Lake Compounce

Discovery in the Park

Lake Compounce proudly presents “Discovery in the Park.” This is an exciting adventure in which students in Grades 4-7 can explore the subject areas of art, English/language, science, social studies, psychology and math.
The Lake Compounce Time Line:

1684 A group of settlers, including John Norton, band together to purchase land from the Tunxis Indians. The lake is named “Lake Compounce” in honor of the Tunxis’ Chief Compound.

1846 Local resident families begin arriving at daybreak to witness an explosion of the lake. Scientist Samuel Botsford gives a lecture on the “Movements of Electricity in Heaven and Earth,” followed by a series of experiments that are to culminate in the explosion. Despite several attempts, the explosion does not occur, and Botsford is run out of town. This is official year Lake Compounce opens as a picnic park.

1850 The park’s first amusement ride opens. The Pleasure Wheel operated very much like a modern Ferris wheel with eight seats and is hand-cranked.

1851 The Pierce Family joins the Norton Family as owners of the park.

1875 The Crocodile Club Banquet tradition is created to thank the state legislature for changing the boundaries of the communities of Southington and Bristol.

1895 The Bristol & Plainville Trolley initiates service to Lake Compounce, traveling four miles to the park from the center of Bristol.

1911 The current carousel is purchased and a new building is constructed. The Carousel features 47 horses, one goat, and two chariots carved by Loof, Carmel, Stein, and Goldstein.

1914 The Green Dragon, the first roller coaster at the park, opens.

1927 The Wildcat Coaster is built by the Philadelphia Toboggan Co. to replace the Green Dragon.

1933 Trolley service to Lake Compounce stops.

1944 The Gillette miniature railway is purchased from the estate of William Gillette, the actor best known for portraying Sherlock Holmes. The Gillette train circles the lake on a mile of track.

1966 The Pierce Family sells all interests to the Norton Family.

1979 The Carousel is named to the National Register of Historic Places.

1985 The Norton Family sells Lake Compounce to the Hershey Entertainment and Resorts Company and re-names the park, “Hershey Lake Compounce.”

1987 Construction is completed on the Big Splash Log Flume.

1988 Hershey Lake Compounce is sold to Joseph Entertainment Group and is re-named “Lake Compounce Festival Park.” A 20,000 seat amphitheater is added.
1989  German R&B Group, Milli Vanilli, is caught lip synching at a live performance in the amphitheater.

1994  The park is sold to a group of investors led by Steven Barbarino, a CT car dealer.

1996  Kennywood Entertainment Corp. purchases the park.

1997  Ten major rides are added including the Thunder Rapids Raft Ride, the Mt. Southington Skyride, the Zoomerang Coaster, the Flying Scooters, the Bumper Cars, the Rotor, the Ferris Wheel, the Top Spin, the CP Huntington Train (replaces Gillette railway), and the Lakeside Trolley, an original 1911 trolley that once brought patrons to Lake Compounce from New Haven, CT. The amphitheater is demolished.

1998  Splash Harbor is added. It is an exciting family water park featuring a sixty-foot lighthouse and an array of slides, sprays, pools, and water fun for all ages. The Skycoaster, which offers guests a free fall type adventure, opens.

1999  Ghost Hunt, an interactive dark ride incorporating animation, black lights, and sound is introduced. Two person vehicles, equipped with boo blasters, transport guests through a 15 room three story mansion, complete with water spouting gargoyles. The Mark Twain, a 70 ft authentic sternwheeler that can carry 65 passengers, now cruises the Lake replacing the classic Lakeboat tour vessel. Youngsters are treated to their own Kiddie Bumper Cars, and the Big Splash Log Flume is renamed Saw Mill Plunge.

2000  Boulder Dash welcomes the new century at Lake Compounce! This one of a kind wooden mountain roller coaster, also billed as the largest and fastest in the East, carries guests over 4500 ft of track at a speed of approximately 60 mph. It races between boulders and trees from the north end to the south end of the Park, across the Bristol and Southington town lines, and back again.

2001  Mammoth Falls, a 551 foot long family raft ride, debuts at Lake Compounce. This Splash Harbor attraction transports guests in 4 person rafts through twisting chutes and tunnels, under a waterfall and down a 50 foot drop. The Flying Scooters are taken out of service.

2002  Lake Compounce begins season pass sales and guests enjoy unlimited free soft drinks. The Crocodile Club tradition takes a several year hiatus after 128 banquets.

2003  Clipper Cove, an interactive splash and play adventure area, adds to the enjoyment of wet family fun. The Carousel receives handsome new housing. The Top Spin is retired and the Flying Scooters return as the American Flyers.

2004  Downtime, a 185 foot drop tower, joins the thrill rides at the park. The Boulder Dash wins a “Golden Ticket Award” for being the #1 wooden roller coaster by Amusement Today.

2005  Splash Harbor expands with the addition of Anchor Bay, an 800 ft lazy river complete with its own special water activities and slide.
2006  Thunder N’ Lightning, a two arm, 32 passenger “screaming swing” takes guests soaring to new heights and angles. Drop tower is added to Circus World.

2007  Zoomer’s Gas N’ Go debuts. It is a 1956 corvette ride where guests experience and enjoy a scenic blast from the past. Rainbow Riders allow children and parents to share an uplifting experience together. The Compounce Cabana Boat replaces the Mark Twain. The park is sold to Parques Reunidos in late 2007.

2008  Ghost Hunt is remodeled with larger cars to accommodate more people per car.

2009  New additions include: Wipeout replacing the Musik Express, Jolly Jester replacing the Arctic Express, and a new set of slides known as Tunnel Twisters to Splash Harbor.

2010  The Crocodile Club returns for its 129th reunion.

2011  The Rotor is removed and the Rev-O-Lution is brought in to replace it.

2012  Lake Compounce introduces Riptide Racers in the newly re-named waterpark “Crocodile Cove.” The park moves nearby Mt. Vernon Road to make way for the waterpark expansion. Lake Compounce opens for the first time in December for weekends for its Holiday Lights season.

2013  Bayou Bay, a new bath house, and Johnny Rockets is added to the waterpark. Boulder Dash wins its second Golden Ticket Award for #1 best wooden roller coaster.

2014  Bear Creek Campground is added to Lake Compounce. Bear Creek offers tent sites, RV sites, Cub Huts, Tipis, one bedroom cabins, and two bedroom cabins. Guests can enjoy discounted tickets to Lake Compounce and various camp activities throughout their stay. Pink’s Hot Dogs opens its first store in the Northeast within the park, offering its famous hot dogs and hamburgers. Boulder Dash wins its third Golden Ticket Award for #1 best wooden roller coaster.

2015  Dino Expedition, an interactive dinosaur exhibit, opens. Guests can walk through this landscaped area, read dinosaur facts, take a picture with giant eggs, and dig for fossils. Boulder Dash wins its fourth Golden Ticket Award for #1 best wooden roller coaster.

2016  Phobia Phear, New England’s first triple launch coaster debuts. It features a giant cobra roll 150 feet in the air and reaches speeds of 65 mph. The coaster uses electromagnets instead of a chained system to get it moving. Boulder Dash wins its fifth Golden Ticket Award for #1 best wooden roller coaster.

2017  Lake Compounce hosts the 20th annual Golden Ticket Awards and the 136th Crocodile Club Banquet.
Use the Lake Compounce Time Line to answer these questions.

1. How many years ago did each of the attractions open at Lake Compounce?
   _____Lakeside Trolley  _____The Wildcat Coaster  _____Ghost Hunt  _____The Carousel
   _____Green Dragon  _____Mammoth Falls  _____Saw Mill Plunge (Big Splash)
   _____Gillette Railway  _____Zoomerang Coaster  _____Sky Coaster  _____Phobia

2. How much older is the Carousel than the Wildcat Coaster?

3. Which attractions were built in the first half of the 20th century?

4. Choose three dates listed on the Lake Compounce Timeline and identify who was President of the USA at that time.

5. How long was Lake Compounce in existence as a park before the Crocodile Club Banquet tradition was born?

6. Calculate how long the Crocodile Club tradition lasted and compare it with how long the park has existed. What percent of time have they shared this unusual bond?

7. When was the Gillette Train retired?

8. How many rooms are in the Ghost Hunt mansion?

9. Assuming everyone meets the height requirement, could your entire class swing on Thunder N’ Lightening together? Don’t forget your teacher!

10. Approximately how many miles long is the unique mountain coaster that ushered in the 2000 season at Lake Compounce?

11. About how many years before the Civil War was the Park land purchased from the Tunxis Indians?

12. What is the potential number of guests that can ride the 551 ft family raft ride when it’s run at full capacity, if up to 15 rafts can be accommodated?

13. How long was Boulder Dash in existence before being named #1 wooden roller coaster in the World?
**Extra! Extra! Read All About It!**

Construct a time line to note important milestones in your life (ex. birth, first steps, entering school, learning to ride a bike).

Construct a time line to commemorate important events in the history of your school.
The Native American Connection

Lake Compounce enjoys a unique importance in terms of its **geological features** and its **historical background**. Some 20,000 years ago, the New England area was facing the end of the last **Ice Age**. In its wake, a mile thick **glacier** created our body of water when large pieces of ice slowly melted and sediment was deposited around them. Lake Compounce is therefore considered a **glacier kettle**. Compounce Mountain was also created at this time, with its large boulders dropped by the glaciers as they melted.

Amazingly, some of the rock formations that were created made ideal shelters where prehistoric peoples and **Native Americans** could live. Historians believe several tribes of Native Americans lived near the Lake and in the surrounding hills for 7,500 years.

In the 1600s, a tribe of **Tunxis Indians** and their **chief, John A. Compound**, lived on the land bordering the Lake. Historical records show that the chief’s name appears on **three original deeds**, along with several other tribal names. Through these deeds, a group of white settlers who migrated to central Connecticut from Massachusetts, were given title to Compound’s Lake and the surrounding land. This area was then known as Farmington and Waterbury (also called Mattatuck).

The Tunxis Indians affixed their **waxed fingertip marks**, or totems, to the deeds to serve as their signatures. In the written part of the deeds, Chief Compound’s name appears with different spellings. At times it may be Compas, Compau, Compowne, Compounce, or Compound.

