

Crash Scene Investigator

Name: _____

Date: _____

Vocabulary

Compass - a tool used to show the current directions based on Earth's magnetic field

Collision - an event where objects exert forces on one another that result in a change of motion

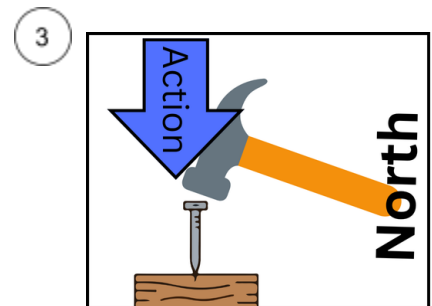
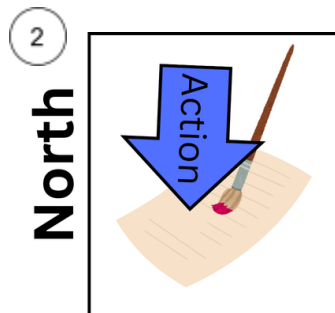
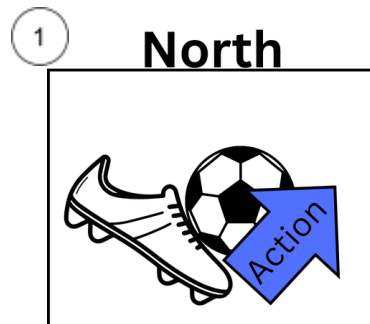
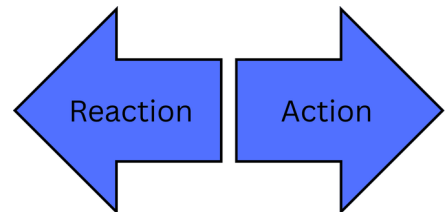
Newton's Third Law - for every action, there is an equal action in the opposite direction.

Introduction

Newton's Third Law

Newton's Laws tell us about how objects move. His third law tells us that if there is an action, there will always be a reaction that is equal in force but in the opposite direction.

For each example, draw the direction of the reaction. Then, use Ari to find the direction based on the orientation of each scene. Then, create your own example.



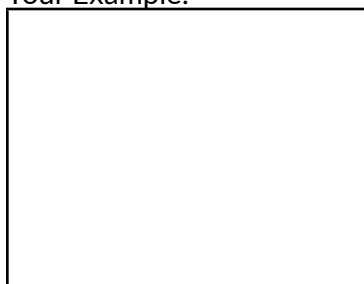
Direction of reaction:

1 _____

2 _____

3 _____

Your Example:



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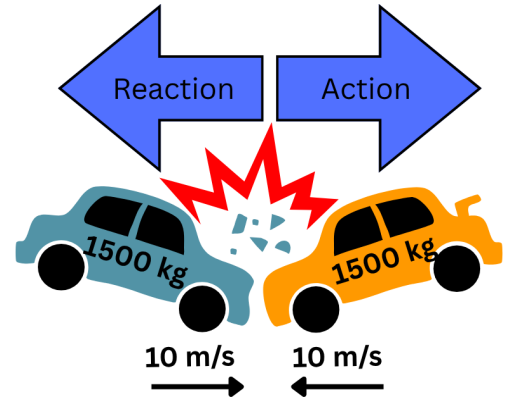
Activity 1

Analyze the Crash

In analyzing vehicle collisions, Newton's third law is used along with the velocity and masses of the vehicles involved.

In this example, since both vehicles have the same mass and are travelling at the same velocity (in opposite directions), the impact of their collision will be the same for each vehicle. If either of them had a larger mass or were travelling at a faster velocity, this would not be true.

