

**Tech labs**

**TECH 11**

PROGRAMS: ST, EST, AST
LAB TYPE: Observation
CONCEPT: Motion transmission
STUDENT BOOK: Chapter 13, page 435
TOOLBOX: Page 76

# Motion transmission

**GOAL**

Observe the motion of various components in motion transmission systems.

**OBSERVATION CRITERIA**

1. In the field of mechanics, what is meant by *motion transmission*?

\_\_\_\_\_

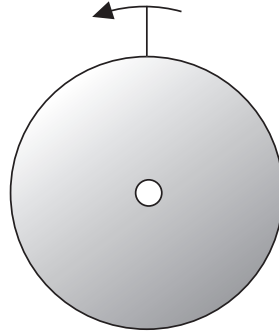
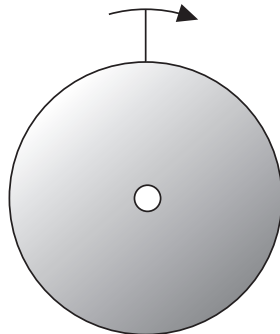
\_\_\_\_\_

\_\_\_\_\_

2. What is a set of components that perform the function of transmitting motion called?

\_\_\_\_\_

3. In which two directions can components rotate, as suggested by the illustrations below?



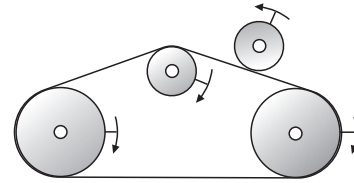
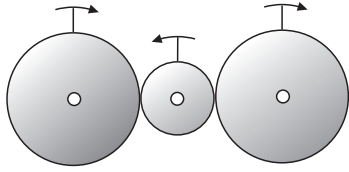
a) \_\_\_\_\_

b) \_\_\_\_\_

4. A motion transmission system contains several components. In the table below, name the three types of components in a mechanical system and describe them briefly.

Type of component	Description
	_____
	_____
	_____

5. Name the two motion transmission systems illustrated below.



a) \_\_\_\_\_ b) \_\_\_\_\_

6. Under what circumstances can a speed change be observed in a motion transmission system?

\_\_\_\_\_  
\_\_\_\_\_

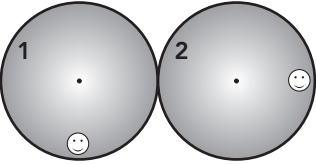
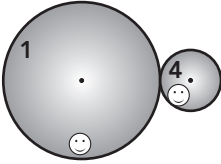
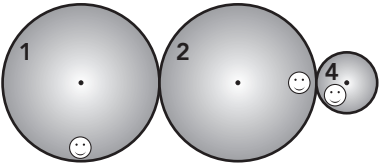
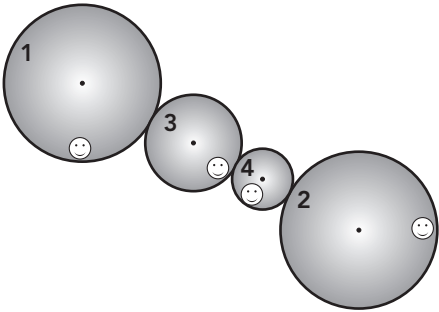
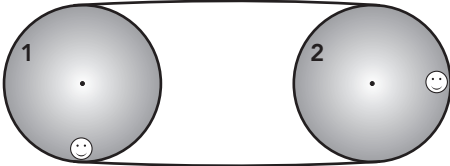
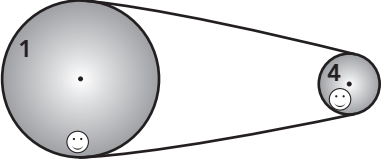
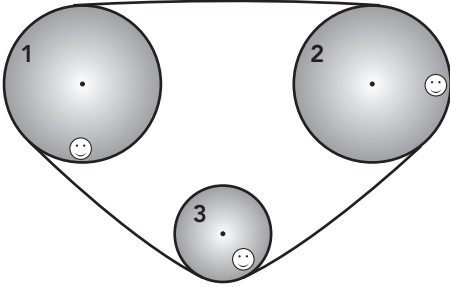
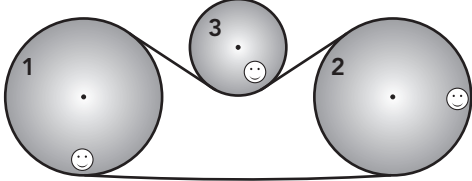
### MATERIALS

