Graphic Communication (10.0399) T-Chart

Convert CWT to price per M	=	Write functions or sequences that model relationships between two quantities

Program Task: Convert CWT to price per M.

Program Associated Vocabulary:
CWT, M

Program Formulas and Procedures:
When working in the printing industry it is often necessary to estimating a printing job. Paper companies provide paper pricing either by M sheets or by CWT. Students should be comfortable determining the cost of the paper by either method.

CWT = cost of 100 lbs. of paper
M = Weight of 1000 sheets of paper of a specific size
CPM = cost of 1000 sheets of paper

$$\frac{\text{CPM x 100}}{\text{M}} = \text{CWT}$$

Example:
Two types of paper have the same CWT, but Type A paper has a CPM of $51.00 and an M of 102 lbs. and Type B has a M of 98 lbs. What is the CPM for Type B?

$$\frac{\text{CPM x 100}}{\text{M}} = \text{CWT}$$

TYPE A

$$\frac{51\times100}{102} = \text{CWT}$$

TYPE B

$$\frac{\text{CPM}\times100}{98} = \text{CWT}$$

$$\frac{51\times100}{102} = \frac{\text{CPM}\times100}{98}$$

$$\frac{5100}{102} = \frac{\text{CPM}\times100}{98} \text{ cross multiply}$$

$$10200\text{CPM} = 499800$$

$$\frac{10200\text{CPM}}{10200} = \frac{499800}{10200}$$

$$\text{CPM} = \$49$$

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:

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

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.

$$(5)(21) = 3x \rightarrow 105 = 3x$$

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
The acronym CWT is derived from two words, centum and weight. The C, centum, is the roman numeral for 100. The WT is an abbreviation for weight. Therefore the cost per CWT refers to the cost per 100 pounds of paper.

The M wt comes from the roman numeral, M, which means 1,000. The M weight refers to the weight of 1,000 sheets of paper. This example requires students to recognize the proportional relationship between Cost per M and M weight when the cost per CWT is constant. As the M weight increases, so does the cost. This is a direct proportion.

Common Mistakes Made By Students
Students get confused between CWT and the use of M.

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.

CTE Instructor's Extended Discussion
When working in the printing industry it is often necessary when estimating a printing job. Paper companies provide paper pricing either by M sheets or by CWT. Students should be comfortable determining the cost of the paper by either method.

Problems	Career and Technical Math Concepts	Solutions
1. The 144M paper has a CPM of $85.00; the 220M has the same CWT. What is the CPM for the 220M weight paper?		
2. The 119M paper has a CPM of 67.00; the other one has an M of 140. What is the CPM for the 140 M weight paper?		
3. The 85M paper has a CPM of $73.00; the other one has an M of 100. What is the CPM for the 220M weight paper?		
Problems	**Related, Generic Math Concepts**	**Solutions**
4. One oil change takes ¼ hr. How many changes can be done in one 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. The 144M paper has a CPM of \$85.00; the 220M has the same CWT. What is the CPM for the 220M weight paper?	$\frac{85\times100}{144}=\frac{CPM\times100}{220}$ $\frac{8500}{144}=\frac{CPM\times100}{220}$ $\frac{14400CPM}{14400}=\frac{1870000}{14400}$	Cross multiply $14400CPM=1870000$ Divide both sides CPM= \$129.86
2. The 119M paper has a CPM of 67.00; the other one has an M of 140. What is the CPM for the 140 M weight paper?	$\frac{67\times100}{119}=\frac{CPM\times100}{140}$ $\frac{6700}{119}=\frac{CPM\times100}{140}$ $\frac{11900CPM}{11900}=\frac{938000}{11900}$	Cross multiply $11900CPM=938000$ Divide both sides CPM= \$78.82
3. The 85M paper has a CPM of \$73.00; the other one has an M of 100. What is the CPM for the 220M weight paper?	$\frac{73\times100}{85}=\frac{CPM\times100}{220}$ $\frac{7300}{85}=\frac{CPM\times100}{220}$ $\frac{8500CPM}{8500}=\frac{1606000}{8500}$	Cross multiply $8500CPM=1606000$ Divide both sides CPM= \$188.94
Problems	**Related, Generic Math Concepts**	**Solutions**
4. One oil change takes ¼ hr. How many changes can be done in one hour?	$\frac{\frac{1}{4}\text{ hr.}}{1\text{ oil change}}=\frac{1\text{ hr.}}{x\text{ oil changes}}$	$\frac{1}{4}x=1$ $(4)\frac{1}{4}x=1(4)$ $x=4$
5. Luke can print five posters in 15 minutes. How many can he print in one hour?	$\frac{5\text{ posters}}{15\text{ min.}}=\frac{x\text{ posters}}{60\text{ min.}}$	$15x=5(60)$ $15x=300$ $x=20$ posters
6. Mark works 35 hours and makes \$420. How much does he make if he works 25 hours at the same rate?	$\frac{35\text{ hrs.}}{\$420}=\frac{25\text{ hrs.}}{\$\,x}$	$35x=425(25)$ $35x=10{,}500$ $x=\$300.00$
Problems	**PA Core Math Look**	**Solutions**
7. Vincent buys four burgers for \$20. What is the cost of 10 burgers?	$\frac{4}{\$20}=\frac{10}{\$x}$	$20(10)=4x$ $200=4x$ $x=\$50$
8. There are 27 pairs of shoes in a case. How many pairs are there in 12 cases?	$\frac{27\text{ pairs}}{1\text{case}}=\frac{x\text{ pairs}}{12\text{ cases}}$	$1x=27(12)$ $x=324$ pairs
9. Margie can buy seven shirts for \$94.50. What would it cost if she only bought four?	$\frac{7\text{ shirts}}{\$94.50}=\frac{4\text{ shirts}}{\$\,x}$	$7x=94.50(4)$ $7x=378.00$ $x=\$54$