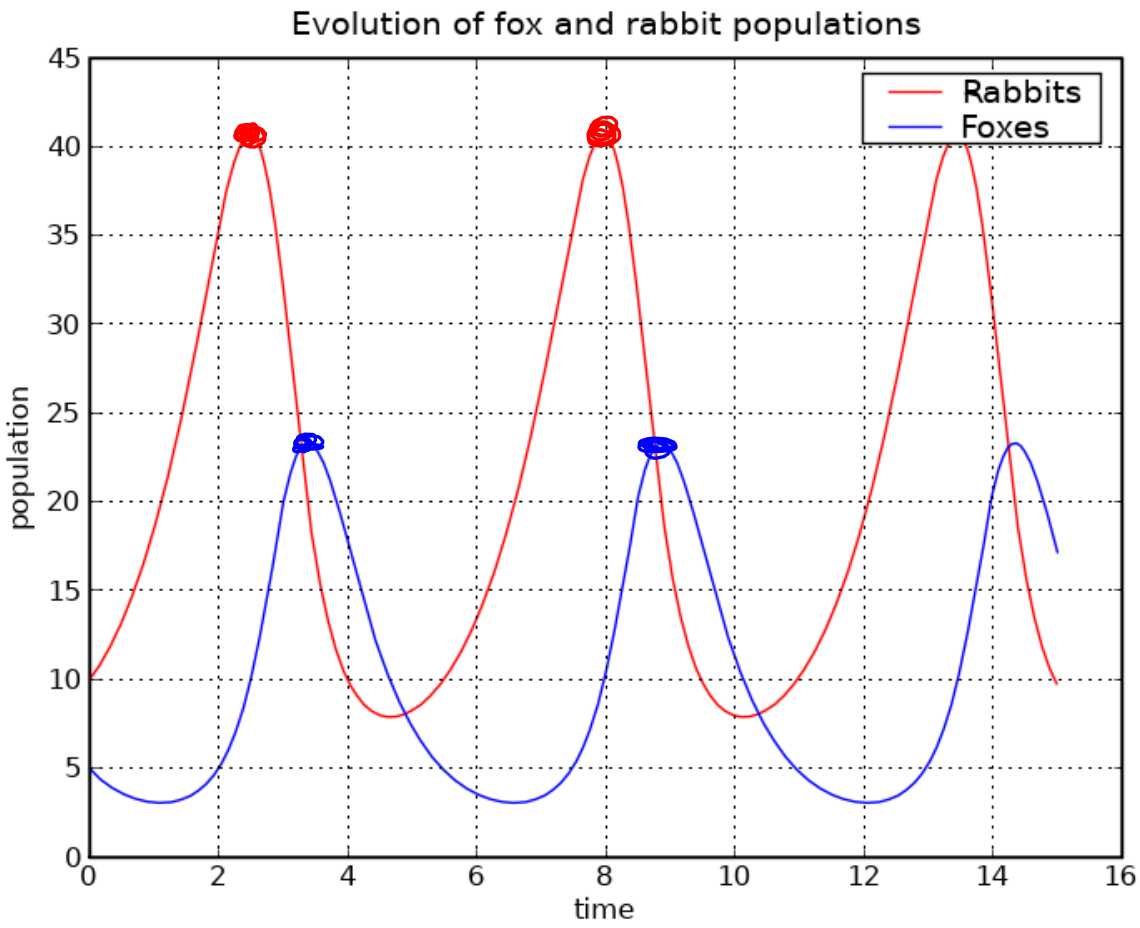


Hours of Daylight



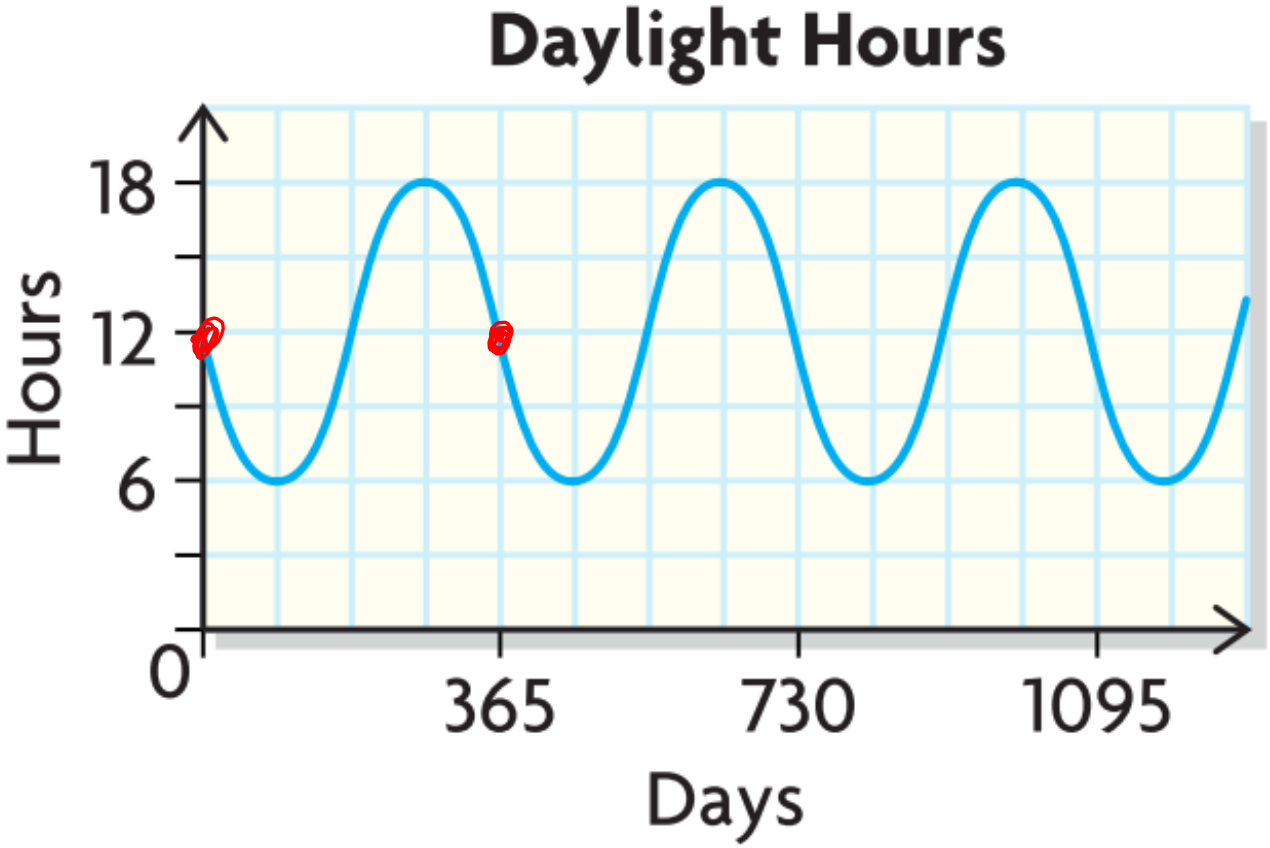
Action!