Here’s a brief summary of deeds:

**May 22, 1673 deed:** Confirms previous grants of land made to the settlers (33 years after Farmington was first settled). It includes a map of the land, which is said to have covered 165 square miles of central Connecticut, and the names and marks of 26 Tunxis Indians. These are arranged into two columns, one headed by Nesaheagun who was the Sachem of Poquonock, and one headed by John A. Compau. The chief’s squaw and other women also signed, indicating that Native American women shared an important part in the process.

**August 26, 1674 deed:** Conveyed a large tract of land in Mattatuck (Waterbury) to the first settlers for 38 pounds; records the names and marks of Nesaheagun, John A. Compowne, and 12 other Tunxis Indians.

**December 2, 1684 deed:** Original found in one of the oldest homes in Waterbury in 1890; gives another tract of land in Mattatuck to the settlers for nine pounds. The mark of Chief John A. Compound is listed first. This deed also includes the signatures of famous men from Connecticut’s early history, including Thomas and Benjamin Judd, John and Timothy Standly, John Wadsworth, and John Hopkins. They were representatives for the 84 proprietors of early Farmington, which encompassed over ten of our current towns.

The Native American word “**acompown-tuk**” reportedly meant “falls of water on the other side.” Therefore, it is believed that Chief Compound was named because of his connection with the body of water or the falls of water on the other side.
water on the other side of the mountain. Other writers suggest that John A. Compaus could mean John at Long pond (Compo).

Whatever the exact derivation of the name, the lake connection is very strong. Legends even tie Chief Compound’s death to water. Several versions of the legend are floating around. One of the earliest recorded by Alice Norton in her 1902 book Compound tells that his cave was near the shore and he drowned while crossing the lake in an iron kettle. Other versions embellish the story by adding he was celebrating after the land exchange and was dared to cross the lake either in the kettle or carrying it as he swam. Interestingly, some of Compound’s signature marks resemble the shape of a kettle. This has caused many to wonder whether the marks inspired the legends or whether they foreshadowed the tragic end of Chief John a Compound. A glacial kettle lake, kettle signature marks, a kettle caused demise…coincidence or creative tale? What do you think?

Decipher the Deed

Here is a portion of the deed that sealed the future of Lake Compounce. Note the original Old English script. Can you decipher what it says?

“This indenture made this second December in the yere of our lorde one the six hundred eighty four betwene John a Compowne hackatowsucke manto warun compowno atumtuckco spinning squaw patuckoos squaw: one the on party and Thomas Judd and John Standly order and in the name and behalfe of propiators of Mattatucke in New England of the other party witnessath that we the aforesaid John a Compound for the summe of nine pounds have by these presnets frely fully souly absolutely given granted agerred and soald unto the aforesaid Standly and Judd with the rest of there asosiats their heirs execketors adminestrators and asigns parsell of lands of Mattatucke situate on the east side of nagatucke or Mattatucke river. The said John Compounce dos clerly fuly holy remitt releas relinquish all there formor title claime pour intrest and intrests the land and emunitys…for ever more:”

Now that you’ve made the Native American connection, challenge yourself to remember what you have discovered without looking back for the answers.
Who Wants To Be a “Wampum” illionaire?

For 100 in wampum: Mattatuck was another name for which of the following towns?
   *(Is that your final answer?)*

For 200 in wampum: When were Compounce Mountain and Lake created?
   a. 2000 years ago   b. 20,000 years ago   c. 300 years ago   d. 1000 years ago

For 500 in wampum: How many Tunxis tribal members “signed” the deed of May 22, 1673?
   a. 33   b. 12   c. 26   d. 15

For 1000 in wampum: Who was the Sachem of the Tunxis tribe in 1673?

For 5000 in wampum: Which of the following was NOT a deed spelling of Chief John’s name?

For 10,000 in wampum: In what year was Alice Norton’s book *Compound* published?
   a. 1902   b. 1890   c. 1875   d. 1908

For 20,000 in wampum: Which is another name for the waxed fingertip marks of the Tunxis tribe?
   a. autographs   b. signs   c. totems   d. sachems
   *(Is that your final answer? Are you sure?)*

For 50,000 in wampum: When was the original Dec. 2, 1684 deed found in a Waterbury home?
   a. 1902   b. 1890   c. 1980   d. 1875

For 100,000 in wampum: What was the purchase price of the land deeded on December 2, 1684?
   a. 12 pounds   b. 38 pounds   c. 9 pounds   d. 10 pounds

For 200,000 in wampum: Which of the following men was NOT a proprietor of early Farmington?

For 500,000 in wampum: What does the Native American word *acompown-tuk* mean?
   a. falls on the other side   b. long pond
   c. from Compound’s lake   d. over the mountain

For 1,000,000 in wampum: How many years total do the three land transfer deeds cover?
   a. almost 10   b. almost 11   c. almost 15   d. almost 20
   *(Is that your final answer? Have you thought this through? Are you positive?)*

If you’ve answered all of the questions correctly

**CONGRATULATIONS! You’re officially a “WAMPUM”ILLIONAIRE!**
Lake Compounce Word Search


American Flyers  Anchor Bay  Boulder Dash  Bumper Cars  Carousel  Clipper Cove  Cotton Candy  CP Huntington Train
Crocodile  Downtime  Family Fun  Ferris Wheel  Lakeside Trolley  Mammoth Falls  Phobia  Pirate Ship
Revolution  Sawmill Plunge  Skyride  Thunder Rapids  Wave Swinger  Wildcat Roller Coaster  Zoomerang Coaster
Lake Compounce Crossword

Down

Discovery in the Park
1. Offers a breathtaking view of Lake Compounce, Bristol, and Southington from almost 100 feet in the air
2. Large gondola which turns and flips forwards, reverse, and upside down. Retired in 2003
3. Has riders clinging to the walls. Replaced in 2011 with the Revolution
5. Raft ride which gives the illusion of traveling through raging rapids
6. Over 4500 feet long, races between boulders and trees
7. Price paid in pounds for 1684 land
8. Circular ride along a track with small peaks and valleys. Replaced with Wipeout in 2009
9. 1956 Corvette Ride
10. Riders control the sideward direction of travel and gives the sensation of diving and flying
11. Sixty foot high feature of Crocodile Cove
13. An award
14. High speed steel coaster which takes riders upside down, in loops, frontward, and backwards
15. Family water park
16. How the lake was formed
17. 1927 classic wooden roller coaster
18. Chairlift that travels up and down the steepest mountain terrain on the eastern seaboard
19. Generated by the anticipation of visiting Lake Compounce and by the thrills once you are here
20. Chieftain John, park namesake
21. 1911 antique open air streetcar
22. Specialty at Harborside
23. Legend says Chief Compound was crossing the lake in this
24. 1910 antique, assembled in Savin Rock, work of four master carvers
25. Fifteen room mansion, Boocifer's haunt
26. Vehicles designed for safe collisions with other drivers
27. An "above average backyard swing" which features the thrill of nearly free falling from the top of its arc

Across

Capturing Your Creativity
1. Write a newspaper article telling when and why families first started coming to Lake Compounce. Use the Park Timeline.

2. Chief Compound deeded the park property to a group of settlers on December 2, 1684. According to legend, he drowned rowing a kettle across the lake shortly thereafter. Expand the legend with your version of what happened.

3. Conduct a survey among your friends to discover their favorite rides at Lake Compounce. Create a line, bar, circle, or pictograph to show your findings.

4. Observe the reactions and behavior of guests of different ages as they exit Boulder Dash. Describe what they might be experiencing.

5. As a reporter for a historical digest, write a descriptive article on Lake Compounce’s famous Carousel. Remember the time line, your observations at the park, and other research on carousels if desired.

6. Pretend you were one of the first people to ride the Wildcat Coaster when it opened in 1927. Describe what it was like to experience such a thrilling ride you had never seen before.

7. You are promoted to General Manager of Lake Compounce. What are your plans for the future of the park? What new rides would you add? Write a letter to the guests who will visit The Lake in the year 2030 describing what the park looks like.

8. Imagine you are an employee at Lake Compounce. Write about what a day working in the park would be like.

9. Create your own song lyrics about Boocifer, Prof. Phearstruck, and what you discover in the many rooms of Ghost Hunt’s haunted mansion. Put the words to the music of a favorite tune.

10. Can you really learn about math and science at an amusement park? Remembering the how, what, when, and why (or why not), write a convincing statement that answers that question.

Poetry in the Park
A very important characteristic of poetry is that it tries to **involve** us in experiences, emotions, moods, attitudes, or ideas rather than just telling us about them. It appeals directly to the senses, (sound, smell, taste, touch) so we can feel and share what the poet wishes to convey. To do this, the poet relies on imagery or word pictures to get the idea across.

One special type of poem that uses imagery is the **haiku**. It is a Japanese poem of three lines (usually having 5, 7, and 5 syllables) that creates a picture which arouses an emotional response and some further insight or thought.

1. Look at the examples and compose a **haiku** that paints a word picture of an experience or feeling that you have during your visit to Lake Compounce.

   Examples:
   - Gray clouds float over
     - bringing children time to rest
     - from splashes in the waves.
   - On the dragon swift
     - I gasp breathless and hold tight
     - senses, soul, fire of life.

2. Use the following fantastic figures of speech to describe some of the things you notice while at the Park.

   **Onomatopoeia:** the effect when words are made to sound like the thing they mean
   (ex  the “buzz” of bees, the “whirr” of the motor)

   **Personification:** animals, things, ideas are given human qualities (ex  The gourmet ice bit my tongue).

   **Simile:** a comparison of two things using “like” or “as” (ex  The coaster flies like a bird).

   **Alliteration:** first letter of words are the same (Silly Suzie Sunshine sang six songs while sitting on the Wave Swinger).

3. Choose your favorite poet and try to imitate his/her style as you compose a park poem. Pay attention to the use of verb forms, adjectives, nouns, adverbs, figures of speech, and the poem’s setup.

4. Create an illustrated poetry book that goes along with each ride you go on while at Lake Compounce.

   **Psychology:** the study of the mind
Are you afraid to ride?

Are you sometimes afraid to ride a ride for the first time? Part of the fun of riding is the excitement and even the bit of fear that you feel. Which rides do you fear? Why? How do these rides affect your body? What can you do to control your fears?

