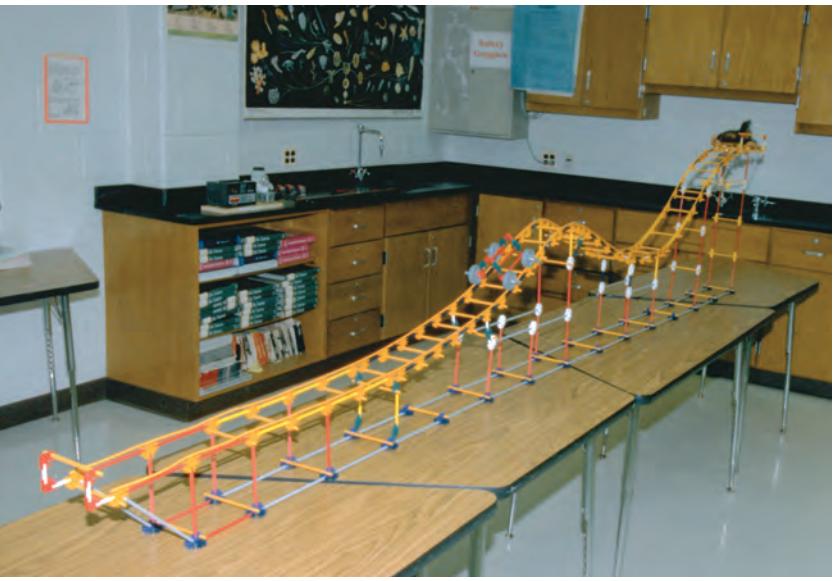
LESSON 20

The Roller Coaster



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The assembled roller coaster

INTRODUCTION

In Lesson 2, you built a battery and saw evidence that it contained energy. You then observed how the energy it stored could be changed to other forms of energy. You found, for example, that it had the energy to light a bulb. In this lesson, you will build a roller coaster and a roller coaster car. You will test the roller coaster to make sure it works properly. In the next lesson, you will learn how to put energy into the roller coaster car. And you will investigate how the speed and energy of the car change as it moves on the track.

OBJECTIVE FOR THIS LESSON

Build a roller coaster.

Getting Started

1. Look at the photo on page 200, which shows an assembled roller coaster. You and your classmates will build a roller coaster just like this one. To do it, you need to divide the work among the members of your class and work cooperatively. Discuss a plan for developing student groups to work on different parts of the roller coaster. Each group should identify the part of the roller coaster it will assemble.

2. Check to see that your group has all the necessary K'NEX® pieces for its section of the roller coaster.

MATERIALS FOR LESSON 20

For the class

K'NEX® parts for the roller coaster and roller coaster car (see Appendix A: Directory of K'NEX® Parts):

- 4 gray connectors (C1)
- 12 red connectors (C4)
- 12 green connectors (C5)
- 30 purple connectors (C6)
- 30 blue connectors (C7)
- 100 gold connectors (C8)
- 22 white connectors (C9)
- 8 yellow connectors (C10)
- 50 green rods (R1)
- 22 white rods (R2)
- 46 blue rods (R3)
- 20 yellow rods (R4)
- 70 gold rods (R5)
- 42 red rods (R6)
- 40 gray rods (R7)
- 4 large wheels (W2)
- 2 4.25-m strips of K'NEX® track

Inquiry 20.1
Building a Roller Coaster

PROCEDURE

1. Figures 20.1 through 20.6 show how to assemble and connect the sides of the roller coaster. Each student group will assemble and connect the two sides needed for each section. Figure 20.7 shows how to connect the two sides of the roller coaster using the gold rods (R5). Figures 20.8 through 20.10 show how to assemble and connect the completed sections. Use the illustrations that match the sections your group is assembling. The orange track shown in the illustrations is attached after all sections have been connected. Figures 20.11 and 20.12 show what the finished roller coaster looks like. Figure 20.13 shows how to assemble the roller coaster car and what the completed car will look like.