Examples of Periodic Functions



Consolidation

Periodic or Not?



Periodic!

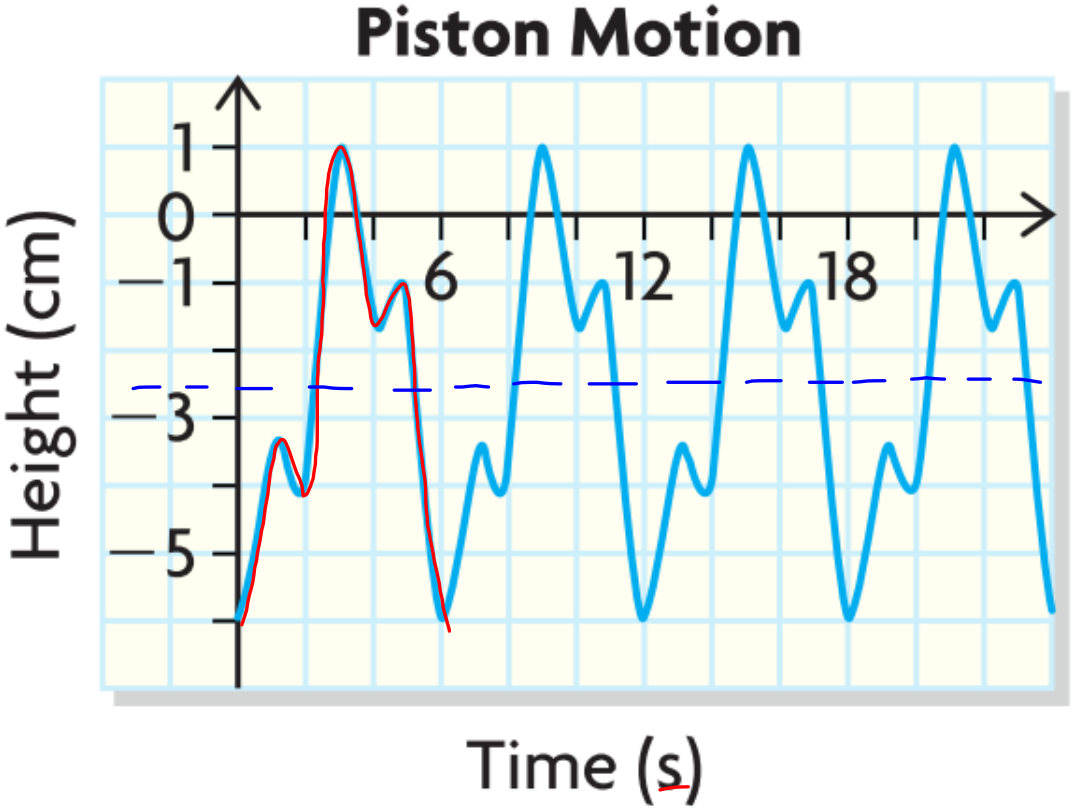
Period: 365 days

Equation of Axis: $H = 12$

Amplitude: $a = 6$

Consolidation

Periodic or Not?



Periodic!

