Warm Up

Find the coordinates of the image of ΔABC with vertices $A(3, 4)$, $B(-1, 4)$, and $C(5, -2)$, after each reflection.

1. across the x-axis

$A'(3, -4)$, $B'(-1, -4)$, $C'(5, 2)$

2. across the y-axis

$A'(-3, 4)$, $B'(1, 4)$, $C'(-5, -2)$

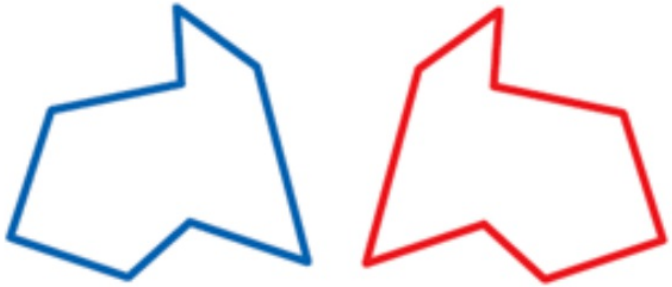
3. across the line $y = x$

$A'(4, 3)$, $B'(4, -1)$, $C'(-2, 5)$

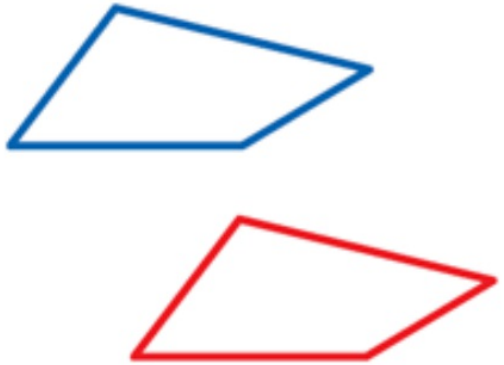
9-2 Translations

A translation is a transformation where all the points of a figure are moved the same distance in the same direction. A translation is an isometry, so the image of a translated figure is congruent to the preimage.

Tell whether each transformation appears to be a translation. Explain.



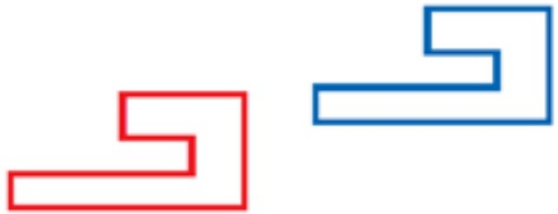
No; the figure appears to be flipped.



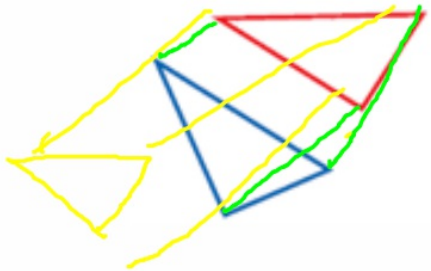
Yes; the figure appears to slide.

9-2 Translations

Tell whether each transformation appears to be a translation.

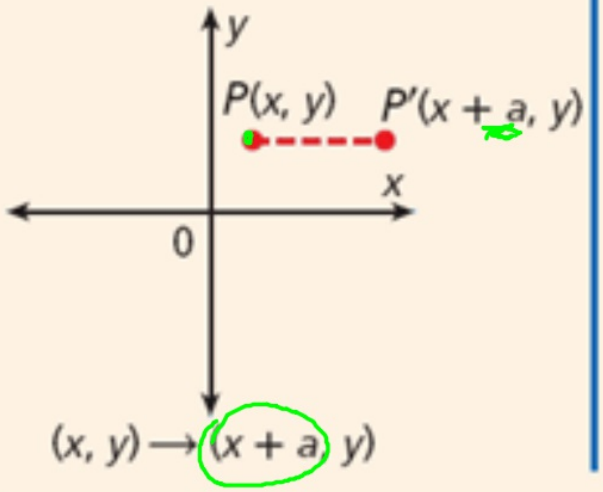
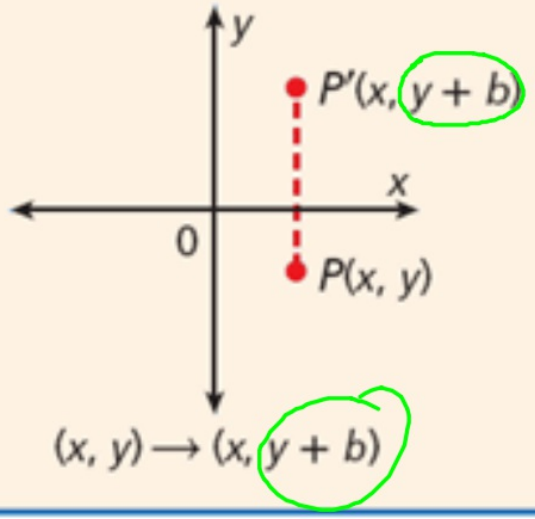
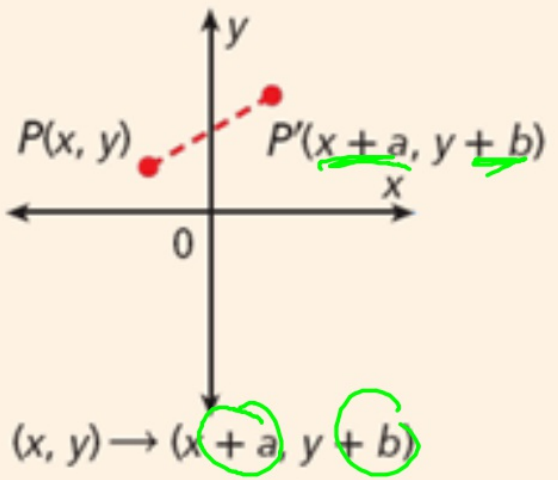