1. Name a ride that you are afraid of: __________

2. Which of these symptoms do you feel when you ride the ride or think about riding the ride?

   - Dizzy
   - Weak knees
   - Sweaty Hands
   - Dry Mouth
   - Cold Hands and Feet
   - Trembling
   - Big Eye Pupils
   - Fast Breathing
   - Stomach Butterflies
   - Tense Muscles
   - Pounding Heart
   - Nausea

3. Now try to cure your fear by trying one of these methods. Indicate the one that made you feel less tense.

   - Identify what seems to cause your fear (like seeing the roller coaster). Try to think of something other than your fear when you see the object (like looking at the beautiful landscaping in the park).
   - Relax. Take a deep breath. Hold it for 7 seconds. Release the air slowly while thinking of a pleasant scene. Think about relaxing your muscles as you breathe.
   - Gradually build up to the feared event (like riding the Saw Mill Plunge before riding Phobia).
   - Force yourself to feel the fear again and again until you are much less afraid (like riding the Wildcat over and over until you have very little fear).
   - Copy the behaviors of someone who does not fear the ride and behave as though you are not afraid.
   - Ignore your fear by keeping your mind busy with other thoughts (like watching the motions and forces on the roller coaster instead of thinking about the feelings you might have).

4. If you are afraid to ride a ride, you are not alone! Most people, however, find that once they ride a ride they have been afraid of, they are no longer afraid of it. In fact, they are often surprised by how much fun it is!

Match the following rides to one or more of the fears that someone might feel while on that ride.
**FEARS**
A. Claustrophobia (confined places)  
B. Coulrophobia (clowns)  
C. Semaphobia (flashing lights)  
D. Barophobia (gravity)  
E. Acrophobia (heights)  
F. Tachyphobia (high speeds)  
G. Phonophobia (sounds)  
H. Roundaphobia (circular rides)  

**RIDES**
A. Ferris Wheel  
B. Compounce Mt. Skyride  
C. Saw Mill Plunge  
D. Haunted Graveyard  
E. Rotor  
F. Zoomerang  
G. Wipeout  
H. Boulder Dash  

**Bonus:** Whether you have no fear of phobias or phobia fever, see if you can match up the following:

**Phobias:**

A. Agoraphobia  
B. Amasophobia  
C. Anemophobia  
D. Chremnophobia  
E. Epistemophobia  
F. Gephyrophobia  
G. Kinesophobia  
H. Mechanophobia  
I. Stenophobia  
J. Updownaphobia  

**Fear of:**

A. Cliffs  
B. Mechanical objects  
C. Roller Coasters  
D. Open places  
E. Movement  
F. Narrow places  
G. Places of learning  
H. Being in vehicles  
I. High winds  
J. Bridges

**RIDE EFFECTS**
Try any three rides on for size, noting your body’s responses. Record them in the table below.

<table>
<thead>
<tr>
<th>Ride Name</th>
<th>Motion: Vertical, horizontal, circular, other</th>
<th>1. Pulse rate (beats/min) while waiting</th>
<th>2. Pulse rate on exiting ride</th>
<th>Difference in rate (1-2) Include + or -</th>
<th>Body symptoms see Q #2 above</th>
<th>Emotions you experienced on the ride</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Which ride in the table did you enjoy the most? Why?

2. Which ride in the table did you enjoy the least? Why?

3. Is there a correlation between the data you collected and how well you enjoyed the ride?

Science is FUNdamental
THE FIVE SENSES

Sight

What you see affects how you feel. Experiment by riding part of a ride with your eyes closed and part with your eyes open. Record the difference:

Your eye has difficulty seeing colors in low light levels. Notice the bright colors of clothes outside. Then notice how much harder it is to see these colors when you are in a dimly lit area of the park.

Look for a red flower surrounded by dark leaves or a yellow flower with light green leaves. Anyone who has difficulty telling the difference in color between these flowers and the leaves may be red/green color blind. Most color blind people are males.

Because you have two eyes, you can judge distances and shapes of objects better. Try riding a motion ride with both eyes open and then with one eye open. What is the difference?

How fast are your eyes? When you observe the rides, notice the speed of each ride. Are there rides which go too fast for you to see clearly without just seeing a blur? Do your eyes have trouble focusing when you are accelerating rapidly? Name the rides that look blurry to you.

The colored iris of your eye contains a pupil which closes to a small dot in bright sunlight. Watch a friend’s eyes and notice any changes that occur when the light level changes. Which eyes seem to be more sensitive to light?

Brown eyes          Blue eyes

Touch
Your sense of touch can tell you the strength and direction of any force you feel. By the feel of the wind against your face, for example, you can guess the speed of a ride.

Notice the downward pressure that you feel against your body when you ride a fast ride and are pressed into the seat.

1. What force is acting upon you to cause this pressure?

2. The pressure you feel tells you how strong the force is. What ride has the strongest force of this kind? What ride has the weakest force?
   - Strongest force
   - Weakest force

3. Notice the pressure of your body on the seat when you are riding the Zoomerang loop. Your sense of touch tells you that you are right side up. Your eyes tell you that you are upside down. The result of this is a sensation that the world is upside down.
   - Do you agree with this statement?
   - Why?

**Hearing**

Listen to the Wildcat Coaster as it speeds by. Does the sound change pitch from higher to lower?
This sound change tells you how fast the ride is moving. The change in pitch (from higher to lower sounding) is called the **Doppler Shift**.

When the Wildcat Coaster rider feels the most force, the coaster is also pushing hardest on the track. Most tracks creak, squeak, or groan more at this time. Listen for track sounds from a walkway near the roller coaster and see if the strong forces and the loud noises come at the same places. Where is the train (cars) on the Wildcat when you hear the loudest sounds?

Light waves travel in straight lines, but sound waves can go around corners. Pick a loud park noise and listen to it all around the park. Mark the noise maker and the places where you can hear it on the park map.

List 5 sounds you hear in the park and where you hear them.

<table>
<thead>
<tr>
<th>Sound</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Taste**
When you have your lunch today, take two bites of food and notice how the food smells as you eat it. Next, eat two bites of your food while you pinch your nose closed with your fingers. Does the food taste different when you cannot smell it?

What are the differences?

Search through the various food and snack items and find something from each of the taste categories: salty, sweet, bitter, sour. Please indicate your findings below:

- Salty
- Sweet
- Sour
- Bitter

Smell
Your sense of smell is one that your brain uses to gather much information about your environment. Oftentimes, however, we do not think of smell as one of our most valuable senses.

When you are in the park, sniff for the following scents. Record where you find them. See if you and your friends have the same sense of smell. Can you smell some things better than others?

<table>
<thead>
<tr>
<th>Item</th>
<th>Location Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamburgers</td>
<td></td>
</tr>
<tr>
<td>French Fries</td>
<td></td>
</tr>
<tr>
<td>Flowers</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Pine Trees</td>
<td></td>
</tr>
<tr>
<td>Popcorn</td>
<td></td>
</tr>
<tr>
<td>Soda</td>
<td></td>
</tr>
<tr>
<td>Cotton Candy</td>
<td></td>
</tr>
</tbody>
</table>

REV THOSE CRANIAL ENGINES!
Amusement Parks conjure up visions of chills and thrills and moments of magic and excitement – breathtaking speed, hanging upside down, plunging to earth, or facing the heavens. Who masterminds such marvels! Would the answer surprise you? Architects, engineers, designers, planners, surveyors, geologists, carpenters, electricians, plumbers, sound technicians, mechanics, construction crews, landscapers, artists, marketers, accountants, personnel directors, and yes, even educators --- all of the inventive, creative, problem solving men and women who rely on science and math (the queen of all sciences) for their inspiration and know-how are the brains and brawn behind creating and operating a wonderful park. Now, will you ever again ask your teacher “what is math good for anyway?” Not if love for amusement park fun is your cup of tea! Consider using math and science to help strengthen your mental muscle.

Want something different to help you get started? Put on your thinking cap, rev those cranial engines, and warm up YOUR problem solving skills with these mental barbells.

Warning! Decode at your own risk. May promote serious synaptic activity, including but not limited to inventive outbursts, spontaneous creative combustion, and feigned mental anguish characterized by murmurs of “oh brother, geez, yeah sure, I’m working on it, leave me alone, oh no, haha, aha, and I knew that.”

Hi \[ \text{GOOD} \]

You’ve had your \[ \text{TWINK TWINK TWINK TWINK} \], now it’s time to \[ \text{T E G O} \].

No more \[ \text{ZZZ JOB} \]. This \[ \text{THING US US} \]. Math and science are involved in every aspect of life as we know it.

Studying and exploring math and science could be \[ \text{scribi} \].

Build your brain power little by little, and soon you’ll see the \[ \text{TUNNEL} \]. Reach for the \[ \text{SKY} \] and surely you’ll \[ \text{BE BUSH AT} \].
you want to experience math and science in action, make an event for Lake Compounce. It’s just right. We’ll have you as you experience centripetal and centrifugal force on the Rotor. The Zoomerang will put you on discovering why the shape of the curve for a looping coaster is not a circle. Take a crash course in how not to drive on the Bumper Cars, where Newton’s Law of Motion will seem like by the time you’re done. Put spuds and decipher the Pirate’s pendulum action. And, if you’ve ever wondered what it’d be like on , head for the Compounce Mt. Skyride. Millions of years of geologic processes will flash before your eyes as you ride the upthrown face of a normal fault and literally be . water is your passion, check out force and motion on the Saw Mill Plunge or on the Thunder Rapids
Raft ride. But, there’s more. The absolute
will be Boulder Dash, the longest wooden roller coaster in the East and,
from COAST COAST COAST, the only one ever built into the side of a mountain.
K N O W I T N O, this unique terrain coaster will garner a huge
as it races between boulders and swishes through trees in its boundary
line hopping journey from Bristol to Southington and back again.
L E A S T, we can even offer you L U N N C O E H to keep you in gear
for all of this excitement. Shhh! Y O U J U S T M E, there’s an awful
lot of fun to be had exploring math and science!
Benefits? on! We’ll try to H A P P I N E S S as we “round”
out your hands-on educational experience, bring you
in your studies, help bridge the E R A G E N T I O N as students and
teachers begin C i i and reach a M I N D M I N D, provide
and generally encourage you to feel...
? You’ll be with The Lake and with learning. Are you still with me bright eyes? If you’re about now, you’re quite.

and for new times sake, we love our park and think you’ll give it too. It’s an . The E in education stands for excellent. , get that science and math thing going. There’s . Put your . Face the music. Take your medicine. And wipe that grin into your face!! Okay, Okay, now that our fest is over and you’re pleading cranial overload,

I’ll sign off with a to in all the old and young familiar places at Lake Compounce. Farewell...au revoir...auf wiedersehen...adios...arrivederci...zaijian... Roger !

