

INDEPENDENT VARIABLE

IDV WORKSHEETS



RIGID TRANSFORMATIONS ON THE COORDINATE GRID

TRANSLATIONS | REFLECTIONS | ROTATIONS

ANIMATED
POWERPOINT:
DOES THE WORK
FOR YOU!

FULL ANSWER
KEYS
INCLUDED

12 EXAMPLE
PROBLEMS
5 PRACTICE
SHEETS

WORKED
EXAMPLES ON
EVERY SHEET
+ FIND THE
MISTAKE

MORE PRACTICE. LESS PREP. BETTER OUTCOMES.

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Inside the Animated Lesson

INDEPENDENT VARIABLE

GRADE 8 • GEOMETRY

RIGID TRANSFORMATIONS ON THE GRID

TRANSLATIONS | REFLECTIONS | ROTATIONS ABOUT THE ORIGIN

Animated PowerPoint lesson

Coordinate rules • 12 worked problems

Leveled practice • full answer keys

MORE PRACTICE. LESS PREP. BETTER OUTCOMES.

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TRANSLATIONS

Slide: Count, Then Add

Right a	add a to x	$(x + a, y)$
Left a	subtract a from x	$(x - a, y)$
Up b	add b to y	$(x, y + b)$
Down b	subtract b from y	$(x, y - b)$

Left/right changes x. Up/down changes y. Every vertex moves exactly the same way.

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TRANSLATIONS • WORKED EXAMPLE 1 OF 6

Transform It on the Grid

THE MOVE

Translate triangle WXY 3 units down and 4 units left.

W(0, 2) → W'(-4, -1)

X(1, 5) → X'(-3, 2)

Y(5, 2) → Y'(1, -1)

THE RULE

$(x, y) \rightarrow (x - 4, y - 3)$

Same size and shape: the image is congruent.

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REFLECTIONS • WORKED EXAMPLE 4 OF 6

Transform It on the Grid

THE MOVE

Reflect SRQT across the x-axis.

S(-5, 1) → S'(-5, -1)

R(-4, 0) → R'(-4, 0)

Q(0, -1) → Q'(0, 1)

T(-3, -4) → T'(-3, 4)

THE RULE

$(x, y) \rightarrow (x, -y)$

Same size and shape: the image is congruent.

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ROTATIONS

Turn About the Origin

90° counterclockwise	swap, then change the sign of the new x	$(-y, x)$
90° clockwise	swap, then change the sign of the new y	$(y, -x)$
180° (either way)	both signs change	$(-x, -y)$
270° one way	= 90° the other way	

Tracing paper check: trace the figure and the axes, hold the origin, and turn.

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FOLLOW ALONG • FOLLOW-ALONG: ON THE GRID, BOX 5

5. Move: Rotate 180° about the origin.

Pre-image

A(4, 2)

B(4, 4)

C(1, 4)

Image

A'(-4, -2)

B'(-4, -4)

C'(-1, -4)

$(x, y) \rightarrow (-x, -y)$

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FOLLOW ALONG • FOLLOW-ALONG: ON THE GRID, BOX 6 • CHALLENGE

6. Move: Rotate 90° counterclockwise about the origin.

Pre-image

A(4, 1)

B(3, 4)

C(1, 4)

D(1, 3)

Image

A'(-1, 4)

B'(-4, 3)

C'(-4, 1)

D'(-3, 1)

