

High School Practice Test Items

Item	Grade	PE	SEP	DCI	CCC	DOK
31	High School	HS-PS2-3	6. Constructing Explanations and Designing Solutions	PS2.A Forces and Motion	2. Cause and Effect	3

ILCS: Select the design solution that best meets the provided criteria about momentum and force during a collision.

A student is asked to evaluate two different bumper designs that will be used on bumper cars at a local amusement park. The bumpers have the same mass and are each attached to a test car that undergoes a controlled collision with a wall. The student measures the average impact force on each bumper during the collision and the duration of each collision. The student's results are shown in the table.

Design Number	Average Impact Force (N)	Duration of Impact (s)
1	980	0.15
2	588	0.25

Which design will provide better protection for a rider in a collision, and why?

- Ⓐ Design 1, because the change in momentum of the test car is smaller.
- Ⓑ Design 1, because the average impact force acting on the test car is larger for a shorter duration.
- Ⓒ Design 2, because the change in momentum of the test car is smaller.
- Ⓓ Design 2, because the average impact force acting on the test car is smaller for a longer duration.

Key: D (1 point)