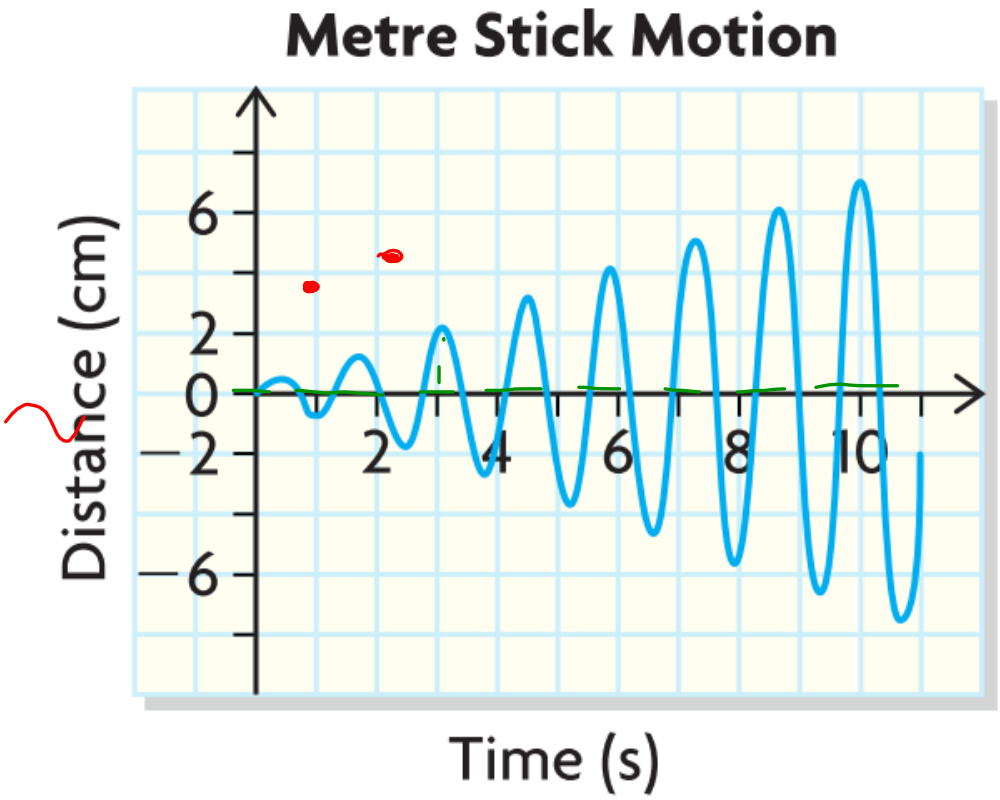
Period: 6 s

Equation of Axis: $\frac{1+(-6)}{2} = \frac{-5}{2} = -2.5$

Amplitude: $\frac{\text{max} - \text{min}}{2} = \frac{1-(-6)}{2} = \frac{7}{2} = 3.5$

Consolidation

Periodic or Not?



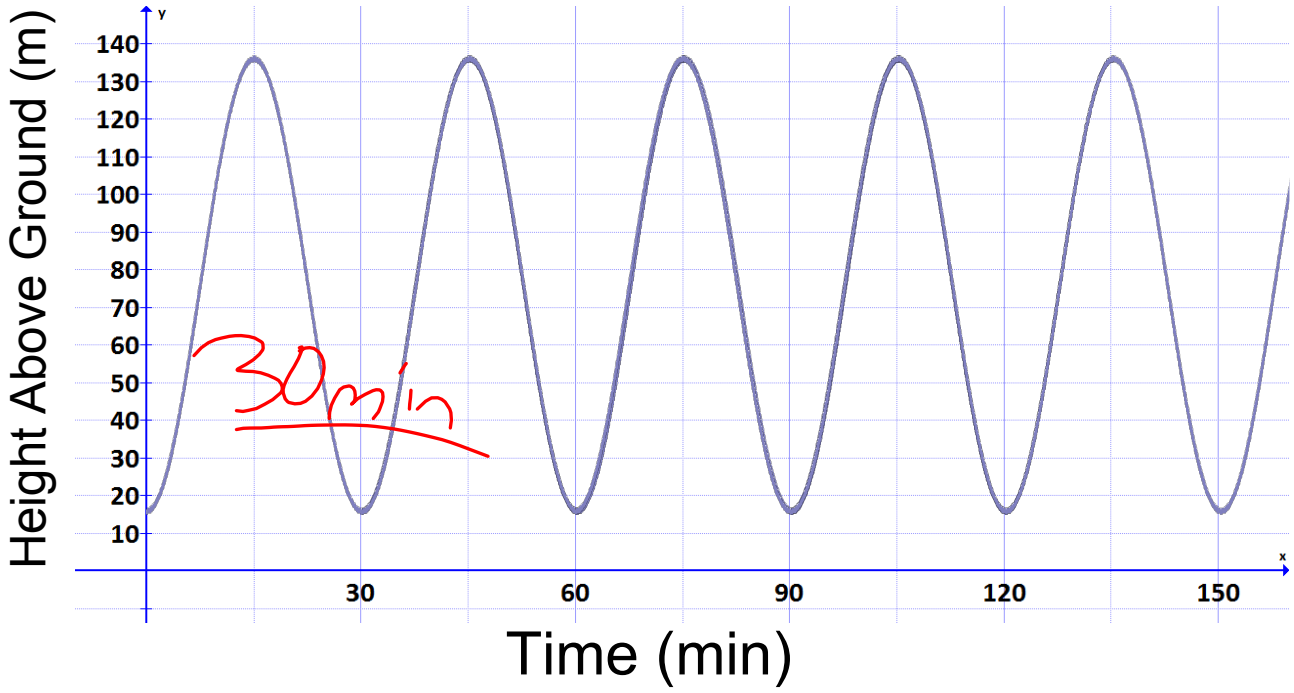
NOT Periodic!

Period:

