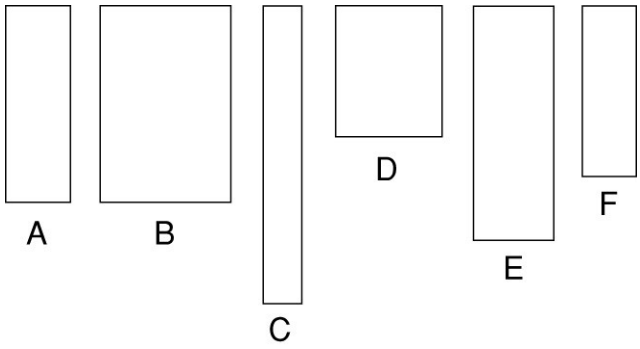
Name _____ Date _____ Class _____

# 7-1 Proportional Relationships

## Challenge: The Golden Ratio

For centuries, people all over the world have considered a certain rectangle to be one of the most beautiful shapes. Which of these rectangles do you find the most attractive?




If you are like most people, you chose rectangle B. Why? It's a golden rectangle, of course! In a golden rectangle, the ratio of the length to the width is called the **golden ratio**—about 1.6 to 1.

The golden ratio pops up all over the place—in music, sculptures, the Egyptian pyramids, seashells, paintings, pinecones, and of course in rectangles.

To create your own golden rectangle, just write a ratio equivalent to the golden ratio. This will give you the length and width of another golden rectangle.

**Golden Ratio**

$$\frac{\ell}{w} = \frac{1.6}{1}$$

$w = 1$ in.

$\ell = 1.6$ in.

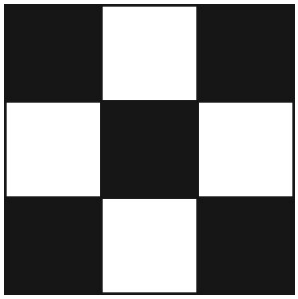
**Use a ruler to draw a new golden rectangle in the space below. Then draw several non-golden rectangles around it. Now conduct a survey of your family and friends to see if they choose the golden rectangle as their favorite.**

Name _____ Date _____ Class _____

# 7-2 Proportional Relationships

## Challenge: It's All Black and White!

This grid has a black-to-white ratio of 5 to 4.



Use the black-to-white ratio to make groups of grids.
Then complete the table of equivalent ratios.

| | | | | | | | | | | | |
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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Black** | 5 | 10 | 15 | | | | | | | | | |
| **White** | 4 | | | | | | | | | | | |

Name _____ Date _____ Class _____

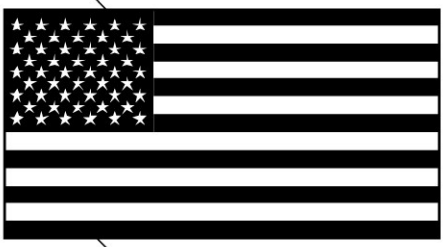
# 7-4 Proportional Relationships

## Challenge: Patriotic Proportions

On August 21, 1959, President Eisenhower signed an order that established the official proportions of the United States flag. No matter what size the flag is, it must match those proportions to be used officially.

| Official Proportions for the United States Flag | |
|---|---|
| Width of flag | 1 |
| Length of flag | $1\frac{9}{10}$ |
| Width of union | $\frac{7}{13}$ |
| Length of union | $\frac{19}{25}$ |
| Width of each stripe | $\frac{1}{13}$ |

The union is the blue area.
The 50 stars represent the 50 states.



The 13 stripes represent the first 13 states.

**Use the official proportions to find the missing dimension of each flag.**

1. Length of flag = 10 feet; Width of flag = _____
2. Width of flag = 57 yards; Length of flag = _____
3. Width of flag = 13 centimeters; Width of Union = _____
4. Width of flag = 260 inches; Width of each stripe = _____
5. Length of flag = 25 meters; Length of Union = _____

**Choose a width in inches for a United States flag. Then use a ruler to draw your flag with the official proportional length in the space below.**

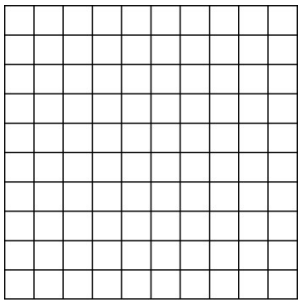
Name _____ Date _____ Class _____

# 7-5 Proportional Relationships

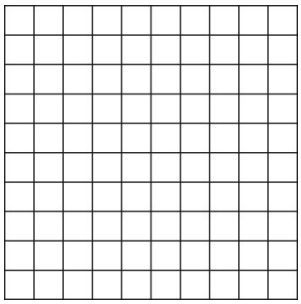
## Challenge: Per State

**To show a percent, you can shade a 10-by-10 grid in any design that you want. For each percent below, try to shade the grid to look like the state it describes.**

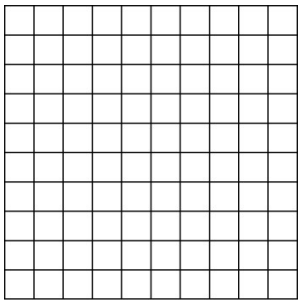
1. California has the largest population of any state. About 12% of all Americans live in California.



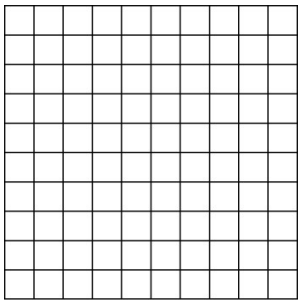
2. Florida is the top tourist state. About 26% of all visitors to the United States choose Florida for their vacations.



