Sales, Distribution, and Marketing Operations (52.1801) T-Chart

 pennsylvania DEPARTMENT OF EDUCATION

Identify and discuss the supply and demand factors in pricing	=	Graph and analyze functions, and use their properties to make connections between the different representations

Program Task: Identify and discuss the supply and demand factors in pricing.

PA Core Standard: CC.2.2.HS.C.2

Description: Graph and analyze functions, and use their properties to make connections between the different representations.

Program Associated Vocabulary:
SUPPLY, DEMAND, PRICE, EQUILIBRIUM, SURPLUSES, SHORTAGES

Math Associated Vocabulary:
FUNCTION, TABLE, COORDINATE, SLOPE, X-AXIS, Y-AXIS, X-INTERCEPT, Y-INTERCEPT, CARTESIAN COORDINATE SYSTEM, QUADRANT, ORIGIN
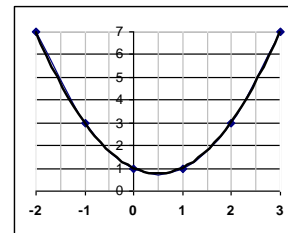
Program Formulas and Procedures:
Supply and Demand Theory is a driving force in the free enterprise system. Businesses use this theory to determine if buyers and suppliers are satisfied with the price of the product being offered.

Formulas and Procedures:
Matching the graph of a given function to its table or equation assesses a student's ability to recognize that a graph is created from coordinates that can be written in a table or used to make an equation true.

Example:
The graph below shows the supply and demand for a new MP3 player.

1. Identify the point on the graph where supply and demand meet; what is the number of MP3 players that will be supplied and what is the price that consumers will pay for the MP3 players at this point?

   Approximately 156 MP3 players at $58/each

2. Which of the following equations represents the relationship between price (p) and supply (s)?

   $p = -4s – 40$ $p = 4s$ $p = 0.4s – 4$ $p = -0.4s$

   As the supply increases, so does the price, so the 2nd and 3rd choices are the only possibilities. When the price is $60, the supply equals 160. The second equation does not work because $60 \neq (4)160$, therefore the third equation is the correct answer. Check: $60 = 0.4(160) – 4$

3. Which of the following tables represents the relationship between price and demand?

   A.
Price	# demanded
40	200
60	150
80	100

   B.
Price	# demanded
40	110
60	160
80	210

   Table A represents demand: as price increases, demand decreases.

Identify the table that corresponds with the graph above:

Step 1: Identify coordinates through which the graph passes. If you look at the graph, you can see that the graph passes through the following coordinates: (-2,7), (-1,3), (0,1), (1,1), (2,3), (3,7).

Step 2: Identify the table containing the points from step 1. In many cases, some tables contain one of the values, but then include values that are not part of the graph.

A.
x	y
-2	7
1	0
2	3

B.
x	y
0	1
1	1
-2	7

Look at options A and B above. The only correct answer can be option B, since the graph passes through all of these points or coordinates. Option A is incorrect because the graph does <u>NOT</u> pass through x = 1 and y = 0 which can be represented as (1,0).

Identify the equation that represents the graph above:
The equation that matches the graph above is one in which all data points on the graph work to make the equation true. Substitute values from the graph into the equation choices to see which ones work.

Example: One of the following equations represents the given graph: Let's check (0, 1) and (1, 1) to see which one works!

A. $y = x^2 – 2x + 1$ B. $y = x^2 – x + 1$
   $1 = (0)^2 – 2(0) + 1$ $1 = (0)^2 – (0) + 1$
   $1 = 1$ $1 = 1$

So (0,1) works for both equations. Let's try (1,1).
A. $y = x^2 – 2x + 1$ B. $y = x^2 – x + 1$
   $1 = (1)^2 – 2(1) + 1$ $1 = (1)^2 – (1) + 1$
   $1 \neq 0$ $1 = 1$

Therefore (1, 1) only works for B. B is the correct answer.