- demonstration setups of various motion transmission systems

### PROCEDURE

For each setup, carry out the following procedure:

1. Observe the setup and determine the type of motion transmission system it represents. Record your answer in the table on page 4.
2. Turn gear 1 clockwise. Observe and record the direction in which the driven component or components rotate.
3. Turn gear 1 counterclockwise. Observe and record the direction in which the driven component or components rotate.
4. Repeat steps 2 and 3. Compare the rotational speed of the components, using the emoticons as reference points.
5. Identify the components with the fastest and slowest rotational speeds. Record the results.
6. Put away the materials.

<p><b>Setup 1</b></p> 	<p><b>Setup 2</b></p> 
<p><b>Setup 3</b></p> 	<p><b>Setup 4</b></p> 
<p><b>Setup 5</b></p> 	<p><b>Setup 6</b></p> 
<p><b>Setup 7</b></p> 	<p><b>Setup 8</b></p> 

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**OBSERVATIONS**

Record your results in the tables below. Give each table a title.

Title: \_\_\_\_\_

Setup	Type of system	Rotational direction of gears			
		Gear 1	Gear 2	Gear 3	Gear 4
1		Gear 1	Gear 2		
		Clockwise			
		Counterclockwise			
2		Gear 1	Gear 4		
		Clockwise			
		Counterclockwise			
3		Gear 1	Gear 2	Gear 4	
		Clockwise			
		Counterclockwise			
4		Gear 1	Gear 2	Gear 3	Gear 4
		Clockwise			
		Counterclockwise			
5		Gear 1	Gear 2		
		Clockwise			
		Counterclockwise			
6		Gear 1	Gear 4		
		Clockwise			
		Counterclockwise			
7		Gear 1	Gear 2	Gear 3	
		Clockwise			
		Counterclockwise			
8		Gear 1	Gear 2	Gear 3	
		Clockwise			
		Counterclockwise			