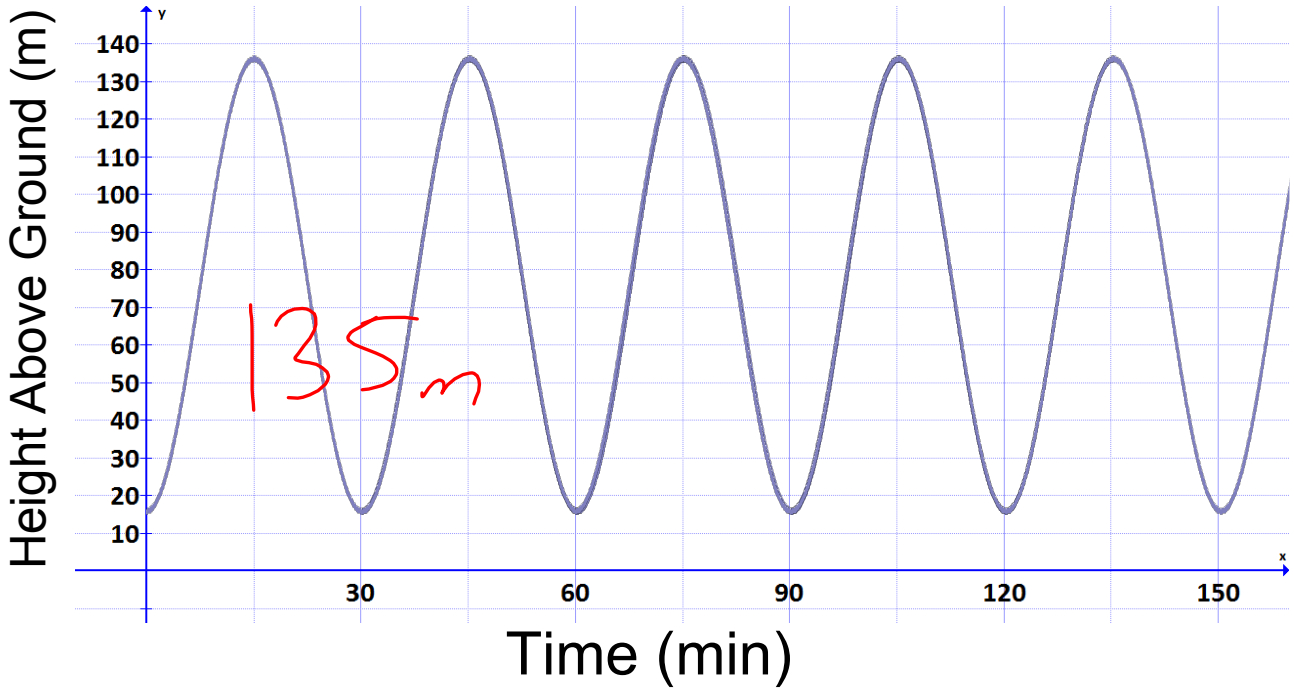
Equation of Axis:

Amplitude:

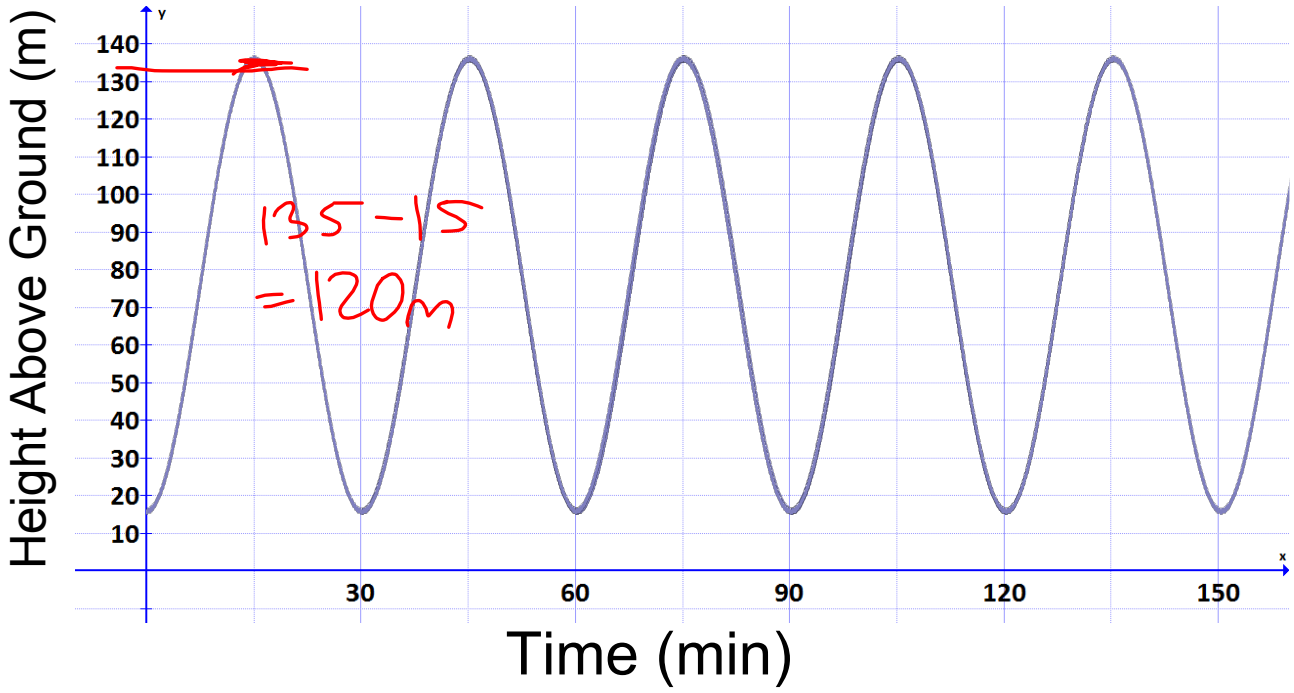
The London Eye



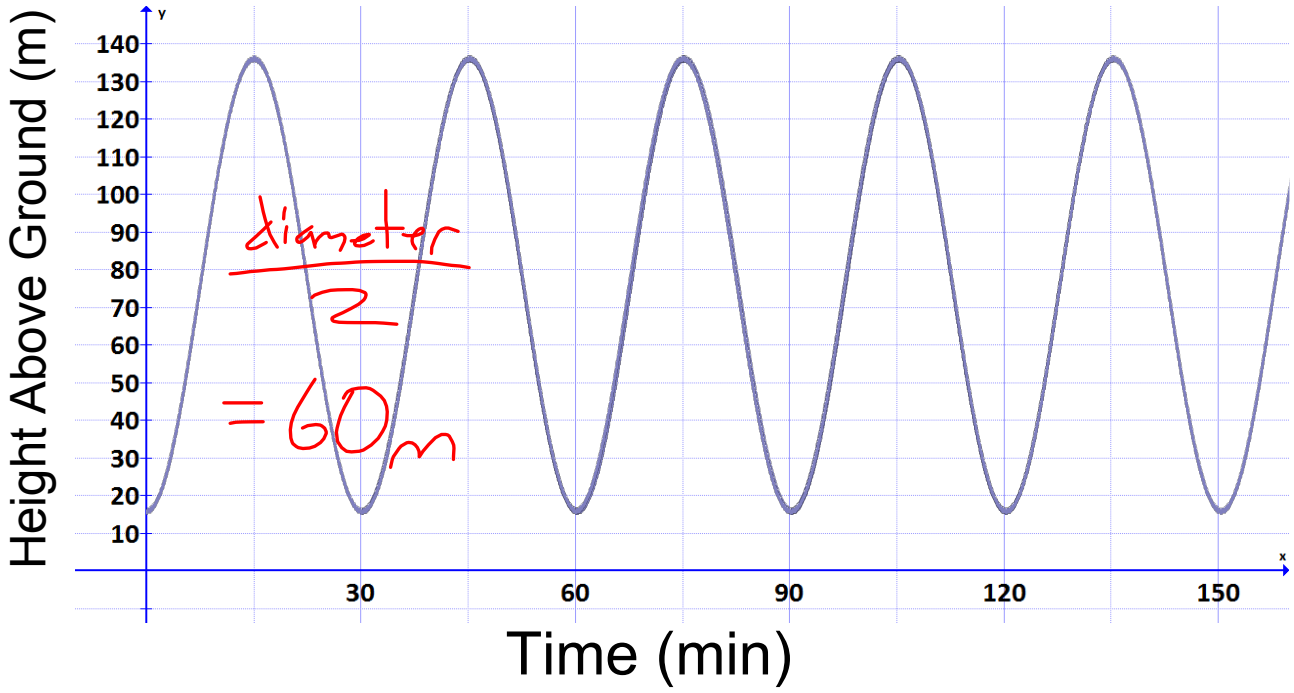
How long does it take to get around once?



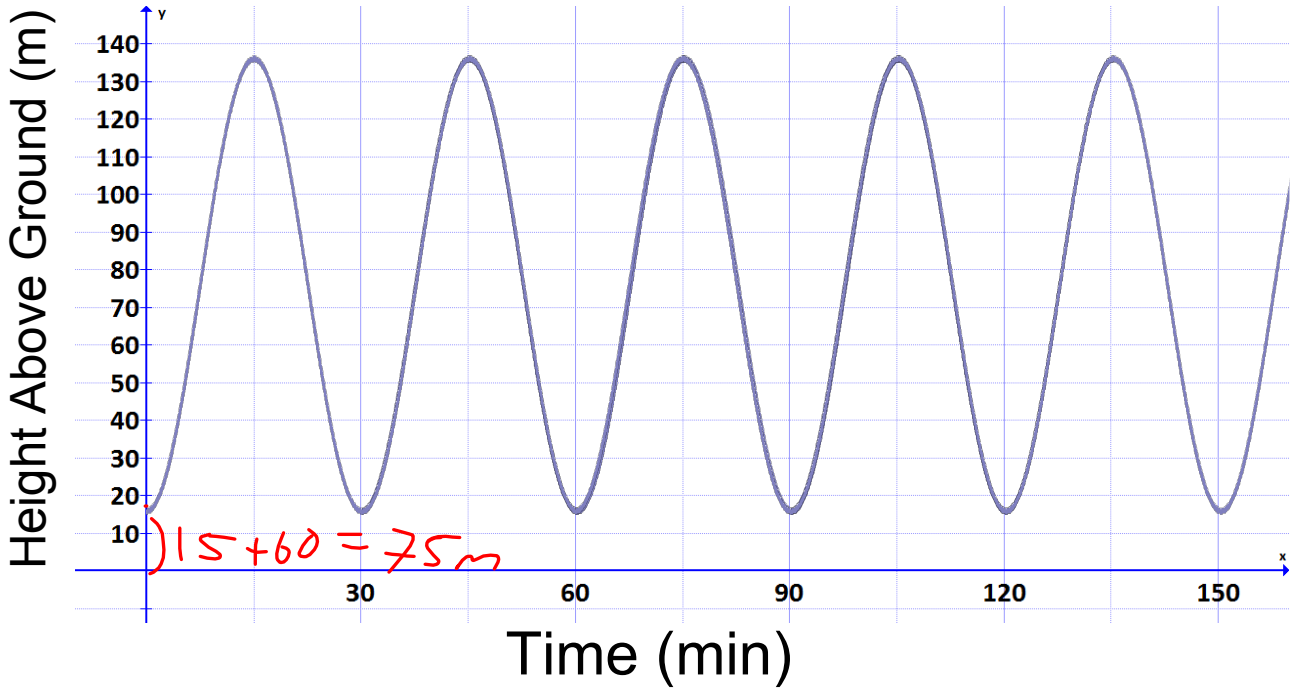
How tall is the London Eye?