Instructor's Script – Comparing and Contrasting
The problems on this T-chart assess a student's ability to recognize the relationships between tables, graphs, and equations (or functions). Many students do not realize that there is an algebraic model that describes a relationship visually shown in a graph. Many students also fail to see the relationship between table values and coordinates (or points) on a graph. Any assistance that CTE teachers can lend in supporting this knowledge will be very beneficial for students. The example displayed on the Marketing side of the T-chart on page one can also serve as an application for systems of linear equations.
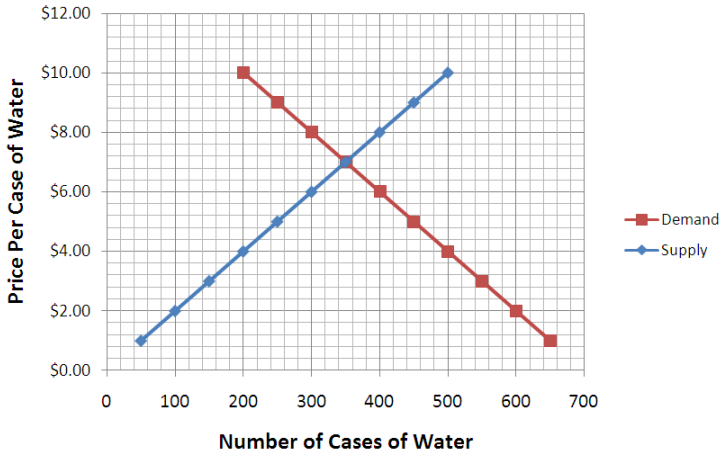
Common Mistakes Made By Students
Matching coordinates to table values: Some students have difficulty reading the scale on a graph. Some axes increase by increments of 10, 5, 2, 1, or less than one. Students should check the scale before identifying the coordinates.
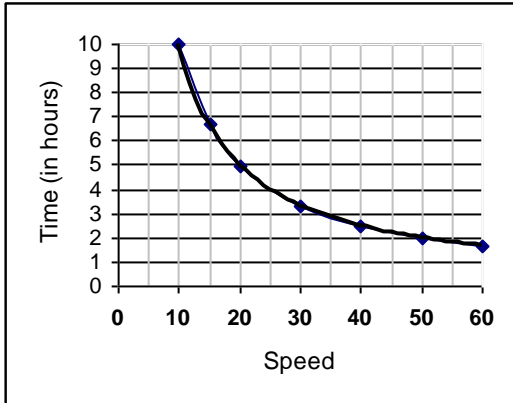
Substituting values from the graph into the equations: When given 4 possible equations, students should substitute the (x, y) values into each equation to see for which equation all the coordinates work. Students sometimes erringly substitute the x value into the y value.
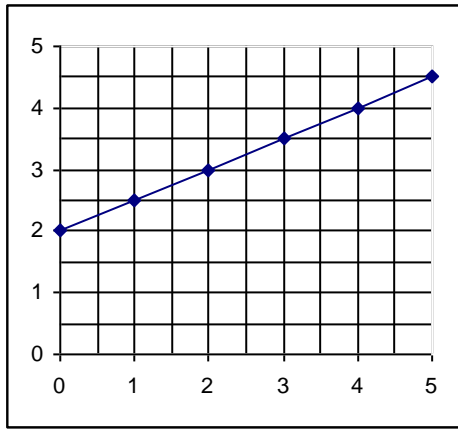
CTE Instructor's Extended Discussion
Supply and demand equations and graphs are real-world math applications in the business world. These models help determine how many products should be produced and at what price they will be sold in the market. The demand line represents how much product consumers are willing to buy at various price points and the supply line represents how much product the suppliers are willing to produce at various price points. When the amount of product supplied is equal to the amount of product demanded, equilibrium is accomplished. It is at this point that suppliers and consumers are satisfied.
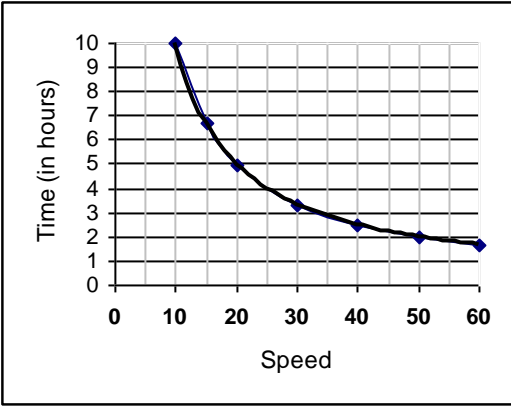
There are a variety of factors that can affect supply and demand in the market. An example that relates to students would be either a sports team or a pop star. If a football team is winning, there will be an increased demand to see the team play but the number of seats in the stadium is finite. These factors will cause a shift in the demand curve which will result in an increase in the price of the tickets that are available for sale. The same principle holds true for a pop star. The number of tickets available in a stadium venue is finite, and if the demand is significantly higher than the supply, it will cause the prices of the tickets to increase significantly.
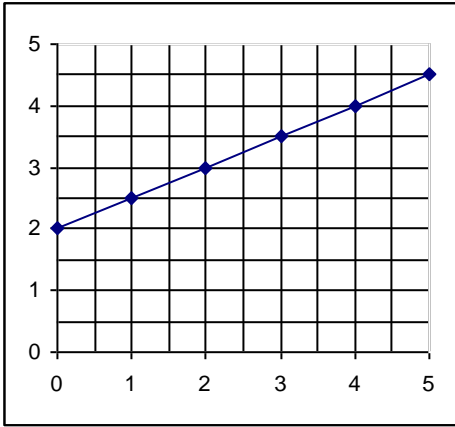
Sales, Distribution, and Marketing Operations (52.1801) T-Chart

