The Living Classroom

Wild Adventures Physical Science Day Student Packet Middle School Program

Program designed by teachers in Dothan, Alabama
With help from Wild Adventures

Math:

- Demonstrate proficiency in performing basic operations on rational numbers.
- Demonstrate proficiency in evaluating rational number expressions using the order of operations.
- Demonstrate proficiency using estimation techniques in problem solving related to real-life situations.
- Use problem-solving strategies effectively.
- Solve measurement problems using mental math, paper and pencil, and estimation techniques as well as appropriate units of measure.
- Apply properties of plane and solid geometric figures to solve problems.
- Identify uses and misuses of statistics in everyday life.
- Conduct a statistical study and use a statistical sampling to make a prediction.
- Determine possible outcomes of an event and compare with experimental outcomes.

Science:

- Identify steps within the scientific process. Measure dimension, volume, and mass using SI units. Identify examples of hypotheses.
- Identify Newton's three laws of motion. Calculate speed, average speed, instantaneous speed, acceleration, and distance traveled.
- Differentiate between potential and kinetic energy.

Cheetah and Hangman

Cheetah is a wooden roller coaster and Hangman is made of steel. Your task is to figure which coaster goes faster. You'll need to figure out which coaster has the greatest average speed.

Average speed = distance / time, so you'll need the length of each track and the total time of each ride.

Estimate: Which coaster will have the highest average speed?

Cheetah or Hangman

Hangman has a total track length of approximately 662 meters. Using your stopwatch, time yourself on the ride from the starting point (where you first start moving) until you arrive back at the station and come to a complete stop.

Total distance: 662 meters

Total Time: _____ seconds

Cheetah has a total track length of approximately 951 meters. Using your stopwatch, time yourself on the ride from the starting point (where you first start moving) until you arrive back at the station and come to a complete stop.

Total distance: 951 meters

Total Time: _____ seconds

Notice that both rides stop short of the station and slowly roll in. How does this affect the average speed of the rides?

What could you do to come up with a speed that might be more representative of the rides?

Which ride has the higher average speed?

What factors did you consider in making your guess?

Why is one ride faster than the other?

What is the average speed of the rides in kilometers/hour?

Cheetah _____ km/hr Hangman _____ km/hr

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Physical Science

Double Shot

Objective: To determine the average number of people that ride on the Double Shot during a given day.

- Total number of passengers.

Ride 1	_____	Ride 6	_____
Ride 2	_____	Ride 7	_____
Ride 3	_____	Ride 8	_____
Ride 4	_____	Ride 9	_____
Ride 5	_____	Ride 10	_____

Total number of passengers (A) _____

Average riders per ride = A/10= _____ (AVG) (Keep the decimal here so as not to affect your total answer by rounding too early. Wait until the end of the problem to round.)

Operating hours of the park: Open _____ Close _____
Total operating hours= _____ (H)
Total operating minutes (H x 60)= _____ (M)
Total operating seconds (M x 60) = _____ (S)

Elapsed time for 10 rides = _____ seconds (E)
Elapsed time for 1 ride (E/10) = _____ (R)

Total number of rides in a day (S/R) = _____ rides

Average riders in a day (rides x AVG) = _____
(Now you can round your answer.)

Boomerang

Objective: Calculate the average speed of the ride and try to figure out the instantaneous speeds at a few points.

Part 1:

- Using your stopwatch, time the ride from the starting point (where you first start moving) until you arrive back at the station and come to a complete stop.

Total distance of track = _____ meters
Total time = _____ seconds
Average speed = _____ meter/second

Part 2:

- Length of train = _____ meters
- Time for entire train to pass the top of the first loop = _____ seconds

Train speed (distance/time) = _____ meters/second

- Try this same procedure at two other points on the track. Try to find the fastest section of track.
  1. Point on track _____
     Speed (Length of train/time) = _____ meters/second
  2. Point on track _____
     Speed (Length of train/time) = _____ meters/second

Part 3:

- Where is the train the fastest on the ride?
- Ask people who have just gotten off the ride where they felt the train was the fastest. How does your data compare to their experience?

Blackfoot Falls

Objective: to determine the acceleration and speed of a ride traveling down the final chute.

Part 1:

- Time for the ride to descend the chute = _____ seconds (A)
- Time for the ride to descend the chute = _____ seconds (B)
- Time for the ride to descend the chute = _____ seconds (C)
- Time for the ride to descend the chute = _____ seconds (D)
- Time for the ride to descend the chute = _____ seconds (E)

Average time (A + B + C + D + E / 5) = _____seconds (F)

Part 2: Distance of Final Chute = _____ meters (G)

$$\text{Acceleration} = \frac{2\,(\text{distance})}{\text{time}^2}$$

Acceleration of Ride = 2 (G) / F^2 = _____ meters/second^2

Part 3:

- How does this acceleration compare to the acceleration of a freely falling object?

- Why would the two accelerations be different?

- What would you have to change on this ride to get the ride's acceleration closer to that of a freely falling object?

Part 4:

Find your speed at the bottom of the chute.
Velocity (speed) = acceleration x time

Speed at the bottom of the chute = _____ meters/second