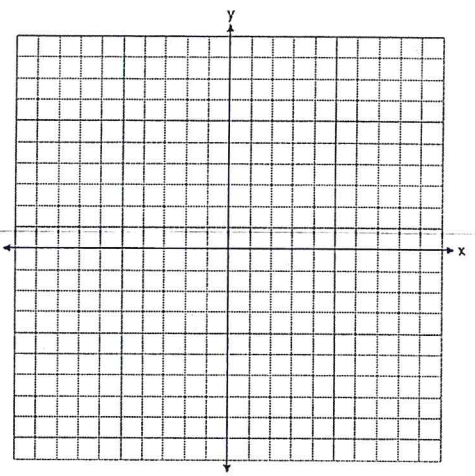# Line Dilations Centered at a Point

If the point is on the line, the equation does not change
If the point is not on the line, use a graph

1. Dilate $y = 2x - 1$ by a scale factor of 2 centered at $(2,3)$
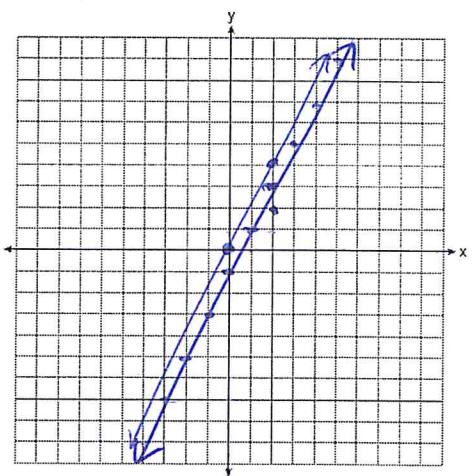
$3 = 2(2) - 1$
$3 = 3$ ✓ equation does not change

$\boxed{y = 2x - 1}$

2. Dilate $y = 2x - 1$ by a scale factor of 2 centered at $(2,2)$

$2 = 2(2) - 1$
$2 = 3$ ✗

$y = 2x$
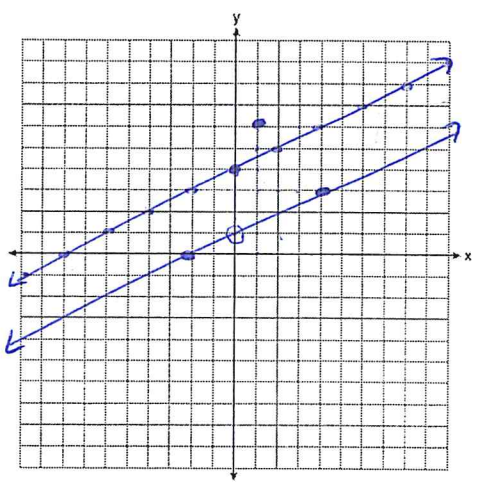
3. Dilate $y = \frac{1}{2}x + 4$ by a scale factor of 3 centered at $(1,6)$
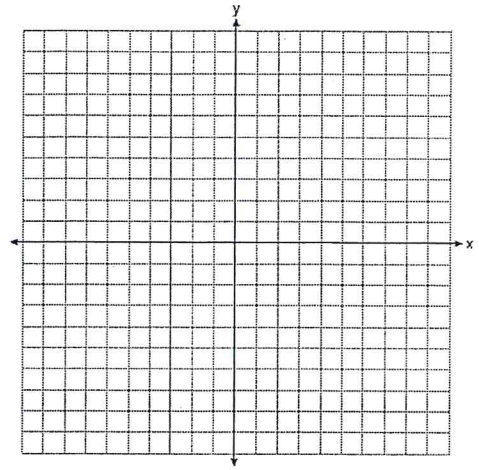
$6 = \frac{1}{2}(1) + 4$
$6 = 4.5$ ✗