Problems	Career and Technical Math Concepts	Solutions

1. Create a list of three points from the graph representing supply.

2. Create a table with at least 5 values that shows the relationship between supply, demand, and price.

3. Which of the following equations best represents the relationship between price (p) and demand (d)?
   a) $p = 700 - 50d$
   b) $p = 700 + 50d$
   c) $p = 1/50(d)$
   d) $p = -50d$

Problems	Related, Generic Math Concepts	Solutions

4. Identify 3 ordered pairs from the graph to the right.

5. Create a table represents the graph to the right.

6. Which of the following equations could be used to represent the function graphed to the right?
   a) $y = 10x$
   b) $y = 100/x$
   c) $y = x/100$
   d) $y = x$

Problems	PA Core Math Look	Solutions

7. Create a list of 6 coordinates from the function graphed to the right.

8. Create a table of values for the graph at the right.

9. Which of the following equations best represents the function graphed to the right?
   a) $y = 2x + 2$
   b) $y = \frac{1}{2}x + 2$
   c) $y = x + \frac{1}{2}$
   d) $y = 2x + \frac{1}{2}$

Sales, Distribution, and Marketing Operations (52.1801) T-Chart

Problems	Occupational (Contextual) Math Concepts	Solutions

1. Create a list of three points from the graph representing supply.

(50,1), (100,2), (150,3), (200,4), (250,5), (300,6), (350,7), (400,8), (450,9), (500,10)

2. Create a table with at least 5 values that shows the relationship between supply, demand, and price.

Supply	650	600	550	500	450	400	350	300
Demand	50	100	150	200	250	300	350	400
Price	$1	$2	$3	$4	$5	$6	$7	$8

3. Which of the following equations best represents the relationship between price (p) and demand (d)?
a) $p = 700 - 50d$
b) $p = 700 + 50d$
c) $p = {}^{1}/_{50}(d)$
d) $p = -50d$

c) Test: when the demand is 200, the price is $4.

Equation $p = 1/50(200)$

Using the chart above, price should equal $4.

Problems	Related, Generic Math Concepts	Solutions

4. Identify 3 ordered pairs from the graph to the right.

(10,10), (15, 6.7), (20,5), (30, 3.33), (40,2.5), (50,2), (60,1.7)

5. Create a table represents the graph to the right.

Mph	10	15	20	30	40	50	60
Time	10	6.7	5	3.33	2.5	2	1.7

6. Which of the following equations could be used to represent the function graphed to the right?

a) $y = 10x$
b) $y = 100/x$ The correct answer is b.
c) $y = x/100$
d) $y = x$

Problems	PA Core Math Look	Solutions

7. Create a list of 6 coordinates from the function graphed to the right.

(0,2), (1,2.5), (2,3), (3, 3.5), (4,4), (5,4.5)

8. Create a table of values for the graph at the right.

x	y
0	2
1	2.5
2	3
3	3.5
4	4
5	4.5

9. Which of the following equations best represents the function graphed to the right?
a) $y = 2x + 2$
b) $y = ½ x + 2$ The correct answer is b.
c) $y = x + ½$
d) $y = 2x + ½$