

# 2025 MCAS Sample Student Work and Scoring Guide

## Grade 8 Science and Technology/Engineering Question 9: Constructed-Response

**Reporting Category:** Physical Science

**Practice Category:** Mathematics and Data

**Standard:** [8.PS.2.2](#) - Provide evidence that the change in an object's speed depends on the sum of the forces on the object (the net force) and the mass of the object.

**Item Description:** Analyze data to complete a model showing the strength and direction of forces acting on a block, and explain how two blocks can have different speeds when pushed with the same amount of force.

This item can be found in the released item sets on the [MCAS Resource Center](#).

### Scoring Guide

*Select a score point in the table below to view the sample student response.*

Score	Description
<a href="#">2</a>	The response demonstrates a thorough understanding of how the change in an object's speed depends on the sum of the forces acting on the object and the mass of the object. The response correctly completes the model of the forces acting on block Z. The response also clearly explains why block X had a greater speed than block Y after both blocks were pushed.
<a href="#">1</a>	The response demonstrates a partial understanding of how the change in an object's speed depends on the sum of the forces acting on the object and the mass of the object.
<a href="#">0</a>	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

**Score Point 2**

**This question has two parts.**

A student completed an investigation with three identical wooden blocks. Weights were added on top of each block to give the blocks different masses. The student pushed each block with the same amount of force for the same amount of time. The table shows data from the investigation.

Block	Total Mass (kg)	Speed before Push (m/s)	Speed after Push (m/s)
X	0.6	0	2.8
Y	1.2	0	0.7
Z	1.8	0	0

**Part A**

Drag and drop a force arrow into the box to complete the model of the forces acting on block Z.

**Horizontal Forces on Block Z during Push**

Force of student push

**Part B**

The student pushed blocks X and Y with the same amount of force.

Explain why block X had a greater speed than block Y after both blocks were pushed.

The reason block X had a greater speed was because it has a smaller mass.

**Score Point 1**

**This question has two parts.**

A student completed an investigation with three identical wooden blocks. Weights were added on top of each block to give the blocks different masses. The student pushed each block with the same amount of force for the same amount of time. The table shows data from the investigation.

Block	Total Mass (kg)	Speed before Push (m/s)	Speed after Push (m/s)
X	0.6	0	2.8
Y	1.2	0	0.7
Z	1.8	0	0

**Part A**

Drag and drop a force arrow into the box to complete the model of the forces acting on block Z.

**Horizontal Forces on Block Z during Push****Part B**

The student pushed blocks X and Y with the same amount of force.

Explain why block X had a greater speed than block Y after both blocks were pushed.

block X had a greater speed than Y because X has less mass meaning it has less friction.

**Score Point 0**

**This question has two parts.**

A student completed an investigation with three identical wooden blocks. Weights were added on top of each block to give the blocks different masses. The student pushed each block with the same amount of force for the same amount of time. The table shows data from the investigation.

Block	Total Mass (kg)	Speed before Push (m/s)	Speed after Push (m/s)
X	0.6	0	2.8
Y	1.2	0	0.7
Z	1.8	0	0

**Part A**

Drag and drop a force arrow into the box to complete the model of the forces acting on block Z.

**Horizontal Forces on Block Z during Push**

Force of student push

**Part B**

The student pushed blocks X and Y with the same amount of force.

Explain why block X had a greater speed than block Y after both blocks were pushed.

because x was pushed harder than y was when both blocks were pushed