Welcome to The Orlando Eye!

Arrival and Entry
Please allow ample time for parking and obtaining tickets. To book an onsite workshop, please contact our call center at 866-228-6444. Workshops must be booked in advance.

Safety
To have the best adventure possible, please abide by all safety precautions posted and given by our staff. If you have any questions during your experience, please speak to any member of our team.

Additional Information
For information on The Orlando Eye and our education programs, visit www.officialorlandoeye.com

Directions
We are conveniently located at I-Drive 360. Please use our east entrance found on Universal Boulevard.

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Educational Objectives
- Learn the major differences between a Ferris wheel and an observation wheel
- Understand the sheer magnitude of the Orlando Eye by measuring the circumference, diameter, and capacity
- Use concepts such as gravity, acceleration, force, and velocity to understand how the Orlando Eye rotates
- Discover landmarks and places of interest visible from the capsule
200 B.C. - The earliest designs of wheels used for amusement rides may have been based on the large, circular wheels used to lift water for irrigation.

1620 – Peter Murphy visited a small town celebration in Turkey. One of the rides included two vertical wheels (about 20 feet across) that were held off the ground by a large post on each side. The ride was called a "pleasure wheel."

1728- In England, small hand-turned wheels were called "ups-and-downs" and had four passenger seats.

1848- Antonio Maguino established a pleasure wheel to draw crowds to his rural park and picnic grounds in Walton Spring, Georgia. The wheel was made of wood and powered by two men.

1860- French pleasure wheel existed that could carry 16 passengers. Men would climb a ladder to the top and turn it by hand!

1893- The race for larger wheels culminated when American bridge builder and engineer, George Washington Gale Ferris, began building a 250 foot wheel for the 1893 Colombian Exposition in Chicago. Designed like a bicycle wheel, with a stiff steel outer rim hung from the center axle by steel spokes under tension, the wheel could carry as many as 1,440 passengers at a time in 36 enclosed cars. The giant wheel opened on June 21, 1893, and drew more than 1.4 million paying customers during the 19 weeks it was in operation.

2014- Since the original 1893 Chicago Ferris Wheel, there have been nine world’s tallest-ever Ferris wheels. The current record holder is the 500 foot High Roller in Las Vegas, Nevada, which opened to the public in March 2014.

May 2015- The Orlando Eye opens to the public, providing breathtaking views of Central Florida. At 400 feet, it is the tallest observation wheel on the East Coast of the U.S.A.
What is the difference between a Ferris Wheel and an Observation Wheel?

The Orlando Eye, as well as the London Eye, are considered Observation Wheels, and differ from Ferris Wheels in the following ways:

**Ferris Wheels:**
- Features free-swing passenger gondolas or carriages suspended from the rim
- Supported by two towers on each side of the axles
- View can sometimes be obstructed by the wheel itself

**Observation Wheels:**
- Features enclosed passenger capsules designed to remain stable throughout the rotation
- Supported by an A-frame support
- Offers a 360 degree unobstructed view

See the difference in the pictures below!

**Ferris Wheels:**

**The Orlando Eye:**
**Background Information**

**Physics Terminology 101**

- **Velocity**: the rate at which an object changes its position. Velocity (the change in distance divided by time) is direction dependent whereas speed (distance divided by time) is not.
- **Force**: An influence on an object which causes a change in velocity, direction, or shape. As stated in Newton’s second law of motion, force equals mass times acceleration or $F=ma$.
- **Gravity**: The force that tends to draw objects towards the center of the Earth.
- **Mass**: The amount of matter within an object is called mass. The greater the mass, the greater the force to achieve motion.
- **Weight**: Differs from mass in that it actually measures the pull of gravity of an object. It equals mass times gravity. Weight = $mg$, where $g = 9.8 \text{ m/s}^2$ (acceleration of gravity).
- **Inertia**: The tendency to resist change in motion.
- **Diameter**: the distance across a circle through the center
- **Circumference**: the distance around a circle. Is calculated by multiplying $\pi$ (approximately 3.1416) times the diameter of a circle.

