

# Teacher Package

## Mathematics Exemplar Task Grade 4 – Measurement

### Teacher Package

**Title:** Designing Quilts

**Time requirements:** 135-165 minutes (total)

- Pre-task – 45 minutes
- Exemplar task – Day 1 – 45–60 minutes  
– Day 2 – 45–60 minutes

(The pre-task and exemplar task may be completed on three separate days. Time requirements are suggestions, and may vary.)

### Description of the Task

This task requires students to:

- explore the relationship between linear dimensions and area and perimeter in non-congruent rectangles using colour tiles;
- build and draw as many different rectangles as possible from a given number of tiles;
- determine the perimeters of different rectangles;
- determine the areas of different rectangles;
- determine whether it is possible to build rectangular-shaped quilts from an odd number of tiles;
- investigate whether the following statement is true: the greater the perimeter, the greater the area.

Students will build non-congruent rectangles from a given number of tiles, draw conclusions about the different rectangles, and decide which would be the best for a quilt shape and why. Then they will investigate whether it is true that the greater the perimeter of a rectangle, the greater its area. Finally, they are challenged to use tiles to build rectangles whose perimeter is an odd number.

### Expectations Addressed in the Exemplar Task

Note that the codes that follow the expectations are from the Ministry of Education's *Curriculum Unit Planner* (CD-ROM).

*Students will:*

1. solve problems related to their day-to-day environment using measurement and estimation (4m36);
2. estimate, measure, and record the perimeter and the area of two-dimensional shapes, and compare the perimeters and areas (4m37).
3. estimate the area of regular polygons and measure the area in square centimetres using grid paper (4m51);
4. understand that different two-dimensional shapes can have the same perimeter or the same area (4m52);
5. explain the meaning of linear dimension, perimeter, and area (4m53);
6. explain the difference between perimeter and area and indicate when each measure should be used (4m55).

### Teacher Instructions

#### Prior Knowledge and Skills Required

Before attempting the task, students should have had experience with the following:

- exploring the concepts of area and perimeter of polygons.

#### The Rubric\*

The rubric provided with this exemplar task is to be used to assess students' work. The rubric is based on the achievement chart given on page 9 of *The Ontario Curriculum, Grades 1–8: Mathematics, 1997*.

Before asking students to do the task outlined in this package, review with them the concept of a rubric. Rephrase the rubric so that students can understand the different levels of achievement.

#### Accommodations

Accommodations that are normally provided in the regular classroom for students with special needs should be provided when the exemplar task is administered.

\*The rubric is reproduced on page 67 of this document.

### Materials and Resources Required

- Rubric – one copy for each student
- Overhead transparency of the rubric, for review with the students (optional – see General Instructions, point 2)
- Student package (see Appendix 1)
- Colour tiles (30 per student – the colour of the tiles does not matter)
- Overhead projector (for the pre-task)
- Overhead projector colour tiles (optional – regular colour tiles may be used)
- Pencils
- Pencil crayons, crayons, or markers (if desired)

### Classroom Set-up

Students may work individually or in pairs for the pre-task. Students work individually and independently at their desks for the exemplar task.

### General Instructions

1. The rubric for this task should be used to assess the students' work.
2. Before administering these tasks, review the rubric with the class. Give each student a copy of the rubric, or create a transparency to use with the class.
3. The pre-task is intended to ensure that students have the knowledge required to complete the exemplar task.
4. Provide students with an adequate supply of colour tiles.
5. Provide ample time for the students to become familiar with using the colour tiles, if they have not used this manipulative before.
6. The time frames suggested for the pre-task and the exemplar task may vary.
7. All of the student's work must be completed at school.

### Task Instructions

#### Introductory Activities

The pre-task is designed to review and reinforce the skills and concepts that students will be using in the exemplar task and to model strategies useful in completing the task.

#### *Pre-task: Constructing a Rectangle (45 minutes)*

1. Use the overhead projector and colour tiles to construct a rectangle with the dimensions of your choice (e.g.,  $5 \times 4$ ,  $6 \times 3$ ,  $7 \times 2$ ).
2. Have students use colour tiles to reproduce the rectangle shown on the overhead.
3. Demonstrate how to find the area and the perimeter. Students may use the edge of a tile to find the perimeter.
4. Have students build a rectangle that has an area of twelve square units.
5. Have them record their rectangle on grid paper.
6. Challenge them with this question: "Is there another way to build a rectangle with an area of 12 square units?"
7. Have students find the perimeter for each of the shapes with an area of twelve square units.
8. Allow them to share their findings using the overhead projector.

#### **Exemplar Task (45–60 minutes $\times$ 2)**

1. Hand out the student package. (See Appendix 1 for the worksheets containing the task the students will work on independently.)
2. Explain to students the meaning of the word *trim* (see question 2a).
3. Remind students about the rubric, and make sure that each student has a copy of it.
4. Tell the students that they will be working independently on the assigned task.
5. Set the students to work on the task.

