

Lesson 10-4 • Group 2

Reinforce Understanding

10.4 Small Group • Group 2

I can use ratios and models to explain how the Penny Farthing and gear-driven bicycles were ingenious solutions to a real problem, explain why the method works, and use it on a problem I have not seen before.

Worked model

A later bicycle design uses a chain: the pedal gear has 48 teeth, and the largest rear gear has 32 teeth.

1. For each rotation of the 48-tooth pedal gear, the wheel gear also turns 48 teeth.
2. The 32-tooth gear needs to turn 32 teeth to make one full rotation, so I find the equivalent ratio: $48 \div 32 = 1.5$.
3. The rear wheel makes 1.5 rotations for each pedal rotation — this gear makes it easier to pedal at slower speeds or go uphill.

Practice

Complete each exercise. Show the reasoning that supports your answer.

1. The pedal gear has 48 teeth. Complete the table of wheel rotations per pedal turn.

Complete the table. Show how you found each value.

Rear gear (teeth)	Ratio $48 \div \text{teeth}$	Wheel rotations per pedal turn
12		
16		
24		

Show your work

2. Distance = rotations $\times$ circumference. Match each ride to its distance.

Write the letter of the matching item on each line.

1. _____ 4 wheel rotations, 7 ft circumference
 2. _____ 3 wheel rotations, 6 ft circumference
 3. _____ 2 wheel rotations, 7 ft circumference
 4. _____ 48-tooth pedal gear with a 12-tooth rear gear
- A 28 feet
 - B 18 feet
 - C 14 feet
 - D 4 rotations per pedal turn