Designing a 5K Course

Goals

- Calculate the distance of a path using the circumference and number of rotations of a trundle wheel.

- Create a scale drawing of a 5K course and present (using words and other representations) the map and course details.

- Use proportional reasoning to calculate the number of laps of a course that is equal to 5 kilometers.

Lesson Narrative

In this optional lesson, students design a 5K course and use their trundle wheels to measure distances. They draw a scale drawing of the course on a map or a satellite image of the school grounds, give instructions where the start and finish of the course should be, and decide how many laps are necessary to complete the race. Students use their experience with the smaller path to design a path of the required length. After planning their course, students use their trundle wheels to measure the course they planned and adjust their plan as necessary. As students measure their course, they decide the appropriate level of precision based on the tools they are using. This lesson may take 2 days.

Student Learning Goal

Let's map out the 5K course.

Lesson Timeline

10 min	**30** min
Activity 1	Activity 2

Activity 1
Make a Proposal

10 min

Activity Narrative

In this activity students return to the context of designing a 5K walk-a-thon that was introduced in an earlier lesson. They use a map or satellite image of the school grounds to decide where the path of the 5K course could be and estimate how many laps it would take to complete 5 kilometers. Ideally, one lap should be about 500 meters because in the next activity, students will use their trundle wheels to measure the course they have designed. Students can use their knowledge of the smaller path they measured to help them design their course.

If possible, each group chooses their own course to help them take ownership of their work and for a greater variety of solutions. Alternatively, the whole class can come to an agreement on one path in order to streamline the process if time is limited.

Launch 👥

Keep students in the same groups of 3–4 from the previous lesson. Distribute maps or printed satellite images of the school grounds. Give students 10 minutes of group work time.

Student Task Statement

Your teacher will give you a map of the school grounds.

1. On the map, draw in the path you measured earlier with your trundle wheel and label its length.

Start/Finish
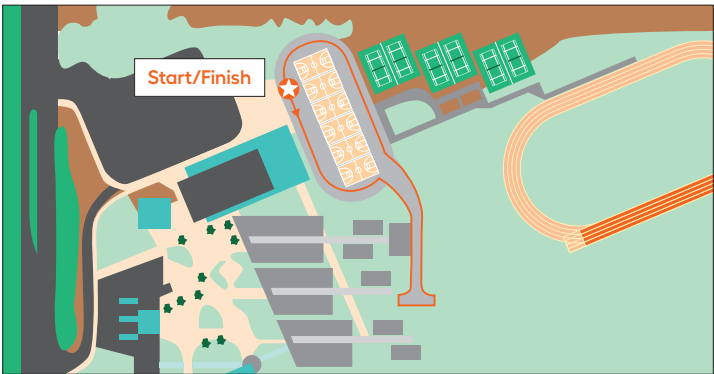
Answers vary.

2. Invent another route for a walking course and draw it on your map. Estimate the length of the course you drew.

Sample response: One time around the course is about 500 meters.

3. How many laps around your course must someone complete to walk 5 kilometers?

Sample response: A person would have to go around the course 10 times to walk 5 kilometers.

Building on Student Thinking

If students struggle with estimating the length of their course, consider asking:

"How long is the course you measured before?"

"How does knowing the length of the earlier course on the map help you estimate the length of your new course?"

Student Workbook

LESSON **12**

Designing a 5K Course
Let's map out the 5K course.

1 Make a Proposal

Your teacher will give you a map of the school grounds.

1 On the map, draw in the path you measured earlier with your trundle wheel and label its length.

2 Invent another route for a walking course and draw it on your map. Estimate the length of the course you draw.

3 How many laps around your course must someone complete to walk 5 kilometers?

2 Measuring and Finalizing the Course

1 Measure your proposed race course with your trundle wheel at least two times. Decide what distance you will report to the class.

2 Revise your course, if needed.

3 Create a visual display that includes:
• A map of your final course.
• The starting and ending locations.
• The number of laps needed to walk 5 km.
• Any other information you think would be helpful to the race organizers.

Are You Ready For More?
The map your teacher gave you didn't include a scale. Create one.

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Activity Synthesis

Check in with each group to approve their proposed courses. Then have students move on to the next activity.

Activity 2

Measuring and Finalizing the Course

30 min

Activity Narrative

Students measure their proposed 5K courses with their trundle wheels. They compare their measurements with their estimates and make final adjustments to their proposed courses. Then they draw a finalized version of their course on the map (or a second copy of the map) including all the details necessary to organize the race: start and finish locations, walking direction, and number of laps. Students attend to precision when deciding how to report their distances and compare the measurements of their final course.

Launch

Keep students in the same groups. Provide access to the trundle wheels they made. Tell students to measure their proposed race course twice, record their measurements, and then to come back to the classroom to finish the computations and revisions.

Student Task Statement

1. Measure your proposed race course with your trundle wheel at least two times. Decide what distance you will report to the class.

   Answers vary.

2. Revise your course, if needed.

3. Create a visual display that includes:

- A map of your final course.

- The starting and ending locations.

- The number of laps needed to walk 5 km.

- Any other information you think would be helpful to the race organizers.

   Sample response:

Start/Finish
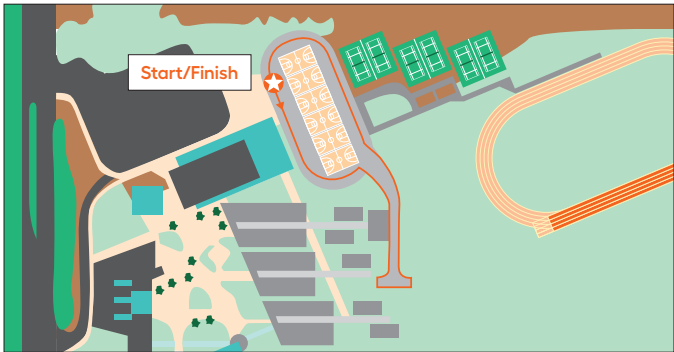
- One time around the course is actually 625 m.

- One has to go around the course 8 times to complete the race.

Are You Ready for More?

The map your teacher gave you didn't include a scale. Create one.

Sample response: 1 cm represents 12 m

Activity Synthesis

Ask students to display their maps and explain their proposed race courses. Consider doing a gallery walk. Encourage students to discuss any assumptions they made to complete their calculations as well as any revisions they made to their plan after measuring their proposed course.