Agent M alias 00 3.14
Science Behind the Rides

What do you like best about amusement parks? Perhaps it’s the exciting rides that take your breath away, send you streaking down steep hills, or turn you completely upside down. Have you ever wondered just how fast that roller coaster goes or why you don’t fall out when a ride has you standing on your head?

Here’s a chance to “unmask” the magic and discover how science and math are the real secrets behind the chills and thrills of a fun park!

Let’s begin by investigating the “g,” a common unit to describe the forces we feel. One g is equal to the force of Earth’s gravity. The force of gravity causes falling objects to accelerate at 9.8 meters per second squared. This means that the downward velocity (speed and direction) of a falling object increases 9.8 meters per second for each second it falls.

Living on Earth, you normally experience 1 g of acceleration vertically. In comparison, the astronauts feel about three g’s of force when the space shuttle takes off. Three times the force of Earth’s gravity makes them feel three times heavier than normal.

You can make a “g” meter to measure the forces you feel while on your bicycle, on the playground swings, in a car, or on an amusement park ride if permitted (dependent on park or attraction). Here’s how it’s done.

Construction:

1. Cut out the g meter on the next page.
2. Glue the g meter to a thin piece of cardboard and trim to size if needed.
3. Take about 15 cm (6 inches) of heavy black thread and tie one end to a weight such as a washer, a fish sinker, or a key. Tie the other end through the hole and the top of the g meter.
4. Holding the g meter in front of you, let the thread hang down so that it lines up with the 0 g mark.
5. For the g meter to work properly, the top edge must be held horizontal or level with the horizon.
6. When the line formed by the string and weight move in the direction of the arrows, you will be able to read the force in g’s.
When your g meter is done, try it out.

* While you are on a swing in your yard, hold the g meter so that the arrows point in the direction you will be moving. How many g’s do you feel as you swing?

* Use the g meter on the “merry-go-round” at the playground. While sitting on the outside edge of the ride, point the arrow toward the center. How many g’s do you feel? Does the number of g’s change if the ride moves faster? Does the number of g’s change if you sit closer to the center of the ride?

* When you are riding in the family car, hold the g meter in front of you as your parent drives around a corner. How many g’s do you feel? Is there a difference between going slowly around a corner or going quickly around it?

* If permitted to use the g meter to investigate g forces on any rides at the amusement park, try to determine how the ride creates the force and whether speed or turns are used to create large forces. 

**Important safety note:** Your g meter should be attached to you by some type of wrist tether so that it will not fall off the ride and cause injury or damage.
The Wildcat

One of the first amusement park rides invented, the roller coaster operates because of gravity—the force of attraction which the Earth exerts on all objects on or near it.

As you ride The Wildcat, you will be the experiment. Notice when you feel increased and decreased forces. They may push you into your seat or lift you off of it. They may push you left or right. After the ride is over, try to answer the following questions.

1. Describe what happens to the size of the hills during the ride? Why do you think this is so?

2. When you are at the top of a hill, are you moving faster or slower? Why?

3. When you are at the bottom of a hill, are you moving faster or slower? Why?

4. Do you gain or lose speed as you go up a hill? Why?

5. Do you gain or lose speed as you go down a hill? Why?

6. Do you feel heavier, lighter, or the same as usual when you go up a hill? Why?

7. Do you feel heavier, lighter, or the same as usual when you go down a hill? Why?

8. Are you pushed inward or outward when you are in a turn? Why?

9. On the curves, do the tracks tilt inward, outward, or are they flat? Why?
10. Can you identify where you:

- Are accelerating or speeding up? ________________________
- Are decelerating or slowing down? ________________________
- Are feeling weightless? ________________________
- Have the greatest speed? ________________________
- Have the slowest speed? ________________________
- Have the most potential or stored energy? ________________________
- Have the most kinetic or energy of motion? ________________________
- Are in a backward leaning zone? ________________________
- Are in a forward leaning zone? ________________________

11. How fast do you think the coaster goes?

12. What simple machines are used on the roller coaster ride (ex. lever, wheel and axle, pulley, inclined plane)?

**Math Link**

Measure the time it takes for the coaster to make one trip by using a watch with a second hand or a digital watch with a stopwatch mode. If the coaster track is about 800 meters long, what is the average speed of the trip? For linear or straight line motion, to find the average speed divide the distance traveled by the time for the trip. Give your answer in meters per second. (Try converting your answer to kilometers per hour.)

\[
time \text{ for trip} \quad \text{seconds}
\]

\[
\text{average speed} = \frac{\text{distance}}{\text{time}}
\]

**An Explanation**

The Wildcat Roller Coaster works because of gravity and the Law of Conservation of Energy. The Law of Conservation of Energy says that energy can change from one form to another, but it cannot be created or destroyed.

Think of using a playground slide. After climbing up the steps to the top of the slide, you have potential energy. It is called potential energy because it is a stored energy that can be used later. As you get on the slide’s surface and start to slide down, your movement shows kinetic energy. Kinetic energy is the energy of motion, energy that is being used.

The Law of Conservation of Energy says that energy cannot be created out of nothing. It has to come from someplace else. It comes from changing some of the potential energy into kinetic energy. The farther you slide, the more potential energy you convert into kinetic energy. By the bottom of the slide, just before your
feet touch the ground, all of the potential energy is changed into kinetic energy and you have the greatest speed.

A roller coaster is similar to a slide, except you ride in a vehicle with wheels that reduce friction, a force that resists motion. (It’s easier to roll an object than to drag or slide it.) You also don’t have to climb to the top of the first hill. A motor does that work for you. At the top of the hill you have potential energy. It is stored energy because gravity wants to pull you down to the ground. This potential energy is changed into kinetic energy as gravity pulls you down the first hill. The farther you go down the hill, the more potential energy changes into kinetic energy, which you feel as speed. Therefore you will be going fastest at the bottom of the hill. Going up the next hill, your kinetic energy will change back into potential energy. More energy is changed the higher you go. The conversion of kinetic energy to potential energy continues as you go up and down hills. Your total energy will not increase or decrease. It will just change from one form to another.

Wind resistance, the rolling of the wheels, and friction in the coaster ride will use some of the kinetic energy. Therefore, to make sure there is enough kinetic energy to reach the starting point for the ride, coaster designers must build each successive hill on the ride lower than the first hill.

When you make a turn, the force you feel is called centripetal force. This is a force on an object that acts toward the center of a circular path. So all rides that move in a circle generate centripetal force.

Think of using a playground slide again, but this time one that is curved. On a curved playground slide, your body still tries to go down in a straight line. You think you are being thrown to the outer edge of the slide, but you are just trying to go straight.

On a coaster, when you make a turn it feels like you are being forced to the outside of the car. To account for centripetal force, coaster designers “bank” the turns, tilting the track and therefore the car, so that you are forced down into your seat rather than being thrown out.
The Zoomerang

Many people find a roller coaster ride that loops and goes through a corkscrew very exciting. It gives the thrill of speed and a feeling of falling from great heights while being turned upside down. The Zoomerang has the added feature of repeating this process while taking riders backwards.

After riding the Zoomerang roller coaster, see if you can answer the following questions.

1. On the loop or corkscrew part of the ride, do the “circles” get wider, narrower, or stay the same as you go through the ride?

2. Are you pushed down in the seat or lifted off the seat when you are turned upside down in the corkscrew part of the ride?

3. Do you feel heavier or lighter at the bottom of a loop?

4. Do you feel heavier or lighter when you reach the top of the loop?

5. Does the force feel greater at the top or at the bottom of the loop?

6. Does the car slow down or speed up when you move up a loop?

7. What design in the ride keeps you from being thrown out when it turns?

8. What forces do you feel on the Zoomerang?

Math Link

The distance traveled on the Zoomerang is 286 meters one way. Measure the time it takes for the Coaster to complete the ride from start to finish. What is the average speed of the trip in meters per second?

time for complete trip________ seconds

average speed = distance/time
An Explanation

The shape of the curve for a looping roller coaster is not a circle. It’s more like a teardrop shape called a clothoid loop. First described by Swiss mathematician Leonard Euler in the 18th century, it is the perfect shape for somersaulting riders on a roller coaster without having them fall out.

Over the years, coaster designers have discovered that a perfect circle is not a good choice for a loop. Centripetal force is generated by all rides that move in a circle. This force presses riders into their seats in a vertical loop on a coaster. When the coaster and its riders are upside down at the top of the loop, the centripetal force has to be greater than the force of gravity or the riders will fall out of their seats.

Designers first thought that making the ride faster and the circle just large enough to create about one g of centripetal force to counteract the one g of gravity at the top of the circle would solve the problem. But that would mean that riders would have to face over eight g’s when entering the loop!

This would not work considering that at six g’s many people get nosebleeds and at nine g’s they can black out and lose consciousness. (Space shuttle astronauts only experience about three g’s of force.)

The clothoid loop, on the other hand, levels or smooths the forces on the riders and still keeps them safe because its radius keeps decreasing on the upward swing. The decrease in the radius produces a higher centripetal force, permits vertical loops to be very large, and allows riders to undergo only three to four g’s when entering the loop. Wow! All of this because of math and physics!
The Bumper Cars

When riding the bumper cars, do you try to bypass being hit or are you looking for the crash? Do you drive calmly around the perimeter or do you bang into everything? Actually, the bumper cars offer a fun, hands-on experience in learning **how not to drive**. Try to answer the following questions as you investigate the crashes!

1. While you are waiting in line, look at the bumper cars. In what ways are they different than normal cars?

2. Which way are you pushed when you first start up your car?

3. Which way are you thrown when your car stops?

4. If you were in a head on crash, which way do you think you would be thrown?

5. Which way are you thrown when hit from behind by another car? Why?

6. What happens to you when your car is hit from the side?

7. When you crash into someone else’s car, in which of these situations do you feel the greatest force?
   - You are moving and they are stopped ________
   - You are moving and they are moving away from you ________
   - You are moving and they are moving towards you ________

   Why?