$(x, y) \rightarrow (-y, x)$

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KEY IDEA

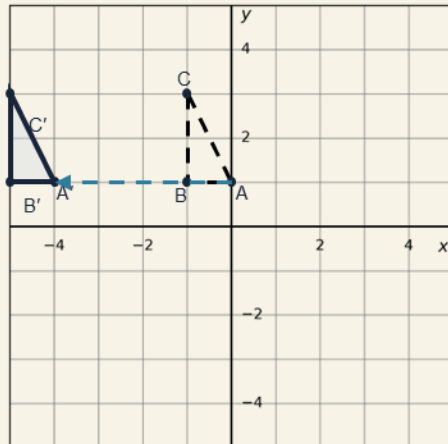
The Coordinate Rules

TRANSLATION	$(x, y) \rightarrow (x + a, y + b)$	right/up: add left/down: subtract
REFLECT x-AXIS	$(x, y) \rightarrow (x, -y)$	y changes sign
REFLECT y-AXIS	$(x, y) \rightarrow (-x, y)$	x changes sign
ROTATE 90° CCW	$(x, y) \rightarrow (-y, x)$	same as 270° clockwise
ROTATE 90° CW	$(x, y) \rightarrow (y, -x)$	same as 270° counterclockwise
ROTATE 180°	$(x, y) \rightarrow (-x, -y)$	both signs change

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Directions: Study the two examples. Then perform each transformation: plot and label the image, and write its coordinates.

SHEET 1 OF 4 • TRANSLATIONS

Example 1: Translate left 4.*Pre-image*

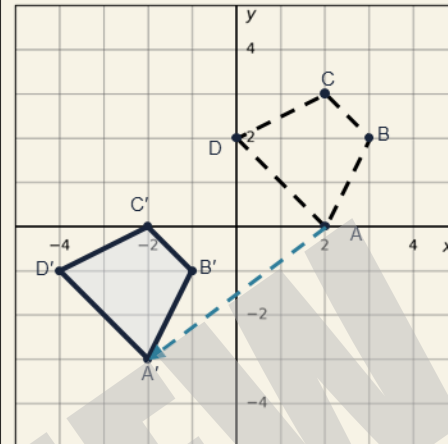
A(0, 1)
B(-1, 1)
C(-1, 3)

Image

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

Rule

$(x, y) \rightarrow$
 $(x - 4, y)$

Example 2: Translate left 4 and down 3.*Pre-image*

A(2, 0)
B(3, 2)
C(2, 3)
D(0, 2)

Image

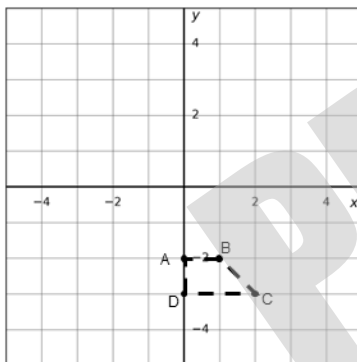
A'(-2, -3)
B'(-1, -1)
C'(-2, 0)
D'(-4, -1)

Rule

$(x, y) \rightarrow$
 $(x - 4, y - 3)$

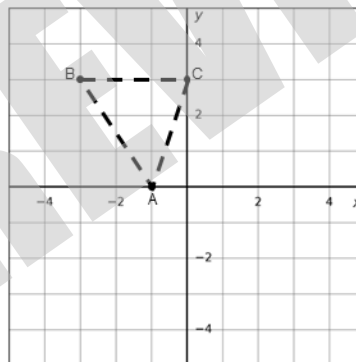
Your turn

1. Translate left 3.



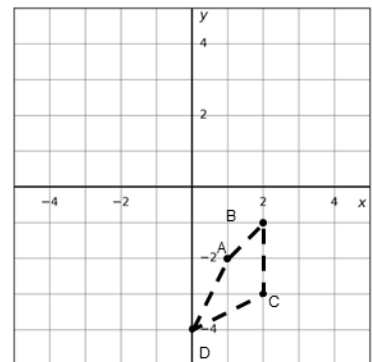
A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

2. Translate right 4 and down 5.



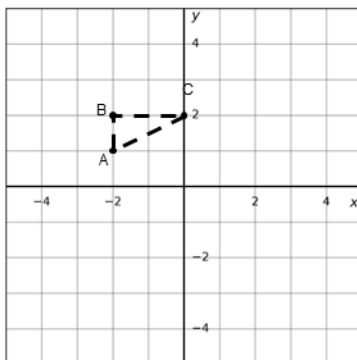
A'(___, ___) B'(___, ___)
C'(___, ___)

