

In pairs, you will measure how far the ruler drops before you can catch it between your fingers. Based on this displacement, you can calculate the time it takes for you to react to a change in motion from rest. Make note of where the ruler starts in order to accurately measure how far it falls. After completing 10 successful tries, convert the distance from each try into a reaction time and then find that average. Convert that average reaction time into an average distance things fall for that time.

1. Form a hypothesis of your performance:

Do you think there will be a general trend for better or worse?

Do you think there will be a lower or upper limit to how far it falls?

Guess your data:

|          |     |     |     |     |     |     |     |     |     |      |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Try      | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |
| Distance |     |     |     |     |     |     |     |     |     |      |

2. Collect Data:

Person 1:

|          |     |     |     |     |     |     |     |     |     |      |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Try      | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |
| Distance |     |     |     |     |     |     |     |     |     |      |

Person 2:

|          |     |     |     |     |     |     |     |     |     |      |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Try      | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |
| Distance |     |     |     |     |     |     |     |     |     |      |

3. Graph your data on the back.

4. Were your hypotheses correct?

The distance an object falls from rest is given by the equation  $d = 4.9 t^2$ .

If you solve for time,  $t = \sqrt{d/4.9}$ , where d is in meters and t is in seconds.

5. Calculate your reaction time for each try and fill the table below:

|      |     |     |     |     |     |     |     |     |     |      |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Try  | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th |
| Time |     |     |     |     |     |     |     |     |     |      |

6. Based on the table above, calculate your average time and solve for the distance something will fall before you react to catch it.

7. Calculate the percent difference between your reaction time and your partner's:

$$\%diff = \frac{\text{difference b/w values}}{\text{average of both values}} \times 100\%$$