$y = \frac{1}{2}x + 1$

4. Dilate $y = 3x - 2$ by a scale factor of 4 centered at $(-1, -5)$

$-5 = 3(-1) - 2$

$-5 = -5$ ✓

$y = 3x - 2$

5. Dilate $y + x = 3$ by a scale factor of 2 centered at $(-1, 6)$

$-x \quad -x$
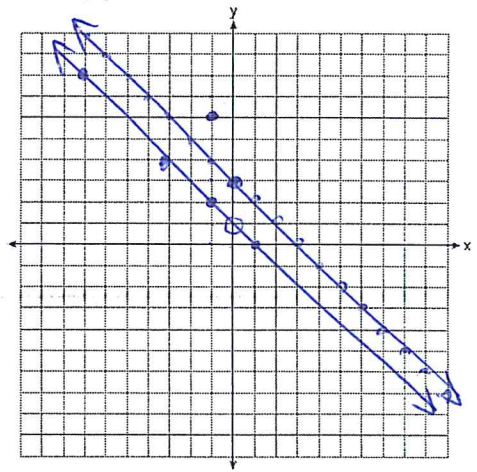
$y = -x + 3$

$6 - 1 = 3$

$5 = 3 \ X$

$y = -x + 1$

6. Dilate $y + 3x = 4$ by a scale factor of $\dfrac{1}{2}$ centered at $(0, 6)$

$-3x \quad -3x$
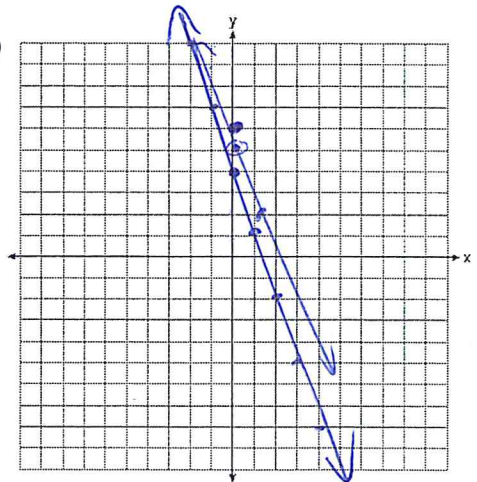
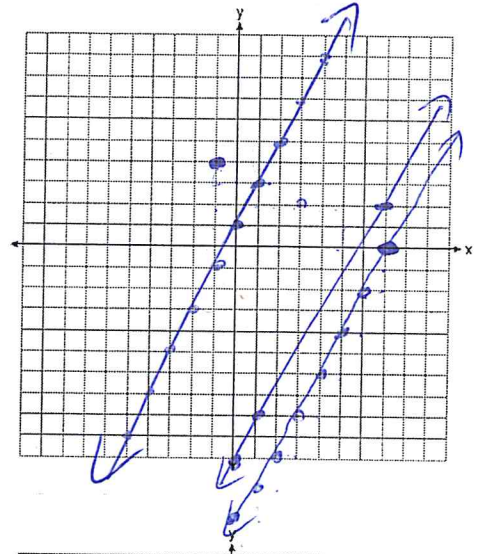$y = -3x + 4$

