

Many different Amusement Park Packets are floating around the country. None of this material is original and is only adapted to each individual situation. The companies CENCO and PASCO have kits available for your students to buy, but if you look at the end product, your students can build their own and learn from the experience.

From the CENCO packet and almost all of the other material, you can find a list of physiological and emotional conditions that the students might want to explore.

The following list of questions can be added to the sample pages that are included with this packet. These questions should be altered to suit your teaching style and curriculum. They may be used with any of the rides where they are appropriate.

Electrical Questions:

1. Power requirements for each of the rides based on observations and measurements that were made. These can deal with actual timing of the initial input (e.g. first hill of a coaster) calculating the power then converting to horsepower rating of motors.
2. In the event of an electrical outage, what safety factors should be in place?
3. Relate the power to everyday relationships like horsepower.

Centripetal Force and Rotary Motion:

1. Compare tangential velocity on the rides for each radius involved in the ride. Angular velocity's meaning should become very clear in these problems. Are any of these rides Simple Harmonic oscillators? Why or why not?
2. How does the angle with respect to the normal line to the horizon come into play for rotating rides like the carousel? How are the rides constructed to give the guest the safest and most comfortable ride? Does this come into the design with any part of the coasters?

Motion:

1. Direct analysis of all types of linear as well as rotational motions using real data and comparing it to the textbook non-friction motions discussed before coming to the park becomes a real eye opener for the student.

References

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Readings

John McGehee, "Physics Students Day at Six Flags/Magic Mountain," **Physics Teacher** 26, 12 (1988)

John Roeder, "Physics and the Amusement Park," **Physics Teacher** 13, 327 (1975)

George Taylor, Joseph Page, Murry Bentley, and Diane Lossner, "A Physics Laboratory at Six Flags Over Georgia," **Physics Teacher** 22, 361 (1984)

Amusement Parks Issue, **Exploratorium Quarterly**, Summer 1987

Amusement Park Physics Handbook, American Association of Physics Teachers, 1989

James Hicks and Chris Chiaverina, "Catch the Wave," **Physics Teacher**, 28, 167 (1990)

Bernadette Clemens-Walatka, "Amusement Park Inquiry," **The Science Teacher**, 65, 21 (1998)

Websites

WWW.SIXFLAGS.COM

WWW.CBAKKEN.NET

WWW.PHYSICSDAY.ORG

**Six Flags Worlds of Adventure
Physics/Science Day Survey Form**

School Name: _____

Address: _____

Phone: _____ Grade: _____

Number of students who attended the event: _____

To ensure that we are meeting your educational needs and making the day beneficial to your school and students, please answer the following questions:

The Workbook:

1. How many questions did you assign your students to complete?

2. What difficulties did your students encounter in doing the packet?

3. Which ride was most helpful in clarifying physics principles taught in the classroom?

4. Which was least helpful?

4.	Did you visit the NASA Exhibit?	Yes	No
	Did you visit Micro Gravity Man?	Yes	No

5. Was NASA a big influence in deciding to participate in Six Flags Physics Day? Yes No

6. Other than Science, what other disciplines did you get involved with?

English Language Art History Math Technology

7. How much was from your own materials? How was much from the Six Flags teacher manual?

8. Would you be willing to share your materials with other teachers? _____

9. What changes would you like to see made to Six Flag's Physics Day educational material? Please be as specific as possible.

10. How did you hear about Six Flag's Physics Day program? (i.e. other teachers, printed materials, Bill's Bugle, Ohio Schools Magazine)

11. What other activities do you think would enhance the event? (i.e. contests, outside speakers, etc.)

12. On a scale of 1- 5 (with 5 being the highest), how would you rate the Meal Deal? 1 2 3 4 5

Thank you for attending our 2001 Physics/Science Day.

Do you plan to attend next year? _____

Additional comments:

Please mail to: **Six Flags Worlds of Adventure**
Attn: Lori Davis
1060 N. Aurora Road
Aurora, Ohio 44202

SIX FLAGS WORLDS OF ADVENTURE HISTORY

Before it became a member of the Six Flags Theme Parks family in 1998, Six Flags Worlds of Adventure was known as Geauga Lake. Over a hundred years ago Geauga Lake was just known as a picnic area. In 1888, the park introduced its first ride – a primitive, steam powered carousel that generated as much smoke as it did steam. At this time, a ride on the carousel only cost “one perfectly good nickel.” By the 1920’s Geauga Lake began its evolution towards becoming a modern amusement park by adding rides like The Big Dipper.

