

# 2022 MCAS Sample Student Work and Scoring Guide

## Grade 5 Science and Technology/Engineering Question 15: Constructed-Response

**Reporting Category:** Physical Science

**Practice Category:** Evidence, Reasoning, and Modeling

**Standard:** [3.PS.2.3](#) - Conduct an investigation to determine the nature of the forces between two magnets based on their orientations and distance relative to each other.

**Item Description:** Determine the orientation of magnets in an investigation, the result of replacing one magnet with a block of iron, and an energy conversion that takes place.

[View item in MCAS Digital Item Library](#)

### Scoring Guide

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

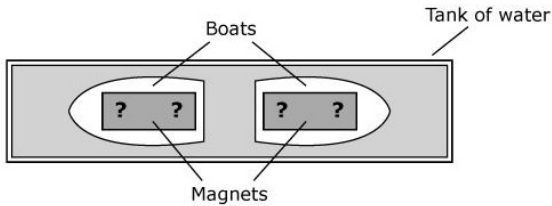
Score*	Description
<a href="#">3A</a>	The response demonstrates a thorough understanding of the forces between two magnets based on their orientations. The response correctly identifies the poles of each magnet. The response clearly describes how the boats will move after one magnet is replaced with a block of iron and clearly explains the reasoning. The response also correctly identifies the form of energy that magnetic energy was converted into and clearly explains the reasoning.
<a href="#">3B</a>	
<a href="#">2</a>	The response demonstrates a partial understanding of the forces between two magnets based on their orientations.
<a href="#">1</a>	The response demonstrates a minimal understanding of the forces between two magnets based on their orientations.
<a href="#">0</a>	The response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.

\*Letters are used to distinguish between sample student responses that earned the same score (e.g., 3A and 3B).

**Score Point 3A**

This question has three parts.

A student is investigating how magnets work. The student has two plastic toy boats. A bar magnet is placed in each boat. The poles of the magnets are not identified. The student then places the boats in a long, narrow tank of water. The sides of the tank prevent the boats from turning. The diagram shows the boats in the tank of water and a magnet in each boat.



**Part A**

When the student places the boats near each other in the tank, they move toward each other.

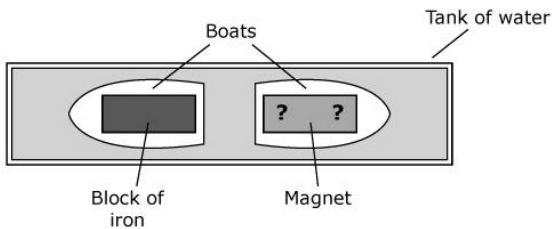
Drag and drop a label into each box to identify the poles of the magnets.

**N S**



**Part B**

The student replaces the magnet in one of the boats with a block of iron, as shown.



Describe how the boats move after the student replaces the magnet with a block of iron. Explain your reasoning.

The Magnet boat will move toward the boat with the block of iron placed on top of it because the magnet will be attracted to the block of iron.

**Part C**

In the investigation, stored magnetic energy is converted into another form of energy.

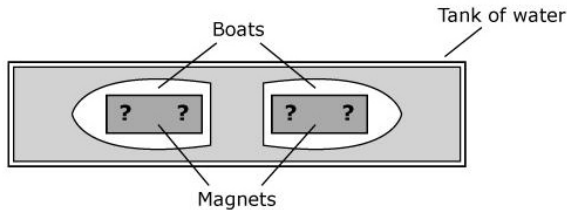
Identify the form of energy that the stored magnetic energy is converted into. Explain your reasoning.

The stored magnetic energy is converted into kinetic energy because the boats start moving towards each other.

**Score Point 3B**

This question has three parts.

A student is investigating how magnets work. The student has two plastic toy boats. A bar magnet is placed in each boat. The poles of the magnets are not identified. The student then places the boats in a long, narrow tank of water. The sides of the tank prevent the boats from turning. The diagram shows the boats in the tank of water and a magnet in each boat.



**Part A**

When the student places the boats near each other in the tank, they move toward each other.

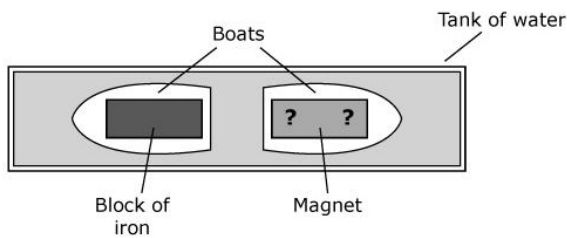
Drag and drop a label into each box to identify the poles of the magnets.

**N S**



**Part B**

The student replaces the magnet in one of the boats with a block of iron, as shown.



Describe how the boats move after the student replaces the magnet with a block of iron. Explain your reasoning.

The bouts will move closer together and then stick together because the magnet is attracting the piece of iron.

**Part C**

In the investigation, stored magnetic energy is converted into another form of energy.

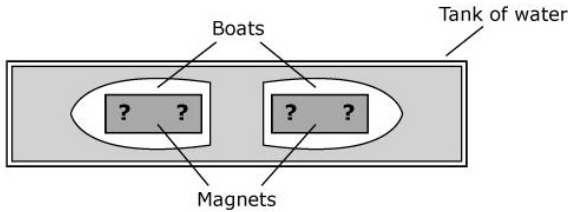
Identify the form of energy that the stored magnetic energy is converted into. Explain your reasoning.