Yes; all of the points have moved the same distance in the same direction.



No; not all of the points have moved the same distance.

Translations in the Coordinate Plane

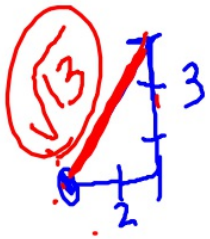
HORIZONTAL TRANSLATION ALONG VECTOR $\langle a, 0 \rangle$	VERTICAL TRANSLATION ALONG VECTOR $\langle 0, b \rangle$	GENERAL TRANSLATION ALONG VECTOR $\langle a, b \rangle$
		
$(x, y) \rightarrow (x + a, y)$	$(x, y) \rightarrow (x, y + b)$	$(x, y) \rightarrow (x + a, y + b)$

+/− to x
(move left/right)

+/− to y
(move up & down)

moves diagonally
both +/− x and +/− y

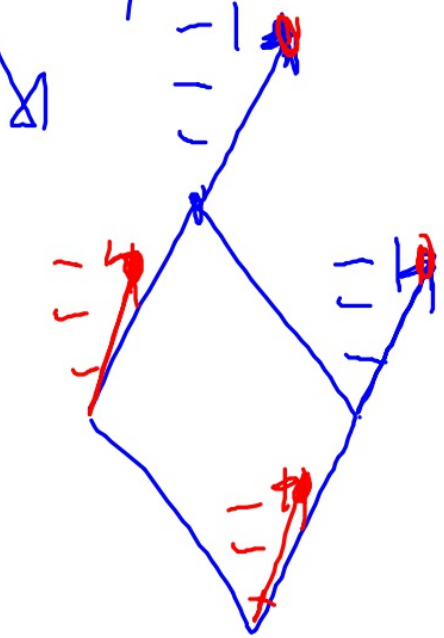
Vector

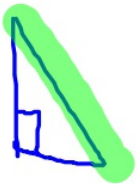


vector (2, 3)

Direction (slope)

magnitude (length = distance formula or





9-2 Translations

Translate the triangle with vertices *D*(–3, –1), *E*(5, –3), and *F*(–2, –2)

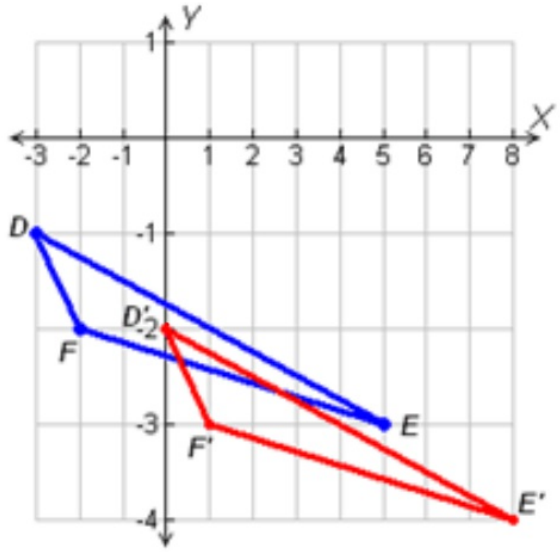
vector $\langle 3, -1 \rangle$

The image of (x, y) is $(x + 3, y - 1)$.

$D(-3, -1)$ (+3, −1) = $(0, -2)$

$E(5, -3)$ (+3, −1) = $(8, -4)$

$F(-2, -2)$ (+3, −1) = $(1, -3)$



Graph the preimage and the image.

9-2 Translations

Translate the quadrilateral with vertices *R*(2, 5), *S*(0, 2), *T*(1,–1), and *U*(3, 1) along the vector <–3, –3>.

Also written like this

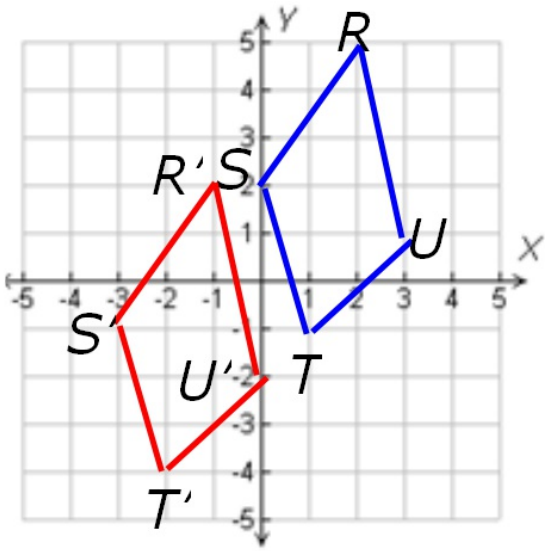
The image of (x, y) is $(x - 3, y - 3)$.