On January 20, 2001, Six Flags Ohio acquired SeaWorld Cleveland creating Six Flags Worlds of Adventure, which is a one of a kind, 750 acre mega park.

INFORMATION PAGES

Americana (Ferris Wheel)

Maximum height	100f
Diameter	120f
Rotational speed	6 revolutions/min
Duration of ride	2.5 minutes
Capacity	24 buckets 6 passengers/bucket

Batman

Maximum height	162 f
Ride length	4210 f
Maximum speed	65 mph
Mass of train	28,000 lbs
Duration	
Capacity	3 trains 8 cars/train 4 passengers/car

Bel-Aire Express (Monorail)

Maximum height	20 f	6.1 m
Maximum speed	6 mph	9.6 km/hr
Length of track	5,020 f	1,530 m

Big Dipper

In 1926, during the Golden Age of Roller coasters, The Big Dipper, was built. The Big Dipper was first known as the Shooting Sky Rocket Coaster, and later renamed the Clipper. At the time, people described this coaster as "MAMMOTH" because it measures 65 feet at its highest point. However, in 1941 a small tornado swept through the park causing \$50,000 worth of damage, killing six people. This mini-cyclone destroyed part of The Big Dipper which was rebuilt. Since this is the parks oldest coaster, upkeep is always a concern. In 1994 the park completed a 5-year refurbishment on The Big Dipper, in which every last nut, bolt, and piece of wood was replaced.

Length of track	2600 f	795 m
Height of highest hill	65 f	19.8 m
Acceleration of falling object	32 f/s/s	9.8 m/s/s
Mass of train	1,405 lb	3,091 Kg
Speed of train travels up highest hill	6 mph	2.7 m/s
Maximum speed of ride	32 mph	
Duration of Ride	105 sec	
Capacity	2 trains	4 cars/train
	6 passengers/car	

Carousel

Since 1937, Six Flags Worlds of Adventure has housed a fully-operational Marcus Illions Supreme Carousel, which was carved in 1926 for the Philadelphia Sesquicentennial. At one time in America there were over 6,000 hand carved carousels but now there are fewer than 170. This carousel is a four-to-a-row, 64 jumping horse carousel which includes four chariots. The craftsman, Marcus Illions, is considered to be the "master" of the carousel. He was born in Lithuania in 1866 and arrived in Boston in 1888. By 1909, he formed his own carousel factory with his four sons and called it M.C. Illions and Sons. He continued to carve carousels until 1929 and refurbished them until 1945.

Duration of ride	90 sec	
Diameter of ride	49 f, 6 in	15.1 m
Diameter of inner ring of horses	20 f	6.1 m
Radius of Center to inside bench	22 f	6.706 m
Radius of Center to outside bench	32 f	9.7 m
Diameter of outer ring of horses	47 f, 6 in	15.4 m
Capacity	64 horses (1 passenger/horse)	
	4 benches (4 passengers/bench)	

Cuyahoga River Logging Co.

While the Cuyahoga River Logging Co. came to California in 1849, Six Flags Worlds of Adventure did not get Cuyahoga River Logging Co. until 1972. Its maximum height is 40 feet with a water speed of 8-9 feet per second. The ride lasts approximately 3 minutes.

Max height	40 f	12.2 m
Height of large hill	40 f	
Height of small hill	7f	
Max Water speed	9 f/s	2.7 m/s
Length of flume	1,200 f	366 m
Duration	3 min	
Mass of boat	1,000 lb	455 Kg
Capacity	24 boats (4 adults or 5 children/boat)	

Dodgems

Weight of car	266 lbs	121 Kg
Max speed	2 f/s	
Floor dimensions	97.75 f by 38.8 f	29.8 m by 11.8 m
Duration	90 sec	
Capacity	16 cars	2 passengers/car

Double Loop

In 1977 Six Flags Worlds of Adventure would become home to the first looping coaster in Ohio. Made from steel, the Double Loop's first hill is 95 feet high followed by 2 loops.