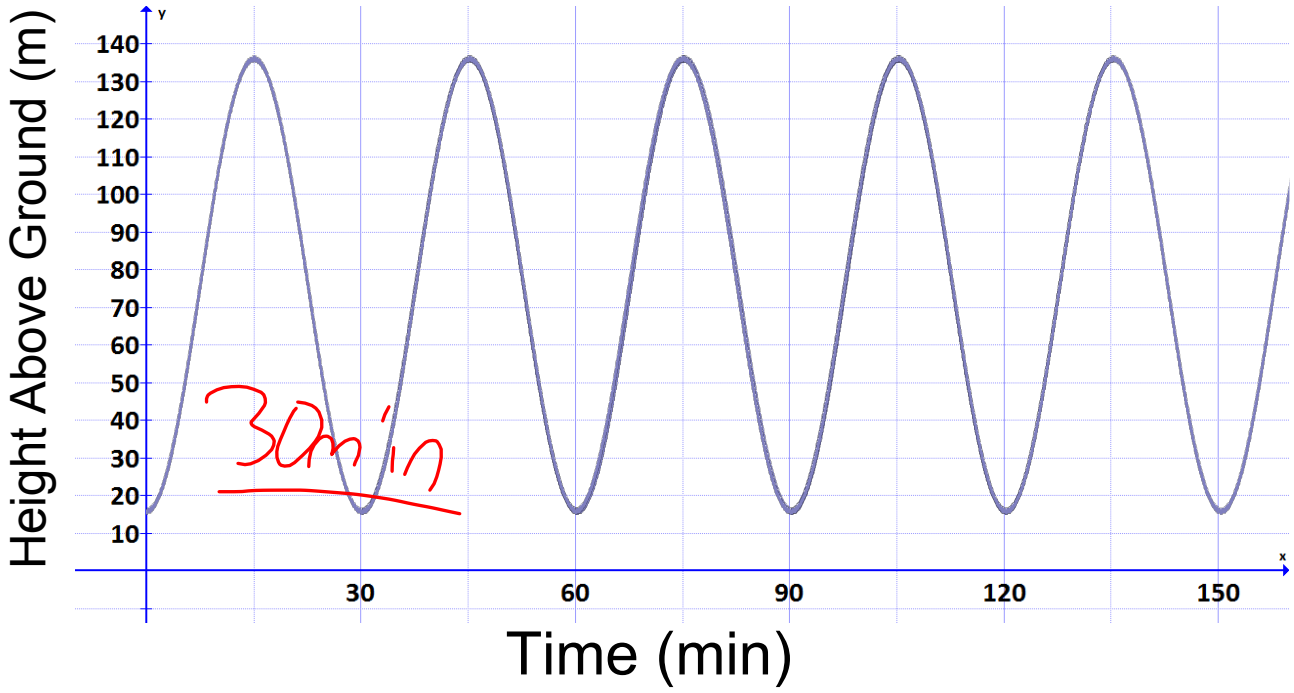
What is its diameter?



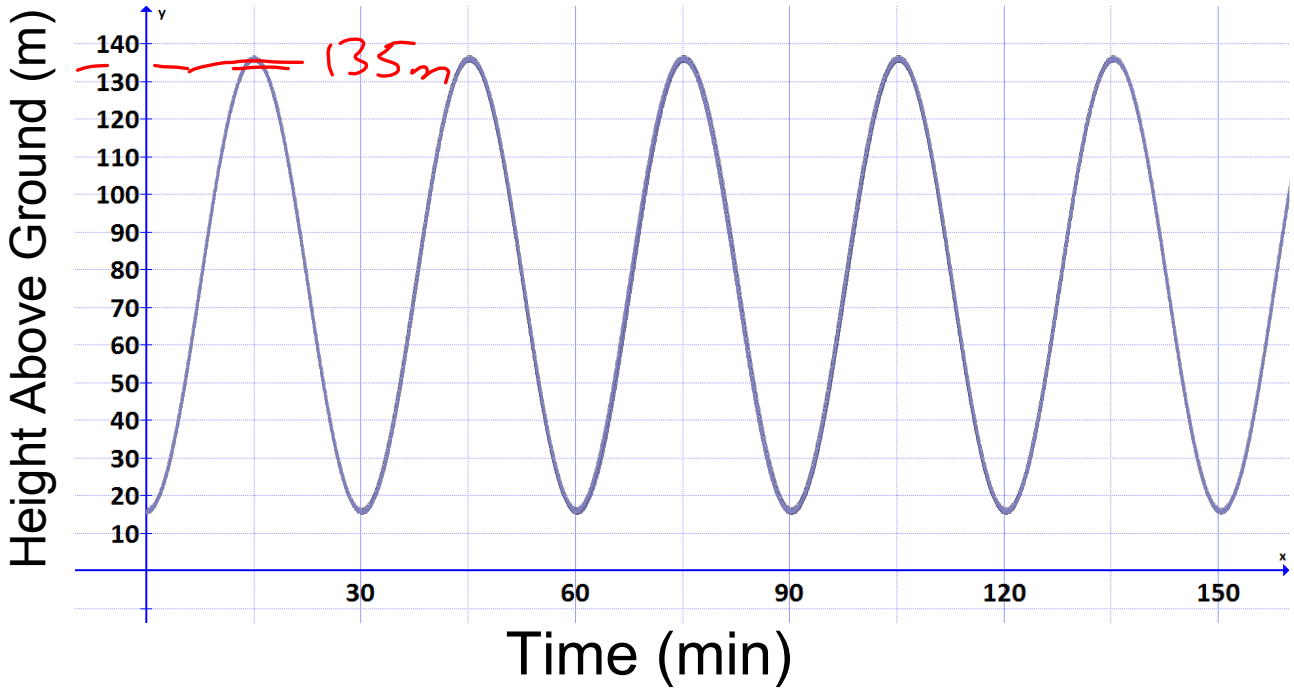
What is its radius?