**Appendix 1**

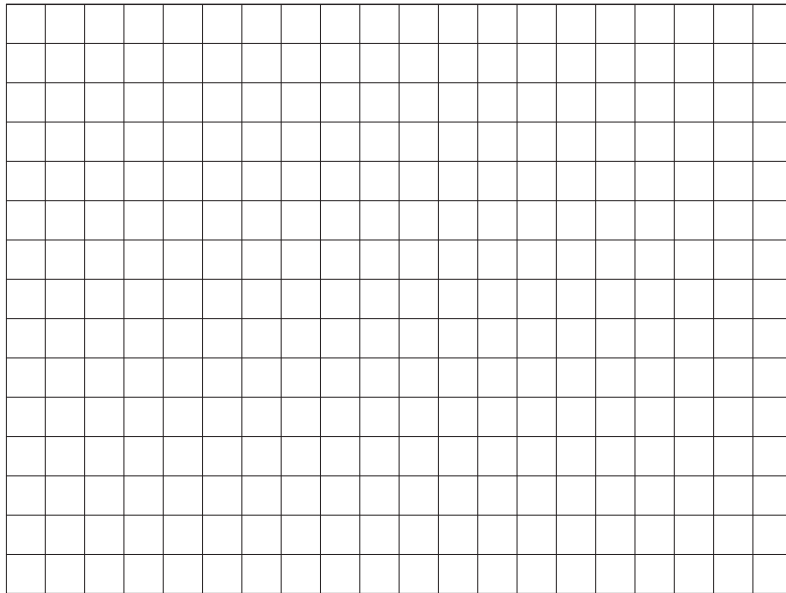
Exemplar Task

1. a) Trevor needs your help. He has decided to make a quilt. He would like to sew together 18 square pieces of material but can't decide upon the best rectangular arrangement of the squares.

Use 18 square tiles. Build as many different rectangular arrangements as you can.

Show each arrangement on the grid paper below.

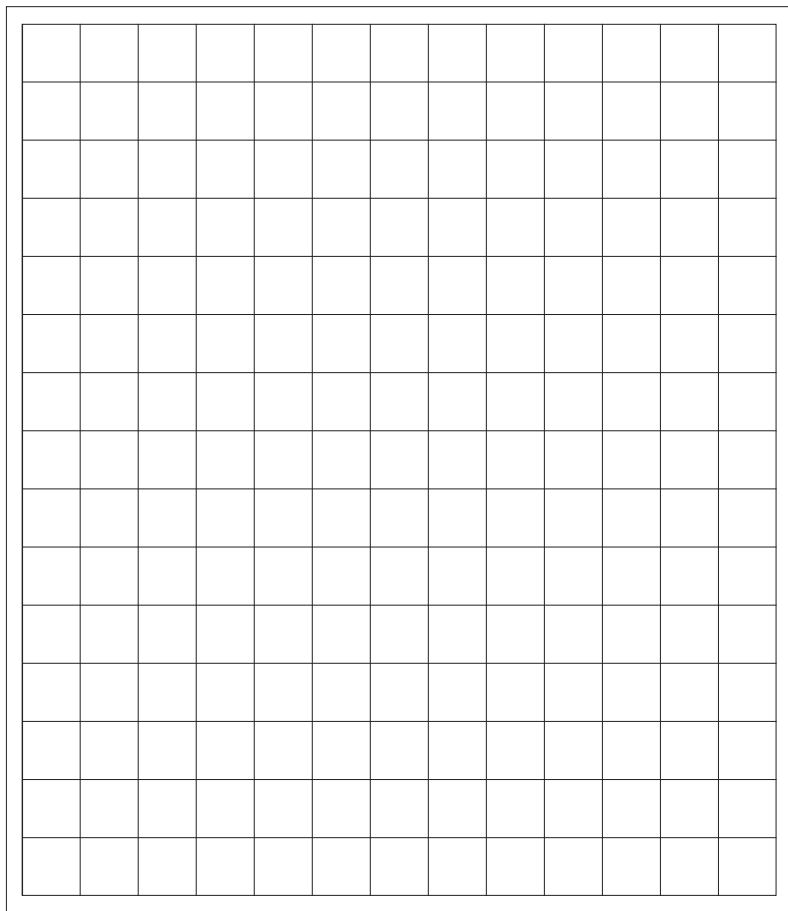
Record the perimeter and area next to each arrangement.



- b) What are some of the things you notice about the different arrangements for the quilts?

- c) What arrangement would make the best quilt shape?  
Explain your choice.

2. a) Katelin believes that the longer the piece of ribbon she has, the greater the area of quilt she can trim. Use the grid paper below to find out if she is correct. (Keep in mind what you learned in question 1.)



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- b) Explain why Katelin was correct or incorrect.

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3. a) Martin is not sure whether you can use tiles to build rectangular quilts with the following perimeters: 15 units? 17 units? 24 units? 60 units?

What do you think? Explain your thinking.

- b) Why do you believe that for certain perimeters we can build more than one rectangular quilt?