Max. Speed	54 mph	24 m/s
Height of first hill	95 f	29 m
Depth of first hill	90 f	27.4 m
Diameter (first loop)	65 f	19.8 m
Diameter (second loop)	55 f	16.8 m
Length of track	1,800 f	548.64 m
Weight of car	1,200 lbs	5,341 N
Mass of train		3,272.7 Kg
Mass of car		545 Kg
Duration	90 sec	
Power of motor	75 hp	56 kW
Speed up highest hill		2.7 m/s
Capacity	2 trains	
	6 cars/train	
	4 passengers/car	

Grizzly Run

Length of ride	1,500 f	457 m
Weight of boat	1,350 lbs.	614 kg
Maximum speed	6 mph	9.6 km/hr
Gallons of water	1,000,000	
Horsepower pumps	2340 hp	
Gallons of water per minute	45,000	
Duration	3-4 min	
Capacity	9 passengers/boat	

Hay Baler

Diameter	55 f 7 in
Ride speed	16 rpm
Maximum Height	24 f 9 in
Duration	90 sec
Capacity	20 cars
	2 passengers/car

Merry Oldies (Antique Cars)

Duration of ride	80 sec	
Maximum speed	8.8 f/s	2.7 m/s
Length of track	1,227 f	374 m
Engine rated at	6.7 hp	

Mind Eraser

Described as a "boomerang" type coaster, the Mind Eraser was added in 1996 and is the only coaster of its kind in the region. This heart-stopping coaster stands 125 feet tall and travels approximately 45mph. The snake-like structure of the Mind Eraser consists of a half loop in combination with half a corkscrew, followed by another half a loop and ending with a complete loop. Weight when shipped 250 metric tons.

Duration of ride	105 sec	
Top speed	55 mph	
Height of highest hill	125 f	38 m
Weight of train (7 cars)	7 tons	6,364 Kg
Track length	938 f	
Capacity	28	

Mr. Hyde's Nasty Fall

Standing 130 feet tall, this thrill ride will keep challengers on the edge of their seat as they dangle over the park for a brief moment before free-falling at a speed of over 50 mph

Height of ride	127.5 f	38.9 m
Length of fall	63 f	19.2 m
Weight of empty car	1,892 lbs	860 kg
Weight of full car	2,552 lbs	1,160 kg
Absolute max. weight	2,692 lbs	1,224 kg
Maximum speed	55 mph	

Music Express

Diameter	53.6 f	16.31 m
Length of track	67.6 f	20.57 m
Maximum height	25.6 f	7.8 m
Maximum speed	20 mph	13 km/hr
Number of rotations	13 rpm	
Duration	90 sec	

Raging Wolf Bobs

In 1988, The Raging Wolf Bobs was added to commemorate the park's 100th anniversary. This coaster is a replica of the famous Chicago Riverview Bobs. The original Bobs was designed by Thomas F. Prior and Frederick Church in the 1920's. This brilliant and early engineering team created a new era of roller coaster terror which stunned the first coaster enthusiasts. At the time, this design was revolutionary with its banked turns and spiral curves. The original bobs was rated among one of the top three coasters in North America during the "Golden Age of Coasters." The Raging Wolf Bobs has been updated to meet today's safety standards. This coaster features 13 hills, 6 banked turns, and 26 curves. The first hill is 80 feet high with a 46½ degree angle to provide the speed of the old gravity-run coasters.

Max speed	42 mph		
Height of first hill	80 f		
Track length	4000 f		
Duration	3 min		
Mass of Train	7,500 lb	3,401.4 Kg	
Mass of car	1,250 lb	566.9 Kg	
Speed up highest hill	2.7 mph		
Capacity	2 trains	6 cars/train	4/passengers per car

RoadRunner

Maximum height	28 f
Ride length	1181 f
Maximum speed	22 mph
Speed on up first hill	6 mph
Duration	105 sec
Mass of train	3,000 lbs
Capacity	1 train 20 cars/train 2 passengers/car

Serial Thriller

Maximum height	125 f
Maximum speed	45 mph
Length of track	1700 f
Duration	2 min 15 sec
Capacity	2 trains 10 cars/train 2 passengers/car