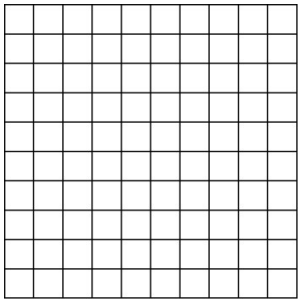
3. Nevada is the fastest-growing state. Its population has grown about 66% in the last ten years.



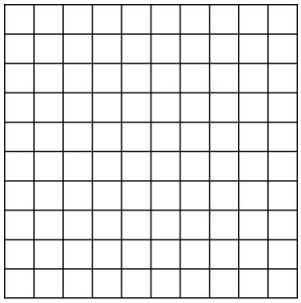
4. Alaska is the largest state. It makes up about 15% of the total area of the United States.



5. Washington produces the most apples. About 50% of all the apples grown in the U.S. come from Washington.



6. Texas is the top oil-producing state. About 21% of all the oil produced in the United States comes from Texas.



Name _____ Date _____ Class _____

# 7-6 Proportional Relationships

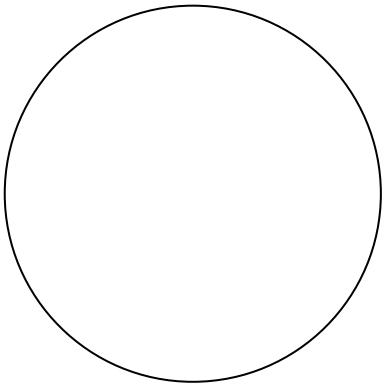
## Challenge: Trash or Treasure?

People in the United States produce about 208 million tons of garbage every year! We recycle about 56 million tons of that garbage, or about 27% of the total.

**Complete the chart at right. Then display the percents on the circle graph below. Remember to give your graph a title. Label each section of the graph with the material and the percent of the total garbage recycled that each section represents. You may wish to color each section differently or add illustrations.**

**United States Recycling**

| Material | Total Garbage Recycled | |
|---|---|---|
| | Fraction | Percent |
|  Metals | $\frac{1}{10}$ | |
|  Yard Waste | $\frac{17}{100}$ | |
|  Glass | $\frac{3}{50}$ | |
|  Paper | $\frac{29}{50}$ | |
|  Plastics | $\frac{1}{50}$ | |
|  All Other Materials | $\frac{7}{100}$ | |



Name _____ Date _____ Class _____

# 7-7 Proportional Relationships

## Challenge: Percent Puzzler

**Use the percent clues to find each number below.**

1. This number is 8 more than $83\frac{1}{2}$% of 20. _____
2. This number is 5 less than 28% of 292. _____
3. This number is equal to the sum of 4% of 75 and $32\frac{1}{2}$% of 64. _____
4. This number is 7.82 more than $15\frac{3}{4}$% of 320. _____
5. This number is equal to the sum of 52% of 86 and 35% of 52. _____
6. This number is equal to the product of 8% of 75 and 12% of 60. _____
7. This number is equal to the sum of 5% of 125 and $55\frac{1}{2}$% of 20. _____
8. This number is equal to the product of 24% of 225 and $3\frac{1}{5}$% of 45. _____
9. This number is equal to the sum of $9\frac{3}{10}$% of 110 and $38\frac{1}{4}$% of 124. _____
10. This number is 23.04 less than $14\frac{1}{2}$% of 768. _____
11. This number is 50.21 more than the sum of $15\frac{1}{2}$% of 42 and 64% of 112. _____
12. This number is equal to the difference of 150% of 85 and 280% of 0.3. _____
13. This number is equal to the square of $7\frac{1}{2}$% of 160. _____
14. This number is 6.8 less than the product of 5 and 8% of 517. _____

Name _____ Date _____ Class _____

# 7-8 Proportional Relationships

## *Challenge: Percentile Rank*

Just as there are three quartiles (the lower quartile, the median, and the upper quartile) that divide a data set into four equal groups, there are 99 *percentiles* that divide a data set into 100 groups.

The definition of a percentile is:

$$\text{percentile of score } x = \frac{\text{number of scores less than or equal to score}}{\text{total number of scores}} \cdot 100$$

The frequency table at the right shows the test scores for 28 students.

| Score | Frequency |
|---|---|
| 100 | 1 |
| 95 | 2 |
| 90 | 5 |
| 85 | 6 |
| 80 | 7 |
| 75 | 3 |
| 70 | 2 |
| 65 | 2 |

Find the percentile corresponding to 80.

$$\text{percentile of } 80 = \frac{\text{number of scores less than or equal to } 80}{\text{total number of scores}} \cdot 100$$

$$= \frac{14}{28} \times 100 = 0.5 \times 100 = 50$$

So, 80 is the 50th percentile.

**Use the frequency table to find the percentile corresponding to each score. Round your answer to the nearest whole number.**

1. 90 _____
2. 70 _____
3. 100 _____
4. 75 _____
5. 95 _____
6. 85 _____

**Use the test scores listed below to find the percentile corresponding to each score. Round your answer to the nearest whole number. (*Hint:* Make a frequency table of the scores.)**

84, 77, 77, 77, 92, 77, 84, 84, 95, 84, 68, 92, 84, 100, 77, 77, 84, 92, 77, 92, 92, 95, 77, 68, 84, 100, 92, 84, 95, 92

7. 100 _____
8. 95 _____
9. 92 _____
10. 84 _____
11. 77 _____
12. 68 _____