

**LESSON****Problem Solving****5-2 Ratios, Rates, and Unit Rates**

Scientists have researched the ratio of brain weight to body size in different animals. The results are in the table below.

1. Order the animals by their brain weight to body weight ratio, from smallest to largest.

\_\_\_\_\_

\_\_\_\_\_

2. It has been hypothesized that the higher the brain weight to body weight ratio, the more intelligent the animal is. By this measure, which animals listed are the most intelligent?

\_\_\_\_\_

\_\_\_\_\_

3. Name two sets of animals that have approximately the same brain weight to body weight ratio.

Animal	<u>Brain Weight</u> <u>Body Weight</u>
Cat	$\frac{1}{100}$
Dog	$\frac{1}{125}$
Elephant	$\frac{1}{560}$
Hippo	$\frac{1}{2789}$
Horse	$\frac{1}{600}$
Human	$\frac{1}{40}$
Small birds	$\frac{1}{12}$

**Find the unit rate. Round to the nearest hundredth.**

4. A 64-ounce bottle of apple juice costs \$1.35.

**A** \$0.01/oz      **C** \$0.47/oz  
**B** \$0.02/oz      **D** \$47.4/oz

5. Find the unit rate for a 2 lb package of hamburger that costs \$3.45.

**F** \$0.58/lb      **H** \$1.73/lb  
**G** \$1.25/b      **J** \$2.28/b

6. 12 slices of pizza cost \$9.00.

**A** \$0.45/slice      **C** \$0.75/slice  
**B** \$0.50/slice      **D** \$1.33/slice

7. John is selling 5 comic books for \$6.00.

**F** \$0.83/book      **H** \$1.02/book  
**G** \$1.20/book      **J** \$1.45/book

8. There are 64 beats in 4 measures of music.

**A** 16 beats/measure  
**B** 12 beats/measure  
**C** 4 beats/measure  
**D** 0.06 beats/measure

9. The average price of a 30 second commercial for the 2002 Super Bowl was \$1,900,000.

**F** \$120.82/sec  
**G** \$1,242.50/sec  
**H** \$5,839.02/sec  
**J** \$63,333.33/sec

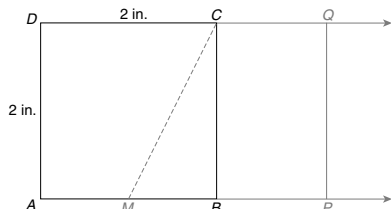
## LESSON Challenge

### 5-2 All That Glitters

Used by the ancient Greeks around 500 B.C., the **golden rectangle** is thought to have a shape that is most pleasing to the human eye.

Follow these steps to construct a golden rectangle to determine its dimensions.

1. Work with square  $ABCD$  below of side 2 inches.  
Use a ruler to locate  $M$ , the midpoint of  $\overline{AB}$ .  $AM = \underline{\quad 1 \quad}$
2. Draw  $\overline{MC}$ . Use the Pythagorean theorem to find  $MC$ .  $MC = \underline{\sqrt{5}}$
3. Extend  $\overline{AB}$  through  $B$ . Locate  $P$  on  $\overline{AB}$  so that  $MP = MC$ .  $AP = \underline{1 + \sqrt{5}}$
4. Extend  $\overline{DC}$  through  $C$ . At  $P$ , draw a line perpendicular to  $\overline{AB}$ . Use  $Q$  to label the point at which the perpendicular intersects  $\overline{DC}$ .  $APQD$  is a golden rectangle.



2. In golden rectangle  $APQD$ , the ratio  $\frac{AP}{AD}$  is called the **golden ratio**.  
  - a. The exact value of the golden ratio is:  $\underline{\frac{1 + \sqrt{5}}{2}}$
  - b. Write an approximation of the golden ratio.  
Use as many decimal places as your calculator allows.  $\underline{1.6180339887}$
3. a. Write the reciprocal of the golden ratio.  $\underline{\frac{2}{1 + \sqrt{5}}}$   
  - b. Write an approximation of the reciprocal of the golden ratio.  $\underline{0.6180339887}$
  - c. Comment on the result.

Decimal portions of golden ratio and its reciprocal are the same.

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1. Order the animals by their brain weight to body weight ratio, from smallest to largest.  
hippo, horse, elephant, dog,  
cat, human, small birds
2. It has been hypothesized that the higher the brain weight to body weight ratio, the more intelligent the animal is. By this measure, which animals listed are the most intelligent?  
small birds
3. Name two sets of animals that have approximately the same brain weight to body weight ratio.  
elephant and horse; cat & dog

Animal	Brain Weight Body Weight
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Elephant	$\frac{1}{560}$
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## LESSON Reading Strategies

### 5-2 Understanding Vocabulary

A **ratio** is a comparison between two like quantities.

- Add 4 **cups** of water for every 1 **cup** of mix.
- For every 3 **hour** class, Tim studies 5 **hours**.

A **rate** is a comparison of two quantities that have different units.

- It took 3 **hours** to make the 150 **mile** trip.
- 16 **ounces** of cheese costs \$3.84.

**Unit** means "one." A **unit rate** compares one of something to another value.

- 18 miles **per gallon** of gasoline
- 1 **hand**, 5 fingers

Write **ratio**, **rate**, or **unit rate** to describe each situation.

1. Compare two quantities with different units. rate
2. Compare two like quantities. ratio
3. Compare one of something to another value. unit rate
4. It costs 20¢ per minute for a long distance phone call. unit rate
5. Jim bought 2 bottles of water for \$1.29. rate
6. The team won 12 games and lost 2 games. ratio
7. A container of tennis balls has three yellow balls and two white balls. ratio
8. The speed limit is 55 miles per hour. unit rate

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## LESSON Puzzles, Twisters & Teasers

### 5-2 Child's Play!

Circle words from the list as you find them. Find a word that answers the riddle, circle it, and write it on the line.

ratio rate unit price aspect  
quantities similarity width height comparison

R A T I O P O I U Y S H  
A S P E C T W I J N I T  
T E R T Y U I P T Y M R  
E T K U L H D R Q E I O  
Q U A N T I T I E S L H  
C V B I M N H C D T A E  
T R Y T U J K E U I R I  
C O M P A R I S O N I G  
I J B Y G S L I D E T H  
A S X E D T V U I J Y T

Why did the kids cross the playground?

To get to the other SLIDE.



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