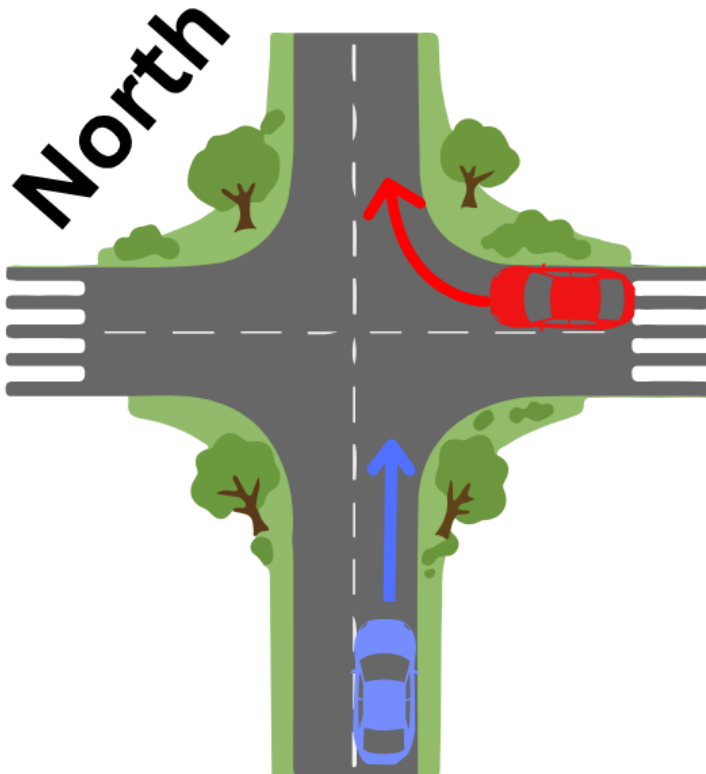
For each scenario, use the diagram to answer the questions and predict the possible damage.



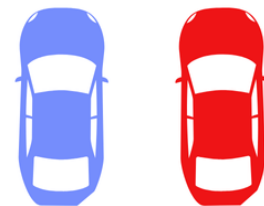
- 1 The red car pulls out into oncoming traffic to take a right.

What direction is the red car turning? _____

What direction is the blue car travelling? _____



Where might the damage be on each of the cars if the red car pulls out in front of the blue one?



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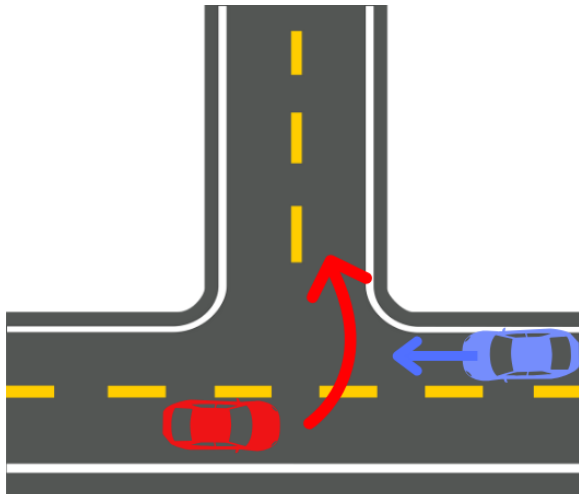
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- 2 The red car takes a left turn without checking for oncoming traffic.

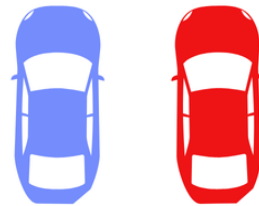
What direction is the blue car travelling? _____

What direction is the red car turning? _____



North

Where will the damage be on each of the cars if the red car cuts across just as the blue car crosses the intersection?



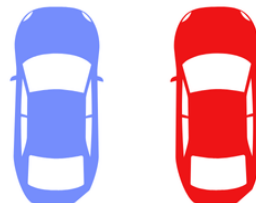
- 3 The red car and blue car are travelling safely through this rotary. The red car suddenly realizes they need to take the exit.

What direction is the blue car moving? _____

What direction is the red car turning? _____



Where will the damage be on each of the cars if the red car suddenly turns while the blue car is continuing in the rotary?



