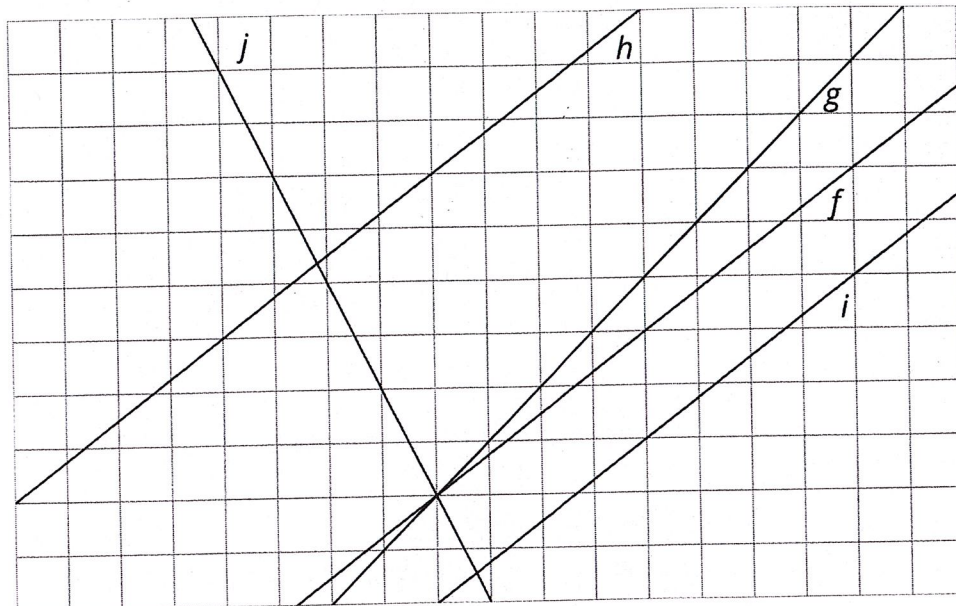# Lesson 8: Translating to $y = mx + b$

Let's see what happens to the equations of translated lines.
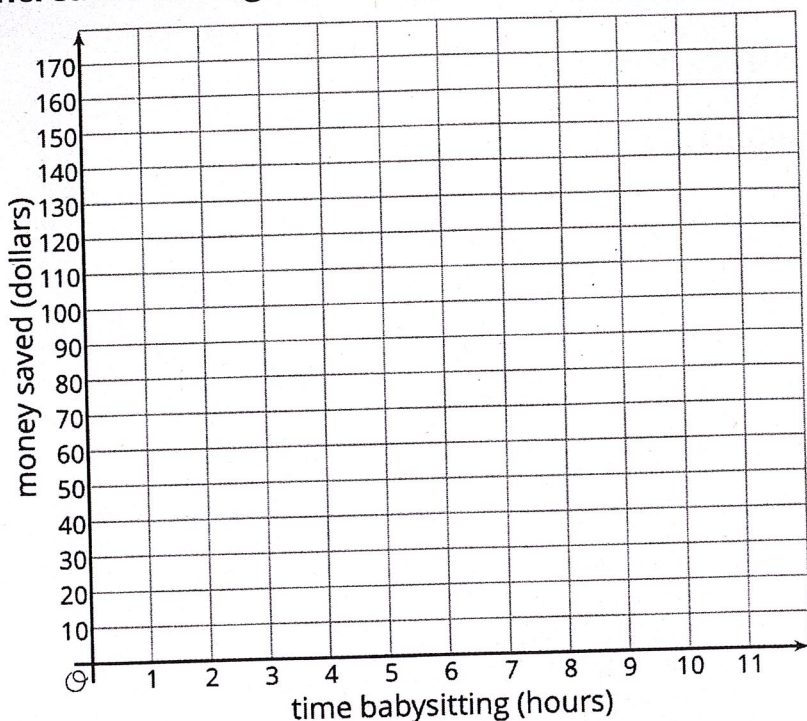
8.1: Lines That are Translations

The diagram shows several lines. You can only see part of the lines, but they actually continue forever in both directions.

1. Which lines are images of line f under a translation?

2. For each line that is a translation of f, draw an arrow on the grid that shows the vertical translation distance.

8.2: Increased Savings

1. Diego earns $10 per hour babysitting. Assume that he has no money saved before he starts babysitting and plans to save all of his earnings. Graph how much money, y, he has after x hours of babysitting.

2. Now imagine that Diego started with $30 saved before he starts babysitting. On the same set of axes, graph how much money, y, he would have after x hours of babysitting.

3. Compare the second line with the first line. How much *more* money does Diego have after 1 hour of babysitting? 2 hours? 5 hours? x hours?

4. Write an equation for each line.

8.3: Translating a Line

This graph shows two lines. Line a goes through the origin $(0, 0)$. Line h is the image of line a under a translation.
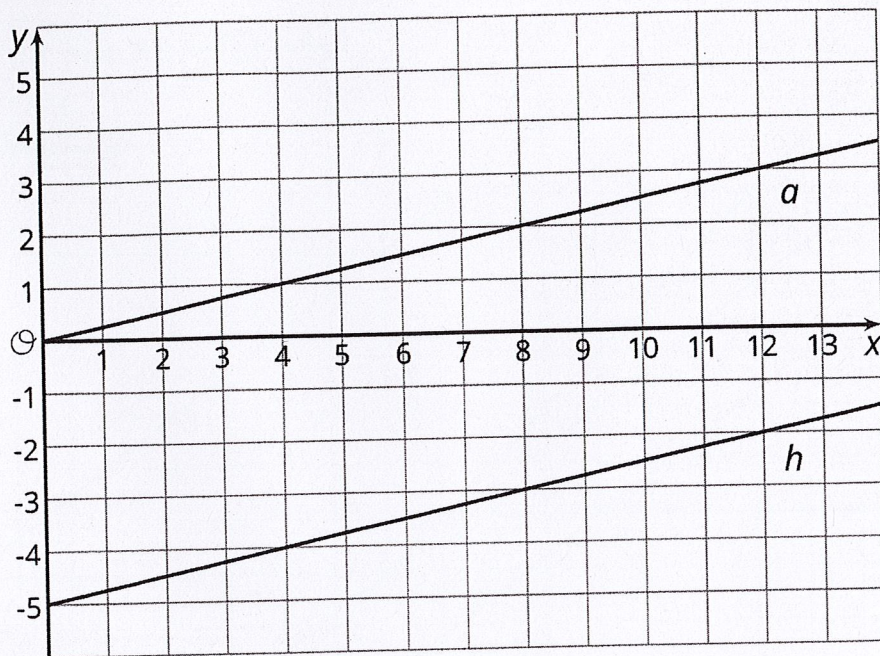
1. Select all of the equations whose graph is the line h.

   a. $y = \frac{1}{4}x - 5$

   b. $y = \frac{1}{4}x + 5$

   c. $\frac{1}{4}x - 5 = y$

   d. $y = -5 + \frac{1}{4}x$

   e. $-5 + \frac{1}{4}x = y$

   f. $y = 5 - \frac{1}{4}x$

2. Your teacher will give you 12 cards. There are 4 pairs of lines, A–D, showing the graph, a, of a proportional relationship and the image, h, of a under a translation. Match each line h with an equation and either a table or description. For the line with no matching equation, write one on the blank card.

Are you ready for more?

A student says that the graph of the equation $y = 3(x + 8)$ is the same as the graph of $y = 3x$, only translated upwards by 8 units. Do you agree? Why or why not?