8. What form of energy is used by the cars to make them move? How do you know this?

9. From what you have discovered, explain why it is important to wear a shoulder harness and seat belt when riding in a vehicle during your real world travel.
Math Link

If you are traveling in a Bumper Car at 2 meters per second, what is the distance you can cover in one minute under the following conditions: you have ten collisions which result in a loss of 5 seconds four times, 4 seconds three times, and 3 seconds three times?

An Explanation

The bumper cars follow Newton’s Three Laws of Motion.

*Newton’s first law of motion* states that an object remains in a state of rest unless an unbalanced force causes it to move, and that an object continues in motion along a straight line unless a force stops it or causes the object to change direction.

*Newton’s second law of motion* states that the acceleration of an object (the rate at which the velocity or speed and direction of an object changes) depends on the size of the force that produces the acceleration and on the mass (amount of matter) of the object.

*Newton’s third law of motion* states that for every force there is an equal and opposite force.

According to Newton’s first law of motion, objects want to keep traveling in the direction they are going. When you are riding in your bumper car and it hits someone else’s car and stops, your body follows the first law of motion and keeps going forward. When you are stopped and someone else hits your car from behind and moves it forward, your body tries to remain stopped. So it feels like you are being thrown backwards.

Newton’s second law of motion relates to *impulse and momentum*. Simply put, it says that when you crash into another bumper car that is stopped, some of your momentum will be transferred to the other car from yours. This is the reason that the other car moves. To keep riders safe, it is important that energy is transferred from one car to the other slowly. The rubber bumpers that surround the cars cause the collision between the two cars to take more time. Energy is then transferred more slowly and insures safer collisions.
The Carousel

The Law of Conservation of Energy and Newton’s Three Laws of Motion help to explain how many
amusement park rides operate. They are especially important in describing centripetal force rides that move
in a circle, such as the Carousel. Remember, centripetal force is what causes you to feel like you are being
thrown to the side of a ride as it moves in a circle. You however are just doing what comes naturally—
trying to move in a straight line, being acted on by an outside force (centripetal) that moves you along the
lines created by it, and exerting an equal and opposite force on your horse. Try to feel the forces that are
acting on you and note where you are on the ride when they occur.

1. Is your body thrown slightly inwards or slightly outwards as the ride turns?
2. Does the floor appear to be level? If not, which way does it tilt? Why?
3. Do all of the horses on the Carousel go up and down at the same time?
4. Does the horse next to yours move in the same or in the opposite direction?
5. When your horse is moving down, do you feel slightly heavier or slightly lighter?
6. When your horse is moving up, do you feel slightly heavier or slightly lighter?
7. Which horses appear to be moving faster, those on the inside or those on the outside?
8. What simple machines (ex. lever, wheel and axle, inclined plane, pulley) are used on this ride?
9. Estimate how many g’s the Carousel creates.
10. Count the animals (the horses and the goat, but not the chariots) on the Carousel. How many move up
and down? How many are stationary? If you hopped on an animal without checking to see if it could
move, what is the probability you would end up on an animal that moves? What is the probability you
would end up: on a moving horse? on the goat?

Math Link

Measure the time it takes for the Carousel to make one complete turn (rotation). If you are on an outside
horse 7 meters from the center, find the average speed of rotation. For circular motion (motion in a
circle), find the average speed for one rotation by dividing the distance traveled (which is the circumference
of the circle) by the time for one rotation. Remember: Circumference equals 3.14 (or 22/7) times the
diameter of the circle.

time for 1 rotation _____ seconds
average speed = Circumference/time
The Wave Swinger

For another experience with centripetal force, ride and observe the Wave Swinger in action. Then answer the following questions.

1. What moves higher: an empty swing or one with a person in it? Why do you think this happens?

2. When the ride increases speed, what sensations do you feel?

3. As the ride increases in speed, what happens to the seats?

4. Identify the forces that act on you during the ride.
   Draw a diagram to show the direction of these forces as they are acting on you.

5. If permitted, use your g meter to determine how many g’s the Wave Swinger creates.

An Explanation

An empty swing chair and one with a person will both reach the same height. Both the force of gravity (which pulls the rider and/or the chair downward) and the centripetal force (which makes the rider and/or the chair move in a circle) depend on the mass of an object (the amount of matter in the object). In other words, an empty chair has less of both forces acting on it, so it rises to the same height as a chair with a person.

Math Link

Measure the time it takes for the Wave Swinger to make one rotation. If you are on a swing chair in the middle row **10 meters from the center**, find the average speed of rotation.

- time for one rotation _____ seconds
- average speed = Circumference/time
**Boulder Dash**

This mountain coaster, new in 2000, is a marvel of engineering. It is the longest wooden roller coaster on the east coast and the only one of its kind, built on a 750 ft. mountain which forms the western boundary of Lake Compounce. The course is determined by the mountain topography and designed to disturb as little of the natural setting as possible, including the trees, bushes, ledges, and boulders.

The coaster ride begins in the north end of the Park near the Ferris Wheel (located in Bristol) travels to the south end of the Park near the Skyride (located in Southington) and back again over 4500 plus ft. of track. For a breathtaking two minutes, guests race through dense woods, past rugged rock facings, and between large boulders at up to 60 miles per hour.

The unusual design tries to keep the coaster a hill hugger and very fast. The speed doesn’t change greatly during the ride as with most roller coasters. Heavily dependent on gravity from the top of the first initial drop on, it maintains a high range speed throughout the ride. For true coaster lovers (as well as everyone who dares to ride), a deluxe assortment of other specialties complete the unparalleled ride. In amusement park lingo, your experiences might include sideways jogs, bunny hops, ejector or floater airtime, laterals, and a feisty 180 degree turnaround.

In short, Boulder Dash may be one of the coolest psychologically thrilling rides in the world. Because you are actually riding on a real intact mountain, many unexpected “blind” surprises may have your hair standing on end.

Now that you know the scoop, give it a try!

1. As you watch: Does almost the same speed appear to be maintained throughout the ride? How about when you’re a rider?

2. Did the speed seem to be faster because of the boulders and trees?

3. Were there any backward leaning zones? Any forward leaning zones?

4. What percentage of your ride seemed to be airtime? Compare your estimate with those of your classmates.

5. Compare your adventure on Boulder Dash to that of the Wildcat and/or the Zoomerang.
   a. On which coaster did you experience less sideward g forces?
   b. On which coaster did you have more airtime?
   c. Did you experience differences in speed?
**DownTime**

A heart pumping, adrenaline flowing, white knuckled, and literally hair raising experience, DownTime is a vertical drop tower with *attitude* and turbo action.

After the guests are seated, the cart is raised slightly and weighed. Then it is steadily lifted to the top of the tower where it is locked in brakes. Stationary for a few seconds, the cart is then abruptly launched toward the ground with chilling negative g-force acceleration. The ride softens with a bungee like bounce before reaching the bottom of the tower and rebounds for a few soft bounces before descending slowly back to the ground. Air pressure, power cylinders, pistons, and air powered brakes work in harmony with each other to provide guests with some exciting ups and downs.

Whether you’re a watcher or a rider, DownTime is an interesting phenomenon to investigate.

1. How many guests can the ride accommodate?

2. Why do you think the cart needs to be weighed?

3. Measure the overall cycle time of the ride from start to finish to give yourself perspective about the ride. You’ll need a watch with a second hand or one with a stopwatch mode. _______ seconds

4. Measure the time it takes for the cart to be lifted to the top of the tower. Start measuring at the end of the weigh sequence. _______ seconds

5. Measure the time of the cart’s turbo descent. Start immediately after release of the braking mechanism. Hint: Don’t look away or you’ll miss it! Stop just as the cart is ready to bounce. _______ seconds

DownTime is 185 feet tall (without the flagpole). The dynamic distance is 165 feet (the distance through which all the action occurs). The first bounce occurs about 40 feet up the tower (from total height).

6 Using the information above, calculate the average speed of the cart moving up the tower. _____ feet/second

7. Calculate the average speed of the cart moving back down toward the ground. _____ feet/second

8. If DownTime was a free fall drop tower rather than a turbo drop tower, what differences would you expect to find in the ascent and descent? Consider time, speed, and g forces.
Thunder n’ Lightning

Packed with power and flash, this new ride will light up your life and send your screams rumbling through the skies like roaring thunder. The ride motion of Thunder N’ Lightning is that of a pendulum - a body which is suspended from a fixed point and which swings freely. The arms of Thunder N’ Lightning are suspended from an axle, swinging in an arc, back and forth as in a playground swing. But you’ve never had a swing ride like this! Air pressure, power cylinders, and pistons all work together to rotate this mega swing up to 115 degrees from vertical in each direction and give a sky’s the limit feeling.

Whether you’re a watcher or a rider, check out Thunder N’ Lightning and try to answer these fair weather questions.

1. How many guests can ride Thunder N’ Lightning?

2. At what part of the ride would you feel weightless?

3. Where would you have the greatest speed? Why?

4. If the length of an arm is 43 feet, estimate how high Thunder or Lightning lifts its passengers?

5. Measure the time it takes for the riders to complete one full arc. Observe several cycles.

6. Estimate the speed of the ride.

Weather Link

To develop, thunderstorms need the following three conditions: 1) moisture to form clouds and rain, 2) unstable air, which is relatively warm air that can rise rapidly, and 3) lift (fronts, sea breezes and mountains have the capability of lifting air to help form thunderstorms).

Mini Math Link

Every thunderstorm has lightning. You can estimate how many miles away a storm is by counting the number of seconds between the flash of lightning and the clap of thunder. Divide the number of seconds by five to get the distance in miles. Give it a try. If Jace sees a flash of lightning at 2:04 pm and hears a clap of thunder at 2:05 pm, how far away is the storm? Why does he see the lightning before hearing the thunder?
Zoomer’s Gas n’ Go

Though the power they’re supplyin’ is electrifyin’ and your chills are multiplyin’. You won’t be losin’ control on the Zoomers.

Ten 1956 style Corvettes are greased up and ready to go and will keep guests on track for a spin down memory lane. The guide unit and steering are designed to allow guests to maneuver the car around the course, but still prevent driving off the roadway. The steering system utilizes a specially manufactured rack and pinion unit acting through steering springs.