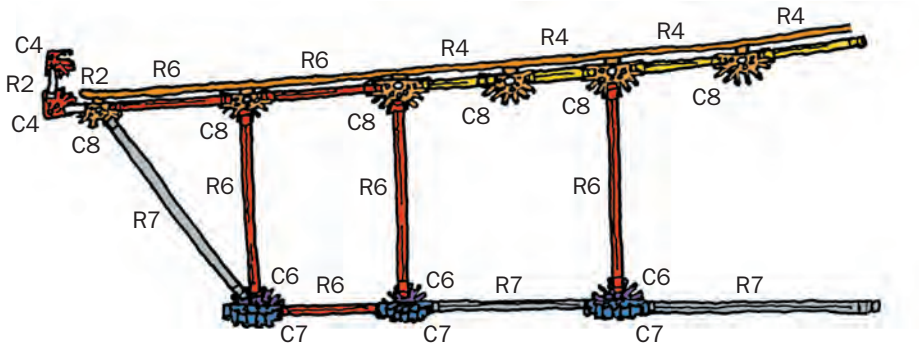

Figure 20.1 *Roller coaster, Section 1*

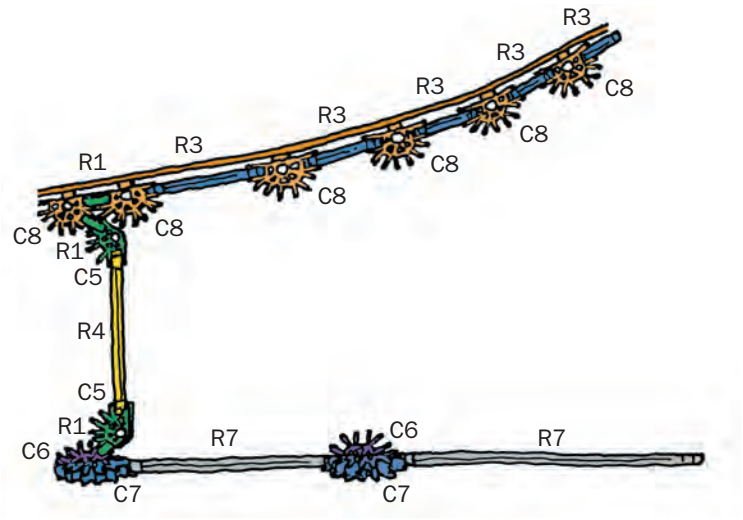

Figure 20.2 *Roller coaster, Section 2*

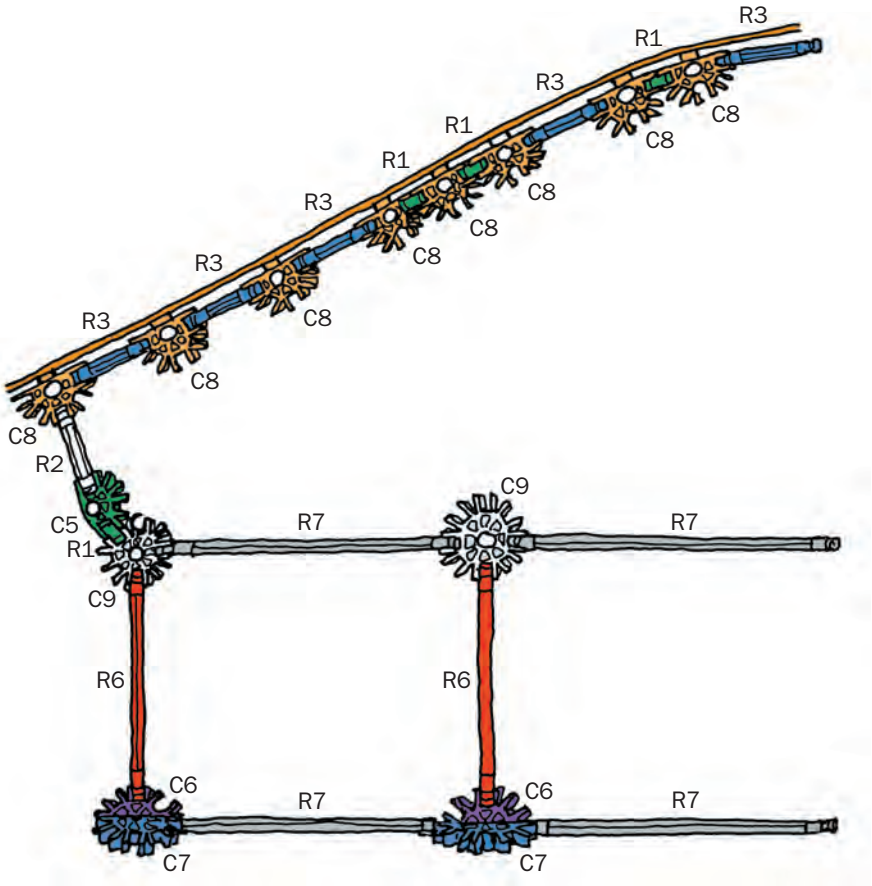

Figure 20.3 *Roller coaster, Section 3*

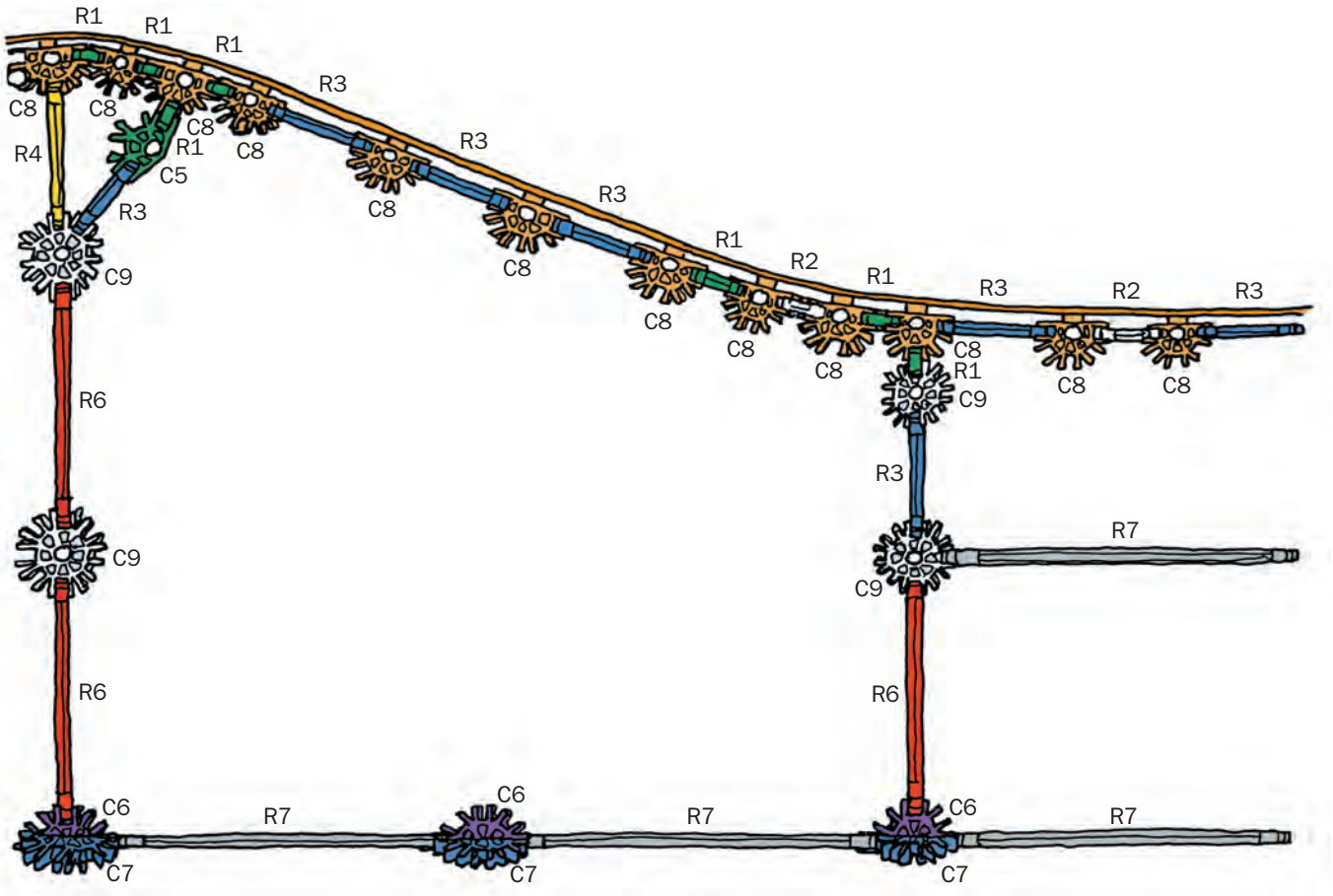

Figure 20.4 *Roller coaster, Section 4*