It is converting into kinetic energy because it is moving the bouts.

**Score Point 2**

This question has three parts.

A student is investigating how magnets work. The student has two plastic toy boats. A bar magnet is placed in each boat. The poles of the magnets are not identified. The student then places the boats in a long, narrow tank of water. The sides of the tank prevent the boats from turning. The diagram shows the boats in the tank of water and a magnet in each boat.



**Part A**

When the student places the boats near each other in the tank, they move toward each other.

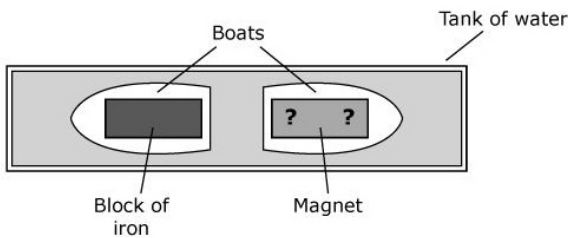
Drag and drop a label into each box to identify the poles of the magnets.

**N S**



**Part B**

The student replaces the magnet in one of the boats with a block of iron, as shown.



Describe how the boats move after the student replaces the magnet with a block of iron. Explain your reasoning.

The boats will move closer to each other because magnets attract to iron.

**Part C**

In the investigation, stored magnetic energy is converted into another form of energy.

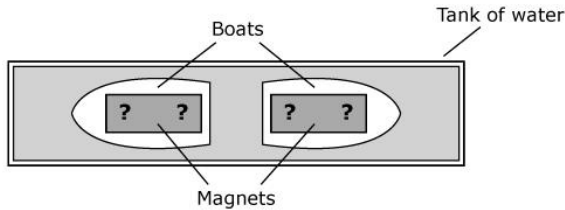
Identify the form of energy that the stored magnetic energy is converted into. Explain your reasoning.

It is converted to push away magnetic energy.

**Score Point 1**

This question has three parts.

A student is investigating how magnets work. The student has two plastic toy boats. A bar magnet is placed in each boat. The poles of the magnets are not identified. The student then places the boats in a long, narrow tank of water. The sides of the tank prevent the boats from turning. The diagram shows the boats in the tank of water and a magnet in each boat.



**Part A**

When the student places the boats near each other in the tank, they move toward each other.

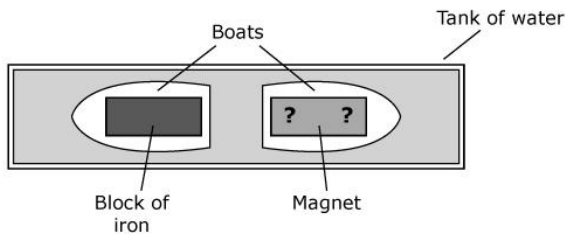
Drag and drop a label into each box to identify the poles of the magnets.

**N S**



**Part B**

The student replaces the magnet in one of the boats with a block of iron, as shown.



Describe how the boats move after the student replaces the magnet with a block of iron. Explain your reasoning.

The boats move closer together because the magnet attracts the piece of iron.

**Part C**

In the investigation, stored magnetic energy is converted into another form of energy.

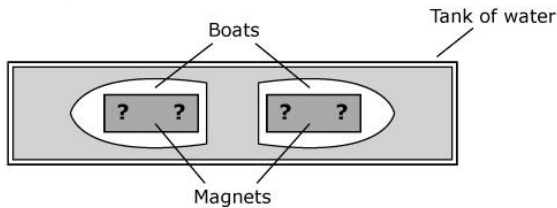
Identify the form of energy that the stored magnetic energy is converted into. Explain your reasoning.

The form of energy that the stored magnetic energy is converted to electricity.

**Score Point 0**

This question has three parts.

A student is investigating how magnets work. The student has two plastic toy boats. A bar magnet is placed in each boat. The poles of the magnets are not identified. The student then places the boats in a long, narrow tank of water. The sides of the tank prevent the boats from turning. The diagram shows the boats in the tank of water and a magnet in each boat.

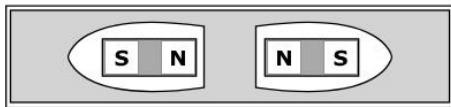


**Part A**

When the student places the boats near each other in the tank, they move toward each other.

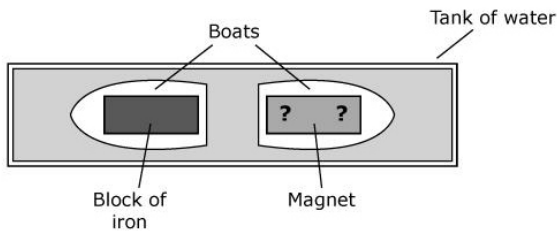
Drag and drop a label into each box to identify the poles of the magnets.

**N S**



**Part B**

The student replaces the magnet in one of the boats with a block of iron, as shown.



Describe how the boats move after the student replaces the magnet with a block of iron. Explain your reasoning.

I think the boats stay in place because the block of iron and the magnet don't connect to each other.

**Part C**

In the investigation, stored magnetic energy is converted into another form of energy.

Identify the form of energy that the stored magnetic energy is converted into. Explain your reasoning.

The magnetic energy converted into no magnetic energy because it had no magnetic energy.