Silver Bullet

Height	57.8 f	17.6 m
Diameter	48 f	14.6 m
Diameter (in motion)	54.8 f	16.7 m
Capacity (40 adults)	150 lbs/ea.	70 Kg/ea.
Car weight	200 lbs	91 Kg
Rotational Speed	13.5 RPM's	
Duration	90 sec	
Capacity	20 cars (2 passengers/car)	

Sky Scraper

Diameter of cab	27.5 f	8.36 m
Travel	157 f	48 m
Overall height	220 f	67 m
Speed	8 ft/sec	
Duration	2 min 30 sec	
Capacity	52	

Superman

Maximum height	184 f	
Maximum speed	67 mph	
Ride length	630 f	
Mass of train	27,500 lbs	
Capacity	1 train	7 cars/train 4 passengers/car

Texas Twister

The Texas Twister was added to the park in 1993 and is the first of its kind in North America. In the amusement industry, it is commonly known as the "Top Spin" because forty riders are swung, twisted and flipped upside down at a height of 60 feet. The Twister has come over from Germany and is programmed by computer. The computer can operate ten different ride patterns, so you never know what will happen next.

Height	5 f	16.8 m
Diameter	(large) 9 f	14.9 m
	(small) 1 f	6.4 m
Rotational speed	3 RPM	
8 programmable ride sequences		
Centripetal Acceleration		9.6 m/s/s
Mass of gondola		12,200 Kg
Capacity	40 passengers	

Villain

Maximum height	120 ft	
Ride length	4000 ft	
Maximum speed	55 mph	
Mass per train	10,800 lbs	
Duration	250 sec	
Capacity	2 trains	6 cars/train 4 passengers/car

Yo-Yos

Length of swing	73 f	22.3 m
Max height	8 f	11.6 m
Diameter	80 f	24.4 m
Rotational speed	10 RPM	
Duration	90 sec	
Capacity	32 swings	(1 passenger/swing)

SPEAKING PHYSICS

To name and describe your observations, you must be able to speak the language of physics. Try to use each of these words at least twice while riding or watching the rides.

Acceleration - how fast speed and/or direction changes.

Action Force - one of the pairs of forces described in Newton's third law.

Air Resistance - force of air pushing against a moving object.

Apparent Weightlessness - the feeling of weightlessness that one has when falling toward the earth. (True weightlessness, however, requires that an object be far out in space, where gravitational forces are negligible.)

Centripetal Force - a push or pull that makes an object move in a curved path. Its direction is toward the center of the object's curved path.

Elapsed Time - the time that has passed, or elapsed, since the beginning of the time measurement.

Elastic Collision - a collision in which colliding objects rebound without lasting deformation or the generation of heat.

Energy - that property of an object or a system which enables it to do work; measured in joules.

Equilibrium - a state of balance between opposing forces or effects.

Force - any sort of push or pull.

Free Fall - motion under the influence of the gravitational force only.

Friction - a force from surrounding material which pushes or pulls on objects when you try to move them. Friction causes coaster rides to slow down. Friction usually results from the rubbing of one surface against another and produces heat as a result. Air resistance is one kind of friction.

Gravitational Potential Energy - the amount of energy of position above the surface of the earth. The higher an object is, the greater the gravitational potential energy it has relative to the surface.

G-Force - one "g" equals the gravitational pull at the surface of the earth. A g-force of 2 g's means a force acting on an object equal to two times its weight. (Acceleration of gravity - 9.8 m/s^2 (-10 m/s^2) or (-32 f/s^2))

Inertia - the tendency of matter to remain at rest or move at a constant speed in a straight line.

Jerk - rate of change of acceleration, named because you notice this as a feeling of being "jerked" in the direction of the change.

Kinetic Energy - the energy of motion. The faster you go the more you have. An object cannot speed up unless it gets energy from something that pushes or pulls it through some distance. Coaster rides get kinetic energy from gravitational potential energy. A moving object can not slow down unless its kinetic energy is changed into some other kind of energy. In coaster rides, kinetic energy changes into gravitational potential energy and into heat. The total of the kinetic energy and potential energy in a coaster tends to remain the same. Brakes change kinetic energy into heat.

Law of Conservation of Energy - the statement that energy cannot be created or destroyed; it may be transformed from one form to another, but the total amount of energy never changes.