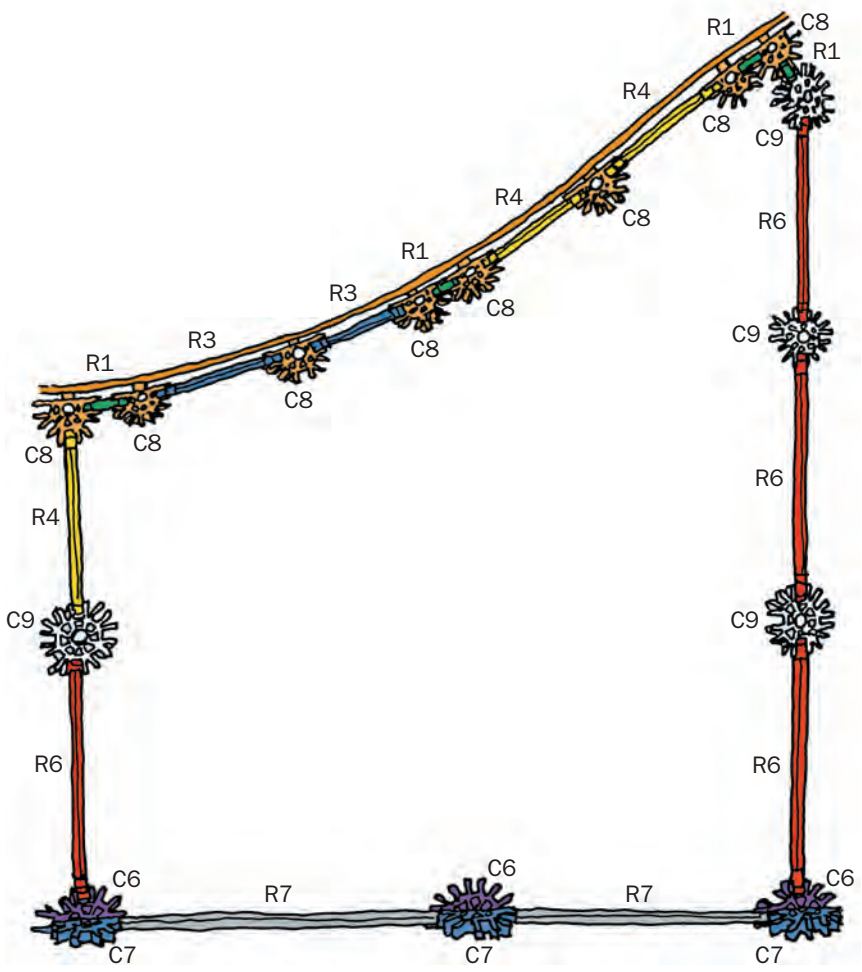

Figure 20.5 *Roller coaster, Section 5*

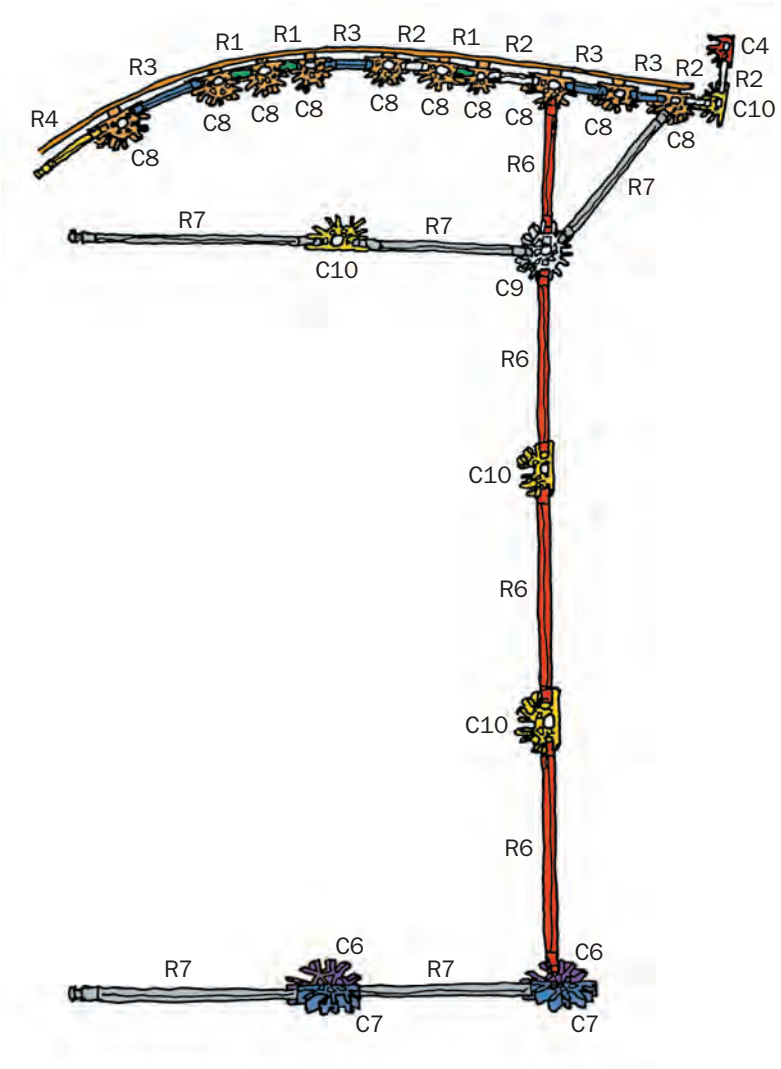

Figure 20.6 *Roller coaster, Section 6*

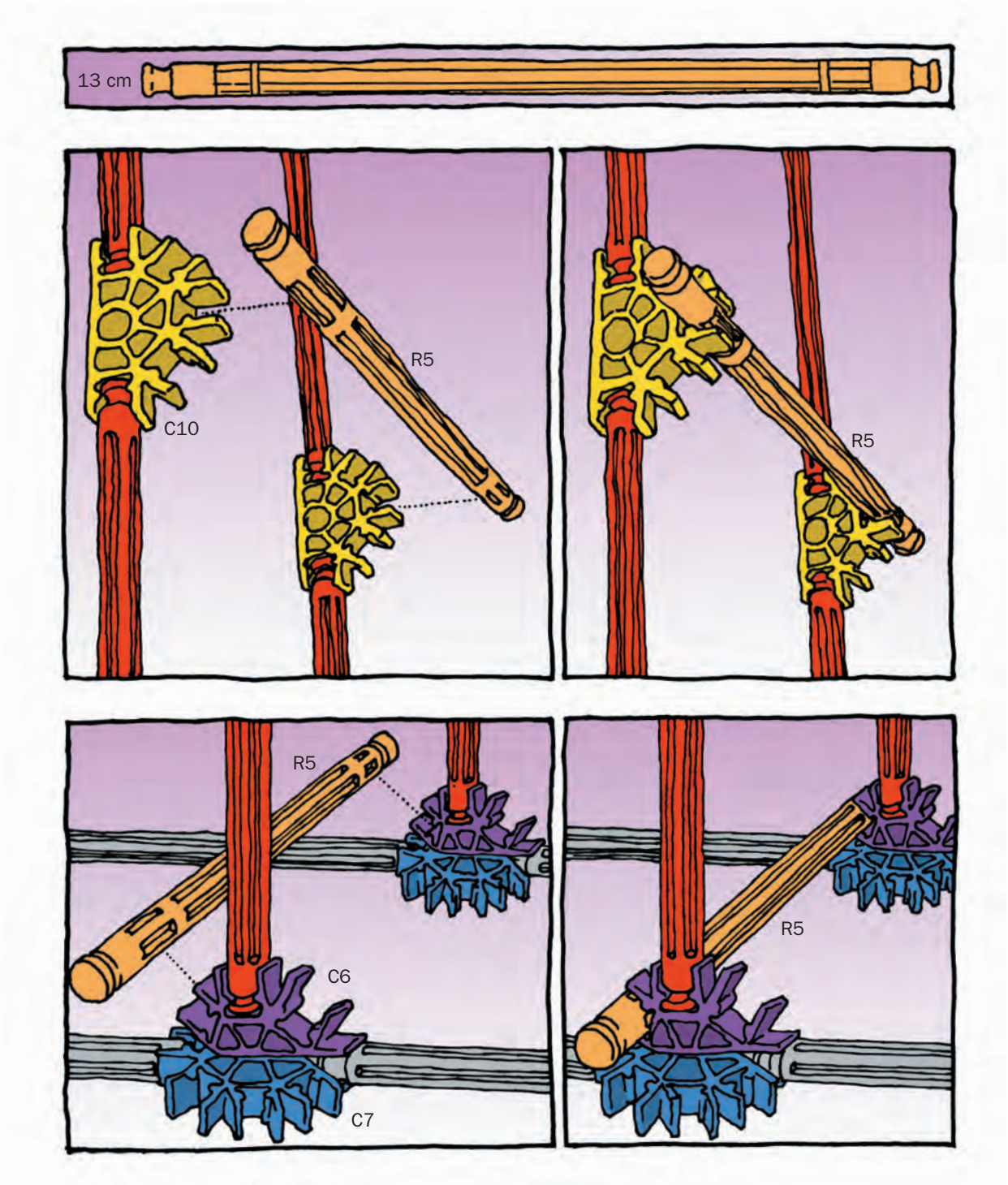

Figure 20.7 *How to connect gold rods to the roller coaster*

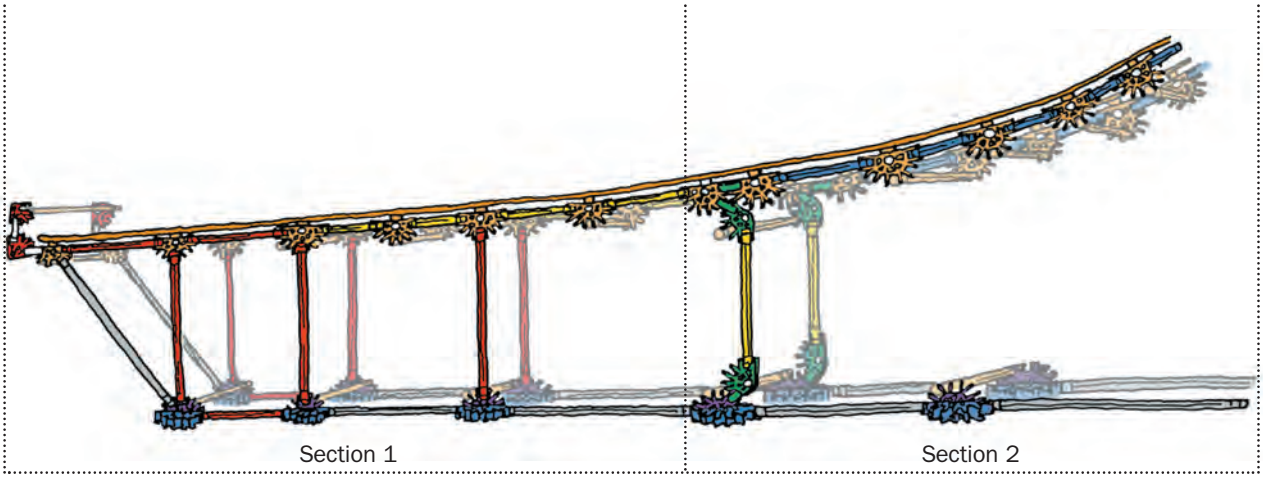

Figure 20.8 *Roller coaster A (Sections 1 and 2 connected)*

