Communication Media Technology (10.9999) T-Chart

Determine video lighting intensity	=	Write functions or sequences that model relationships between two quantities

Program Task: Determine video lighting intensity.

Program Associated Vocabulary:
LUX, FOOTCANDLE(fc), INTENSITY, KEY LIGHT, FILL LIGHT, BACKLIGHT

Program Formulas and Procedures:
A ratio in lighting indicates the relationship between the intensity of the key light to the intensity of the fill light. This is important in contrast lighting in photography. This is an example of a 2:1 ratio.

$$\frac{2}{1} = \frac{\text{Key light}}{\text{Fill light}}$$

Example:
Given a ratio of 3:1, with a key light of 300 fc, what would your fill light be?

Steps:

1. Identify the proportional relationship and label the units:
   Key Light = 300 fc
   Fill Light = x fc
   Ratio is 3:1

2. Set up the proportional relationship, using a variable for the missing value.

$$\frac{3 \text{ fc key light}}{1 \text{ fc fill light}} = \frac{300 \text{ fc key light}}{x \text{ fc fill light}}$$

3. Cross multiply.
   (3)(x) = (300)(1)

4. Divide by the coefficient.

$$\frac{300}{3} = 100$$

The fill light should be 100 foot-candles.

PA Core Standard: CC.2.2.HS.C.3

Description: Write functions or sequences that model relationships between two quantities**.**

Math Associated Vocabulary:
RATIO, PROPORTION, CROSS MULTIPLY, SCALE, COEFFICIENT

Formulas and Procedures:
A proportion states that two ratios are equal.

$$\frac{a}{b} = \frac{c}{d}$$

Steps:

1. Identify the proportional relationship and label the units:

   5 girls to 3 boys: $\frac{5 \text{ girls}}{3 \text{ boys}}$

2. Set up the proportional relationship, using a variable for the missing value.

$$\frac{5 \text{ girls}}{3 \text{ boys}} = \frac{x \text{ girls}}{21 \text{ boys}}$$

3. Cross multiply.

   (5)(21) = 3x → 105 = 3x

4. Divide by the coefficient.

$$\frac{105}{3} = x \qquad x = 35$$

   One would expect to find 35 girls.

Instructor's Script - Comparing and Contrasting
This is a great example of where the ratio changes as the situation changes. In Communication Media, the ratio is not always the same.

Common Mistakes Made By Students
Students do not write each ratio consistently: For example, students may write hours/minutes = minutes/hours.

Conversions of units: In many cases, the student must convert between units before setting up the proportion. For example, if one ratio is dollars per hour and the student must use that ratio to set up a proportion to solve for dollars in a given number of days, the student must convert the number of days to hours before proceeding.

CTE Instructor's Extended Discussion
The ratio changes based on the desired mood, which is created by the lighting. A higher the ratio, for example 4:1 or 8:1, will create more of a modeled/dramatic look of the lighting. A 1:1 or 2:1 ratio is considered flat lighting and generally used for video and TV production.

The **key light** is the **main light source** in a lighting design. The key light, as the name suggests, shines directly upon the subject and serves as its principal illuminator; more than anything else, the strength, color and angle of the key determines the shot's overall lighting design.

The **fill light** is placed opposite the key and **fills in shadows**. The fill light also shines on the subject, but it comes from a side angle. It balances the main (key) light by illuminating shaded surfaces.

The **backlight illuminates the back** of the subject and separates it from the background. The back light shines on the subject from behind. It separates the subject from the background and highlighting contours.

In order to achieve the results the artist wants, it's important to understand the way these lights interact with each other. Using ratios, we can let the photographer know what proportion of light comes from each source. This is important to know in different situations so a photo shoot does not have to be re-done because the lighting did not work. Many photographers have set ratios that they use based on the different locations and lighting requirements necessary to gain a desired effect.