Equipped with a sound system, these replicas of the famed car which came into its own in the 1950’s, take guests back in time with sights and sounds that will revive memories, as well as create new ones. And, it’s sure to be a very pleasant reminder that the 50’s still impact us today.

So, what’s up with the Corvette?

The famed Chevrolet Corvette was the first all American open top sports car built by an American car manufacturer. The very first Corvette rolled off the production line in Flint, Michigan on June 30, 1953 and cost $3490. The outer body was constructed with fiberglass, which was a unique new material at the time. It had a 6 cylinder truck engine, a two speed transmission, drum brakes, and a triple carburetor intake.

From 1953 to the present, the Corvette has been a sought after, sporty, and all over cool car with special appeal. For example, movie legend John Wayne owned a Corvette made on October 1, 1953. And, the oldest surviving Corvette, which was the third one off the assembly line in 1953, was sold in Scottsdale, Arizona for one million dollars on January 12, 2006.

We’re All Shook Up

1. Approximately how old is the oldest surviving Corvette?

2. A Chevrolet Corvette cost $3631 in 1958 and the average price of a basic car was $2550. What is the percent of increase of the Corvette over the average price of a car for that year?

3. Compare the selling price of the oldest surviving Corvette in 1953 with its selling price in 2006. Taking only sell prices into consideration, what was the gross percent of profit?

4. In 1951 a loaf of bread cost 16 cents, bacon was 52 cents a pound, and a dozen of eggs cost 24 cents. How much would a typical 2006 breakfast consisting of two eggs over easy, 2 pieces of toast, and 2 pieces of bacon (12 slices to a lb) cost in 1951?

5. If a pound of coffee sold for 85 cents in 1956, and you need 2 ounces of ground coffee to make a carafe of coffee that holds 6 cups, what would it cost to serve one cup of coffee in 1956?
6. Gasoline cost 18 cents a gallon in 1950 and 25 cents a gallon in 1959. Calculate the percent of increase in the cost of gas from the beginning to the end of the 50s.

**Zoomer’s Gas N’ Go Connections**

1. What songs representing the 50’s do you hear on the Zoomer’s car radio?

2. List all of the components of the Zoomer’s ride that relate to the memories and images of the 50’s?

3. The Zoomer’s Gas N’ Go ride consists of 1015 feet of track. Measure the time it takes to navigate the track on your scenic journey. Start from the second you leave the station until the time you return.

4. Calculate the approximate speed of the ride in miles per hour.

5. Estimate the capacity of the station queue building if it contains 960 square feet of space. Assume each person requires his/her own four sq.ft. of standing room and that space for entry, exit, and other function occupies 300 sq. ft.

6. Though the Zoomer’s cars travel with the help of a guide system, does the track need to be designed a certain way for the ride to function correctly? Explain your theory.
Math Counts

A visit to Lake Compounce can put your math skills to the test. All around you, every aspect of the design and construction, maintenance and upkeep, and daily operation of the park entails the use of math skills for the people who work here. For visitors, a good understanding of basic math is really all you need to make good decisions and determine how far your money will stretch during your visit.

Please show your work for each of the following questions.

1. A class of 23 students eats pizza for lunch. There are 15 boys in the class. Each boy eats 4 slices and each girl eats 2 slices. There are 8 slices in one pizza.
   
   A. How many total slices of pizza will the boys eat?
   
   B. How many total slices of pizza will the girls eat?
   
   C. How many total slices of pizza will be eaten by the class?
   
   D. How many pizzas will you need to buy to feed the whole class?

2. The Pirate Ship seats 54 people at a time, and your grade consists of 144 students.
   
   A. How many people will be left in line after the first ride cycle?
   
   B. How many ride cycles will the Pirate Ship run for everyone to get one ride?
   
   C. If six people can sit in one seat, how many seats will be used on the Pirate Ship’s last ride cycle with only your classmates?

3. Your bus trip takes 20 minutes to get to Lake Compounce from your school. Your bus driver drives at 55 mph for 15 minutes and 20 mph for the rest of the trip. How many miles is your school from Lake Compounce?

4. 205 class members visit Lake Compounce. Each student wants to ride the Thunder Rapids Raft Ride. The ride has 10 rafts each holding 8 people and the ride lasts 180 seconds. What is the actual ride time for the entire class to go on the ride once?

   _____________ minutes.
If it takes 40 seconds for a raft to move through the station, plus the time on the ride, how long will it take the entire class of 205 people to ride 3 times?

____________ minutes.

5. Choose which combination of the following items you can purchase if you have $25.00 to spend at Lake Compounce. (Don’t forget to add CT State Sales Tax of 6.35%).

☐ 1 tee-shirt for $15.00, .5lb of candy at $2.49 per lb., and 1 balloon for $2.98.
☐ 1 sweatshirt for $24.95
☐ 3 balloons at $2.98 each, and 1 tee-shirt for $15.00

7. Zoomerang Coaster

A. How many riders are on the Zoomerang Coaster with all seats filled? Find the average number per ride from 3 cycles.

1st trip number ______
2nd trip number ______
3rd trip number ______

Average number per trip_______

B. Use your watch or a stopwatch to determine how long the ride lasts. Start with loading and end with the train (cars) unloaded.

Time = _________ seconds = _________ minutes = _________ hours

C. Based on the time for one ride, calculate how many rides could be run in an 8 hour day.

__________ rides.
Geoscape Scavenger Hunt

Search the Park for objects (buildings, signs, etc.) or parts of objects that resemble the geometric figures or concepts listed below. Record the name of each discovery and place where it was found.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle:</td>
<td></td>
</tr>
<tr>
<td>Triangle:</td>
<td></td>
</tr>
<tr>
<td>Rectangle:</td>
<td></td>
</tr>
<tr>
<td>Square:</td>
<td></td>
</tr>
<tr>
<td>Trapezoid:</td>
<td></td>
</tr>
<tr>
<td>Parallel Lines:</td>
<td></td>
</tr>
<tr>
<td>Cone:</td>
<td></td>
</tr>
<tr>
<td>Cube:</td>
<td></td>
</tr>
<tr>
<td>Cylinder:</td>
<td></td>
</tr>
<tr>
<td>Pyramid:</td>
<td></td>
</tr>
<tr>
<td>Sphere:</td>
<td></td>
</tr>
<tr>
<td>Rectangular Prism:</td>
<td></td>
</tr>
<tr>
<td>Triangular Prism:</td>
<td></td>
</tr>
</tbody>
</table>

Study the list of discoveries with your classmates and discuss the following questions:

1. Which is the most common figure found in the park? Why do you think this is so?

2. Would this figure be the most common one found in all types of amusement parks? Why or why not?

3. Which figure do you think is found most often in the “outside world?” Why?

4. Which figure is found most often in your classroom? Why?

**Tunxis Tangram**
Cut out the shapes below. Arrange all of them to form one large square.

Many other figures or designs can also be made using the given shapes. Experiment and see how many you and your classmates can create. Do they resemble the basic designs behind the construction of any of the park rides or attractions?

1. **Who gets the monopoly on fun?** Todd and Kristin have season passes to Lake Compounce and want to visit as often as possible. This year Todd has a part time job and projects that he will be able
to go to the park for 5 days from 11 am to 7 pm. On all other days, he can visit for 3 hour intervals. Between babysitting and basketball camp, Kristin’s schedule shows that she will have 3 days off to visit the park for eight hours each day. On the remaining days of summer, she hopes to visit for 4 hours at a time.

a. Write equations to express the total number of hours each can be at the park.

b. After how many days will Kristin spend more time at the park than Todd?
   1) Solve the problem algebraically.
   2) Solve by graphing the equations. What does the point of intersection represent?

2. **Investigation:** Who are you more likely to find riding roller coasters – males or females. Try this investigation with the Phobia, Boulder Dash, or the Zoomerang. Or, join with your classmates and do all three.

a. Stand to the side of the roller coaster entrance or exit and count how many males and how many females enter or exit the ride. Use tick marks to keep count. Do this for 3 ride cycles.

b. Were there more males or female riders? What percent of the total riders were male? What percent of the total riders were female?

c. Considering the data collected, out of 10 riders how many would you expect to be male? female?

d. Do you think counting additional ride cycles would affect the percentages?

e. If you investigated several coasters, compare the data. Create double bar graphs for each coaster. If you use different colors for each coaster, you can place the three double bar graphs on the same grid (space in between). Do you think the type of coaster makes a difference in who rides?

---

**For Further Investigation** – Consider the following: Who is more likely to ride roller coasters – people under 18 years of age or those over 18 years of age? Why?
3. **Investigation:** What type of thrills do guests your age prefer?

Most guests have specific preferences as to what type of thrill brings them the most enjoyment. They make their choices based on rides that might have one specific thrill factor as well as those that may have a combination of thrill factors. (For example, the Giant Ferris Wheel travels in a circle but does so at great heights.)

   a. Circle the answer that best describes how you feel about the 7 types of ride/thrill factors listed below. Gather additional responses from 19 of your classmates (20 in all).

   b. Using the data collected, make triple bar graphs for each of the categories. For example, for roller coasters: how many people chose column A, how many chose column B, and how many chose column C?

   c. Compare your graphs. What do they tell you about thrill preferences?

   d. Turn your results into percentages for the type of rides/thrills preferred.

<table>
<thead>
<tr>
<th>Category</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller coasters</td>
<td>I love all the wild things.</td>
<td>I’m very choosy about my coaster.</td>
<td>No way, no time, never.</td>
</tr>
<tr>
<td></td>
<td>Drench me, soak me, I’m a sponge.</td>
<td>Spray me, but no splashing.</td>
<td>Keep every inch of me dry.</td>
</tr>
<tr>
<td>Water rides</td>
<td>The sky’s the limit.</td>
<td>A little lift goes a long way.</td>
<td>My feet are firmly planted on the ground.</td>
</tr>
<tr>
<td>Flyers/lifters</td>
<td>Round &amp; round I go; where I stop no one knows.</td>
<td>Just a turn or two is fine.</td>
<td>Spin anything but me.</td>
</tr>
<tr>
<td>Spinners</td>
<td>I have to be in the driver’s seat.</td>
<td>I’ll come along, but someone else has to drive.</td>
<td>I prefer a predictable ride every time.</td>
</tr>
<tr>
<td>Controlled</td>
<td>I need “down”time. Bring it on.</td>
<td>Anything over 8 ft and I’m leaving.</td>
<td>Ouch, ouch, ouch!</td>
</tr>
<tr>
<td>Droppers</td>
<td>I can do this all day.</td>
<td>It’s a nice change of pace.</td>
<td>This is way too tame for me.</td>
</tr>
<tr>
<td>Scenic/leisure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

 Permit me to introduce you to Permutations.
No, permutations are not something your favorite monster might experience, but they do involve change. **Permutations are possible arrangements of a set of items in which order is important.**

For example: Jim, Sue, and Bill will be riding the Skyride together. They will be seated next to each other in the front chair. How many possible seating options exist for the three friends?