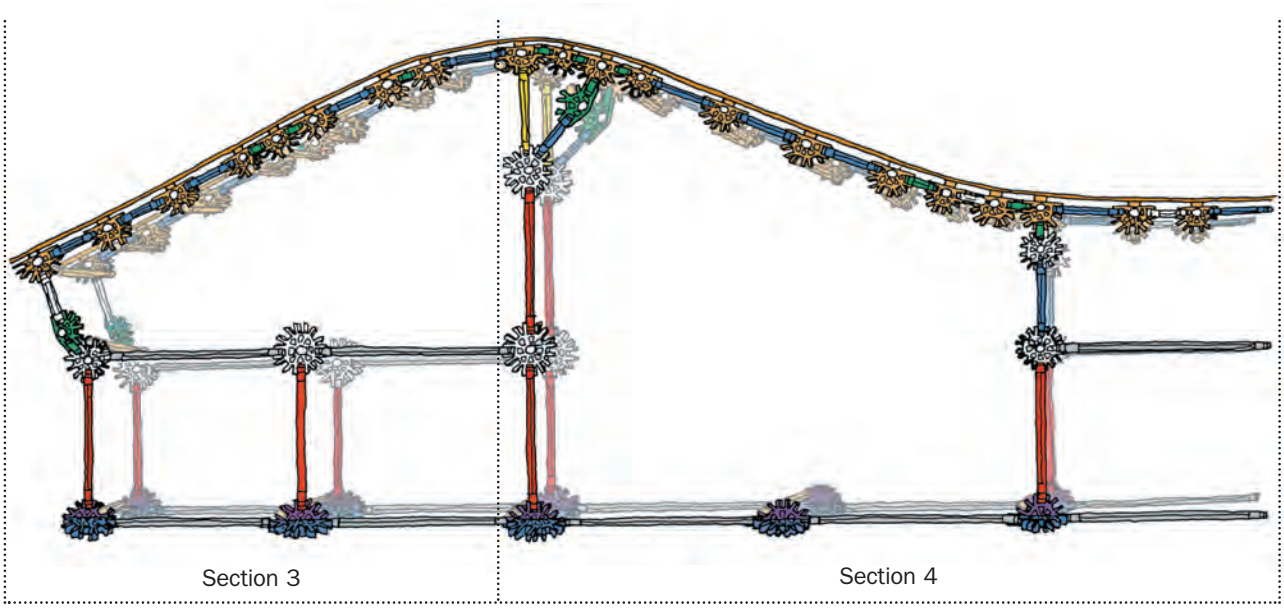

Figure 20.9 *Roller coaster B (Sections 3 and 4 connected)*

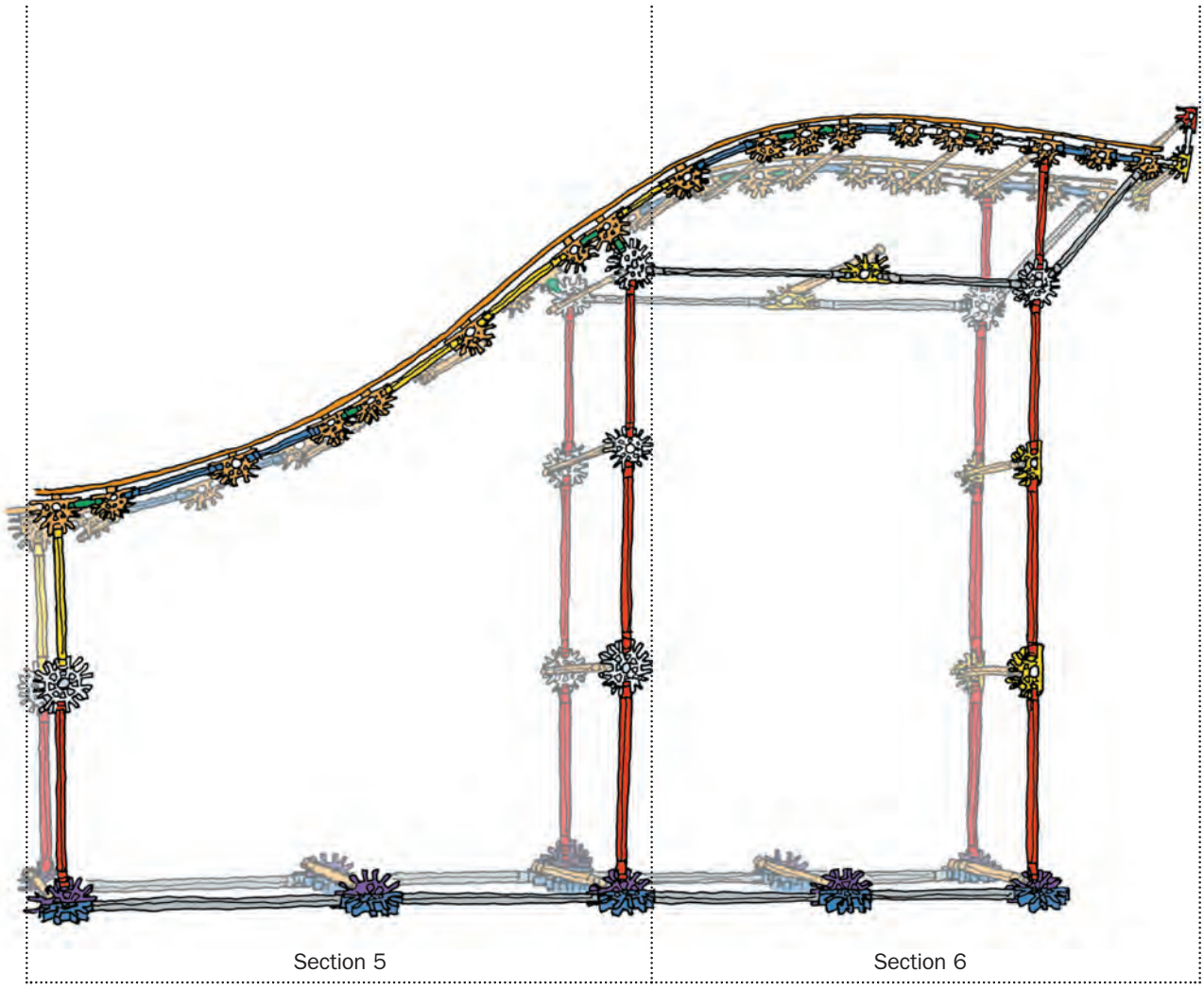

Figure 20.10 *Roller coaster C (Sections 5 and 6 connected)*

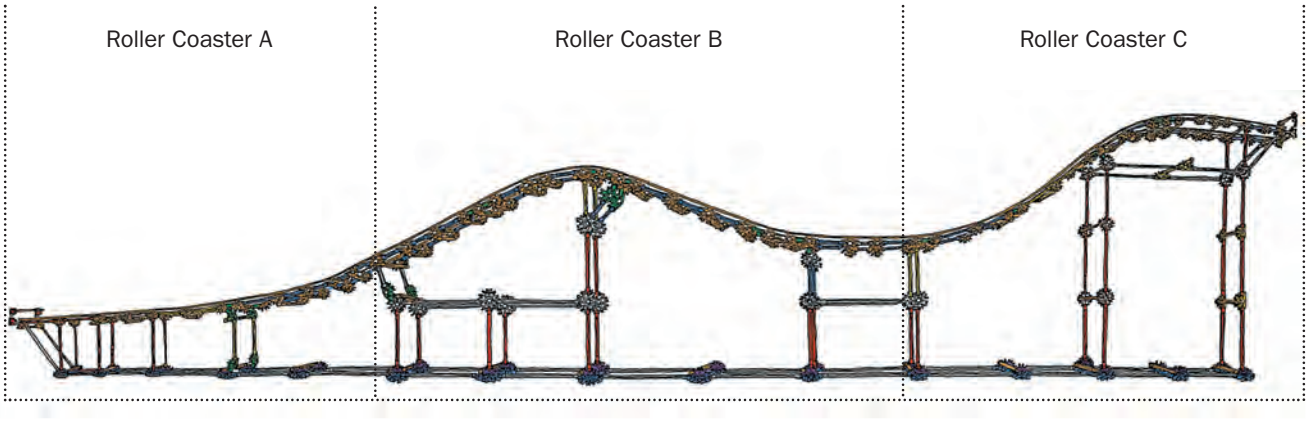

Figure 20.11 *Finished roller coaster, showing A, B, and C connected*