Communication Media Technology (10.9999) T-Chart

Problems	Occupational (Contextual) Math Concepts	Solutions
1. Using the ratio of 2:1, what would the fill light be if the key light was 200 fc?		
2. Given a ratio of 4:1, and a fill light of 50fc, what would your key light be?		
3. If a backlight is two-thirds of the intensity of the key light and the key light is 200fc, what is the backlight intensity?		
Problems	**Related, Generic Math Concepts**	**Solutions**
4. One oil change takes ¼ hr. How many changes can be done in an hour?		
5. Luke can print 5 posters in 15 minutes. How many can he print in one hour?		
6. Mark works 35 hours and makes $420.00. How much does he make if he works 25 hours at the same rate?		
Problems	**PA Core Math Look**	**Solutions**
7. Vincent buys 4 burgers for $ 20.00. What is the cost of 10 burgers?		
8. There are 27 pairs of shoes in a case. How many pairs are there in 12 cases?		
9. Margie can make buy 7 shirts for $ 94.50. What would it cost if she only bought 4?		

Problems	Occupational (Contextual) Math Concepts	Solutions
1. Using the ratio of 2:1, what would the fill light be if the key light was 200 fc?	$\frac{2 \text{ fc key light}}{1 \text{ fc fill light}} = \frac{200 \text{ fc key light}}{x \text{ fc fill light}}$ Cross multiply: $2x=200(1)$ Divide: $200/2x$ Solution: x = 100 foot-candles	
2. Given a ratio of 4:1, and a fill light of 50fc, what would your key light be?	$\frac{4 \text{ fc key light}}{1 \text{ fc fill light}} = \frac{x \text{ fc key light}}{50 \text{ fc fill light}}$ Cross Multiply: $1x = 200$ Solution x = 2000 foot-candles	
3. If a backlight is two-thirds of the intensity of the key light and the key light is 200fc, what is the backlight intensity?	To solve, note: $\frac{2}{3}$(of) key light = backlight $\frac{2}{3} x\ 200 \text{ fc} = \frac{2 \times 200}{3} = 400/3 \approx 133.33 \text{ foot-candles backlight}$	
Problems	**Related, Generic Math Concepts**	**Solutions**
4. One oil change takes ¼ hr. How many changes can be done in an hour?	$\frac{\frac{1}{4} \text{hr.}}{1 \text{ oil change}} = \frac{1 \text{ hr.}}{x \text{ oil changes}}$	$\frac{1}{4}x = 1 \quad (4)\frac{1}{4}x = 1(4) \quad x = 4$
5. Luke can print 5 posters in 15 minutes. How many can print in one hour?	$\frac{5 \text{ posters}}{15 \text{ min.}} = \frac{x \text{ posters}}{60 \text{ min.}}$	$15x = 5(60) \quad 15x = 300 \quad x = 20$ posters
6. Mark works 35 hours and makes $420.00. How much does he make if he works 25 hours at the same rate?	$\frac{35 \text{ hrs.}}{\$420} = \frac{25 \text{ hrs.}}{\$ x}$	$35x = 425(25) \quad 35x = 10{,}500 \quad x = \$300.00$
Problems	**PA Core Math Look**	**Solutions**
7. Vincent buys 4 burgers for $ 20.00. What is the cost of 10 burgers?	$\frac{4}{\$20} = \frac{10}{\$x}$	$20(10) = 4x \quad 200 = 4x \quad x = \$50$
8. There are 27 pairs of shoes in a case. How many pairs are there in 12 cases?	$\frac{27 \text{ pairs}}{1 \text{case}} = \frac{x \text{ pairs}}{12 \text{ cases}}$	$1x = 27(12) \quad x = 324 \text{ pairs}$
9. Margie can make buy 7 shirts for $ 94.50. What would it cost if she only bought 4?	$\frac{7 \text{ shirts}}{\$94.50} = \frac{4 \text{ shirts}}{\$ x}$	$7x = 94.50(4) \quad 7x = 378.00 \quad x = \$54$