Lesson 1: Newton's First Law

Section 1: Exploration

Ex1: Motion on a Low-Friction Track

Directions: Use the video of the ball rolling along the track to answer the questions.

1. What is the speed of the ball near the beginning of the portion of the track marked off by the ruler?

2. What is the speed of the ball near the end of the portion of the track marked off by the ruler?

3. Does the ball's speed change significantly from the beginning to the end?

4. Based on your answers to the previous two questions what would you predict the ball's speed to be somewhere in the middle of the track?

5. Based on your answers to the first two questions what would you predict the speed of the ball to be at the end of a track that is twice as long?

6. Do your observations support Newton's first law? Why, or why not?

Ex2: Coffee Cup Video

Directions: Use the video of the car and coffee cup to answer the questions.

1. What is the initial speed of the coffee cup?

2. What is the initial speed of the car?

3. When the car's speed begins to change does the coffee cup's speed also change? How can you tell?

4. Does this behavior support Newton's First Law? Why, or why not?

Ex3: Car Crash Test

Directions: Use the car crash test video to answer the questions.

1. Record an estimate of the speed of the car and the dummy before and after the crash.

	Before Crash	After Crash
Dummy		
Car		

2. The car's speed is roughly constant prior to the crash. How does the speed of the dummy after the car stops moving compare to the car's original speed?

3. Are there any external forces acting on the dummy? If so do any of them affect the dummy's horizontal motion?

4. Why does the dummy finally stop moving?

Section 2: Discussion

This page is provided for note taking.

Section 3: Application

App1: Coin and Graduated Cylinder

Directions: Answer the questions BEFORE viewing the video clips.

1. Consider a coin stuck lightly to the bottom of a graduated cylinder. The cylinder is narrow and long so you can't reach in and get it. Given you knowledge of Newton's first law, how would you go about getting the coin out of the cylinder? Explain your answer completely and clearly.

App2: Liquid Filled Carts

Directions: Answer the first question BEFORE viewing the video. Answer the second question AFTER viewing the video.

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1. Consider a cart with wheels that has a fluid-filled container on it. Think about what would happen if we pulled on it with a constant force. Which answer best describes what the surface profile of the fluid will look like once the cart begins to accelerate?

a) The fluid surface will be flat.
b) The fluid surface will slope such that it is lower near the front (where the string connects).
c) The fluid surface will slope such that it is higher near the front (where the string connects).
d) The fluid surface will slope such that it is low in the middle and high on the ends.
e) None of these.

2. Was your answer to the last question correct? Explain why the profile looks the way it does using Newton's first law.

App3: Coin and Beaker

Directions: Answer the first question BEFORE viewing the video. Answer the second question AFTER viewing the video.

1. In the video a coin rests on a card that is sitting on a glass beaker. Once the video is started the card will be pulled quickly. Which of the choices below best describes the trajectory of the coin after the card is pulled?

a) The coin will fall down and towards the right landing in the beaker.
b) The coin will fall down and towards the left landing in the beaker.
c) The coin will fall straight down into the beaker.
d) The coin will move with the card and will not fall at all.
e) The coin moves but doesn't land in the beaker.

2. Was your answer to the previous question correct? Explain the trajectory of the coin using Newton's first law.