Lesson 5.2 **PROPORTIONS**

EQ: How can we use what we know about ratios and equivalent fractions to determine whether ratios are proportional?

**Proportional:** equivalent

**Proportion:** an equation stating that two ratios are equivalent.

**Determine whether RATIOS are PROPORTIONAL by reducing/simplifying them:**

 **STEP 1:** Reduce/Simplify both ratios individually.

 **STEP 2:** COMPARE the simplified ratios.

 **STEP 3:** If they are the same: **PROPORTIONAL**

If they are NOT the same: **NOT PROPORTIONAL**

EX: $\frac{4}{10}$ , $\frac{16}{40}$ 🡪 $\frac{4}{10}$ ÷ $\frac{2}{2}$ = $\frac{2}{5}$

$\frac{2}{5}$ = $\frac{2}{5}$ They ARE the same, so they ARE proportional!

 $\frac{16}{40}$ ÷ $\frac{8}{8}$ = $\frac{2}{5}$

$\frac{5}{7}$ ≠ $\frac{2}{3}$ They are NOT the same, so they are NOT proportional!

$\frac{15}{21}$ , $\frac{20}{30}$ 🡪 $\frac{15}{21}$ ÷ $\frac{3}{3}$ = $\frac{5}{7}$

 $\frac{20}{30}$ ÷ $\frac{10}{10}$ = $\frac{2}{3}$

 EX:

|  |  |
| --- | --- |
| x | y |
| 1 | 12 |
|  2 | 24 |
| 3 | 36 |
| 4 | 48 |

$\frac{1}{12}$ ÷ $\frac{1}{1}$ = $\frac{1}{12}$

$\frac{2}{24}$ ÷ $\frac{2}{2}$ = $\frac{1}{12}$They ARE the same, so

$\frac{3}{36}$ ÷ $\frac{3}{3}$ = $\frac{1}{12}$they ARE proportional!

$\frac{4}{48}$ ÷ $\frac{4}{4}$ = $\frac{1}{12}$

**Cross Products**- in the proportion $\frac{a}{b}$ = $\frac{c}{d}$ 🡪 a ∙ d and b ∙ c are called CROSS PRODUCTS!

**USING CROSS PRODUCTS TO DETERMINE IF RATIOS / QUANTITIES ARE PROPORTIONAL :**

**STEP 1:** Find the CROSS PRODUCTS of two ratios.

**STEP 2:** COMPARE the CROSS PRODUCTS.

**STEP 3:** If they are the same: **PROPORTIONAL**

If they are NOT the same: **NOT PROPORTIONAL**

EX: Are the following ratios proportional?

 $\frac{2}{3}$ = $\frac{4}{6}$ 🡪 🡪 **2 ∙ 6** = 12 and **4 ∙ 3** = 12

 **12 = 12**, so YES they ARE

 PROPORTIONAL!

$\frac{1}{12}$ = $\frac{5}{65}$ 🡪 **1 ∙ 65** = 65 and **12 ∙ 5** = 60

**65 ≠ 60**, so NO they ARE **NOT** PROPORTIONAL!

On Your Own: Tell whether the ratios form a proportion.

**1.** $\frac{1}{2}$ , $\frac{5}{10}$ **2.** $\frac{4}{6}$ , $\frac{18}{24}$ **3.** $\frac{10}{3}$ , $\frac{5}{6}$ 4. $\frac{25}{20}$ , $\frac{15}{12}$

5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Birdhouses Built, x | 1 | 2 | 4 | 6 |
| Nails Used, y | 12 | 24 | 48 | 72 |

**Lesson 5.2 PROPORTIONS**

EQ: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Proportional:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Proportion:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Determine whether RATIOS are PROPORTIONAL by REDUCING/SIMPLIFYING them:**

 **STEP 1:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STEP 2:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STEP 3:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **PROPORTIONAL**

\_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_NOT PROPORTIONAL**

EX:1 $\frac{4}{10}$ , $\frac{16}{40}$ 🡪 $\frac{4}{10}$

 $\frac{16}{40}$

 $\frac{15}{21}$ , $\frac{20}{30}$ 🡪 $\frac{15}{21}$

 $\frac{20}{30}$

 EX2:

|  |  |
| --- | --- |
| x | y |
| 1 | 12 |
| 2 | 24 |
| 3 | 36 |
| 4 | 48 |

$\frac{1}{12}$

$\frac{2}{24}$

$\frac{3}{36}$

$\frac{4}{48}$

**Cross Products**- in the proportion $\frac{a}{b}$ = $\frac{c}{d}$ 🡪 \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Determine whether RATIOS are PROPORTIONAL using CROSS PRODUCTS:**

**STEP 1:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**STEP 2:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**STEP 3:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: **PROPORTIONAL**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: **NOT PROPORTIONAL**

EX: Are the following ratios proportional?

 $\frac{2}{3}$ = $\frac{4}{6}$ 🡪 🡪

$\frac{1}{12}$ = $\frac{5}{65}$ 🡪

Do these ratios form a proportion?

1. $\frac{1}{2}$ , $\frac{5}{10}$ **2.** $\frac{4}{6}$ , $\frac{18}{24}$ **3.** $\frac{10}{3}$ , $\frac{5}{6}$ **4**. $\frac{25}{20}$ , $\frac{15}{12}$

5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Birdhouses Built, x | 1 | 2 | 4 | 6 |
| Nails Used, y | 12 | 24 | 48 | 72 |