

Unit 3b Day 17: Linear Equations in Context

Focus Question: How do we write linear equations that represent the same situation?

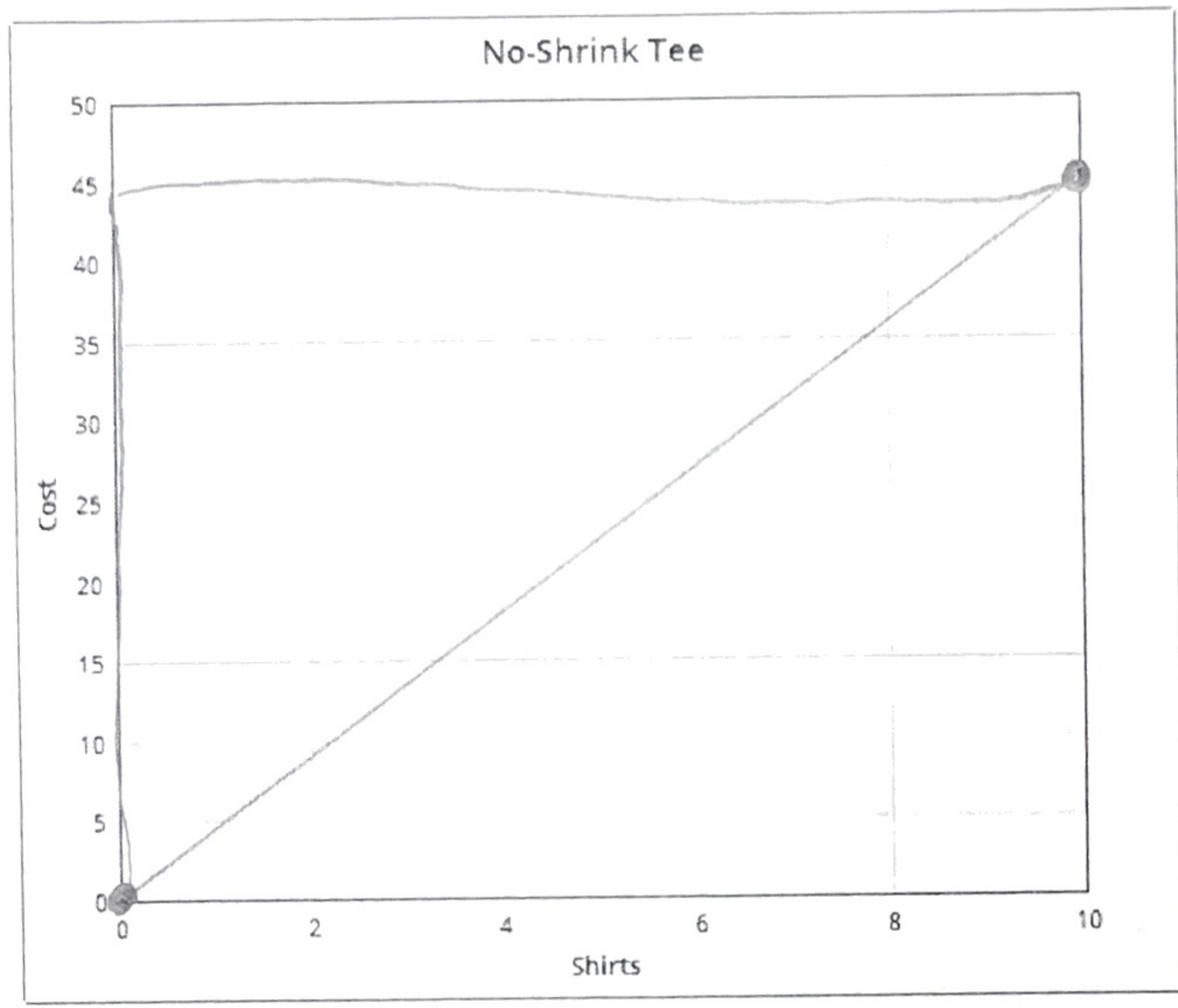
A. Ms. Chang's class decides to give t-shirts to each person who participates in a walkathon. They received bids for the cost of the t-shirts from four different companies in different ways.

Company 1 "Mighty Tee" told them over the phone that they charge a \$49 set up fee plus \$1 per t-shirt.

Company 2: "No Shrink Tee" sent them the graph below in an email.

Company 3: "Big T" sent them the table below in an email.

Company 4: "Shirts R Us" told them that they sell 10 shirts for \$50 and 20 shirts for \$70.



**Big - T
T-Shirt Costs**

n	C
0	34
+3	41.5
+2	46.5
+3	54
+2	59

$\frac{7.5}{3} = 2.5$ $\frac{5}{2} = 2.5$

1. Ms. Chang asked the class what the independent and dependent variables are and what letters will represent them.

IV: number of shirts represented by letter n

DV: Cost represented by letter C

2. Ms. Chang asked the class to complete the table and tell which company charged the least per shirt.

Company	Cost Per Shirt
Mighty Tee	\$1.00
No-Shrink Tee	\$4.50
Big T	\$2.50
Shirts R Us	\$2.00

R.O.C.
Slope
m

$$\frac{\text{cost}}{\text{shirt}} = \frac{70 - 50}{20 - 10} = \frac{20}{10}$$

Mighty Tee b/c \$1 is less than \$2 + \$2.50 + \$4.50

3. Ms. Chang asked the class to complete the table and tell which company charged the lowest set up fee.

Company	Set Up Fee
Mighty Tee	\$49
No-Shrink Tee	\$0
Big T	\$34
Shirts R Us	\$30

$$y = mx + b$$

$$50 = 2(10) + b$$

$$50 = 20 + b$$

$$\begin{array}{r} -20 \\ \hline 30 = b \end{array}$$

No Shrink Tee b/c $\$0 < \$30 < \$34 < \49 .

4. Finally Ms. Chang asked the class to write an equation for each company in function notation.

Company	Equation
Mighty Tee	$C(n) = n + 49$
No-Shrink Tee	$C(n) = 4.5n$
Big T	$C(n) = 2.5n + 34$
Shirts R Us	$C(n) = 2n + 30$

f(x)
C(n)

5. Ms. Chang's student Lucy noticed that all the equations were hard to tell apart if the company name

wasn't right next to it, so Ms. Chang wrote the following for Mighty Tee: $C_m(n) = n + 49$

What do you think that means? Cost of mighty tee based on # of shirts

Write the equation for the other 3 companies using this notation.

$$C_N(n) = 4.5n \quad C_B(n) = 2.5n + 34 \quad C_S(n) = 2n + 30$$

6. What does the following find? $C_m(n) = C_B(n)$
Find it.

$$\begin{array}{r} n + 49 = 2.5n + 34 \\ -n \qquad \qquad -n \\ \hline 49 = 1.5n + 34 \\ -34 \qquad \qquad -34 \\ \hline 15 = 1.5n \\ \frac{15}{1.5} = \frac{1.5n}{1.5} \end{array} \quad \boxed{10 = n}$$

The cost of mighty Tee & cost of Big Tee are the same when... you order 10 shirts.

7. What does the following find? $C_N(n) < C_S(n)$
Find it.

$$\begin{array}{r} 4.5n < 2n + 30 \\ -2n \qquad -2n \\ \hline 2.5n < 30 \\ \frac{2.5n}{2.5} < \frac{30}{2.5} \\ n < 12 \end{array}$$

The cost for No Shrink is less than the cost for shirts are US when... you order less than 12 shirts.