

PHYSICS

Predicting Future Motion Via Observations

Materials Needed: 6 yardsticks, 6 stress balls, 6 bouncy balls, 6 tennis balls, masking tape

Procedure:

Have the instructor break the class into 6 teams.

Hand one of each type of ball and a yardstick to each team. Have one person be a “dropper,” one a “yardstick holder,” and the remainder of the team as observers. Make sure that every team has some paper and something to write with in order to record their observations. If the class is mature enough, you can have them rotate duties. Holding the yardstick vertically, bring the bottom of the stress ball up to the 12-inch mark. Drop the ball (no added force...don't throw). The observers should be on the floor watching the drop with the yardstick in front of them. Have the observers note how high the ball bounced on its first bounce. Do this two more times with the stress ball and record the first bounce. After the first three observations are completed, move the ball up to the 24in mark, run, observe and record the first bounce three more times. End with taking the ball to the 36in level, run, observe, and record three more drops. After the stress ball, have the group run the same test (9 drops each) on the bouncy ball and the tennis ball. Remind them to record all drops. Bring the class back together and discuss findings. Where the bounces of each ball type fairly consistent for all three tests from the same height? If you gave them the type of ball and said that you were going to drop it from 30 inches, do they think that they could predict the bounce (within a couple of inches)? Note: Inconsistency in production or age will likely cause some difference in the bounce of the same type of ball between teams.



Depending on what the instructor prefers, each team could make a graph showing the relationship between the test number (1, 2, or 3) on the x-axis and the average height the ball bounced on the y-axis for all three balls. Or,

you can do this optional activity, take a tennis ball into the hall---or other large area with walls. Place a masking tape target on the wall, and mark (towards the middle of the hall) where student will start the balls rolling. Have students roll (not throw) the tennis ball toward the target. Have a team member place a piece of masking tape on the floor to show the angle the ball left the wall (of course, if they did not hit the target, don't mark the angle). Give every student a chance to roll the ball, marking the angle the ball rolled after contact (if they hit the target). The resulting angles should be relatively consistent. Some variance will occur due to speed and spin. Go back into the classroom and ask if the students thought that the angle was fairly consistent. How could we make the angle even more consistent? (Maybe replace humans with a machine that could always roll the ball at the same speed and with the same spin.)

Indiana Standard:

3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.



Extension

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