



# Quilt Blocks

## Overview

Students will see how fractions, decimals, and percents are interrelated, then explore and learn how to convert between them. Students will also practice estimating.

## Math Concepts

- multiple representation of numbers (fractions, decimals, percents)
- area
- patterns
- rounding

## Materials

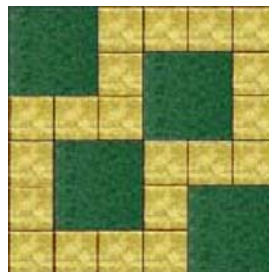
- TI-30XS MultiView™

## Activity

Begin with a discussion about quilts and the patterns used to make them. Relate what is seen in the patterns to mathematical topics such as symmetry, reflections, area, and perimeter.

*Quilts have been made for hundreds of years, and there are hundreds of different patterns. Each requires a different number of blocks, a different combination of fabrics, and assembly in a repeating pattern. Below is one popular design, called Patience Corner.*

Show students this particular quilt pattern with the projector. A larger image (Transparency 1) is included at the end of this activity for reproduction. (**Note:** students will need full-color images to use during the activity [either a color transparency or a printed class set of color copies]. For the full-color version of this activity, go to <http://education.ti.com/exchange> and enter “8347” in the search box.)



First, discuss the pattern. Ask students if they can see and describe it.

*Can you describe the pattern? Can you visualize what the quilt blocks that surround this one will look like?*

Ask the students for their predictions, realizing that their answers will vary depending upon their vocabulary, their ability to visualize patterns, etc.

Now, move into the fraction of the overall area for each color.

*Can you see how many equal-sized squares there are? Notice that each of the larger green squares is equal to four of the smaller yellow squares. Also, notice that the dimension of the Patience Corner square is 36 small squares.*

Introduce the idea that each color represents a fraction of the whole quilt.

*How many of the 36 equal-sized squares are green?*

Let the students count. Anticipate answers of both 4 and 16. Remind them that each of the green squares is equal to four of the smaller yellow squares.



# Quilt Blocks

Sixteen of the squares are green. We also know there are 36 squares total. Therefore,  $16/36$  can be used to represent the fraction of green squares.

We know that  $16/36$  of the squares will be green. Do you know the decimal approximation for this? Make an estimate.

Discuss the size of the fraction  $16/36$ . Since 16 is slightly less than one-half of 36, students should expect to see a decimal equivalent slightly less than 0.5. This assumes students are familiar with  $\frac{1}{2} = 0.5$ .

Now that you've estimated the decimal, calculate it using the TI-30XS MultiView™ calculator.

$\frac{16}{36}$  simplifies to  $\frac{4}{9}$ , which is approximately equal to 0.44.

How close was your estimate?

Discuss how this decimal can easily be expressed as a percent.

Do you know how to express 0.44 as a percent? Estimate the percent equivalent. Remember that the entire quilt would be 100%.

Students should know that *percent* literally means “per hundred,” therefore 0.44 is equivalent to  $\frac{44}{100}$ , which is 44%.

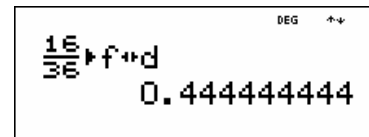
Now that you've estimated, calculate the percent, using the calculator. Was your estimate close?

Note: Discuss with your students the exact representation of  $\frac{16}{36} = 0.\overline{4} = 44.\overline{4}\%$ . Compare the exact numbers to their estimations of 0.44 and 44%. How much are they missing?

Before distributing the student activity, you may want to look at the activity and key to ensure your students have all the skills required to complete the activity. You will also need to have a full-color version of Transparency 2 for use during this activity.

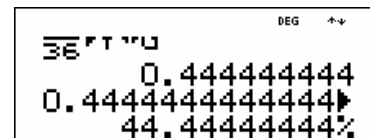
Follow these steps:

1. Press  $16 \left[ \frac{\square}{\square} \right] 36 \left[ \rightarrow \right] \left[ f \leftarrow d \right] \left[ \text{enter} \right]$ .
2. The calculator should display this:



Follow these steps:

1. Press  $\left[ 2\text{nd} \right] \left[ \% \right] \left[ \text{enter} \right]$ .
2. The calculator should display this:



# Quilt Blocks

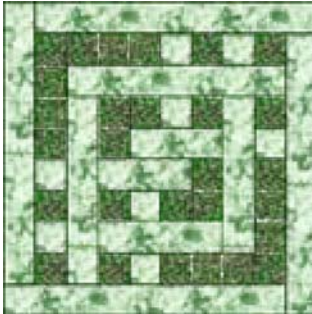
Name \_\_\_\_\_

Date \_\_\_\_\_




Directions: In each of the quilt blocks below, answer all questions, and then complete the chart. Round decimals to the nearest hundredth, and round percents to the nearest whole percent. Your teacher will provide you with a color version of each of the images below.

