

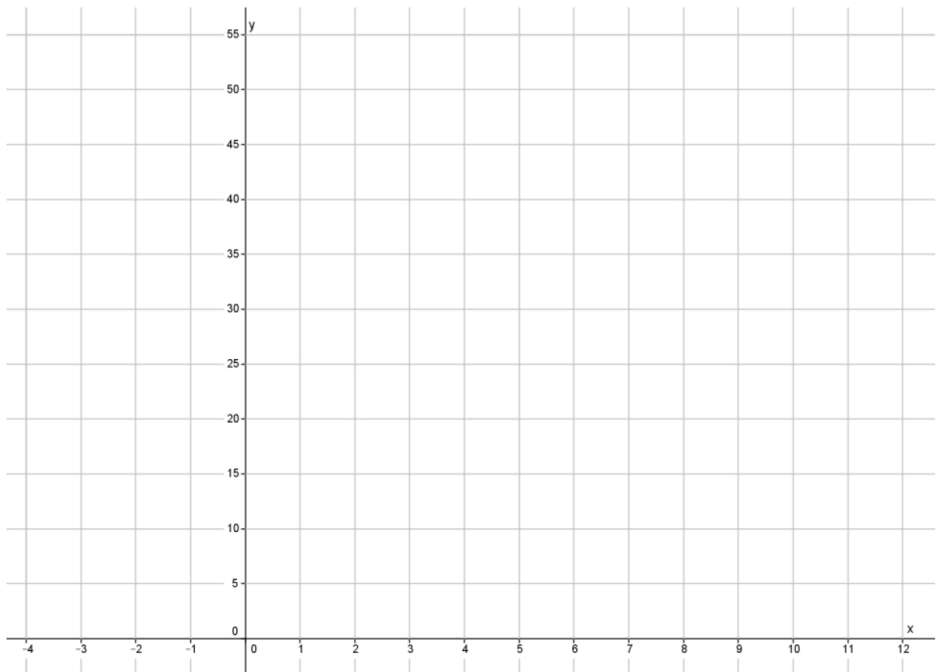
Name _____

Date _____

Conversion Between Celsius and Fahrenheit

Use the equation developed in class to answer the following questions:

- 1. How many degrees Fahrenheit is 11°C ?
- 2. How many degrees Fahrenheit is -3°C ?
- 3. Graph the equation developed in class, and use it to confirm your results from Problems 1 and 2.



1. Does the equation, $t^{\circ}\text{C} = (32 + 1.8t)^{\circ}\text{F}$, work for any rational number t ? Check that it does with $t = 8\frac{2}{3}$ and $t = -8\frac{2}{3}$.
2. Knowing that $t^{\circ}\text{C} = \left(32 + \frac{9}{5}t\right)^{\circ}\text{F}$ for any rational t , show that for any rational number d , $d^{\circ}\text{F} = \left(\frac{5}{9}(d - 32)\right)^{\circ}\text{C}$.
3. Drake was trying to write an equation to help him predict the cost of his monthly phone bill. He is charged \$35 just for having a phone, and his only additional expense comes from the number of texts that he sends. He is charged \$0.05 for each text. Help Drake out by completing parts (a)–(f).
 - a. How much was his phone bill in July when he sent 750 texts?
 - b. How much was his phone bill in August when he sent 823 texts?
 - c. How much was his phone bill in September when he sent 579 texts?
 - d. Let y represent the total cost of Drake's phone bill. Write an equation that represents the total cost of his phone bill in October if he sends t texts.
 - e. Another phone plan charges \$20 for having a phone and \$0.10 per text. Let y represent the total cost of the phone bill for sending t texts. Write an equation to represent his total bill.
 - f. Write your equations in parts (d) and (e) as a system of linear equations and solve. Interpret the meaning of the solution in terms of the phone bill.

Use the equation developed in class to answer the following questions:

1. How many degrees Fahrenheit is 11°C ?

$$11^{\circ}\text{C} = (32 + 11 \times 1.8)^{\circ}\text{F}$$

$$11^{\circ}\text{C} = (32 + 19.8)^{\circ}\text{F}$$

$$11^{\circ}\text{C} = 51.8^{\circ}\text{F}$$

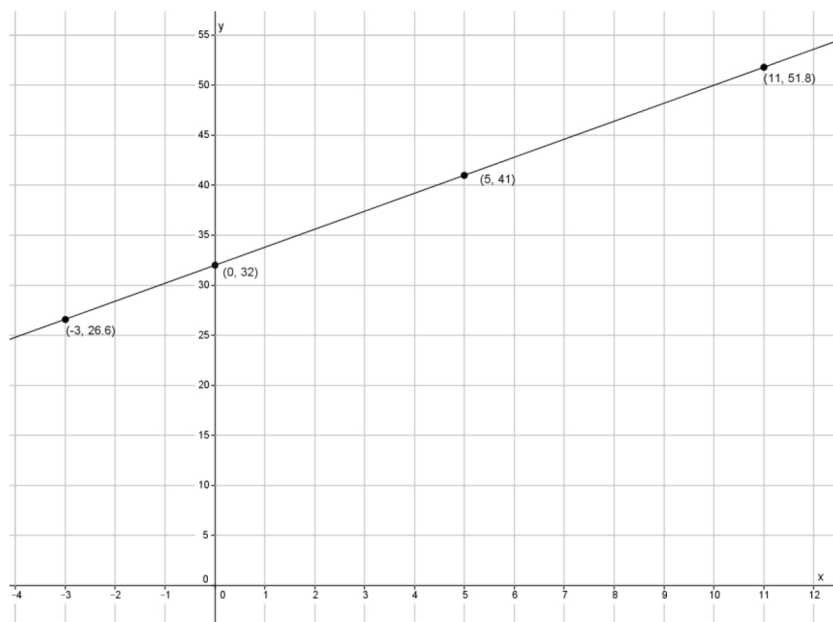
2. How many degrees Fahrenheit is -3°C ?

