Name _____ Date _____ Class _____

Motion ▪ *Skills Lab*

Stopping on a Dime

Problem

What is the distance needed between an out-of-bounds line and a wall so that a player can stop before hitting the wall?

Skills Focus

measuring, calculating, inferring

Materials

wooden meter stick

tape measure

2 stopwatches or watches with second hands

Procedure

Part I Reaction Time

1. Have your partner suspend a wooden meter stick, zero end down, between your thumb and index finger. Your thumb and index finger should be about 3 cm apart.
2. Your partner will drop the meter stick without giving you any warning. You will try to grab it with your thumb and index finger.
3. Note the level at which you grabbed the meter stick and use the chart shown to determine your reaction time. Record the time in the class data table.
4. Reverse roles with your partner and repeat Steps 1 through 3.

Reaction Time

Distance (cm)	Time (s)	Distance (cm)	Time (s)
15	0.175	25	0.226
16	0.181	26	0.230
17	0.186	27	0.235
18	0.192	28	0.239
19	0.197	29	0.243
20	0.202	30	0.247
21	0.207	31	0.252
22	0.212	32	0.256
23	0.217	33	0.260
24	0.221	34	0.263

Part II Stopping Distance

5. On the school field or in the gymnasium, mark off a distance of 25 m. **CAUTION:** *Be sure to remove any obstacles from the course.*
6. Have your partner time how long it takes you to run the course at full speed. After you pass the 25-m mark, come to a stop as quickly as possible and remain standing. You must not slow down before the mark.
7. Have your partner measure the distance from the 25-m mark to your final position. This is the distance you need to come to a complete stop. Enter your time and distance into the class data table.
8. Reverse roles with your partner. Enter your partner's time and distance into the class data table.

Class Data Table

Student Name	Reaction Time (s)	Running Time (s)	Stopping Distance (m)

Stopping on a Dime *(continued)*

Analyze and Conclude

Answer the following questions in the space provided.

1. **Calculating** Calculate the average speed of the student who ran the 25-m course the fastest.

2. **Interpreting Data** Multiply the speed of the fastest student (calculated in Question 1) by the slowest reaction time listed in the class data table. Why would you be interested in this product?

3. **Interpreting Data** Add the distance calculated in Question 2 to the longest stopping distance in the class data table. What does this total distance represent?

4. **Drawing Conclusions** Explain why it is important to use the fastest speed, the slowest reaction time, and the longest stopping distance in your calculations.

5. **Controlling Variables** What other factors should you take into account to get results that apply to a real basketball court?

6. **Communicating** Suppose you calculate that the distance between the out-of-bounds line and the wall in a playground or gymnasium is too short for safety. Write a proposal to the school that describes the problem. In your proposal, suggest a strategy for making the court safer.

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More to Explore

Visit a local playground and examine it from the viewpoint of safety. Use what you learned about stopping distance as one of your guidelines, but also try to identify other potentially unsafe conditions. Write a letter to the Department of Parks or to the officials of your town informing them of your findings.