

Name: \_\_\_\_\_

**Lesson 2.1 - Intro to Rates**


**Definitions:**

Ratio = a comparison of two quantities

A Ratio can be written like 2:3 or 2/3

A Ratio is often reduced to lowest terms

A Ratio is NOT a fraction

Fraction = parts of a whole  = 3/8

Percentage = amount per hundred.

**Example:** A classroom has 10 boys and 20 girls

a) Write a ratio to compare the boys to girls

$10:20$

b) Reduce the ratio to lowest terms

$1:2$

c) Write this ratio in fraction form, decimal form, and percentage form

$1/2, 0.5, 50\%$

**NOTE:** What fraction of the classroom is boys? DIFFERENT QUESTION!

$10/30 = 1/3!$

Comparisons can be expressed as a ratio, fraction, decimal, or percentage.

Ratio	Fraction Form	Decimal Form	Percentage Form
3:4	$3/4$	0.75	75%
267:100	$267/100$	2.67	267%

**Assignment:**

Ratio	Fraction Form	Decimal Form	Percentage Form
4:5	$\frac{4}{5}$	0.8	80%
6:5	$\frac{6}{5}$	1.2	120%
5:8	$\frac{5}{8}$	.625	62.5%
7:4	$\frac{7}{4}$	1.75	175%
15:4	$\frac{15}{4}$	3.75	375%
17:20	$\frac{17}{20}$	0.85	85%
11:15	$\frac{11}{15}$	0.733	73.3%
1:3	$\frac{1}{3}$	0.3333...	33.3%
11:9	$\frac{11}{9}$	1.22...	122.2%

**Word Problem:** A classroom has 16 boys and 12 girls

- a) Write a ratio to compare the boys to girls

$$16:12$$

- b) Reduce the ratio to lowest terms

$$4:3$$

- c) Write this ratio in fraction form, decimal form, and percentage form

$$\frac{4}{3}, 1.33, 133.3\%$$

**NOTE:** What fraction of the classroom is boys? **DIFFERENT QUESTION!**

$$\frac{16}{28} \text{ OR } \frac{4}{7}$$

2) Reducing Ratios

To reduce a ratio to lowest terms, you can use the calculator...

Assignment:

- |                                  |                |                                  |         |
|----------------------------------|----------------|----------------------------------|---------|
| a) 2.4 to 10                     | $\frac{6}{25}$ | f) $\frac{3}{5} : \frac{2}{9}$   | $27:10$ |
| b) $\frac{1}{4}$ to 3            | $\frac{1}{12}$ | g) 5.3 to 3.975                  | $4:3$   |
| c) $3\frac{1}{2} : 8\frac{3}{4}$ | $\frac{2}{15}$ | h) 2.6 to 3.64                   | $5:7$   |
| d) $1\frac{3}{4} : 6\frac{2}{3}$ | $21:80$        | i) $\frac{4}{7} : \frac{2}{5}$   | $10:7$  |
| e) 0.04 : 0.0028                 | $100:7$        | j) $2\frac{1}{3} : 5\frac{1}{2}$ | $14:33$ |

3) Proportions

$$\frac{1}{2} \begin{matrix} \times 3 \\ \times 3 \end{matrix} = \frac{3}{6}$$

Are the ratios proportional? Yes or No

1. 14:14, 2:1 $\frac{14}{14} \neq \frac{2}{1}$ NO	2. 5 to 4, 28 to 35 $\frac{5}{4} \neq \frac{28}{35}$ NO	3. $\frac{45}{30} = \frac{61}{46}$ 1.5 1.3 NO
4. 3:7, 18:42 .42 .42 YES	5. $\frac{5}{24} = \frac{10}{12}$ .208, .833 NO	6. 20 to 23, 8 to 11 .87 .73 NO

Find the missing number

When x is on top:

$$\frac{2}{3} = \frac{x}{9}$$

$$9 \div 3 \times 2 = \textcircled{6}$$

When x is on the bottom:

