Dental Technology (51.0601) T-Chart

Schedule patients	=	Write functions or sequences that model relationships between two quantities

Program Task: Schedule patients to optimize dentist's time.

Program Associated Vocabulary:
TIME UNIT, NO-SHOW, CALL LIST, RECALL, BLOCK SCHEDULING, PRODUCTION SCHEDULING, DOUBLE-BOOK, TREATMENT CODES, PALLIATIVE, SEQUENTIAL, CONFIRMATION

Program Formulas and Procedures:
It is important to understand how to solve math problems related to proportional relationships when scheduling patients. This will help you manage your schedule more efficiently.

Example:
You work as a scheduling coordinator for Dr. Thompson. Once a year, Dr. Thompson volunteers his office and time for a clinic to clean, seal and restore teeth for children. Dr. Thompson has ten available operatories and several dental professionals help him. Dr. Thompson has asked you coordinate the scheduling of the patients and the volunteers.

Two hygienists can seal the teeth of 12 children in one hour. How long will it take to seal the teeth of 34 children?

$$\frac{12 \text{ children}}{1 \text{ hour}} = \frac{34 \text{ children}}{X \text{ hours}}$$

$$12x = 34(1)$$

$$12x = 34$$

$$\frac{12x}{12} = \frac{34}{12}$$

x = 2.83 hours

0.83 hours x (60 min./hr.) = 50 minutes

It will take 2 hygienists 2 hours and 50 minutes to seal the teeth of 34 children.

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.

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

Example:

Girls outnumber boys 5 to 3. If there were 21 boys in the class, how many girls would one expect to find?

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.

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

One would expect to find 35 girls.

Instructor's Script - Comparing and Contrasting
Proportional relationships can be either direct or inverse in nature. Direct proportions are the most common. As one value increases, so does the other. For example, if two hygienists can seal 12 teeth in one hour, then 4 hygienists can seal 24 teeth in one hour. As the number of workers doubles, the amount of work performed doubles. Inverse proportions have the opposite relationship. As one value increases, the other decreases. For instance, if 2 hygienists can seal 24 teeth in one hour, then 4 hygienists can seal the same number of teeth (24) in ½ hour. As the number of workers doubles, the time it takes halves. To effectively teach proportional relationships, the instructor must teach students to examine the problem carefully to determine if a direct or inverse relationship exists.

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 money per hour and the student must use that ratio to set up a proportion to solve for money in a given number of days, the student must convert the number of days to hours before proceeding.

Students assume that all proportional relationships are direct and therefore incorrectly solve inverse variations.

CTE Instructor's Extended Discussion
It is helpful to read some of the word problems with the students. They can work as a group to find the common denominator and this will help with setting up the problem. Once understanding is gained as a group, give a scheduling scenario, and ask the students to create a related problem. How many students were able to create a problem using proportion? Can the other students effectively organize the problems using proportions and solve them?

Problems	Career and Technical Math Concepts	Solutions
1. Two hygienists can seal 12 children's teeth in one hour, how long will it take to seal 75 children's teeth?		
2. If it takes three minutes to deliver a fluoride treatment to one child, how long will it take to deliver fluoride treatments to 50 children?		
3. A stainless steel crown takes 50 minutes per child, how many crowns can the doctor place in seven hours?		
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 five posters in 15 minutes. How many can he print in one hour?		
6. Mark works 35 hours and makes $420. How much does he make if he works 25 hours at the same rate?		
Problems	**PA Core Math Look**	**Solutions**
7. Vincent buys four burgers for $ 20. 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 buy seven shirts for $94.50. What would it cost if she only bought four?		

Problems	Career and Technical Math Concepts	Solutions
1. Two hygienists can seal 12 children's teeth in one hour, how long will it take to seal 75 children's teeth?	$\frac{1 \text{ hour}}{12 \text{ children's teeth}} = \frac{x \text{ hours}}{75 \text{ children's teeth}}$	$12x = 1 \times 75 \rightarrow 12x = 75$ x = 6.25 hours .25 hours = .25 x 60 = 15 minutes x = 6 hours and 15 minutes
2. If it takes three minutes to deliver a fluoride treatment to one child, how long will it take to deliver fluoride treatments to 50 children?	$\frac{3 \text{ minutes}}{1 \text{ child}} = \frac{x \text{ minutes}}{50 \text{ children}} \rightarrow 3(50) = 1x \rightarrow 150 = 1x$	60 minutes in an hour, $150 \div 60 = 2.5$ hours
3. A stainless steel crown takes 50 minutes per child, how many crowns can the doctor place in seven hours?	Convert hours to minutes 7 x 60 = 420 minutes Set up equation: $\frac{1 \text{ SS crown}}{50 \text{ Minutes}} = \frac{x}{420 \text{ minutes}} \rightarrow$ 50x = 420 x = 8.4	Rounding, the doctor can place 8 SS Crowns in 7 hours.
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 five posters in 15 minutes. How many can he print in one hour?	$\frac{5 \text{ posters}}{15 \text{ min.}} = \frac{x \text{ posters}}{60 \text{ min.}}$	$15x = 5(60) \quad 15x = 300 \quad x = 20$
6. Mark works 35 hours and makes $420. 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 four burgers for $ 20. 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?	$\frac{27 \text{ pairs}}{1 \text{case}} = \frac{x \text{ pairs}}{12 \text{ cases}}$ pairs	$1x = 27(12) \quad x = 324$
9. Margie can buy seven shirts for $94.50. What would it cost if she only bought four?	$\frac{7 \text{ shirts}}{\$94.50} = \frac{4 \text{ shirts}}{\$ x}$	$7x = 94.50(4) \quad 7x = 378.00 \quad x = \$54$