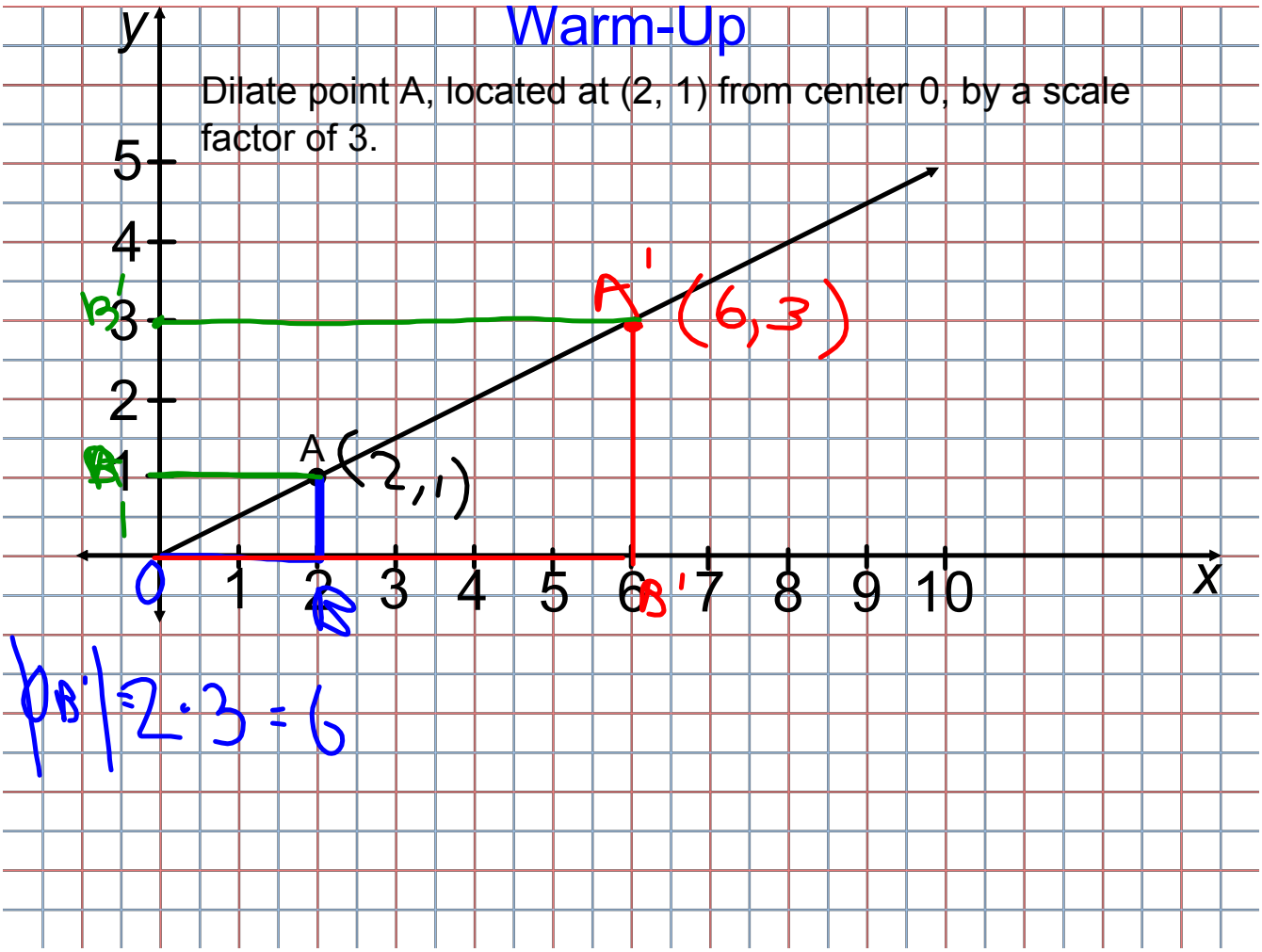
Warm-Up

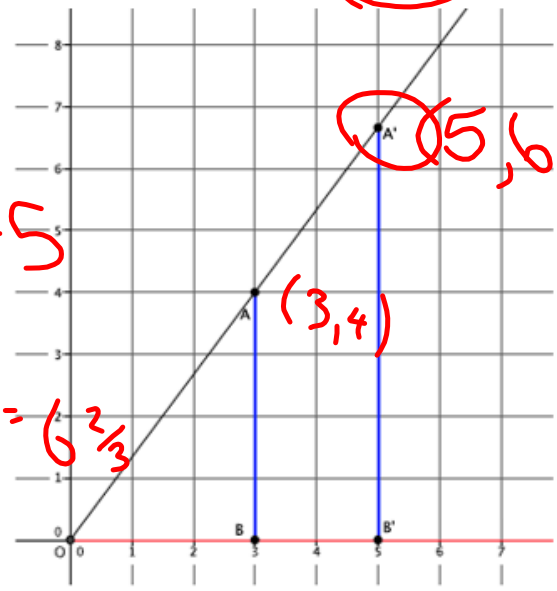
Dilate point A, located at (2, 1) from center 0, by a scale factor of 3.



$|OB'| = 2 \cdot 3 = 6$

Homework Answers

1. Dilate point A, located at $(3, 4)$ from center O, by a scale factor $r = \frac{5}{3}$.



$|OB| = 3$

$|OB'| = \frac{5}{3} \cdot 3 = 5$

$\frac{4}{1} \cdot \frac{5}{3} = \frac{20}{3} = 6\frac{2}{3}$

$3\overline{)20.0}$ 6.6

-18

2

(5, 6.6)

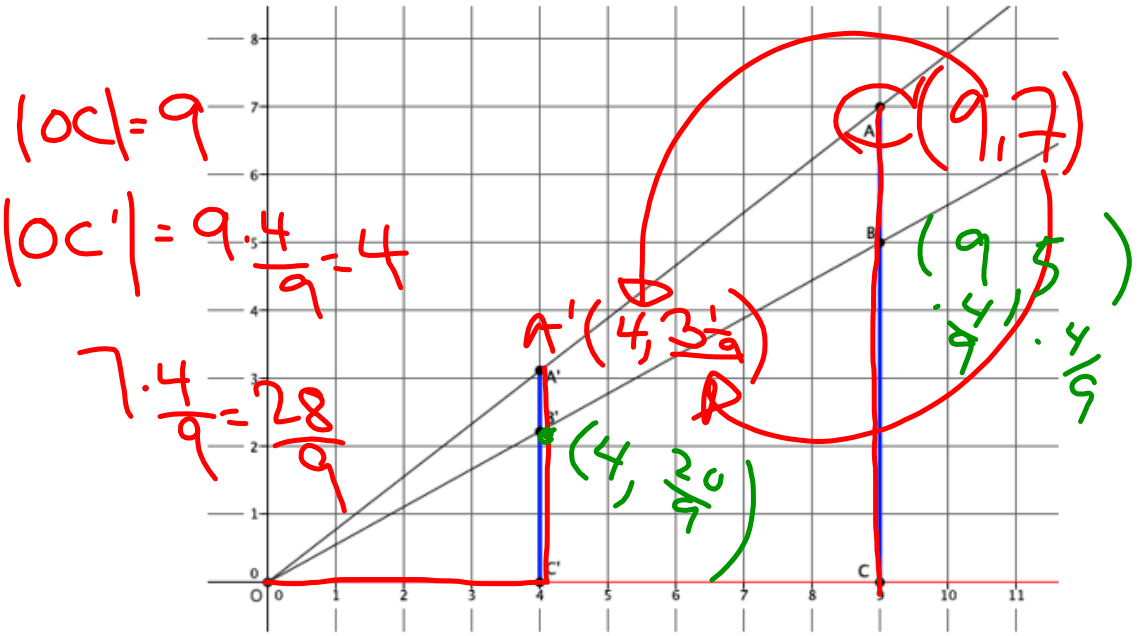
(3, 4)

What is the precise location of point A'?

The y-coordinate of point A' will be the length of segment $A'B'$. Since $|A'B'| = r|AB|$, then $|A'B'| = \frac{5}{3} \times 4 = \frac{20}{3}$.

The location of point A' is $\left(5, \frac{20}{3}\right)$, or approximately $(5, 6.7)$.

2. Dilate point A, located at $(9, 7)$ from center O, by a scale factor $r = \frac{4}{9}$. Then dilate point B, located at $(9, 5)$ from center O, by a scale factor of $r = \frac{4}{9}$. What are the coordinates of A' and B'? Explain.