$$\frac{4}{5} = \frac{20}{x}$$

$$20 \div 4 \times 5 = \textcircled{25}$$

**Assignment:** Find the missing number

1. $\frac{n}{7} = \frac{36}{28}$ $n=9$	2. $\frac{7}{4} = \frac{14}{n}$ $n=8$	3. $\frac{6}{1} = \frac{30}{n}$ $n=5$
5. $\frac{n}{6} = \frac{8}{3}$ $n=16$	6. $\frac{9}{6} = \frac{n}{2}$ $n=3$	7. $\frac{45}{5} = \frac{9}{n}$ $n=1$
9. $\frac{2}{5} = \frac{n}{15}$ $n=6$	10. $\frac{3}{1} = \frac{39}{n}$ $n=13$	11. $\frac{n}{24} = \frac{2}{3}$ $n=16$
13. $\frac{n}{36} = \frac{8}{9}$ $n=32$	14. $\frac{9}{11} = \frac{18}{n}$ $n=22$	15. $\frac{7}{12} = \frac{n}{48}$ $n=28$
17. $\frac{1}{2} = \frac{n}{44}$ $n=22$	18. $\frac{4}{n} = \frac{48}{36}$ $n=3$	19. $\frac{6}{18} = \frac{n}{3}$ $n=1$
21. $\frac{n}{33} = \frac{32}{24}$ $n=44$	22. $\frac{26}{13} = \frac{48}{n}$ $n=24$	23. $\frac{26}{13} = \frac{16}{n}$ $n=8$

**Assignment:** Find the missing number

1. $\frac{6}{16} = \frac{3}{n}$ $n=8$	2. $n$ to 40 = 9 to 10 $\frac{n}{40} = \frac{9}{10}$ $n=36$	3. 4:7 = $n$ :49 $\frac{4}{7} = \frac{n}{49}$ $n=28$
4. 4: $n$ = 48:36 $\frac{4}{n} = \frac{48}{36}$ $n=3$	5. 4 to 7 = $n$ to 21 $\frac{4}{7} = \frac{n}{21}$ $n=12$	6. 28 to $n$ = 7 to 11 $\frac{28}{n} = \frac{7}{11}$ $n=44$
7. $\frac{1}{n} = \frac{5}{50}$ $n=10$	8. 6:2 = 3: $n$ $\frac{6}{2} = \frac{3}{n}$ $n=1$	9. 44:8 = 33: $n$ $\frac{44}{8} = \frac{33}{n}$ $n=6$
10. 44 to $n$ = 11 to 6 $\frac{44}{n} = \frac{11}{6}$ $n=24$	11. $n$ :4 = 49:28 $\frac{n}{4} = \frac{49}{28}$ $n=7$	12. 6:7 = 18: $n$ $\frac{6}{7} = \frac{18}{n}$ $n=21$
13. 4 to 5 = $n$ to 10 $\frac{4}{5} = \frac{n}{10}$ $n=8$	14. 11: $n$ = 44:12 $\frac{11}{n} = \frac{44}{12}$ $n=3$	15. $n$ to 5 = 36 to 15 $\frac{n}{5} = \frac{36}{15}$ $n=12$

**Assignment:** Fill in the blank

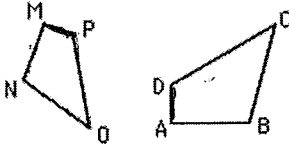
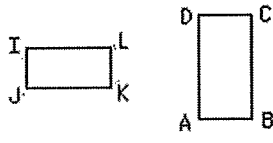
1. 417 pages in 3 days = <u>1251</u> pages in 9 days	2. 208 miles in 4 hours = <u>104</u> miles in 2 hours
3. 64 meters in 1 second = <u>128</u> meters in 2 seconds	4. 12 calls in 3 hours = <u>4</u> calls in 1 hour
5. 160 meters in 4 seconds = <u>800</u> meters in 20 seconds	6. 168 pages in 2 days = <u>504</u> pages in 6 days

7. 64 calls in 16 hours = <u>16</u> calls in 4 hours	8. 524 miles in 2 hours = <u>2620</u> miles in 10 hours
9. 14 seats in 1 row = <u>56</u> seats in 4 rows	10. 774 meters in 9 seconds = <u>258</u> meters in 3 seconds

Find the unit rate: Definition of unit rate is per one unit

1. 4 calls in 1 hour <u>4 calls per hour</u>	2. 759 miles in 3 hours <u>253 miles/hour</u>
3. 312 pages in 4 days <u>78 pages/day</u>	4. 54 seats in 6 rows <u>9 seats/row</u>
5. 219 meters in 3 seconds <u>73m/s</u>	6. 144 seats in 6 rows <u>24 seats/row</u>
7. 544 pages in 4 days <u>136 pages/day</u>	8. 106 meters in 2 seconds <u>53m/s</u>
9. 10 calls in 5 hours <u>2 calls/hour</u>	10. 7,472 miles in 16 hours <u>467 miles/hour</u>