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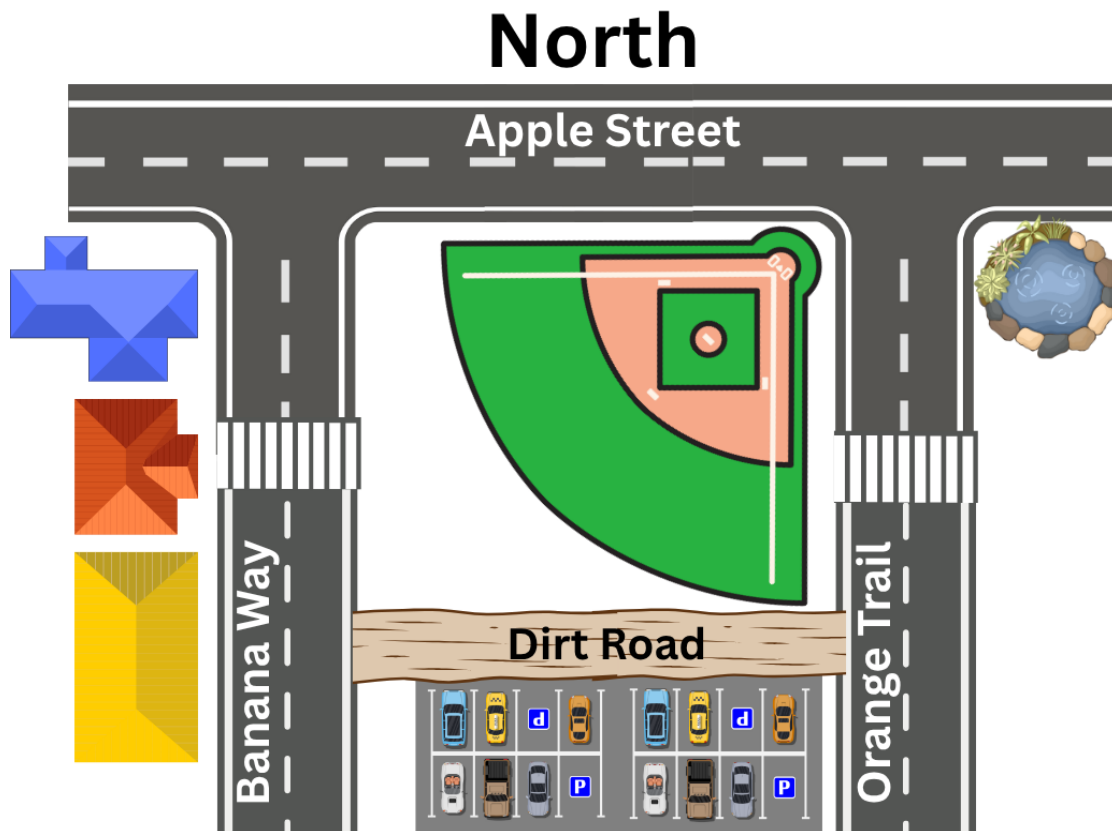
Date: _____

Activity 2

Reconstruct the Collision



Multiple crashes at the baseball field! Read the witness statements that were taken after the incident(s). Use each statement to reconstruct a visual showing what happened on the map below.



Police Statement: Write a statement of what happened.

Put an X on where you expect the damage on each vehicle:



yellow



blue



red



black



silver

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Witness Statements:

- ① Witness 1 - I saw a red car driving north on Banana Way while I was walking my dog on Dirt Road near the parking lot. They stopped at the crosswalk and continued North. They put their right turn blinker on when they got to the stop sign at Apple Street. Then I heard a crash.



- ② Witness 2 - I was driving South down Banana Way in my black car when a red car turned out of Dirt Road and started driving North. I stopped, hoping they had left a spot open for me in the parking lot. I put my blinker on to turn down Dirt Road. A yellow car behind me had to stop so I could wait to turn. There was a blue car driving North super fast, so I couldn't turn yet.

- ③ Witness 3 - I was driving my blue car, going North on Banana Way. Something hit my windshield, I hit my brakes, and then suddenly, someone smashed into the back of my car.



- ④ Witness 4 - I was driving south in my yellow car on Banana Way, and the person in front of me slammed on their brakes. I tried to avoid impact by hitting my brakes and turning my steering wheel towards the sidewalk. Thankfully, I did not hit the car in front of me.

- ⑤ Witness 5 - I drive a red car. I was about to take a left at the Apple Street intersection when I heard a crash, got frazzled, and hit my gas instead of my brake pedal. I have no idea what happened.



- ⑥ Witness 6 - I was sitting in the bleachers of the baseball field. It was a fantastic game, and our best hitter was up. I heard a loud crash, then I looked up and saw a red car go right through the stop sign and into Apple Street.

- ⑦ Witness 7 - I was listening to music nice and loud, driving West on Apple Street, heard a crash, and then the next thing I knew, the back end of my silver car was hit. I didn't see anything.



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Analyzing the Witness Statements:

1 Witness 1 - What direction was the red car turning onto Apple Street?



2 Witness 2 - What direction was the black car turning onto Dirt Road?

3 Witness 3 - What direction was the blue car coming from?



4 Witness 4 - What direction did the yellow car turn its wheel?

5 Witness 5 - What direction was the red car travelling? _____

6 Witness 6 - If the hitter hit a ball toward right field, what direction was the ball travelling?



7 What direction was the silver car driving from?

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Exit Ticket

1 A red vehicle claims to need a new rear bumper from a recent crash. Is this damage from the accident at the baseball field near Dirt Road? How do you know?



2 Based on your police statement and what you know about Newton's third law, what do you think caused the damage during a vehicle collision?

Criteria for Success:

- Use your navigational skills and reasoned argument to suggest whether or not the bumper damage was caused by the accident described in Activity 2.
- Use Newton's Third Law to accurately identify the direction of the action and reaction using the information about the collision