1. Use the information below to create a Distance vs. Time line graph that shows the motion of one capsule on the Orlando Eye. (SC.6.P.12.1; MAFS.6.SP.2.4)

<table>
<thead>
<tr>
<th>Distance (m)</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9.5</td>
<td>0.5</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>28.5</td>
<td>1.5</td>
</tr>
<tr>
<td>38</td>
<td>2</td>
</tr>
<tr>
<td>47.5</td>
<td>2.5</td>
</tr>
<tr>
<td>57</td>
<td>3</td>
</tr>
</tbody>
</table>

***Values are approximate

2. Based on the graph, can you tell whether the velocity of a capsule is constant or not constant? How do you know? (SC.6.P.12.1; MAFS.6.SP.2.5)

BONUS! Can you calculate the velocity? $v = \frac{d}{t}$ (MAFS.8.EE.2.5)
Wheel and Capsule Facts

Wheel and Capsule Specifications

- Capacity: 30 capsules accommodating 15 people each
- Cycle time: approximately 20 minutes
- Capsules height: 10 feet tall
- Capsule weight: 6600 pounds
  - Equivalent to 20 average sized green sea turtles. You can find these marine creatures at SEA LIFE Orlando!
- The Orlando Eye height:

Put the Facts to the Test! (Make sure you show your work!) Put your final answer on the line. (MAFS.7.G.2.4; MAFS.6.EE.2.6; MAFS.7.EE.2.3; MAFS.7.EE.S.4; MAFS.7.G.2.4)

1. \[ \text{What is the greatest number of people that can ride the observation wheel at once?} \]

2. \[ \text{If all of the capsules are } \frac{3}{5} \text{ full, how many people are riding on the Orlando Eye?} \]

3. \[ \text{If the diameter of the Orlando Eye is 120m, what is the circumference (in meters)? Remember, } C = \pi d \]

4. \[ \text{How far (in meters) does an Orlando Eye capsule travel in 40 minutes? (Hint: think about the circumference)} \]
Law of Universal Gravity

Isaac Newton was the first to suggest that gravity was universal and affects all objects in the universe. His law of gravity is therefore called the “Law of Universal Gravitation.” Newton’s discovery explains that the force (gravity) that causes an apple to fall from a tree is the same force that causes the moon to rotate around the Earth. Furthermore, every object that has mass produces gravity, even you! This means that there’s a gravitational pull between you and every object around you— a pencil, this guide, even the Earth! You’re pulling on the Earth while it is pulling on you!

Some factors that influence the strength of gravity:

- The more mass an object has, the stronger its force of gravity. So big objects, like planets, have a stronger pull than small ones, like a pencil.

- The more mass an object has, the more gravity pulls on it. This pull has a special name, known as “weight.” So mass is how much matter is in something, but weight is how strong gravity’s pull is on it.

- Objects that are closer together have a stronger pull (force of gravity) on each other than objects that are far apart.

How does Newton’s Law of Universal Gravity apply to The Orlando Eye? Applying what you’ve learned about gravity, describe in your own words why the Orlando Eye weighs so much! Use the key terms: mass, weight, gravity, force (SC.8.P.8.2; SC.6.P.13.2; SC.6.P.13.1)

______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Identify 3 ways that humans have impacted the landscape that you see as you travel around the wheel (SC.7.E.6.6):

1. ____________________________________________

2. ____________________________________________

3. ____________________________________________

Name three natural features or landforms that you can see from the top of the wheel and note which direction (N,S,E,W) they are facing (SC.6.E.6.2):

1. ____________________________________________

2. ____________________________________________

3. ____________________________________________

Draw or give a detailed description of one natural feature you saw below:
2. The velocity is constant because the line has a constant slope (no bends in the line)
   BONUS: $v = 19 \text{ m/s}$

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1. $15 \times 30 = 450 \text{ people}$
2. $450 \times (3/5) = 270 \text{ people}$
3. $120 \text{ m} \times 3.14 \approx 376.8 \text{ m}$
4. $376.8 \text{ m} \times 2 \text{ (revolutions of wheel)} = 753.6 \text{ m}$

Page 6: (Answers will vary)

The Orlando Eye has a huge mass, so according to Newton’s Law of Universal Gravity, the Earth’s gravity has a greater force on it (weight) than objects around it with a smaller mass. Also, the Eye is seated on the ground, so it is close to the Earth, giving a stronger gravitational attraction.
SIXTH GRADE Relevant standards include:

- Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship. (SC.6.P.12.1)
- Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational. (SC.6.P.13.1)
- Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are. (SC.6.P.12.2)
- Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida (SC.E.6.2)
- Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MAFS.6.SP.2.4)
- Summarize numerical data sets in relation to their context, such as by:
  a) Reporting the number of observations.
  b) Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
  c) Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
  d) Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (MAFS.6.SP.2.5)
- Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MAFS.6.EE.2.6)

SEVENTH GRADE Relevant standards include:

- Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water. (SC.7.E.6.6)
- Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. (MAFS.7.G.2.4)

EIGHTH GRADE Relevant standards include:

- Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass. (SC.8.P.8.2)
- Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. (MAFS.8.EE.2.5)