After the Bump

Investigate and predict what happens when objects collide

4.2 "Plan and carry out investigations to answer questions regarding changes in energy when objects collide, and predict reasonable outcomes based on observed patterns."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two things Nia keeps the same, circle two signs that energy moves or changes during a collision, and write 1 beside the low start and 2 beside the high start to track the pattern.

Nia's Collision Test

1. At the science table, Nia wants to learn what happens when a rolling toy car hits a wooden block. She sets a ramp beside a smooth floor and puts the block at the same spot each time. She uses one car and one block for every run. First she lets the car go without pushing it from a low mark on the ramp.

2. The car bumps the block with a soft tap. The block slides a short distance, and the car slows down. Nia puts the block back on its starting mark. She releases the same car from a higher mark, without giving it a push. This time the block slides farther after the hit. The tap is louder, and the car slows again.

3. Nia repeats both runs to check her results. Each time the car starts higher, the block slides farther and the tap sounds louder. The moving car has energy. During a collision, some energy passes to the block, which begins to move. Some energy also makes sound. Nia wonders what would happen if she released the car from a mark between the two she tested.

2 ANSWER WITH EVIDENCE

Use the passage

1. What does Nia change to test how the car's starting place affects the block? Name two things she keeps the same.

2. In the higher-start run, what two observations show that energy moves or changes during the collision?

3. What pattern does Nia find when she repeats the runs? Why does repeating them help?

4. If Nia starts the car between the two marks, how far might the block slide compared with the other runs? Use her results to explain.

3 YOUR TURN

Your own words

Choose two safe objects other than the toy car and wooden block, and plan a collision test that changes how fast one object moves without using a ramp. In four sentences, tell how you would run two trials, what you would keep the same, what you would observe, and what you predict from Nia's results.

ANSWER KEY

After the Bump

GRADE 4 · 4.2

PART 1 · READ AND MARK

Underline two things Nia keeps the same, circle two signs that energy moves or changes during a collision, and write 1 beside the low start and 2 beside the high start to track the pattern. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What does Nia change to test how the car's starting place affects the block? Name two things she keeps the same.	**She changes the car's starting mark on the ramp. She keeps the same car and block.**
2	In the higher-start run, what two observations show that energy moves or changes during the collision?	**The block slides farther, showing energy passed to it, and the louder tap shows that some energy became sound.**
3	What pattern does Nia find when she repeats the runs? Why does repeating them help?	**A higher start leads to a farther slide and a louder tap. Repeating the runs helps Nia check that the pattern happens again.**
4	If Nia starts the car between the two marks, how far might the block slide compared with the other runs? Use her results to explain.	**It might slide farther than in the low-start run but not as far as in the high-start run, because a higher start made the block slide farther in Nia's tests.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I will roll a soft ball slowly and then faster into an empty plastic cup on the floor. I will keep the same ball, cup, floor, and cup starting spot each time. I will watch how far the cup slides and listen for a tap. I predict the faster ball will push the cup farther because Nia's higher-start car pushed the block farther.

Accept other observations of energy change, such as the car slowing after impact. For the open task, accept any safe, fair collision test with a prediction tied to the passage's pattern.