Title: \_\_\_\_\_

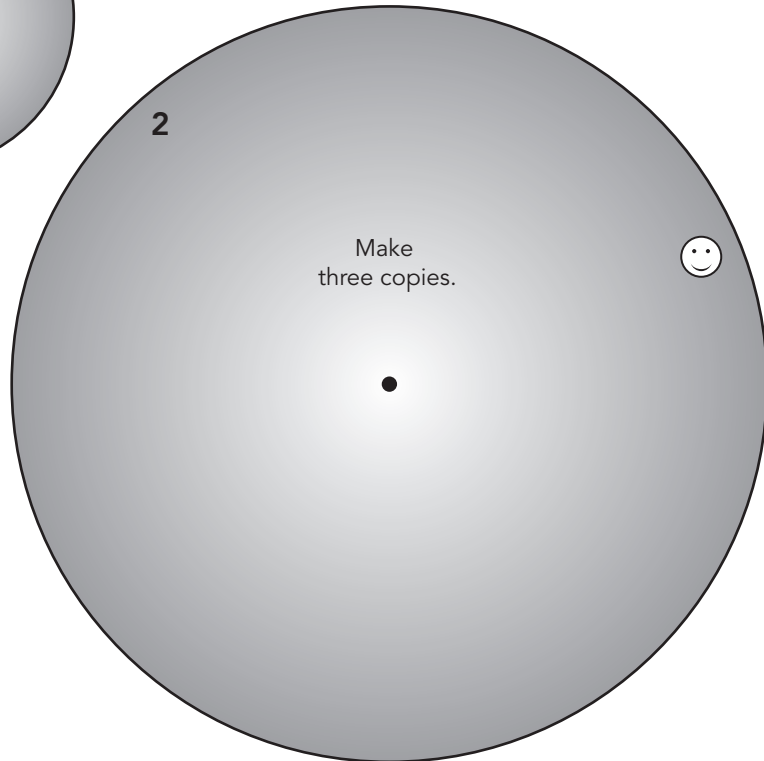
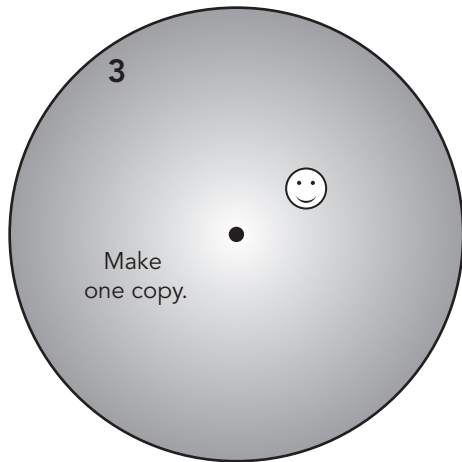
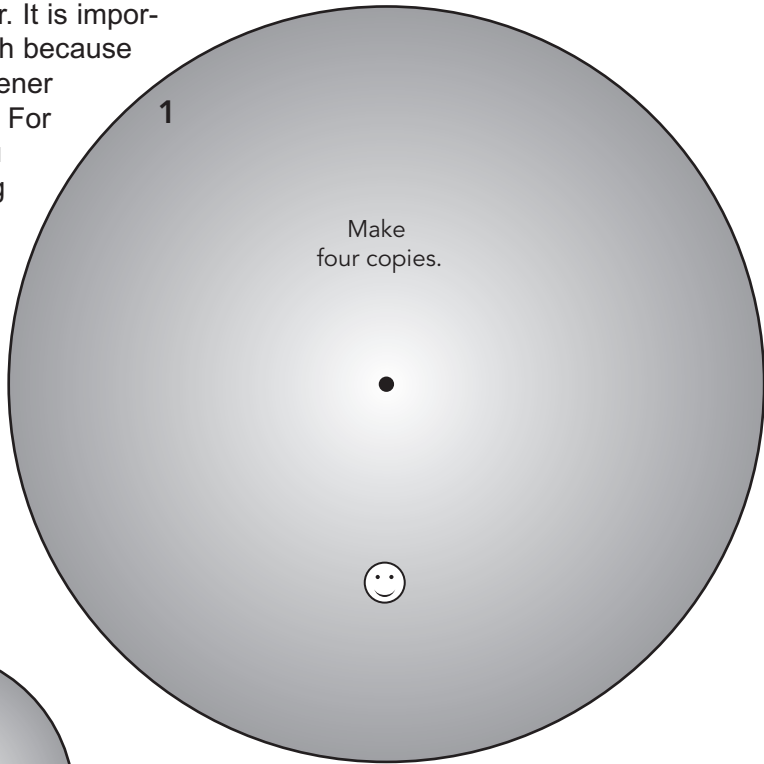
Setup	Comparison of gear diameter	Comparison of rotational speed of gears
1	1 ____ 2	1 ____ 2
2	1 ____ 4	1 ____ 4
3	(1 ____ 2) ____ 4	(1 ____ 2) ____ 4
4	(1 ____ 2) ____ 3 ____ 4	(1 ____ 2) ____ 3 ____ 4
5	1 ____ 2	1 ____ 2
6	1 ____ 4	1 ____ 4
7	(1 ____ 2) ____ 3	(1 ____ 2) ____ 3
8	(1 ____ 2) ____ 3	(1 ____ 2) ____ 3

**REFLECTING ON YOUR OBSERVATIONS**

- Refer to your observations to complete the following sentences:
  - In a friction gear system, the greater the \_\_\_\_\_ of a gear, the \_\_\_\_\_ its \_\_\_\_\_ speed will be.
  - In a friction gear system, the direction of rotation of components \_\_\_\_\_ from one gear to the next.
- In setup 6, why is there a difference in speed between the two pulleys?  
 \_\_\_\_\_  
 \_\_\_\_\_
- According to your observations, what condition is necessary for one pulley to rotate in a different direction from another in a belt and pulley system?  
 \_\_\_\_\_  
 \_\_\_\_\_
- In the systems you observed, did the rotational direction influence speed changes? Identify the determining factor for a change in speed.  
 \_\_\_\_\_  
 \_\_\_\_\_
- Have your observations helped you understand how components move in motion transmission systems?  
 \_\_\_\_\_  
 \_\_\_\_\_
- How could you improve the protocol for this lab?  
 \_\_\_\_\_  
 \_\_\_\_\_