The y-coordinate of point A' will be the length of $A'C'$. Since $|A'C'| = r|AC|$, then $|A'C'| = \frac{4}{9} \times 7 = \frac{28}{9}$. The location of point A' is $\left(4, \frac{28}{9}\right)$, or approximately $(4, 3.1)$. The y-coordinate of point B' will be the length of $B'C'$. Since $|B'C'| = r|BC|$, then $|B'C'| = \frac{4}{9} \times 5 = \frac{20}{9}$. The location of point B' is $\left(4, \frac{20}{9}\right)$, or approximately $(4, 2.2)$.

3. Explain how you used the Fundamental Theorem of Similarity in Problems 1 and 2.

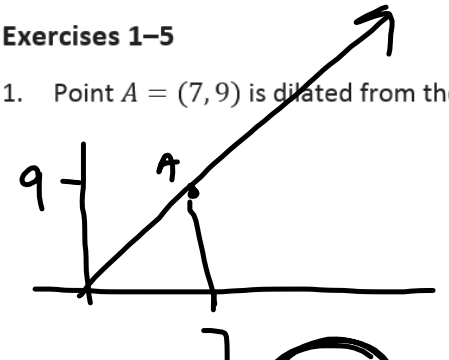
Using what I knew about scale factor, I was able to determine the placement of points A' and B', but I did not know the actual coordinates. So, one of the ways that FTS was used was actually in terms of the converse of FTS. I had to make sure I had parallel lines. Since the lines of the coordinate plane guarantee parallel lines, I knew that $|A'C'| = r|AC|$. Then, since I knew the length of segment AC and the scale factor, I could find the precise location of A'. The precise location of B' was found in a similar way but using $|B'C'| = r|BC|$.

Lesson 6: Dilations on the Coordinate Plane

Classwork

Exercises 1–5

1. Point $A = (7, 9)$ is dilated from the origin by scale factor $r = 6$. What are the coordinates of point A'?



$A(7,9)$

$A'(7 \cdot 6, 9 \cdot 6) = A'(42, 54)$

2. Point $B = (-8, 5)$ is dilated from the origin by scale factor $r = \frac{1}{2}$. What are the coordinates of point B'?

$B'(-8 \cdot \frac{1}{2}, 5 \cdot \frac{1}{2}) = B'(\frac{-8}{2}, \frac{5}{2}) = B'(-4, 2\frac{1}{2})$

3. Point $C = (6, -2)$ is dilated from the origin by scale factor $r = \frac{3}{4}$. What are the coordinates of point C'?

$C'\left(6 \cdot \frac{3}{4}, -2 \cdot \frac{3}{4}\right) = C'\left(\frac{18}{4}, -\frac{6}{4}\right)$

$= C'\left(\frac{9}{2}, -\frac{3}{2}\right)$

4. Point $D = (0, 11)$ is dilated from the origin by scale factor $r = 4$. What are the coordinates of point D'?

$D'(0, 44)$

5. Point $E = (-2, -5)$ is dilated from the origin by scale factor $r = \frac{3}{2}$. What are the coordinates of point E'?