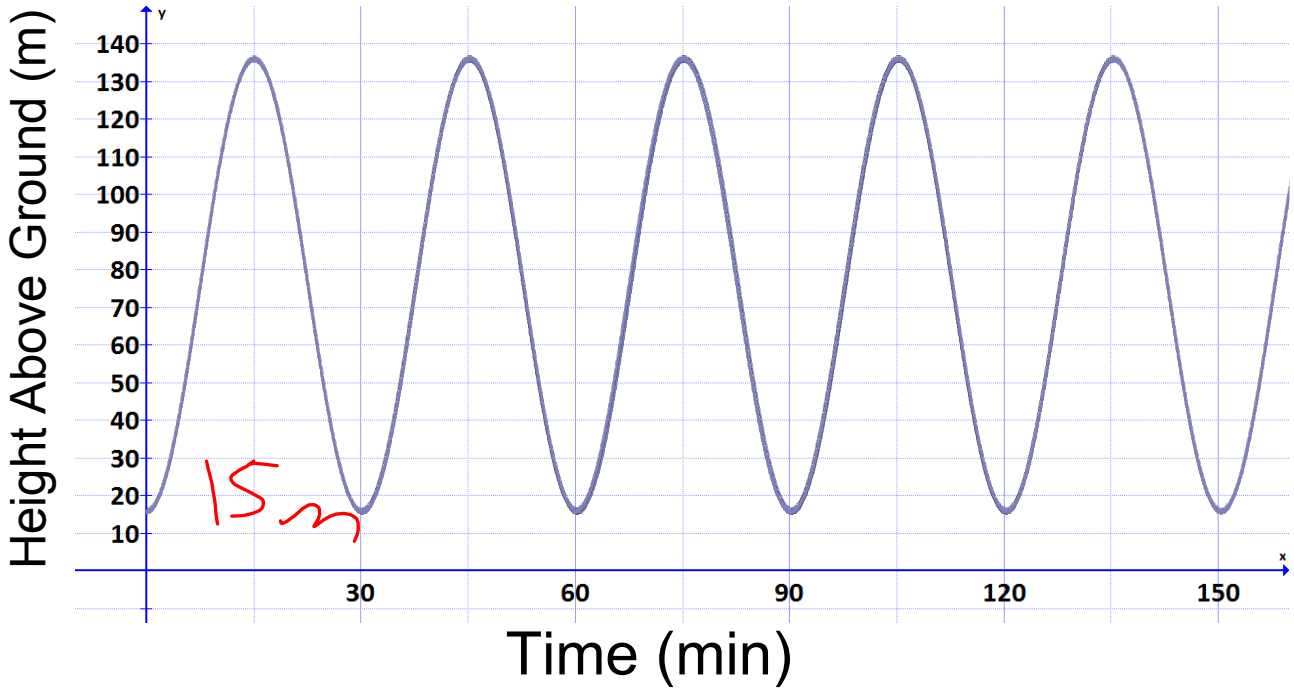
How high off the ground is its centre?



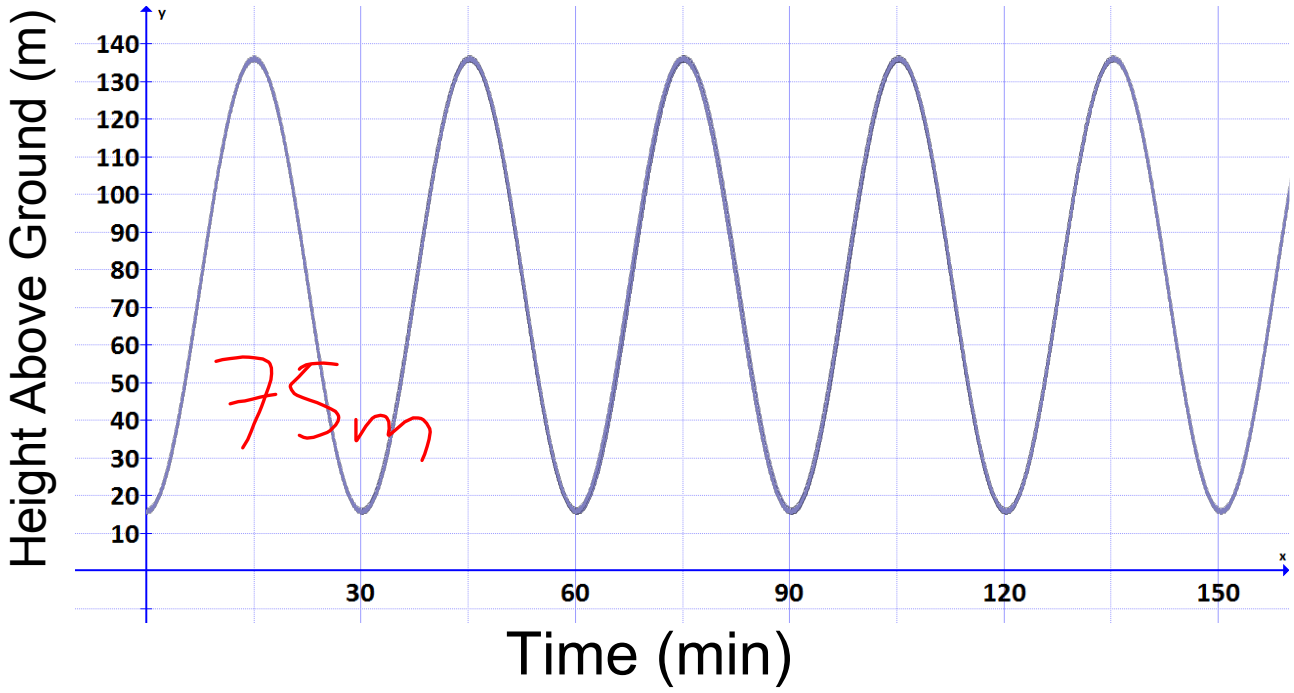
What is the period of the function of the London Eye?



