Unit 9 Notes: Proportions

A proportion is an equation stating that two ratios (fractions) are equal.

- If the cross products are equivalent, the two ratios form a proportion.
- If the cross products are not equal, the ratios do not form a proportion.

Examples:

Determine whether each pair of ratios forms a proportion.

A) \( \frac{1}{3}, \frac{3}{9} \)
B) \( \frac{1.2}{4}, \frac{2}{5} \)

Independent Practice: Determine if each pair of ratios are equivalent.

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<tbody>
<tr>
<td>1) ( \frac{2}{3}, \frac{8}{12} )</td>
<td>2) ( \frac{4}{2}, \frac{18}{7} )</td>
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<td>3) ( \frac{15}{5}, \frac{3}{9} )</td>
<td>4) ( \frac{2.1}{3.5}, \frac{3}{7} )</td>
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<td>5) ( \frac{5.3}{15.9}, \frac{2.7}{8.1} )</td>
<td>6) ( \frac{18}{2.4}, \frac{15}{2} )</td>
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If a proportion contains a *variable*, use cross multiplication and single-step algebra to find the missing value.

**Examples:** Solve the proportion.

A) \( \frac{a}{25} = \frac{52}{100} \)

B) \( \frac{12.5}{m} = \frac{15}{7.5} \)

**Independent Practice:** Solve each proportion.

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<tbody>
<tr>
<td>1)</td>
<td>( \frac{k}{35} = \frac{3}{7} )</td>
</tr>
<tr>
<td>2)</td>
<td>( \frac{3}{t} = \frac{18}{24} )</td>
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<tr>
<td>3)</td>
<td>( \frac{10}{8.4} = \frac{5}{m} )</td>
</tr>
<tr>
<td>4)</td>
<td>( \frac{p}{6} = \frac{24}{36} )</td>
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<tr>
<td>5)</td>
<td>( \frac{2}{15} = \frac{c}{72} )</td>
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<tr>
<td>6)</td>
<td>( \frac{2}{9.4} = \frac{0.2}{v} )</td>
</tr>
<tr>
<td>7)</td>
<td>( \frac{a}{0.28} = \frac{4}{1.4} )</td>
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<tr>
<td>8)</td>
<td>( \frac{16}{x+5} = \frac{4}{5} ) (distributive property)</td>
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**Solving Proportions**

1) Write a proportion
2) Cross Multiply
3) Simplify
4) Divide to isolate the variable

✓ The cross products of two ratios must be equal if the two ratios form a proportion
Proportions can be used to solve real-world problems.

<table>
<thead>
<tr>
<th>Solving Practical Problems Using Proportions</th>
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<tbody>
<tr>
<td>1) Set-up the proportion using WORDS</td>
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<td>2) Set-up the proportion with known values</td>
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<td>3) Cross multiply</td>
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<td>4) Solve</td>
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You must **compare similar units of measure** in order to solve properly!

**Examples:**

1) Sam ran 4 miles on Saturday with his running club. How far did he run in kilometers if there are approximately 1.61 kilometers in each mile?

2) A recipe calls for 12 ounces of fruit juice for every 40 ounces of soda. How much soda should you use if you use 16 ounces of fruit juice?

**Independent Practice:**

**Directions:** Write a proportion that could be used to solve for each variable, then solve. Round to the nearest hundredth.

1) If there are 8 pencils in 2 boxes, how many pencils will fit into 5 boxes?

2) If 5 quarts of juice costs $6.25, how many quarts of juice can you buy with $8.75?
3) If there are 3.28 feet in a meter, how many feet are in the 110 meter dash?

4) A photograph is 3 inches wide by 5 inches long. If the photograph is enlarged so that the length is 7 inches, how wide is the enlarged photo?

5) If 1 pint of paint is need to paint a square that is 5 feet on each side, how many pints are needed to paint a square that is 9 feet on each side?

6) The world’s largest baseball bat is 120 feet long. If there are 30.28 centimeters in a foot, find the length of the bat in centimeters.

### Currency Exchange Rates

1) Ming is planning a trip to Western Samoa. The exchange rate is 6 Tala for $2. How many Tala will she get if she exchanged $6?

2) The money used in Jordan is called Dinar. The exchange rate is $3 to 2 Dinars. Find how many dollars you would receive if you exchanged 22 Dinars?

3) Jenny is planning a trip to the United Arab Emirates. She learned that the exchange rate is 4 Dirhams for every dollar. How many Dirhams would she get if she exchanged $7?

4) Asanji took a trip to Mexico. Upon returning to the US he converted his Pesos back to dollars. How much did he receive in dollars if he exchanged 42.7 Pesos at a rate of $5.30 = 11.1 Pesos? Round your answer to the nearest cent.
5) The currency in Argentina is the Peso. The exchange rate is approximately $3 = 1 Peso. At this rate, how many Pesos would you get if you exchanged $121.10? Round your answer to the nearest tenth.

6) The money in Peru is called the Nuevo Sole. The exchange rate is $8.80 for one Nuevo Sole. How many dollars would you receive if you exchanged 32.4 Nuevos Soles?

7) The currency in Tajikistan is Somoni. The exchange rate is approximately 1 Somoni for every $9.70. At this rate, how many Somoni would you get if you exchanged $436.60? Round your answer to the nearest tenth.

8) The money used in the Eastern Caribbean Islands is called the Eastern Caribbean Dollar. The exchange rate is $4 to one Eastern Caribbean Dollar. How many Eastern Caribbean Dollars would you receive if you exchanged $162.60?

Shapes

9) Shawna reduced the size of a rectangle to a height of 2 inches. What is the new width if the original rectangle had a width of 24 inches and a height of 12 inches?

10) Nicole reduced the size of a photo to a width of 4.6 inches. What is the new height if it was originally 9.4 inches tall and 9.2 inches wide?

11) A triangle is 20 inches in height and has a base of 5 inches wide. If the base is reduced to a width of one inch, how tall will it be?

12) A frame is 9 inches wide by 6 inches tall. If the width is reduced to 3 inches, what is the new length of the frame?
13) A painting is 2 feet wide by 3 feet long. If it is enlarged to a width of 15 feet, what is the new length?

14) A MacBook Air is 13 inches wide by 9 inches long. If the width were increased to 18 inches, how long would it be? Round your answer to the nearest tenth.

15) A rectangle has a length of 4.6 cm, and a width of 3.2 cm. If the width is enlarged to 12.8 cm, what is the new length?

16) A photograph is 3 inches in length by 5 inches in width. If the photo is enlarged to 15 inches in length, how wide is the new photo?

### Measurement

17) Preston drove to his new college and home again. The round trip was 212 miles. If there are approximately 8.05 km in 5 miles, what distance did Preston drive in km?

18) The average weight of a 12 year old boy in the US is 45 kg. If there are 2.2046 pounds in a kg, what is the average weight in pounds? Round your answer to the nearest pound.

19) A rectangle measures 9 cm by 5 cm. If there are approximately .79 inches in 2 cm, what are the dimensions of the rectangle in inches? Round your answers to the nearest tenth.

20) A classroom measures 28 feet wide. If there are 16.404 feet in 5 meters, how long is the classroom in meters? Round your answer to the nearest tenth.

21) The distance from the playground to the school building is 13 yards. What is the distance in inches?

22) An iPhone 4S measures 4.5 inches in length and 2.25 inches in width. If there are about 1.18 inches in 3 centimeters, what are the dimensions of the iPhone 4S in centimeters? Round your answers to the nearest tenth.