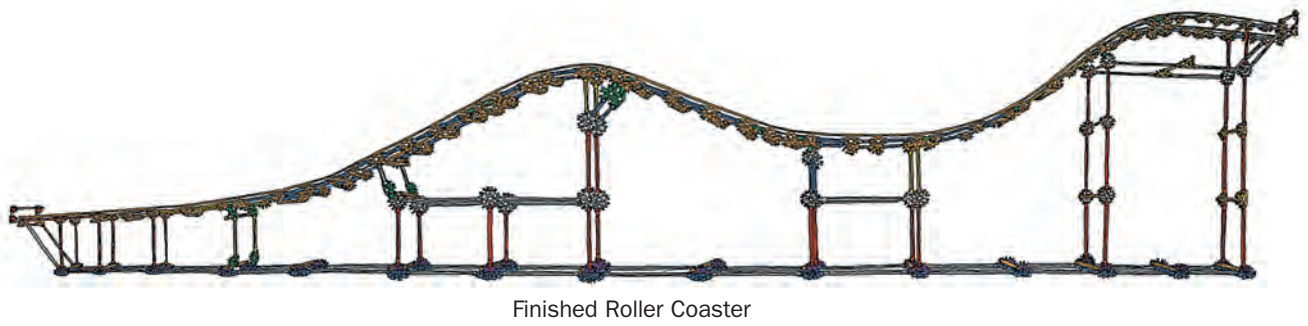

Figure 20.12 *Finished roller coaster*

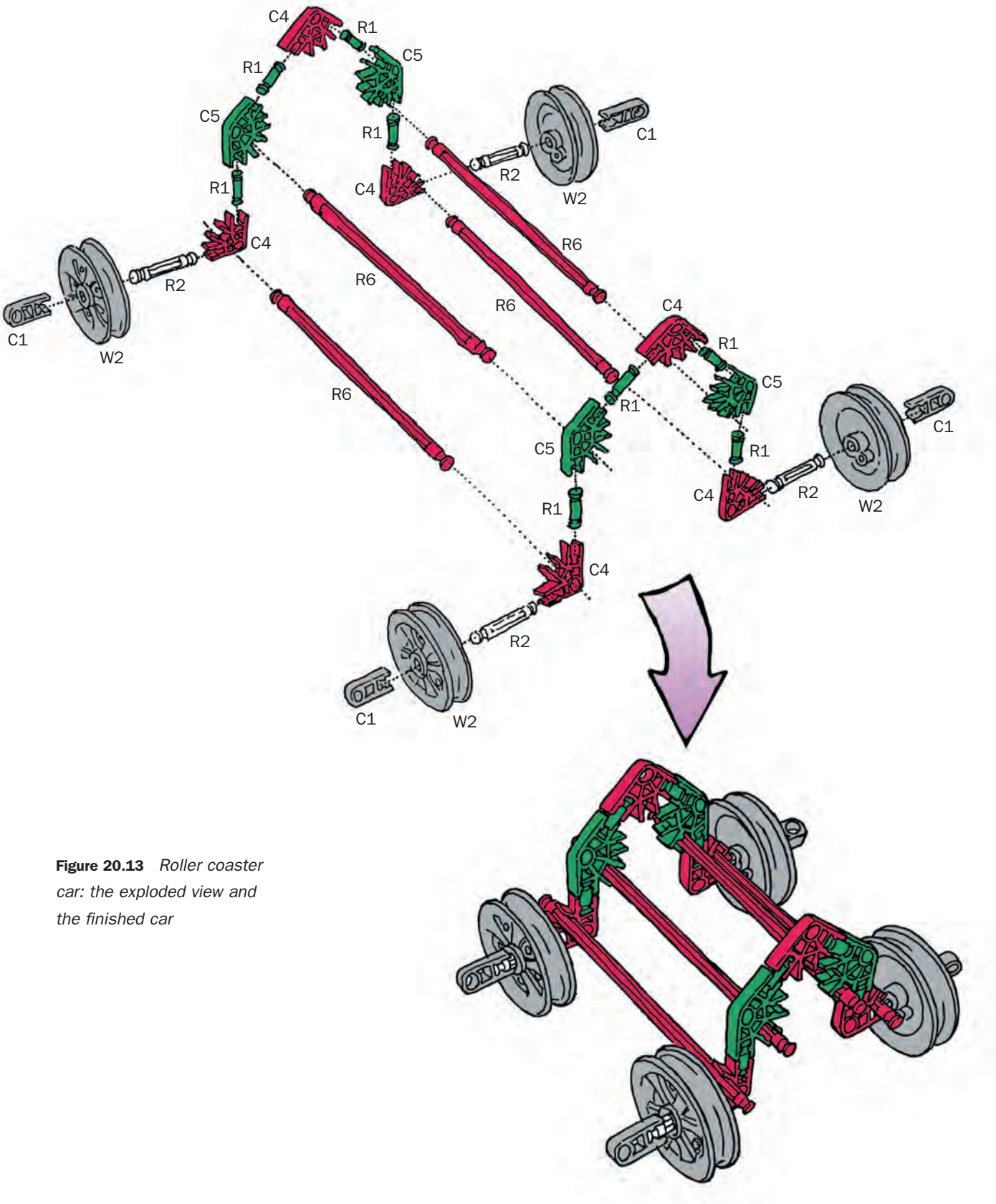

Figure 20.13 *Roller coaster car: the exploded view and the finished car*

2. After each group has connected its section of roller coaster, the group responsible for the track should attach the track to each side of the roller coaster. The track must be stretched smoothly and tightly along the coaster frame. Appendix A has tips for putting the track on the roller coaster.

3. The group that built the roller coaster car should then place the car on the roller coaster at the high end of the track and test the car to make sure that it coasts smoothly and remains on the track for the entire length of the roller coaster. If the car does not move smoothly, check to see that all the parts are connected correctly and that the track is attached smoothly.

REFLECTING ON WHAT YOU'VE DONE

1. In your science notebook, describe your contribution to the class's task of building the roller coaster.

2. Now place the roller coaster car at the low end of the roller coaster track. Describe the motion of the car.

3. Discuss with the class ways to put energy in the car so that it will move along the track.

4. Discuss with the class how roller coasters in amusement parks get the energy they need to move along the track.