

# Similarities – Ratios & Proportions

Homework Section 7.1

Name \_\_\_\_\_

Gears on bicycles are called sprocket wheels. To determine gear ratios on bicycles, you must find the ratio of the number of rear sprocket teeth to the number of front sprocket teeth. Find each ratio. Express your answer as a decimal rounded to the nearest tenth.

- #1) 12 rear sprocket teeth  
24 front sprocket teeth

$$GR = \frac{\#r.s.t}{\#f.s.t} = \frac{12}{24} = 0.50$$

- #2) 15 rear sprocket teeth  
55 front sprocket teeth

$$GR = \frac{\#r.s.t}{\#f.s.t} = \frac{15}{55} \approx 0.27$$

- #3) 13 rear sprocket teeth  
52 front sprocket teeth

$$GR = \frac{\#r.s.t}{\#f.s.t} = \frac{13}{52} = .25$$

- #4) 20 rear sprocket teeth  
30 front sprocket teeth

$$GR = \frac{\#r.s.t}{\#f.s.t} = \frac{20}{30} \approx 0.67$$

Solve each proportion. Do not round answers.

#5)  $2x \cdot \frac{11}{24} = \frac{x}{24} \cdot 24$

$$11 = x$$

#6)  $6x \cdot \frac{5}{8} = \frac{20}{x} \cdot 8x$

$$5 \cdot x = \frac{8 \cdot 20}{8}$$

$$x = 8 \cdot 4$$

$$x = 32$$

#7)  $3.24 \cdot \frac{x}{3.24} = \frac{1}{8} \cdot 3.24$

$$x = \frac{3.24}{8}$$

$$x = 0.405$$

#8)  $8 \cdot \frac{4}{7} = \frac{7}{8} \cdot 8x$

$$8 \cdot 4 = 7 \cdot x$$

$$32 = 7x$$

$$\frac{32}{7} = x$$

#9)  $12 \cdot \frac{x+3}{12} = \frac{5}{4} \cdot 123$

$$x+3 = 5 \cdot 3$$

$$x+3 = 15$$

$$x = 12$$

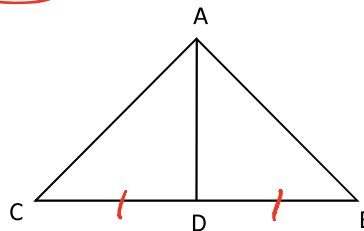
#10)  $8(8-x) \cdot \frac{1}{8} = \frac{x}{8-x} \cdot 6 \cdot 3$

$$8-x = 3x$$

$$8 = 4x$$

$$2 = x$$

$\overline{AD}$  is a median of  $\triangle ABC$ . Use the picture below for #11 - #13.



#11) Find the ratio of BD to DC.

$$\frac{BD}{DC} = \frac{1}{1}$$

#12) Find the ratio of DC to BC.

$$\frac{DC}{BC} = \frac{1}{2}$$

#13) If  $\triangle ABC$  is an equilateral triangle, find the ratio of  $m\angle ABD$  to  $m\angle ADC$ .

$$= 60^\circ \qquad = 90^\circ$$

$$\frac{m\angle ABC}{m\angle ADC} = \frac{60}{90} = \frac{2}{3}$$

# Similarities – Ratios & Proportions

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Proportions can be used to change a fraction to a percent. For example, to change  $\frac{5}{6}$  to a percent, you divide 5 by 6, then shift the decimal two places to the right. Change each fraction to a percent using long division. (No calculators.) Round final answer to the nearest tenth.

#14)  $\frac{3}{8} = 37.5\%$

$$\begin{array}{r} 0.375 \\ 8 \overline{) 3.0000} \\ \underline{24} \phantom{00} \\ 60 \\ \underline{56} \phantom{00} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

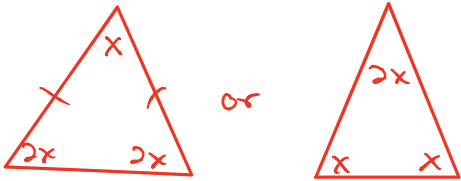
#15)  $\frac{5}{12} \approx 41.7\%$

$$\begin{array}{r} 0.4166 \\ 12 \overline{) 5.0000} \\ \underline{48} \phantom{00} \\ 20 \\ \underline{12} \phantom{00} \\ 80 \\ \underline{72} \phantom{00} \\ 80 \\ \underline{80} \\ 0 \end{array}$$

#16)  $\frac{13}{4} = 325\%$

$$\begin{array}{r} 3.250 \\ 4 \overline{) 13.0000} \\ \underline{12} \phantom{00} \\ 10 \\ \underline{8} \phantom{00} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

#17) The ratio of the measures of two angles of an isosceles triangle is 1 to 2. What are the possible measures of the angles of the triangle?



$$\begin{aligned} x + 2x + 2x &= 180 \\ 5x &= 180 \\ x &= 36 \end{aligned}$$

$$\begin{aligned} x + x + 2x &= 180 \\ 4x &= 180 \\ x &= 45 \end{aligned}$$

$$\begin{aligned} x &= 36 \\ 2x &= 2(36) = 72 \end{aligned}$$

$$\begin{aligned} x &= 45 \\ 2x &= 2(45) = 90 \end{aligned}$$

The measures of the triangle are 36, 72, 72 or 45, 45, 90.

#18) One way to determine the strength of a bank is to calculate its capital-to-assets ratio as a percent. A strong bank should have a ratio of 4% or more. The Pilgrim National Bank has a capital of 2.3 billion dollars and assets of 52.6 billion dollars. Is it a strong bank? Explain.

$$\text{Strength} = \frac{\text{CAP}}{\text{Assets}}$$

$$\text{Strength} = \frac{2.3 \text{ billion}}{52.6 \text{ billion}}$$

$$\text{Strength} = 0.0437$$

$$\text{Strength} = 4.37\%$$

P.N.B is strong because its Capital to Assets ratio is larger than 4%

#19) On a bike, the ratio of the number of rear sprocket teeth to the number of front sprocket teeth is equivalent to the number of rear sprocket wheel revolutions to the number of pedal revolutions. If there are 24 rear sprocket teeth and 54 front sprocket teeth, how many revolutions of the rear sprocket wheel will occur for 3 revolutions of the pedal? Round to the nearest tenth.

$$\frac{\# \text{ r.s.t}}{\# \text{ f.s.t}} = \frac{\# \text{ r.s.w.r}}{\# \text{ p.r.}}$$

$$\frac{4 \cdot 24}{9 \cdot 54} = \frac{x}{3}$$

$$8 \cdot \frac{4}{9} = \frac{x}{3} \cdot 3$$

$$\frac{4}{3} = x$$

$$1.3 \approx x$$

The number of revolutions of the rear sprocket wheel are about 1.3.

- |   |                               |                    |
|---|-------------------------------|--------------------|
| #1) 0.50  | #2) 0.27                      | #3) 0.25           |
| #4) 0.67  | #5) 11                        | #6) 32             |
| #7) 0.405   | #8) $\frac{32}{7}$            | #9) 12             |
| #10) 2  | #11) $\frac{1}{1}$            | #12) $\frac{1}{2}$ |
| #13) $\frac{2}{3}$  | #14) 37.5%                    | #15) 41.7%         |
| #16) 325%   | #17) 36, 72, 72 or 45, 45, 90 |                    |
| #18) Yes, because their capital-to-assets ratio is 4.4% which is greater than 4%. |                               |                    |
| #19) About 1.3  |                               |                    |