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Tech labs

TECH 12

Motion transformation

PROGRAMS: ST, EST, AST
LAB TYPE: Modelling
CONCEPT: Motion transformation
STUDENT BOOK: Chapter 13, page 445
TOOLBOX: Page 76

GOAL

Build models of various motion transformation systems.

DETERMINING THE PHENOMENON TO MODEL

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

_____

_____

_____

_____

2. What do we mean when we say a motion transformation system is reversible?

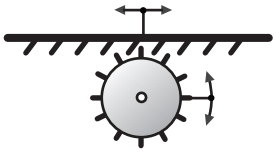
_____

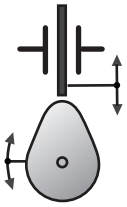
_____

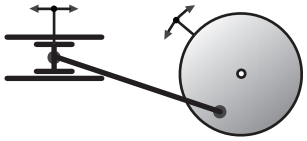
_____

_____

3. With the help of the illustrations below, write the names of the three motion transformation systems you will be modelling in this lab.







_____ _____ _____

_____ _____ _____

_____ _____ _____

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4. Complete the table below with the names of the three systems you will be modelling, a description of the motion transformation involved in each system and an indication of its reversibility ("yes" or "no").

Motion transformation system	Possible transformations	Reversibility

BUILDING THE MODELS

You will need the following materials to build your models:

MATERIALS

- system parts for each model
- 3 sheets of foam core (216 mm × 280 mm [8 1/2 in × 11 in]), slit
- adhesive putty
- 9 25.4-mm (1-in) round-head paper fasteners

Follow the procedure below to build the models of the various motion transformation systems.

PROCEDURE

1. Look at the parts available for building the models, and note the number on each part. Match each part to the corresponding component and write the number beside the correct component in the table below. Complete the table with the names of the three systems containing the components.

System	Component	Part number
	Pinion	
	Rack	
	Cam	
	Follower	
	Follower guide	
	Crank	
	Connecting rod	
	Connecting rod bushing for crank	
	Connecting rod bushing for piston	
	Piston	
	Cylinder walls	

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2. Two types of linking components have been provided for assembling your models: round-head paper fasteners and adhesive putty.

   a) Which linking component will you use to connect the moving parts?

   _____

   b) Which linking component will you use to connect the stationary parts?

   _____

3. Look at the sheets of foam core. Why do you think they are slit?

   _____

   _____

4. Build a model of each of the three motion transformation systems, based on your answers to questions 1 to 3.

TESTING THE MODELS

1. Test your models. Do they work properly? If not, explain what is wrong with them.

_____

_____

_____

2. Do your models help you understand motion transformation systems? Explain your answer.

_____

_____

_____

3. What improvements could you make to your models?

_____

_____

_____

4. Could you have built your models with other types of materials?

_____

_____

_____

_____

5. In this lab, did you make models of all the types of motion transformation systems? If not, give some examples of systems you did not model.

_____

_____

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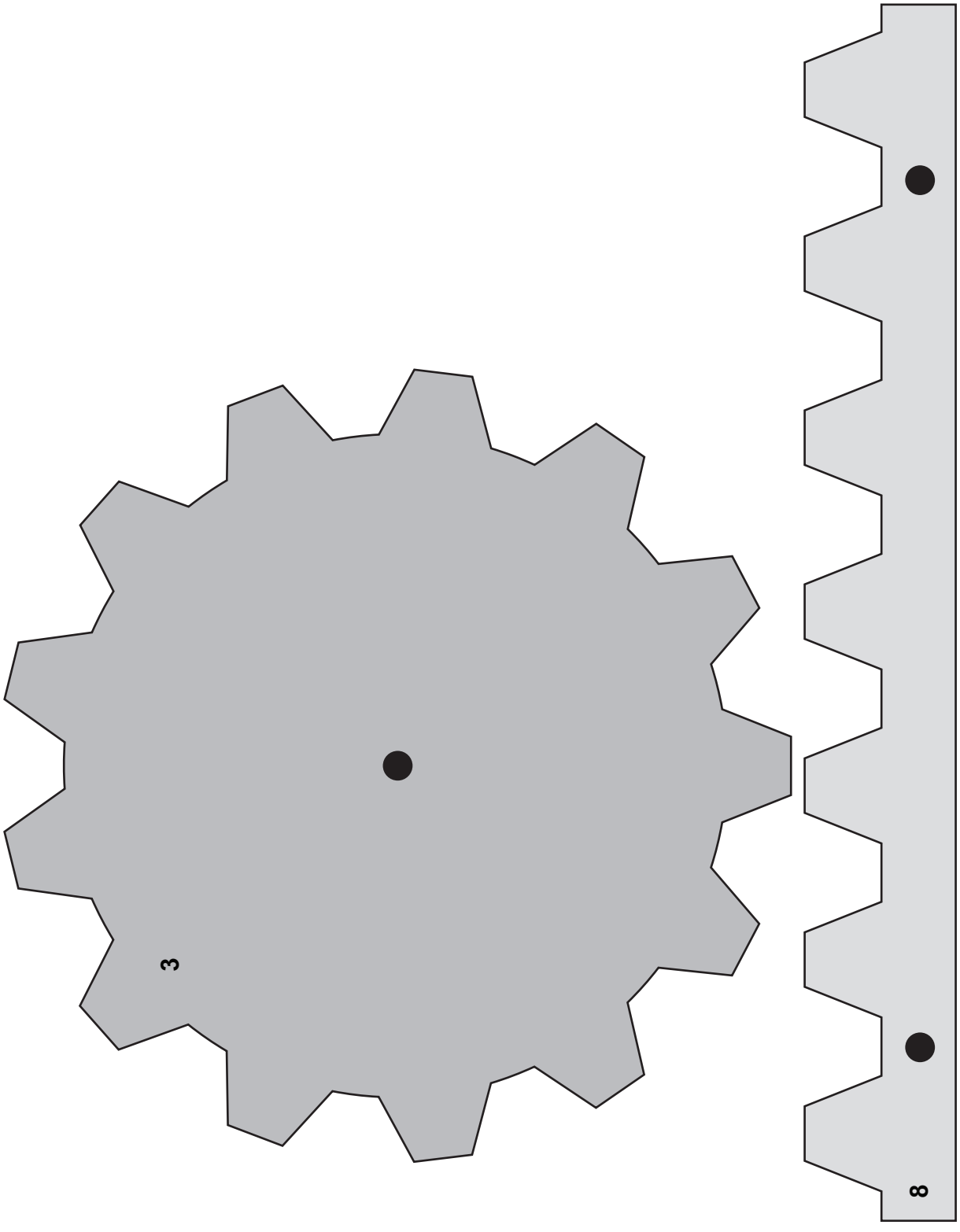
Rack and pinion system