$6 + 3(0) = 4$

$6 = 4 \ X$

$y = -3x + 5$

$$y = 2x + 1$$

7. Dilate $\frac{2y}{2} = \frac{4x + 2}{2}$ by a scale factor of 4 centered at $(-1, 4)$

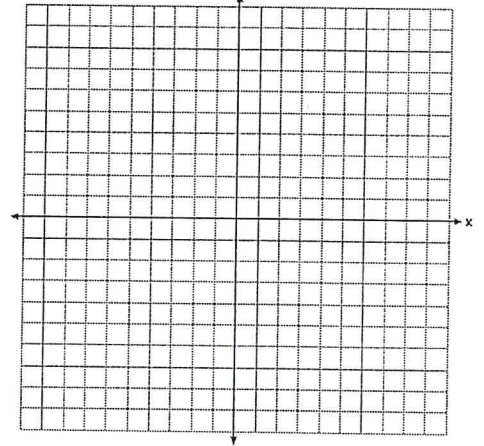$$2(4) = 4(-1) + 2$$
$$8 = -2X$$

$$\boxed{y = 2x - 14}$$

8. Dilate $y + 3x = -2$ by a scale factor of 3 centered at $(2, -8)$

$$-8 + 3(2) = -2$$
$$-8 + 6 = -2$$
$$-2 = -2 \checkmark$$

$$\boxed{y + 3x = -2}$$

$$y = \tfrac{5}{2}x + 2$$

9. Dilate $\frac{2y}{2} = \frac{5x + 4}{2}$ by a scale factor of 2 centered at $(1, -1)$

$$2(-1) = 5(1) + 4$$
$$-2 = 9 X$$

$$\boxed{y = \tfrac{5}{2}x + 7.5}$$
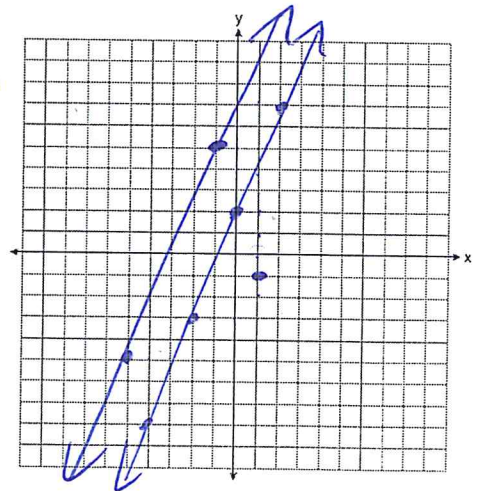

$$m = \tfrac{5}{2}$$
$$x = 1$$
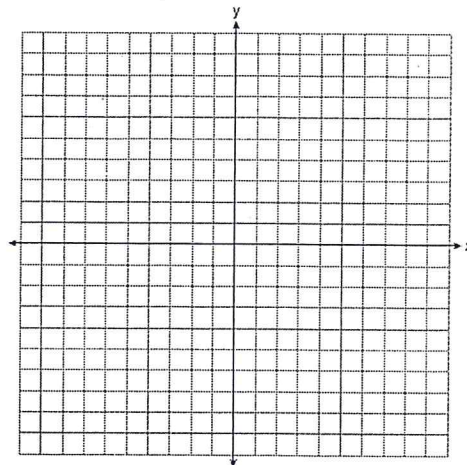$$y = 5$$

$$5 = \tfrac{5}{2}(1) + b$$
$$5 = 2.5 + b$$
$$\begin{array}{r} +2.5 \quad +2.5 \end{array}$$
$$7.5 = b$$

10. Dilate $2x + 3y = -2$ by a scale factor of $\frac{1}{4}$ centered at $(2, -2)$

$2(2) + 3(-2) = -2$
$-2 = 2$ ✓

$\boxed{2x + 3y = -2}$

11. Dilate $2y = 3x + 4$ by a scale factor of 2 centered at $(2, 5)$

$2(5) = 3(2) + 4$
$10 = 10$ ✓

$\boxed{2y = 3x + 4}$
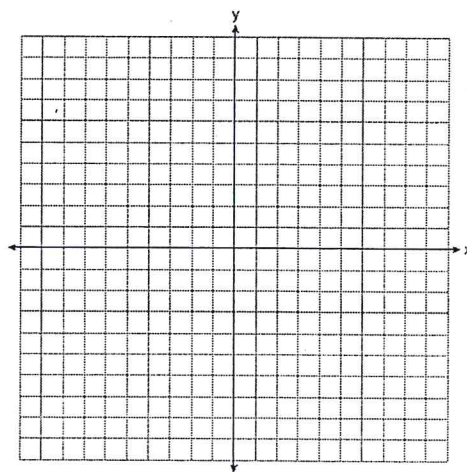
12. Dilate $2y + 6x = 4$ by a scale factor of 3 centered at $(-1, 3)$

$2(3) + 6(-1) = 4$
$-36 = 4$ ✗

$2y + 6x = 4$
$-6x \quad -6x$

$\dfrac{2y}{2} = \dfrac{-6x + 4}{2}$

$y = -3x + 2$

$\boxed{y = -3x + 12}$