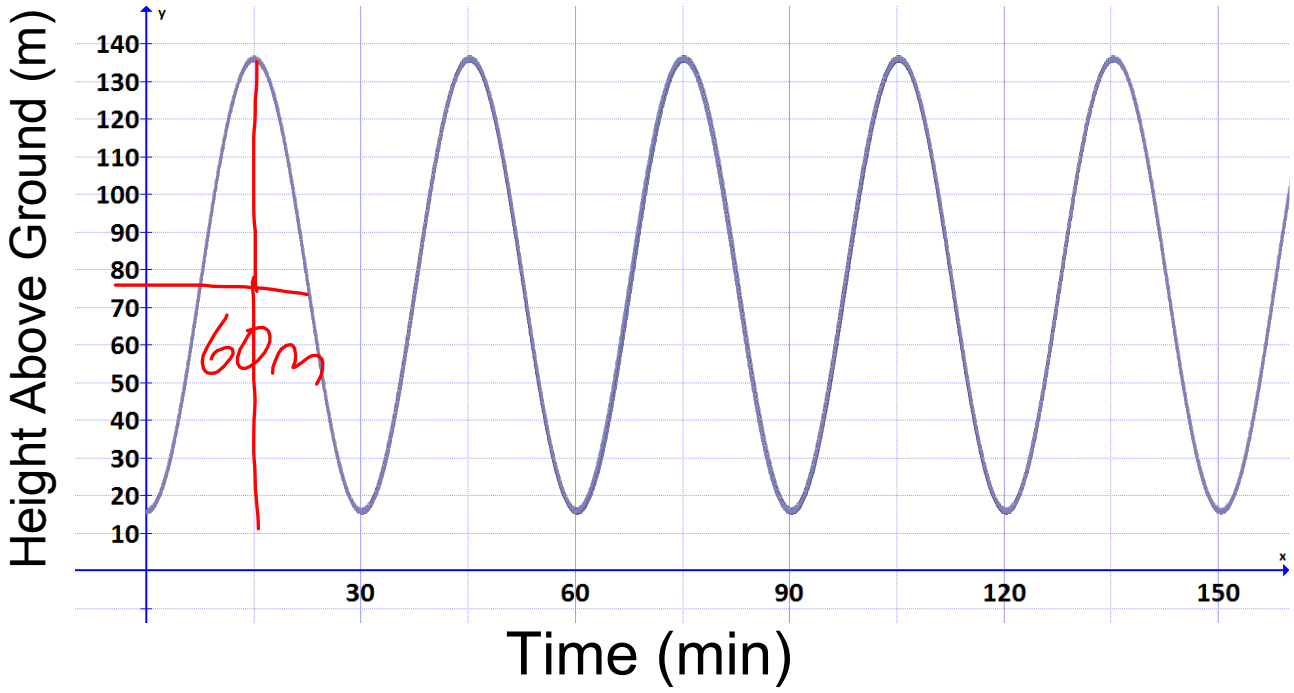
Identify the peak of the periodic function.



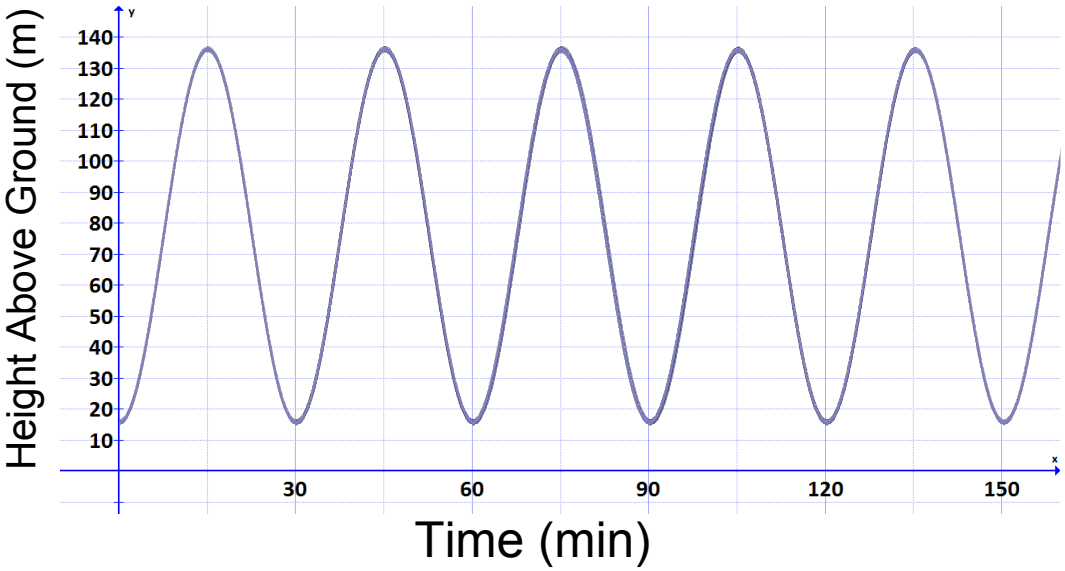
Identify the trough of the periodic function.



Determine the equation of the axis.



Determine the amplitude of the periodic function.



Challenge: What is the speed of the Ferris wheel in metres per second?

We need the distance travelled over a set period of time...

circumference is distance travelled in 30m

$C = 2\pi r$

$C = 2 \times \pi \times 60$

$C = 120\pi m$

Time = 30min

= 1800s

$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{120\pi}{1800}$

$= 0.21 m/s$