A tree diagram can be used to show the possible arrangements. The permutations would include: Jim-Sue-Bill, Jim-Bill-Sue, Sue-Jim-Bill, Sue-Bill-Jim, Bill-Sue-Jim, and Bill-Jim-Sue (six in all).

But if you would like to determine the **total number of permutations** without writing them out, the **multiplication principle** offers a speedy answer. It can be more efficient for many items. Notice in the example, that for each choice for the first place, 2 choices remain for the second position. For each pair of choices for the first and second places, only 1 choice remains for the third position. Therefore, there are 3 x 2 x 1, or 6 permutations.

**Multiplying a whole number, \( n \), by every positive whole number less than itself is abbreviated as \( n! \) In the language of math, this is read as **n factorial**. (Sorry, it’s not a surprised n.) So, 3 ! = 3 x 2 x 1 = 6.

Ready? **It’s your turn to flip.**

1. Last season Gerry, Jane and Liz joined Jim, Sue and Bill for some fun on the Pirate Ship. How many possible ways could the friends have been found next to each other?

2. Too easy? Try this one. If the six friends were waiting in line together but only four could ride at one time, how many arrangements would be possible now?

3. Suppose Mark, Jane, and Sharon will be riding the Trolley together and it’s been decided that Mark will sit in the middle. Will this increase or decrease the number of permutations. Why?

4. You have already calculated 6 ! How can you use that answer to calculate 7?

---

**It’s Just Logical That You’ll Love Lake Compounce!**
Using *logical reasoning* helps you to solve problems and to make sense of information that seems to bombard you from every direction. *Venn Diagrams* are especially good aids for solving many problems that require logical thinking, because they help you to visually organize your data. They’re fun too! Here’s an example that will put you on the logic railroad. All aboard!

**Example:** Members of the Learning Can Be Fun Club visited Lake Compounce to explore the Science Behind the Rides. Eleven tested the Wildcat, fifteen tested the Zoomerang, and twelve tested the Bumper Cars. No one in the club rode all three rides, but six of them rode the Zoomerang and the Bumper Cars. **How many members does the club have?**

Before you start to say, “are you kidding,” try a **Venn Diagram** to solve the problem.

A. First draw three intersecting circles. Label one for each ride.

B. To show the number of members who rode all three rides, write the number 0 in the region that is inside all three circles.

C. Next, to show the number of members who rode the Zoomerang and the Bumper Cars, write the number 6 in the region that is inside both of those circles.

D. Write the number 3 in the region that is inside the overlapping circles for the Wildcat and the Zoomerang.

E. Write the number 4 in the region that is inside the overlapping circles for the Wildcat and the Bumper Cars.

F. To find the number of members who rode only one ride, you can now subtract using the total number of members who tested each ride.

   Wildcat testers: 11 – (4 + 0 + 3) = 4       rode only the Wildcat
   Zoomerang testers: 15 – (3 + 0 + 6) = 6     rode only the Zoomerang
   Bumper Car testers: 12 – (4 + 0 + 6) = 2     rode only the Bumper Cars

So, how many members ARE there in this club anyway? Do you know the answer? **Working from the small center region outwards, we add**

\[
0 + (3 + 4 + 6) + (4 + 6 + 2) = 25 \text{ members in the club!}
\]

**Logically speaking, now it’s your turn to be the engineer!**
Solve the following problems using Venn Diagrams.

1. **Warmup: Use two circles.**

   Mrs. Murphy’s fifth grade class made a beeline for the water rides. Fourteen students went on the Saw Mill Plunge and nine went on the Thunder Rapids Raft Ride. Six of the students went on both water rides. How many members are there in the class?

![Venn Diagram for Warmup Problem](image)

2. **Full speed ahead: Use three circles.**

   Each of Mr. D’s seventh grade students purchased food for lunch at the park. Of the three food choices offered, nineteen ate hot dogs. Eighteen had pizza, and eleven had chicken. No one ordered both pizza and chicken. However, twelve students bought hot dogs and pizza, and seven had hot dogs and chicken. How many students are in Mr. D’s class and had at least one of these three items for lunch? (Hint: How do you know that no one had hot dogs, pizza and chicken?)

![Venn Diagram for Full Speed Ahead Problem](image)

It’s Mathalicious!
At Lake Compounce, the Master Chef and his helpers depend on math everyday not only in preparing foods for our guests, but also in ordering the right amount of fresh and tasty ingredients and the supplies that are necessary for serving these foods. They have to keep their math skills in tiptop shape, because it’s like preparing for a really big party attended by thousands of guests!

Use your math skills to try these delicious treats. Be sure to ask for permission before you get started.

### Circus World Snowballs

**Ingredients:**
- 2 teaspoons of colored jimmies
- ½ cup of shredded coconut, regular or toasted
- 1 pint of your favorite ice cream

*Serves 4*

1. Measure and mix together the jimmies and coconut in an 8-inch square baking pan.
2. Using an ice cream scoop, make four round balls of ice cream and place in pan.
3. Take two spoons and roll the ice cream balls around in the mixture until coated.
4. Place the pan in the freezer for ten minutes so that the ice cream can harden. You can also place the ice cream balls in separate dessert dishes that are freezer safe.
5. Serve your Circus World Snowballs by themselves or on top of a slice of cake or pie.

**What would you need to do to feed 8 people?**

### Wildcat Waffles

**Ingredients:**
- 8 frozen waffles
- 1 small can of pineapple tidbits (about 8 ounces)
- 1 carton of frozen strawberries (about 10 ounces), thawed
- whipped cream or nondairy topping
- chopped nuts (optional)

*Serves 4*

1. Toast the waffles in the toaster. Place two on each plate.
2. Drain the liquid from the pineapple tidbits.
3. Divide the pineapple tidbits and strawberries evenly over the waffles.
4. Top each of your creations with whipped cream and chopped nuts if desired.

**Helpful hints:** Fresh fruit in season is extra scrumptious. Cherry or blueberry pie filling or fruit cocktail are also good substitutes. Add a scoop of ice cream and you have a great Wildcat Waffle Sundae.

### Compounce Island Survivor
Welcome to Compounce Island. You are about to embark on an unforgettable journey, where the thrills and chills are not for the faint of heart, where brains count as much as brawn, and where the fun may raise our laugh quotient to astronomical proportions. Your mission will be to survive the series of challenges that await your thoughts and actions. Will intelligence, cunning, boldness, observation, clear thinking, research, or just sheer endurance be the survivor’s claim to fame? Only time will tell. Only you and you alone hold the answer! Good Luck!

*The Tribal Council*

Note: Challenge components vary in degree of difficulty. Your master leader is to determine whether you will attempt to meet any or all of the challenges as a team or individually, whether time restraints will be required, or whether other limitations will be imposed. Please proceed according to her/his directions. This most excellent teacher is authorized by the Tribal Council to make all decisions concerning the challenges and to determine who is the ultimate survivor.

**Challenge 1: Fractured Powerlines**
ID the types of energy using the clues. Beware of high voltage!
(Hint: Fractions are reduced to lowest terms)

ex \( \frac{1}{2} \) of a soft drink (soda) + 3/5 of spacious (large) Answer: solar

A. \( \frac{5}{7} \) of the central part of an atom + 2/7 of ancient __________

B. 1 relative + 1/3 of manners + 1/3 of a vehicle __________

C. 3/4 of a negatively charged atom particle + 2/3 of frozen water + 1/4 of the height of a thing __________

D. 3/5 of molten rock + 1/4 of the opposite of positive + 1 spasmodic muscle contraction __________

E. 3/5 of gladness + 3/7 of a minute organism + 1/5 of loyalty __________

F. 1/3 of to think deeply + 3/7 of stress on a material + 3/5 of a woman’s headdress + 1/2 of an interjection (!) for see __________

G. 3/7 of a proposition that can be proved + 1/4 of scarce + 3/7 of a common wild duck __________

H. 1/3 of the measurement of light intensity + 1/3 of a large ox from Tibet + 2/7 of a brother or sister + 3/7 of the unit of energy produced by a food substance __________

I. 2/7 of to wander + 4/7 of a waterway + 2/5 of frosting + 2/9 of a large lizard __________

How many of these types of energy do you think are found at the park? Where?
Challenge 2: **Scienceologies**

How do your island relationships stack up?
(Hint: Relationships take many forms. Don’t make snap judgments.)

ex. Fire is to hot as ice is to cold. Hot is to fire as cold is to ice.
    Ice is to cold as fire is to hot. Cold is to ice as hot is to fire.
    Hot is to cold as fire is to ice. Cold is to hot as ice is to fire.
    Fire is to ice as hot is to cold. Ice is to fire as cold is to hot.

Bonus: Try the first analogy above with numbers that make the statement true. Let fire be 2, hot be 4, ice be 3 and cold be 6. Does 2/4 = 3/6? Try each of the other analogies using the same substitutions. Discovery?

A. Long strings are to short strings as lower frequency of vibration is to ______________ frequency of vibration.

B. One meter is to 2.5 meters as 39.37 inches is to ______________ inches.

C. Similarly charged is to oppositely charged as repel is to ______________.

D. Negatively charged particles are to positively charged particles as electrons are to ______________.

E. Potential is to rest as kinetic is to ______________.

F. Positive is to negative as anode is to ______________.

G. Pulley and wheel & axle are to lever as wedge and screw are to ______________.

H. Change of liquid to gas is to change of gas to liquid as evaporation is to ______________.

I. Absorbing energy is to liberating energy as endothermic is to ______________.

J. Divergent parallel light rays are to convergent parallel light rays as concave is to ______________.

K. Light excluded shadow part is to partially illuminated shadow part as umbra is to ______________.

*Challenge 3: Crocodile Gulch*
Do YOU know what makes the island creatures tick? Take the man meets machine challenge.