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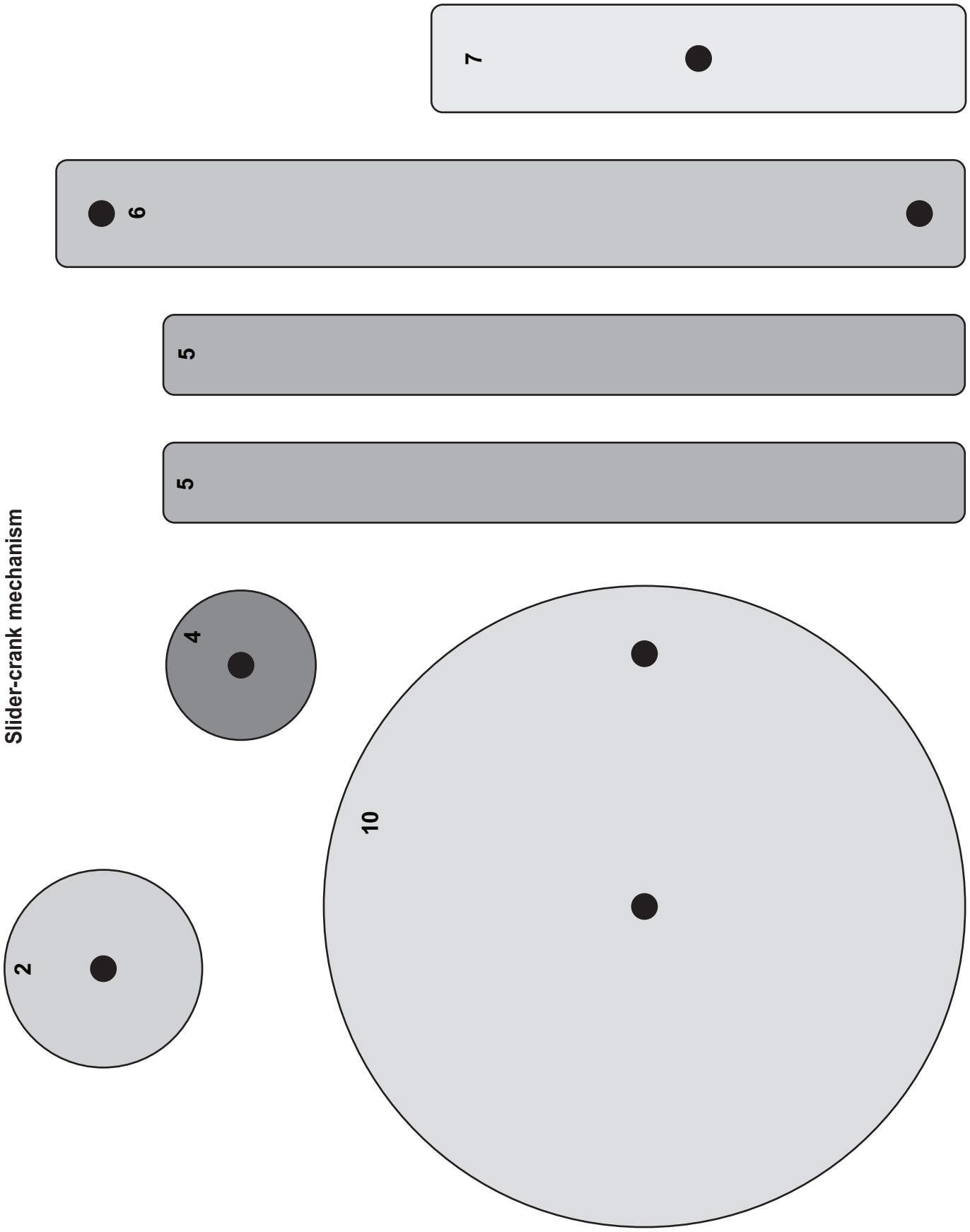

Slider-crank mechanism

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Cam and follower system