

Name: Key Official Class: _____ Date: _____
Teacher: _____ Period: _____ Class: _____

Collision Theory

YOYO: What must happen in order for a hockey player or a soccer player to score the winning goal? Write your answer in at least 2 complete sentences.

Introduction: In the picture below, the baseball bat represents **Reactant A** and the baseball represents **Reactant B**. A reaction will only be successful if the batter hits a homerun. If the batter does not hit a homerun, the reaction will be considered a failure. Now, read the four scenarios below and answer the key questions that follow.



Scenario 1: The pitcher throws a fastball down the middle of the plate. The batter takes a mighty swing and totally misses the ball. The umpire yells, "Strike one!"

Scenario 2: The pitcher throws an off-speed pitch and the batter checks his swing. The batter just barely makes contact with the ball and it dribbles down in front of the batter's feet into foul territory. The umpire yells, "Foul ball; strike two!"

Scenario 3: The pitcher throws a curve ball that looks like it might catch the outside corner of the plate. The batter swings with all his strength, but the bat grazes the underside of the ball and the ball skews off to the right, flying into the crowd. The umpire yells, "Foul ball, still two strikes!"

Scenario 4: The pitcher throws another fastball down the middle of the plate. The batter swings and wallops the ball high into the air and the ball clears the center field wall that reads 410 feet. The ump yells, "Homerun!"

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Questions:

1. Did a reaction take place between **Reactant A** and **Reactant B** in Scenario 1? Why or why not? Explain your reasoning in terms of the *nature* of the collision.

NO - there was no contact w/ reactants.

2. Did a reaction take place between **Reactant A** and **Reactant B** in Scenario 2? Why or why not? Explain your reasoning in terms of the *nature* of the collision.

NO - ~~poor contact - not hit in right spot (wrong orientation)~~
Wrong speed - not enough energy

3. Did a reaction take place between **Reactant A** and **Reactant B** in Scenario 3? Why or why not? Explain your reasoning in terms of the *nature* of the collision.

NO - poor contact - not hit in ~~the~~ right spot (wrong orientation)

4. Did a reaction take place between **Reactant A** and **Reactant B** in Scenario 4? Why or why not? Explain your reasoning in terms of the *nature* of the collision.

YES! - proper orientation
- proper energy
- actual contact made.

5. Based on your responses to Questions 1-4 and your reasoning, what insight has your team gained about the term *effective collision*?

if effective collisions occur a reaction can progress forward.

6. Based on your answer to Key Question 5, complete the following statement: Collision theory states that a reaction is most likely to occur if...

- contact occurs
- proper orientation
- enough energy

(this is the answer to many Regents questions)