1.



Carpenter's Square

 = one small square

- (a) How many small squares cover the area of the Carpenter's Square?
- (b) What fraction of the Carpenter's Square area is light green?
- (c) Write an estimate of the light green area as a percent.


(d)

| Color       | Number of squares | Fraction | Decimal (rounded) | Percent (rounded) |
|-------------|-------------------|----------|-------------------|-------------------|
| Light green |                   |          |                   |                   |
| Dark green  |                   |          |                   |                   |

2.



Water Wheel

 = one small square

Note: Be careful with this one—when counting the squares, notice that some are half one color and half another color.

- (a) How many small squares cover the area of the Water Wheel?
- (b) What fraction of the Water Wheel's area is light blue?
- (c) Write an estimate of the light blue area as a percent.

(d)

| Color        | Number of squares | Fraction | Decimal (rounded) | Percent (rounded) |
|--------------|-------------------|----------|-------------------|-------------------|
| Light blue   |                   |          |                   |                   |
| Medium blue  |                   |          |                   |                   |
| Dark blue    |                   |          |                   |                   |
| Darkest blue |                   |          |                   |                   |

# Quilt Blocks

Name \_\_\_\_\_

Date \_\_\_\_\_



---

3. Add the decimals in the above chart.

(a) What is the sum? \_\_\_\_\_

(b) What should the sum be? \_\_\_\_\_

(c) Why are the numbers different?

\_\_\_\_\_  
\_\_\_\_\_

(d) Use your calculator to get the sum you expect. (Hint: Use exact values vs. approximated values.) Describe what you did.

\_\_\_\_\_  
\_\_\_\_\_

4. Why is it important to be able to estimate percentage in the above problems? If you were unable to make good estimates, how would that make creating a quilt difficult?

\_\_\_\_\_  
\_\_\_\_\_



# Quilt Blocks

## Answer Key

- How many small squares cover the area of the Carpenter's Square?  
**100**
  - What fraction of the Carpenter's Square area is light green?  **$72/100$**
  - Write an estimate of the light green area as a percent. **Answers will vary.**

(d)

| Color       | Number of squares | Fraction                   | Decimal (rounded) | Percent (rounded) |
|-------------|-------------------|----------------------------|-------------------|-------------------|
| Light green | <b>72</b>         | <b><math>72/100</math></b> | <b>0.72</b>       | <b>72%</b>        |
| Dark green  | <b>28</b>         | <b><math>28/100</math></b> | <b>0.28</b>       | <b>28%</b>        |

- How many small squares cover the area of the Water Wheel? **36**
  - What fraction of the Water Wheel's area is light blue?  **$16/36$  or  $4/9$**
  - Write an estimate of the light blue area as a percent.  
**Answers will vary.**

(d)

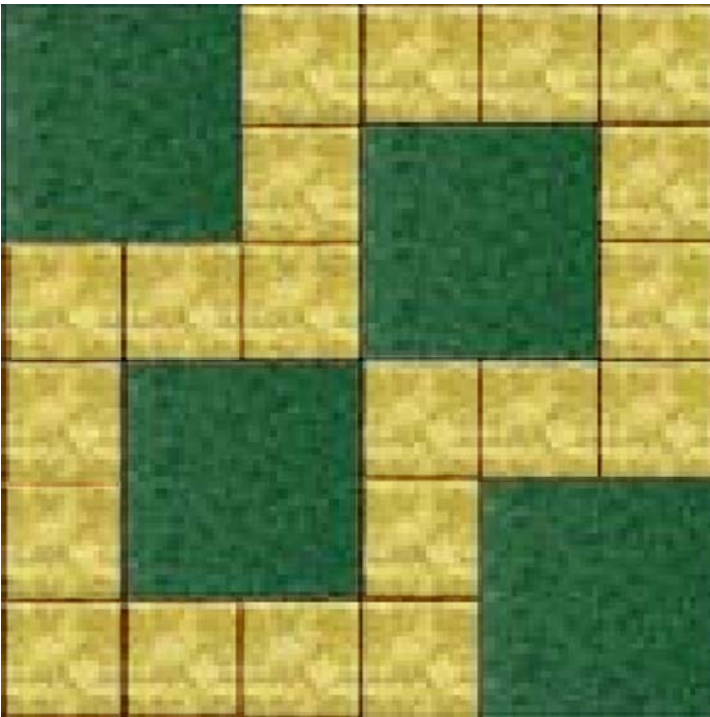
| Color        | Number of squares | Fraction                  | Decimal (rounded) | Percent (rounded) |
|--------------|-------------------|---------------------------|-------------------|-------------------|
| Light blue   | <b>16</b>         | <b><math>16/36</math></b> | <b>0.44</b>       | <b>44</b>         |
| Medium blue  | <b>4</b>          | <b><math>4/36</math></b>  | <b>0.11</b>       | <b>11</b>         |
| Dark blue    | <b>8</b>          | <b><math>8/36</math></b>  | <b>0.22</b>       | <b>22</b>         |
| Darkest blue | <b>8</b>          | <b><math>8/36</math></b>  | <b>0.22</b>       | <b>22</b>         |

