



## LESSON PLAN

**Subject:** Grade 5 Science

**Lesson:** Forces and Motion

**Standards Addressed:**

- 5.P.1. Understand force, motion and the relationship between them.

**Objectives:**

- Students will be able to identify how mass, gravity, and friction affect the motion of objects.
- Students will be able to measure the motion of an object based on the distance it will travel in a certain amount of time.
- Students will be understand how the mass of an object will affect the force upon it.

**Materials Needed:**

- Device for showing *Riving and Turning* video.
- “Forces and Motion” activity

**Outline:**

- Prior to this lesson students will have an understanding of force and motion and how different factors affect the motion of an object.
- Show the video.
- Discuss the activity prompt.
- Students finish the activity independently or with a partner.

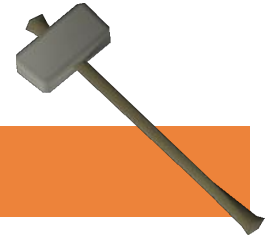
**Take It Further:**

Students can conduct an experiment by measuring out a set distance and then rolling a ball that distance while timing how long it takes with a stopwatch. Given that data they can then determine the average speed of the ball. This can also be represented on a graph.

**Cross-Curriculum Connection:**

Students can research the origins of the indigenous origins of the “bow drill” and explain how this technology is similar to the mechanics of the lathe in the video.





## Force and Friction in Joiner's Shop

Grade 5 Science

Name: \_\_\_\_\_

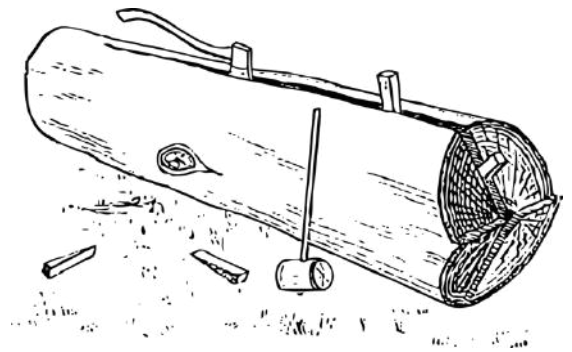
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### Activity 1:

In the video, Joiner Ben was using a maul to drive the froe into a piece of wood to split it. Circle the best response to the following questions about this activity.

**1. What force was acting on the maul.**

- A. The force applied by the froe.
- B. The force applied by the piece of wood.
- C. Gravity
- D. Friction



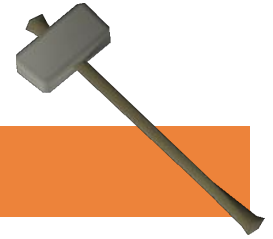
**2. Describe how a bigger maul with more mass would it affect the joiner's ability to split the wood?**

- A. The greater mass of the maul will result in greater force applied to the froe.
- B. The greater mass will make it easier for the joiner to lift the maul.
- C. The greater mass of the maul will result in less force applied to the wood.
- D. The greater mass of the maul will not affect the joiner's ability to split the wood.

**3. Describe how the mass of the wood being split effects the force of the froe?**

- A. The greater the mass of wood, the greater the effect the force of the froe will have on it.
- B. The mass of the wood does not affect the force of the froe.
- C. The greater the mass of the wood, the less effect the force of the froe will have on it.
- D. The smaller the mass of the wood, the less effect the force of the froe will have on it.



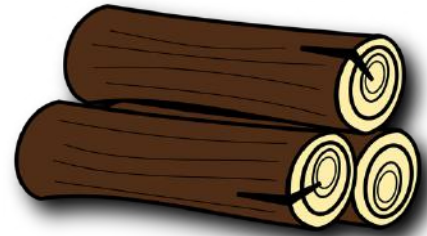


## Force and Friction in Joiner's Shop

### Activity 2:

Friction was involved when the joiner was turning a piece of wood on the lathe. *Answer the following questions about this friction.*