(Please choose the section that is appropriate to your grade level.)

Section One

Simple machines are an important part of our lives, especially since they are tools that make work easier. They’re all around us, and certainly at an amusement park. The simple machines include the inclined plane, the wedge, the screw, the lever, the wheel and axle, and the pulley. All other machines are combinations of two or more of these simple machines, no matter how complicated they seem.

1. Simple machines may be used to multiply force, to multiply speed, or to change direction. Match the following items with the action.
   
   a. flagpole pulley      1. multiply force
   b. car jack             2. multiply speed
   c. gears                3. change direction

2. Classify and group the following items used by the maintenance department at the park: hammer, wood chisel, wood screw, drill bits, pliers, auger, winch, nails, jack, snow blower, plow, axe, crowbar, kitchen knives, car steering wheels.

3. Give examples of the six simple machines that you might find inside the park.

4. How would you classify the gangplank and the chutes in the waterpark?

5. What do you think is the most common simple machine in Circus World?

6. What do you think is the most common simple machine in the rides department in general?

7. What do you think is the most common simple machine at the park? Why?

8. What ride in the park has the largest simple machine?

9. DownTime and Thunder N’ Lightning lift guests to great heights and bring them back down. What simple machine do you think they might have in common that would help in completing this feat?

10. Choose one ride in the park and list the simple machines that you think might be part of its makeup.

Section Two
A machine can help make a job easier to perform by changing the___________ or ____________ of an applied force. For each of the six simple machines below indicate the job easing function. Give an example that might be found at the Park.

<table>
<thead>
<tr>
<th>Changes direction of force</th>
<th>Changes amount of force</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lever</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>Pulley</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>Wheel &amp; Axle</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>Inclined Plane</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>Screw</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>Wedge</td>
<td>________</td>
<td>________</td>
</tr>
</tbody>
</table>

Force applied to a machine is the _____________ force. The force produced by the machine is the _____________ force. The amount by which the applied force is multiplied by a machine is known as _____________ _____________. Friction _______________ the mechanical advantage of a machine and causes mechanical energy to be changed into _____________ energy. The work done by a machine can never be _____________ than the work put into it. The work _______________ is always _____________ than the work _______________. The ratio of work output to work input is called the _____________ of a machine. Efficiency is increased by reducing _______________.

1. What is the ideal mechanical advantage of an inclined plane that is 3.5 m long and 1.0 m high?

2. What is the mechanical advantage of a machine that only changes the direction of the effort force?

3. What is the mechanical advantage of the pulley arrangement at the top of a flagpole that allows someone to raise the Compounce flag while standing on the ground?

4. How is the mechanical advantage of a pulley system measured?

5. What ride can claim the largest wheel and axle system in the park?
6. A car jack has an effort arm of 48 cm and a resistance arm of 6.0 cm. What is the mechanical advantage of the jack?

7. A maintenance worker decides to use a crowbar to move a cement slab which weighs 370 N. The bar has a mechanical advantage of 5.0. What effort force is needed to move the slab?

8. A retail clerk needs to lift a box of display items weighing 220 N from the floor to a counter which is 1 m high. Disregarding friction, if he uses a ramp 2 m long, how much force will be needed to move the box?

   Without the ramp, how much force is needed?
   How many joules of work is done either way?

9. Using a lever to move a rock at the Boulder Dash site, a construction worker applies 92 N of force and moves the lever 2.2 m. The rock, which weighs 610 N, is moved .15 m. What is the percent efficiency of the lever?

10. The efficiency of a machine can be increased by reducing friction. For machines run by electricity or fossil fuels, natural resources can in turn be conserved. List five ways to reduce friction that could be used at the Park.

Bonus: Compute the mechanical advantage if the radius of the Ferris Wheel is 12.2 meters and the diameter of the axle is 12 inches.

Challenge 4: Compounce Stew
A little bit of this and that.
Match and savor the island tidbits.

<table>
<thead>
<tr>
<th>First List</th>
<th>Second List</th>
<th>Third List</th>
<th>Fourth List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guinness &amp; World records for most consecutive rides on the Wildcat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand cranked 20 ft. Pleasure Wheel renamed Dare Wheel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Takes 455,000 watts of electricity to operate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tested for safety with twenty-eight 175 lb. sand bags</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertained at The Lake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World’s first mountainside coaster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Park’s Presidential guests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White horse entertainment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contains over 18 tons of steel bolts; built by Philadelphia Toboggan Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second List</th>
<th>Third List</th>
<th>Fourth List</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. 1911</td>
<td>A. Golden Age of Roller Coasters, wooden classic</td>
<td>1. Warren Harding</td>
</tr>
<tr>
<td>II. 1850</td>
<td>B. Magician Harry Houdini</td>
<td>2. King &amp; Queen of Lake Compounce</td>
</tr>
<tr>
<td>III. September 1975</td>
<td>C. Preceded George Ferris ride by 43 years</td>
<td>3. 1310 complete trips</td>
</tr>
</tbody>
</table>
IV. $ .10 front row seats  D. Has 1896 working mechanism: Wurlitzer 153B band organ  

V. 1927  E. Theodore Roosevelt  5. Boulder Dash  

VI. 3.05 m rafts  F. Noel Nu Nu Aube Meriden, CT  6. Eight seats were rotated vertically  

VII. 10 m loop “diameter”  G. Power to turn on 7584 sixty watt light bulbs  7. Zoomerang  

VIII. 145 ft. total drop  H. Fastest, longest wooden coaster on East Coast  8. Wildcat  

IX. Crocodile Club outing  I. Equal to a Saturn 4-door sedan and 14 mountain goats  9. Carousel  

X. 20 ft platform  J. Dove in the lake in early 1900’s  10. Orson Welles juggler  

**Challenge 5: Tame the Wild Things**

Be forewarned. This is not a walk in The Park! It requires physical stamina, cunning, and a spirit of adventure. (Hint: Enjoy!)

*Completed (X)*

A. Navigate the Saw Mill Plunge *without* getting soaked.  

B. Spin in the Rotor *without* tossing your cookies or developing a green facial hue.  

C. Bravely race through and between the dense vegetation and rugged rock facings on Boulder Dash *without* screaming or laughing raucously.  

D. Travel up, up, up, and yet farther up the famous hillside (where the spirits of compowne, atumtuckoo, or patuchoos squaw may call your name) *without* trembling, closing your eyes, or begging to come down.  

Note: If you *really* (*really, actually*) were able to tame the wild things as suggested, you didn’t follow the hint. Go back and do it the right way!!!  

**Locator**
<table>
<thead>
<tr>
<th>North End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoomerang</td>
</tr>
<tr>
<td>Zoomer's Gas N' Go</td>
</tr>
<tr>
<td>Pirate Ship</td>
</tr>
<tr>
<td>Twister</td>
</tr>
<tr>
<td>Phobia</td>
</tr>
<tr>
<td>Ghost Hunt</td>
</tr>
<tr>
<td>Saw Mill Plunge</td>
</tr>
<tr>
<td>Thunder N' Lightning</td>
</tr>
<tr>
<td>Ferris Wheel</td>
</tr>
<tr>
<td>American Flyers</td>
</tr>
<tr>
<td>Back Midway</td>
</tr>
<tr>
<td>Carousel</td>
</tr>
<tr>
<td>Wildcat Entrance</td>
</tr>
<tr>
<td>Wipeout</td>
</tr>
<tr>
<td>DownTime</td>
</tr>
<tr>
<td>Bumper Cars</td>
</tr>
<tr>
<td>Boulder Dash</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Midway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wildcat</td>
</tr>
<tr>
<td>Wave Swinger</td>
</tr>
<tr>
<td>Rotor</td>
</tr>
<tr>
<td>Crocodile Cove</td>
</tr>
<tr>
<td>Clipper Cove</td>
</tr>
<tr>
<td>Croc-o-Nile</td>
</tr>
<tr>
<td>Mammoth Falls</td>
</tr>
<tr>
<td>CP Huntington Train</td>
</tr>
<tr>
<td>Circus World/Kiddieland</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>South End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thunder Rapids</td>
</tr>
<tr>
<td>Lakeside Trolley</td>
</tr>
<tr>
<td>Compounce Mt. Skyride</td>
</tr>
<tr>
<td>Catering Pavilions</td>
</tr>
</tbody>
</table>

**Art in the Park**
In this section, use your imagination to see “art in the park.” Maybe you would like to design a ride or make improvements to what is already here. Let your mind be free as it invents new ideas!

Mission Important: Shrink Some Smiles into a Short Space! Create a cartoon strip showing what tickled your funny bone at the park.
Choose one of these projects to work on. Write a fun caption for your creation.

1. Draw yourself racing over the mountainside on Boulder Dash.

2. Create an ad for a new ride to be installed at Lake Compounce.

3. Design a new water ride for Crocodile Cove.

4. Draw a picture of what Boocifer’s secret room in the mansion attic might be like.

5. Design a tee-shirt that could be sold in one of the gift shops.

6. Draw a picture of your favorite ride at Lake Compounce.

7. Design and decorate a new animal for the Carousel.

8. Design a new landscaping feature for the entrance.

9. Design a food building that highlights a new edible specialty.

10. Draw you and your friends traveling under the Mammoth’s waterfall.
A logo is a special design that identifies a product or company. Design a new logo for Lake Compounce!
YOU CAN DRAW THIS COWBOY
IN THREE EASY STEPS

1. USING A PENNY AS A
GUIDE MAKE A CIRCLE
AND ADD A FEW LIGHT
LINES AS SHOWN ABOVE.

2. NOW WITH A PEN OR
USING HEAVY STROKES
OF THE PENCIL GO OVER
YOUR GUIDE LINES AS
SHOWN. NOW LIGHTLY
SKETCH IN THE REST.

3. WITH HEAVY STROKES
FINISH UP THE COWBOY
AS YOU SEE HERE.

NOW GIVE THIS HORSE
A TRY!

The next 2 pages can be backed to create a puzzle. Color Boulder Dash, then cut out the pieces.