$E'\left(\frac{-2}{1} \cdot \frac{3}{2}, \frac{-5}{1} \cdot \frac{3}{2}\right)$

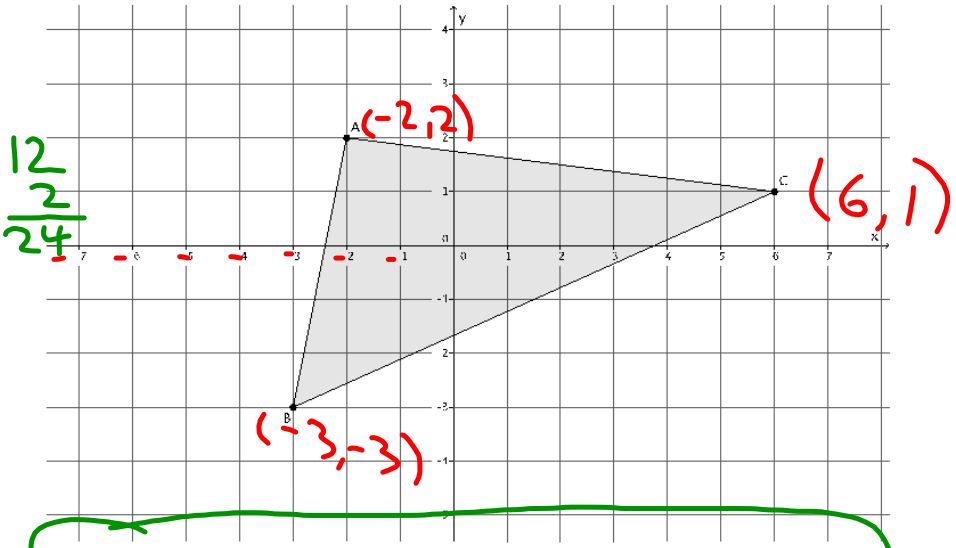
$E'\left(-3, -\frac{15}{2}\right)$

$E'(-3, -7.5)$

$-15 \div 2$

Exercises 6–8

6. The coordinates of triangle ABC are shown on the coordinate plane below. The triangle is dilated from the origin by scale factor $r = 12$. Identify the coordinates of the dilated triangle $A'B'C'$.



12
x 2
24

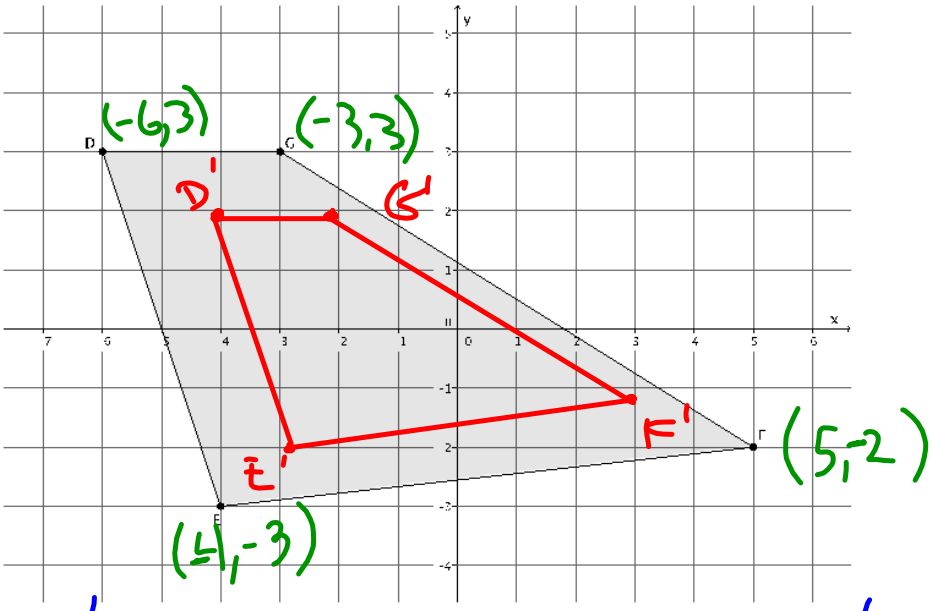
12
x6
72

$A'(-2 \cdot 12, 2 \cdot 12) = A'(-24, 24)$

$B'(-3 \cdot 12, -3 \cdot 12) = B'(-36, -36)$

$C'(6 \cdot 12, 1 \cdot 12) = C'(72, 12)$

7. Figure $DEFG$ is shown on the coordinate plane below. The figure is dilated from the origin by scale factor $r = \frac{2}{3}$. Identify the coordinates of the dilated figure $D'E'F'G'$, and then draw and label figure $D'E'F'G'$ on the coordinate plane.



$D'\left(-\frac{6}{1}\cdot\frac{2}{3}, \frac{3}{1}\cdot\frac{2}{3}\right) = D'\left(-\frac{12}{3}, \frac{6}{3}\right) = D'(-4, 2)$

$E'\left(-\frac{4}{1}\cdot\frac{2}{3}, -\frac{3}{1}\cdot\frac{2}{3}\right) = E'\left(-\frac{8}{3}, -\frac{6}{3}\right) = E'\left(-2\frac{2}{3}, -2\right)$

$F'\left(\frac{5}{1}\cdot\frac{2}{3}, -\frac{2}{1}\cdot\frac{2}{3}\right) = F'\left(\frac{10}{3}, -\frac{4}{3}\right) = F'\left(3\frac{1}{3}, -1\frac{1}{3}\right)$

$G'\left(-\frac{3}{1}\cdot\frac{2}{3}, \frac{3}{1}\cdot\frac{2}{3}\right) = G'\left(-\frac{6}{3}, \frac{6}{3}\right) = G'(-2, 2)$