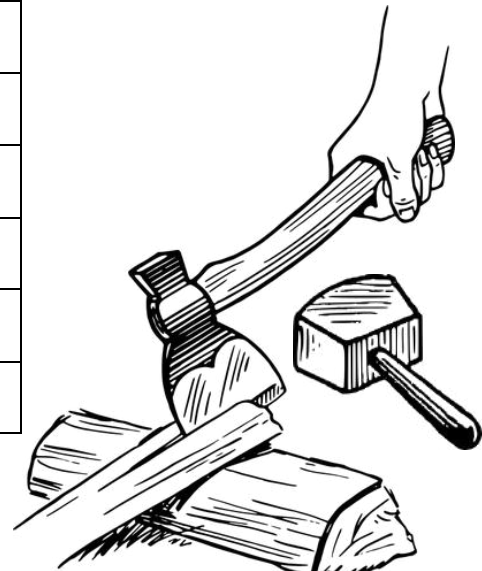
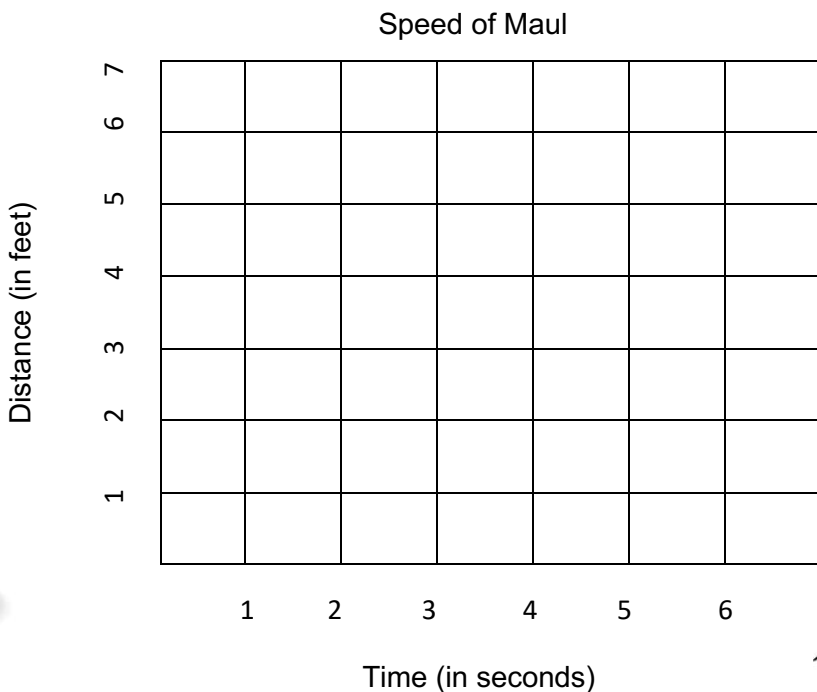
1. What were two points where friction was being created?
2. How does this friction affect the rotation of the piece of wood on the lathe?
3. How could the joiner observe this friction?



### Activity 3:

The maul is traveling 3.5 feet, and it takes 1 second for it to hit the froe. *Use this information to complete the following.*

1. What is the average speed of the maul?
2. Construct a graph that shows how far the maul will travel in 2 seconds.





## Force and Friction in Joiner's Shop

### ANSWER KEY

**Activity 1:** In the video, Joiner Ben was using a maul to drive the froe into a piece of wood to split it.

Circle the best response to the following questions about this activity.

1. What force was acting on the maul.
  - A. The force applied by the froe.
  - B. The force applied by the piece of wood.
  - C. Gravity
  - D. Friction
2. Describe how a bigger maul with more mass would it affect the joiner's ability to split the wood?
  - A. The greater mass of the maul will result in greater force applied to the froe.
  - B. The greater mass will make it easier for the joiner to lift the maul.
  - C. The greater mass of the maul will result in less force applied to the wood.
  - D. The greater mass of the maul will not affect the joiner's ability to split the wood.
3. Describe how the mass of the wood being split effects the force of the froe?
  - A. The greater the mass of wood, the greater the effect the force of the froe will have on it.
  - B. The mass of the wood does not affect the force of the froe.
  - C. The greater the mass of the wood, the less effect the force of the froe will have on it.
  - D. The smaller the mass of the wood, the less effect the force of the froe will have on it.

**Activity 2:** Friction was involved when the joiner was turning a piece of wood on the lathe. Answer the following questions about this friction.

1. What were two points where friction was being created?

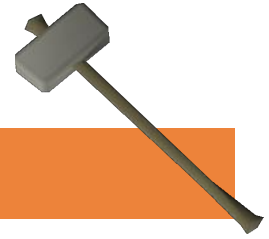
The iron centers rubbing on the wood, and the rope rubbing on itself.

2. How does this friction affect the rotation of the piece of wood on the lathe?

The friction reduces the efficiency of the lathe.

3. How could the joiner observe this friction?

He can feel the heat created by the friction.



## Force and Friction in Joiner's Shop

### ANSWER KEY

#### Activity 3:

The maul is traveling 3.5 feet, and it takes 1 second for it to hit the froe. *Use this information to complete the following.*

1. What is the average speed of the maul?

Speed=distance/time 3.5 feet per second

2. Construct a graph that shows how far the maul will travel in 2 seconds.