$R(2, 5)$ $\xrightarrow{-3, -3}$ $= R'(-1, 2)$

$S(0, 2)$ $\xrightarrow{-3, -3}$ $= S'(-3, -1)$

$T(1, -1)$ $\xrightarrow{-3, -3}$ $= T'(-2, -4)$

$U(3, 1)$ $\xrightarrow{-3, -3}$ $= U'(0, -2)$



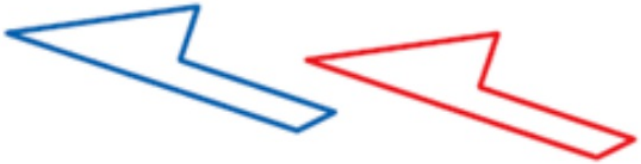
Graph the preimage and the image.

5. A rook on a chessboard has coordinates (3, 4). The rook is moved up two spaces. Then it is moved three spaces to the left. What is the rook's final position? What is the rule for the translation that moves the rook from its starting position to its final position?

(0, 6); (x–3, y+2)

Lesson Quiz: Part I

1. Tell whether the transformation appears to be a translation.



9-2 Translations

Translate the figure with the given vertices according to the given translation

3. $G(8, 2)$, $H(-4, 5)$, $I(3, -1)$; along the vector <-2,0>

-2 0 -2 0 -2 0

$G'(6,2)$ $H'(-6,5)$ $I'(1,-1)$

4. $S(0, -7)$, $T(-4, 4)$, $U(-5, 2)$, $V(8, 1)$; along the vector <-4, 5>

-4 5 -4 5 -4 5 -4 5

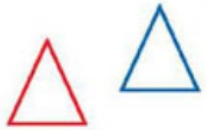
$S'(-4,-2)$ $T'(8,9)$ $U'(-9,7)$ $V'(4,6)$

GUIDED PRACTICE

Tell whether each transformation appears to be a translation.

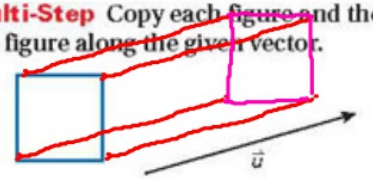
1. 

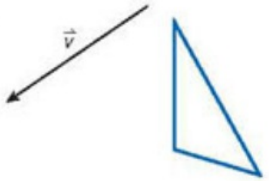
2. 

3. 

4. 

Multi-Step Copy each figure and the translation vector. Draw the translation of the figure along the given vector.

5. 

6. 

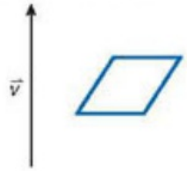
Translate the figure with the given vertices along the given vector.

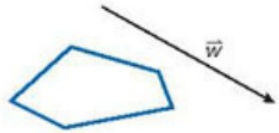
7. $A(-4, -4)$, $B(-2, -3)$, $C(-1, 3)$; $\langle 5, 0 \rangle$
8. $R(-3, 1)$, $S(-2, 3)$, $T(2, 3)$, $U(3, 1)$; $\langle 0, -4 \rangle$
9. $J(-2, 2)$, $K(-1, 2)$, $L(-1, -2)$, $M(-3, -1)$; $\langle 3, 2 \rangle$

HW 9.2 Online

p614 #1-9, 11-20

Multi-Step Copy each figure and the translation vector. Draw the translation of the figure along the given vector.

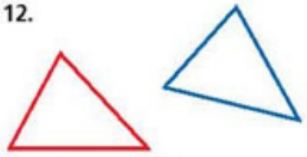
15. 

16. 

PRACTICE AND PROBLEM SOLVING

Tell whether each transformation appears to be a translation.

11. 

12. 

13. 

14. 

Translate the figure with the given vertices along the given vector.

17. $P(-1, 2)$, $Q(1, -1)$, $R(3, 1)$, $S(2, 3)$; $\langle -3, 0 \rangle$
18. $A(1, 3)$, $B(-1, 2)$, $C(2, 1)$, $D(4, 2)$; $\langle -3, -3 \rangle$
19. $D(0, 15)$, $E(-10, 5)$, $F(10, -5)$; $\langle 5, -20 \rangle$

20. **Animation** An animator draws the ladybug shown and then translates it along the vector $\langle 1, 1 \rangle$, followed by a translation of the new image along the vector $\langle 2, 2 \rangle$, followed by a translation of the second image along the vector $\langle 3, 3 \rangle$.
    a. Sketch the ladybug's final position.
    b. What single vector moves the ladybug from its starting position to its final position?