Find the missing side length

1.  length of sides: PM = 112 yd OP = 80 yd NO = 96 yd MN = 72 yd BA = 90 yd DC = 100 yd AD = 120 yd CB = <del>90.52 yd</del> <u>102.9 yd</u>	2.  length of sides: IJ = 42 cm KL = 42 cm LI = <u>12 cm</u> JK = 12 cm DA = 26 cm CD = 91 cm AB = 91 cm BC = 26 cm
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$$\frac{120}{112} = \frac{CB}{96}$$

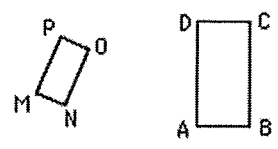
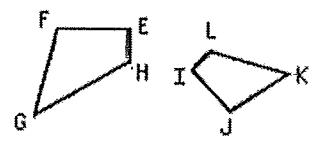
**Solve the proportions**

1. $\frac{w}{18} = \frac{2}{9}$ $w = 4$	2. $\frac{162}{61.2} = \frac{270}{s}$ $s = 102$
4. $\frac{30}{9} = \frac{10}{h}$ $h = 3$	5. $\frac{70.7}{140} = \frac{x}{260}$ $x = 131.3$
7. $\frac{28}{c} = \frac{44}{858}$ $c = 546$	8. $\frac{4}{8} = \frac{3}{v}$ $v = 6$
10. $\frac{23}{n} = \frac{92}{32}$ $n = 8$	11. $\frac{30}{69} = \frac{d}{207}$ $d = 90$

**Find the unit rate:**

1. a 2.6-kg bag of carrots for \$7.05 <u>\$2.71</u> per kg	2. 322.7 miles in 7 hours <u>46.1</u> miles per hour
3. 12 for \$38.88 <u>\$3.24</u> each	4. type 1103.6 words in 17 minutes and 31 seconds $1103.6 \div 17.5$ <u>63</u> words per minute
5. \$17.40 for 12 hours <u>\$1.45</u> per hour	6. 768 calories for 3 servings of pie <u>256</u> calories per serving
7. 70 chairs in 5 rows <u>14</u> in each row	8. 91 chairs in 7 rows <u>13</u> in each row
9. 140 students in 4 buses <u>28</u> in each bus	10. 13 for \$37.31 <u>\$2.87</u> each

**Find the missing side lengths:**

<p>5.</p>  <p>length of sides:</p> <p>MN = 24 yd      AB = 72 yd          PM = 9 yd      DA = 27 yd          NO = 9 yd      CD = 72 yd          OP = 24 yd      BC = <u>27 yd</u></p>	<p>6.</p>  <p>length of sides:</p> <p>FE = 63 ft      JI = 49 ft          EH = 54 ft      LK = <u>91 ft</u>          GF = 81 ft      KJ = 63 ft          HG = 117 ft      IL = 42 ft</p>
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$$\frac{42}{54} = \frac{LK}{117}$$

**Practice Quiz:**

1) Complete the chart

Ratio	Fraction	Decimal	Percentage
6:10	$\frac{6}{10} = \frac{3}{5}$	0.6	60%
5:4	$\frac{5}{4}$	1.25	125%

2) Reduce each of the following ratios to lowest terms:

a)  $12 : 36 = \underline{1 : 3}$

b)  $\frac{2}{3} : \frac{3}{4} = \underline{8 : 9}$

3) Solve the following ratios:

a)  $\frac{6}{16} = \frac{n}{64}$       $n = 24$   
 $64 \div 16 \times 6$

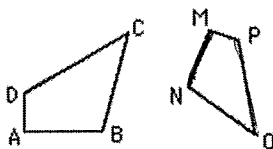
b)  $\frac{11}{23} = \frac{8}{n}$       $n = 16.7$   
 $23 \div 11 \times 8$

4) Solve the following ratios to find the unit rate:

a)  $\frac{300 \text{ km}}{2.0 \text{ h}} : \frac{x}{1.0 \text{ h}}$       $x = 150 \frac{\text{km}}{\text{h}}$      b)  $\frac{300 \text{ cal}}{500 \text{ mL}} : \frac{x}{1.0 \text{ L}}$       $600 \text{ cal/L}$

5) Find the missing side lengths

500mL is half of 1.0L



length of sides:

- |             |                        |
|-------------|------------------------|
| CB = 132 cm | OP = <u>56 cm</u>      |
| DC = 168 cm | MN = 32 cm             |
| BA = 96 cm  | PM = <u>40 cm.</u>     |
| AD = 120 cm | NO = <del>40 cm.</del> |

$$\frac{32}{96} = \frac{OP}{168} = \frac{PM}{120}$$