$$-3^{\circ}\text{C} = (32 + (-3) \times 1.8)^{\circ}\text{F}$$

$$-3^{\circ}\text{C} = (32 - 5.4)^{\circ}\text{F}$$

$$-3^{\circ}\text{C} = 26.6^{\circ}\text{F}$$

3. Graph the equation developed in class, and use it to confirm your results from Problems 1 and 2.



When I graph the equation developed in class, $t^{\circ}\text{C} = (32 + 1.8t)^{\circ}\text{F}$, the results from Problems 1 and 2 are on the line, confirming they are solutions to the equation.

1. Does the equation, $t^{\circ}\text{C} = (32 + 1.8t)^{\circ}\text{F}$, work for any rational number t ? Check that it does with $t = 8\frac{2}{3}$ and $t = -8\frac{2}{3}$.

$$\begin{aligned}\left(8\frac{2}{3}\right)^{\circ}\text{C} &= \left(32 + 8\frac{2}{3} \times 1.8\right)^{\circ}\text{F} = (32 + 15.6)^{\circ}\text{F} = 47.6^{\circ}\text{F} \\ \left(-8\frac{2}{3}\right)^{\circ}\text{C} &= \left(32 + \left(-8\frac{2}{3}\right) \times 1.8\right)^{\circ}\text{F} = (32 - 15.6)^{\circ}\text{F} = 16.4^{\circ}\text{F}\end{aligned}$$

2. Knowing that $t^{\circ}\text{C} = \left(32 + \frac{9}{5}t\right)^{\circ}\text{F}$ for any rational t , show that for any rational number d , $d^{\circ}\text{F} = \left(\frac{5}{9}(d - 32)\right)^{\circ}\text{C}$.

Since $d^{\circ}\text{F}$ can be found by $\left(32 + \frac{9}{5}t\right)$, then $d = \left(32 + \frac{9}{5}t\right)$, and $d^{\circ}\text{F} = t^{\circ}\text{C}$. Substituting $d = \left(32 + \frac{9}{5}t\right)$ into $d^{\circ}\text{F}$ we get

$$\begin{aligned}d^{\circ}\text{F} &= \left(32 + \frac{9}{5}t\right)^{\circ}\text{F} \\ d &= 32 + \frac{9}{5}t \\ d - 32 &= \frac{9}{5}t \\ \frac{5}{9}(d - 32) &= t\end{aligned}$$

Now that we know $t = \frac{5}{9}(d - 32)$, then $d^{\circ}\text{F} = \left(\frac{5}{9}(d - 32)\right)^{\circ}\text{C}$.

3. Drake was trying to write an equation to help him predict the cost of his monthly phone bill. He is charged \$35 just for having a phone, and his only additional expense comes from the number of texts that he sends. He is charged \$0.05 for each text. Help Drake out by completing parts (a)–(f).

- a. How much was his phone bill in July when he sent 750 texts?

$$35 + 750(0.05) = 35 + 37.5 = 72.5$$

His bill in July was \$72.50.

- b. How much was his phone bill in August when he sent 823 texts?

$$35 + 823(0.05) = 35 + 41.15 = 76.15$$

His bill in August was \$76.15.

- c. How much was his phone bill in September when he sent 579 texts?

$$35 + 579(0.05) = 35 + 28.95 = 63.95$$

His bill in September was \$63.95.

- d. Let y represent the total cost of Drake's phone bill. Write an equation that represents the total cost of his phone bill in October if he sends t texts.

$$y = 35 + t(0.05)$$

- e. Another phone plan charges \$20 for having a phone and \$0.10 per text. Let y represent the total cost of the phone bill for sending t texts. Write an equation to represent his total bill.

$$y = 20 + t(0.10)$$

- f. Write your equations in parts (d) and (e) as a system of linear equations and solve. Interpret the meaning of the solution in terms of the phone bill.

$$\begin{cases} y = 35 + t(0.05) \\ y = 20 + t(0.10) \end{cases}$$

$$35 + (0.05)t = 20 + (0.10)t$$

$$15 + (0.05)t = (0.10)t$$

$$15 = 0.05t$$

$$300 = t$$

$$y = 20 + 300(0.10)$$

$$y = 50$$

The solution is (300, 50), meaning that when Drake sends 300 texts, the cost of his bill will be \$50 using his current phone plan or the new one.