Mass - a kind of moving inertia that tends to keep moving objects going in the same direction. Momentum is the mass of a body multiplied by its velocity. Momentum (mass x velocity) tends to remain the same.

Momentum - the product of the mass and the velocity of an object. Has direction as well as size.

Parabola - the shape of the curved path of a ball as it is tossed from one person to another. Roller coaster hills have this shape.

Potential Energy - energy that is stored and held in readiness by an object by virtue of its position. In this stored state it has the potential for doing work.

Power - the rate at which work is done, equal to the amount of work done divided by the amount of time during which the work is done; measured in watts.

Reaction Force - the force that is equal in strength and opposite in direction to the action force and that acts on whatever is exerting the action force.

Revolutions - motion in which an object turns about an axis outside the object.

Rotation - the spinning motion that takes place when an object moves about an axis that is located within the object.

Rotational Speed - the number of rotations or revolutions per unit of time; often measured in rotations or revolutions per second or per minute.

Rotational Velocity - rotational speed, together with a direction of rotation or revolution.

Speed - how fast something is moving; the distance moved per unit of time.

Velocity - the speed of an object in a particular direction.

Weight - the force on a body of matter due to the gravitational attraction of another body (commonly the earth).

GUT FEELING AT THE PARK

Because your body has its own way of detecting accelerations, you can easily detect accelerations on rides without the use of manufactured accelerometers. This collection of sensing devices your body uses to measure accelerations could be called a "natural accelerometer." Let's take a look at how your "natural accelerometer" detects different kinds of accelerations.

When you experience. . .

Direction of Acceleration	Physics Term	Gut Feeling
Upward	Vertical	· You feel pressed into your seat. (The greater the acceleration, the more squashed you feel.)
Downward	Vertical	· You feel like you are rising out of your seat. · Your stomach feels like it's in your throat. · You feel queasy. · Weightlessness; you feel as though you weigh nothing.
Forward	Longitudinal	· You feel pushed back against your seat. · Your head and shoulders may swing backward.
Backward	Longitudinal	· You slide forward on the seat. · Your head and shoulders may lurch forward.
Left or Right	Lateral	· You slide sideways across the seat. · Your shoulder may be pressed against the side wall or your ride partner. · Your head may bang against the side wall.

Superhero Fact Sheet

Aquaman

Aquaman communicates telepathic ally with most sea life.
His cybernetically controlled left hand can become almost any shape, including a hook with retractable cable.
Super-dense body can withstand pressures of the deep and grants Aquaman superhuman strength.
He was raised by a dolphin.
The villain Charybdis cost him left hand.
He is the King of the Seas

Real Name: Arthur Curry
Occupation: Protector of the seas, crimefighter, King of Poseidonis
Base of Operations: Poseidonis
Height: 6'1"
Eyes: Blue
Hair: Blonde

Batman

Cowl is Kevlar-lined helmet with Starlite nightvision and radio link to the Batcave.
Costume and cape are Nomex fire -resistant and lined with triple -weave Kevlar.
Weapons include razor -sharp Batarangs; decel monofilament cord jumplines and grapnels; gas capsules; and rebreather. These and other devices are stored in the Batman's utility belt, which is booby -trapped to prevent tampering.
The points of Batman's cape are weighted for use as an offensive weapon.

Real Name: Bruce Wayne
Occupation: Industrialist, philanthropist
Base of Operations: Gotham City
Height: 6'2"
Eyes: Blue
Hair: Black

Captain Marvel

Possesses the wisdom of Solomon, the strength of Hercules, the stamina of Atlas, the power of Zeus, the courage of Achilles and the speed of Mercury, which also enables flight.
Has the super-powered body of an adult with savvy mind of a teenager.
Granted powers by the wizard Shazam – Billy only has to say the wizard's name to transform into Captain Marvel.

Real Name: Billy Batson
Occupation: Radio personality
Base of Operations: Fawcett City
Height: As Captian Marvel – 6'2" As Billy Batson – 5'4"
Eyes: Blue
Hair: Black

Catwoman

Razor-sharp retractable claws on gloves and boots.

Extendable bullwhip housed on right forearm.
She has natural acrobatic skills.