- Add the decimals in the above chart.
  - What is the sum? **0.99**
  - What should the sum be? **1.0**
  - Why are the numbers different? **Because we rounded decimals to the nearest hundredth, the numbers are approximations vs. exact numbers.**
  - Use your calculator to get the sum you expect. (Hint: Use exact values vs. approximated values.) Describe what you did. **Instead of adding 0.44, 0.11, 0.22, and 0.22, you add the entire decimal without rounding.**
- Why is it important to be able to estimate percentage in the above problems? If you were unable to make good estimates, how would that make creating a quilt difficult? **Estimating the amount of each fabric to purchase would be very important. If you couldn't estimate how much fabric to buy, you could easily end up with too much or too little. This could be time consuming and expensive if you purchased the wrong amounts.**

# Quilt Blocks

Transparency 1

---

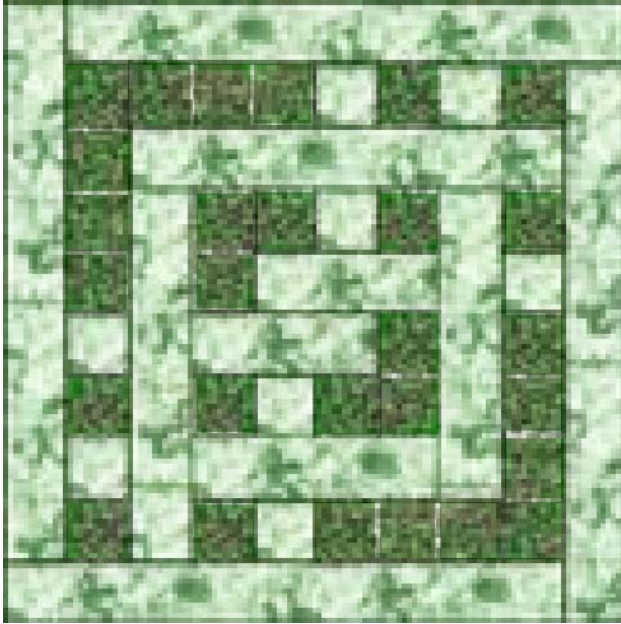


# Quilt Blocks

## Transparency 2 (Student Worksheet)

---

1.

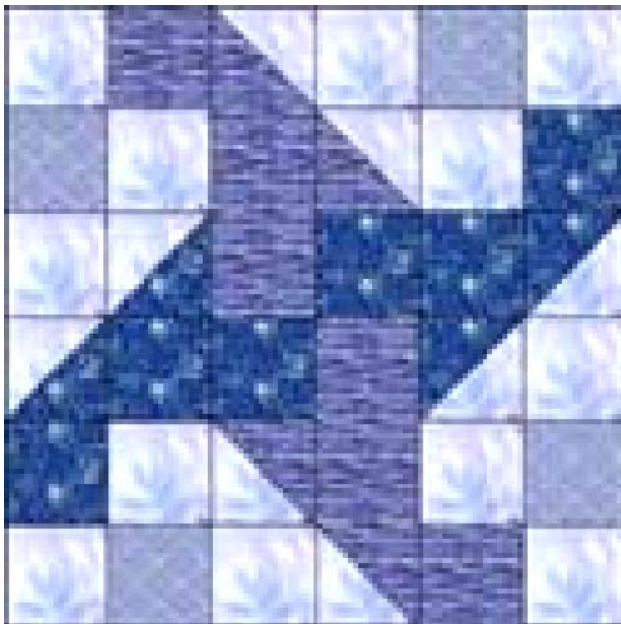


Carpenter's Square



= one small square

2.



Water Wheel



= one small square