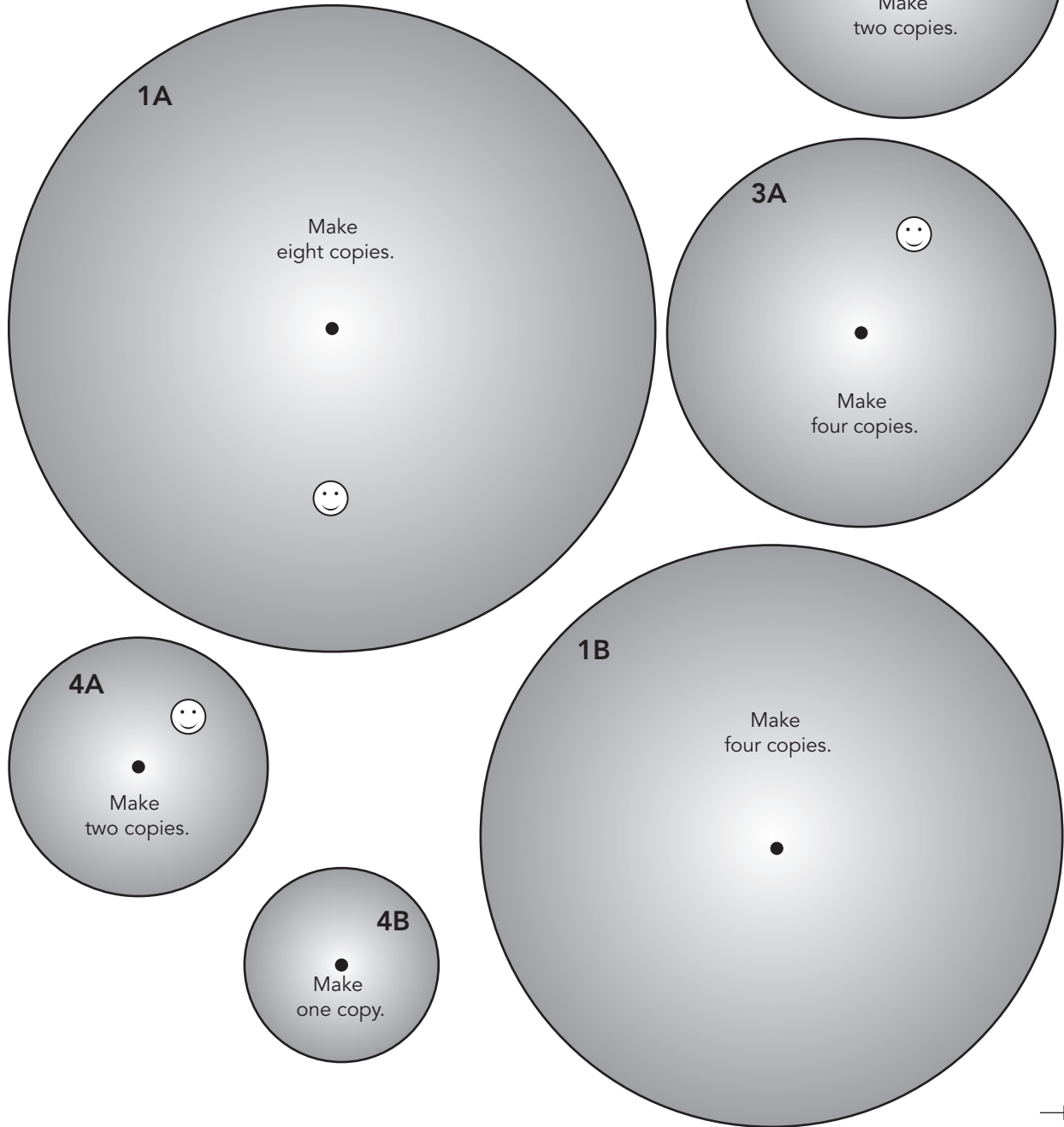
### TEMPLATES FOR THE FRICTION GEAR SYSTEMS

**Note:** Each black circle marks the location of a centre hole for a round-head paper fastener. It is important that you do not use a hole punch because the hole will be too large for the fastener and the parts will shift on their base. For this reason, we recommend that you use a nail to make the holes, placing a piece of scrap material behind the gear to protect the work surface. The models on this page represent the actual sizes of the parts.



### TEMPLATES FOR THE BELT AND PULLEY SYSTEMS

**Note:** Each black circle marks the location of a centre hole for a round-head paper fastener. It is important that you do not use a hole punch because the hole will be too large for the fastener and the parts will shift on their base. For this reason, we recommend that you use a nail to make the holes, placing a piece of scrap material behind the pulley to protect the work surface. The models on this page represent the actual sizes of the parts.



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