Real Name: Selina Kyle
Occupation: Professional thief, adventurer
Base of Operations: Gotham City
Height: 5'7"
Eyes: Green
Hair: Black

The Flash

Flash can vibrate through solids, but not without causing them to explode.
Inside Flash's earpieces are radios tuned to police band and emergency frequencies.
Flash can reach a top velocity of just under light speed. Any faster and he emerges with speed force.
Though he cannot affect people or things at rest, Flash can lend velocity to moving objects.
He got his powers from a bolt of lightning.

Real Name: Wallace Rudolph (Wally) West
Occupation: Adventurer
Base of Operations: Blue Valley, Nebraska
Height: 6'
Eyes: Green
Hair: Red

Green Lantern

Ring is the most powerful weapon in the universe. It creates solid light images that can be shaped to take the form of anything the wearer imagines.
Ring is keyed to Kyle's genetic signature and can only be used by him.
Unlike previous Green Lantern rings, Kyle's ring is limited only by his imagination and will power; no weakness to the color yellow and no 24-hour time limit.
He is a member of the Justice League.

Real Name: Kyle Rayner
Occupation: Freelance artist
Base of Operations: New York City
Height: 5'11"
Eyes: Dark Green
Hair: Black

The Joker

The Joker's signature weapon is his Joker Venom, a fast-acting poison that leaves its victims with a grinning rictus in death, not unlike his own macabre smile.
He uses electrocuting joy buzzers, acid spewing boutonnieres and spear-firing gag pistols.

Real Name: Unknown
Occupation: Professional criminal
Base of Operations: Gotham City
Height: 6'5"
Eyes: Green
Hair: Green

Lex Luthor

An unparalleled and ruthless businessman with power and influence second only to Superman in Metropolis.
As CEO of LexCorp, Luthor has full access to some of the most technologically advanced weaponry on the planet.

Real Name: Lex Luthor
Occupation: Chief Executive Officer, LexCorp International
Base Operations: Metropolis
Height: 6'2"
Eyes: Green
Hair: N/A

Lois Lane

Grew up on army bases all over the world.
Learned hand-to-hand combat and survival training from her father.
Lois has written a number of mystery novels.
She works for the Daily Planet.
She was saved from a plane crash by Superman.
She is now married to Clark Kent (Superman).

Full Name: Lois Joanne Lane
Occupation: Reporter
Base of Operations: Metropolis
Height: 5'6"
Eyes: Blue
Hair: Brown

The Penguin

A notorious and brilliant criminal strategist with considerable intellect.
Employs numerous umbrellas containing hidden tools or weapons.
Has often used birds of prey to help carry out his schemes.
Surprising agility and hand-to-hand combat skills.

Real Name: Oswald Chesterfield Cobblebot
Occupation: Crime boss
Base of Operations: Gotham City
Height: 5'2"
Eyes: Blue
Hair: Black

The Riddler

A cunning criminal strategist and an accomplished marksman.
His weapons have varied from exploding jigsaw puzzles to pistols shaped like question marks.
His obsession with beating Batman is often his undoing.
Provides clues to his capers in the form of puzzles and riddles.

Real Name: Eddie Nashon
Alias: Edward Nigma

Occupation: Professional Criminal
Base of Operations Gotham City
Height: 6'1"
Eyes: Blue
Hair: Black

Robin

Employs a reinforced polymer telescoping Bo staff.
R-emblem can be thrown as a razor -sharp shuriken; slingshot, gas pellets, rebreather and other devices are concealed in his costume and utility belt.

Real Name: Timothy (Tim) Drake
Occupation: High school student
Base of Operations: Gotham City
Height: 5'1"
Eyes: Blue
Hair: Black

Superman

Super-strength, super-speed, super-invulnerability, and the power of flight. An arsenal of super -senses, including X-ray vision, telescopic vision, heat vision, and super-hearing.
He is especially vulnerable to Kryptonite radiation.

Real Name: Clark Kent
Occupation: Journalist, Novelist
Base of Operations: Metropolis
Height: 6'3"
Eyes: Blue
Hair: Black

Wonder Woman

Possesses incredible strength and the power of flight.
Bracelets can deflect bullets.
She was formed out of clay by her mother.
Magic lasso was spun from the girdle of Gaia.

Real Name: Diana
Occupation: Ambassador
Base of Operations: Gateway City
Height: 5'11"
Eyes: Blue
Hair: Black