3. Translate left 4.



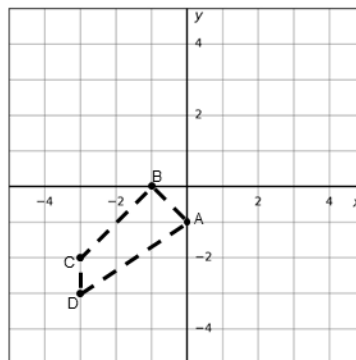
A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

4. Translate right 3 and down 2.



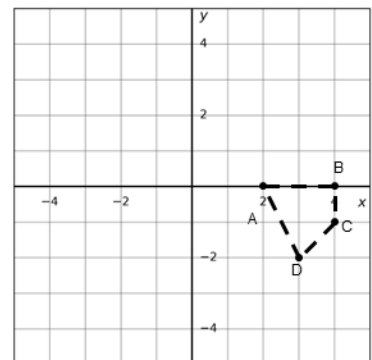
A'(___, ___) B'(___, ___)
C'(___, ___)

5. Translate right 5 and up 1.



A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

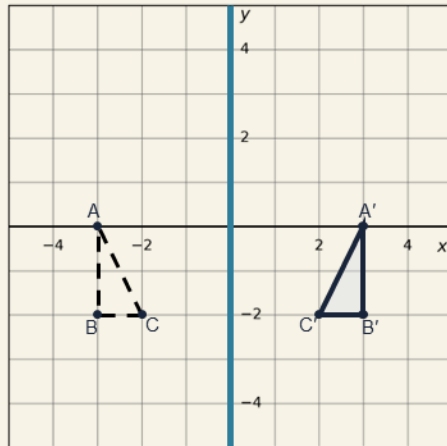
6. Translate left 4 and down 1.



A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

Directions: Study the two examples. Then perform each transformation: plot and label the image, and write its coordinates.

SHEET 2 OF 4 • REFLECTIONS

Example 1: Reflect across the y-axis.*Pre-image*

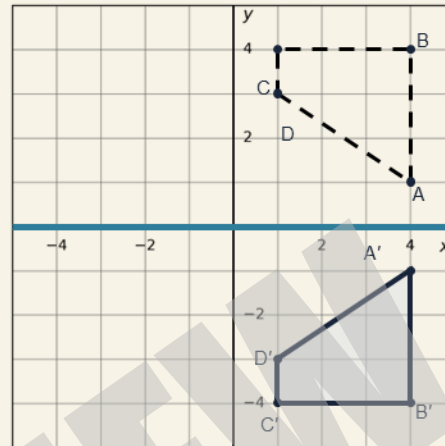
A(-3, 0)
B(-3, -2)
C(-2, -2)

Image

A'(3, 0)
B'(3, -2)
C'(2, -2)

Rule

$(x, y) \rightarrow$
 $(-x, y)$

Example 2: Reflect across the x-axis.*Pre-image*

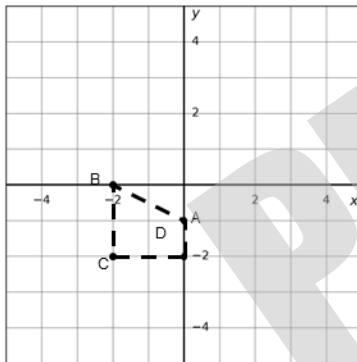
A(4, 1)
B(4, 4)
C(1, 4)
D(1, 3)

Image

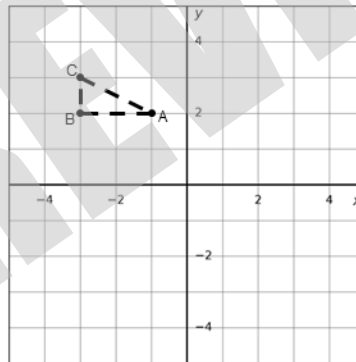
A'(4, -1)
B'(4, -4)
C'(1, -4)
D'(1, -3)

Rule

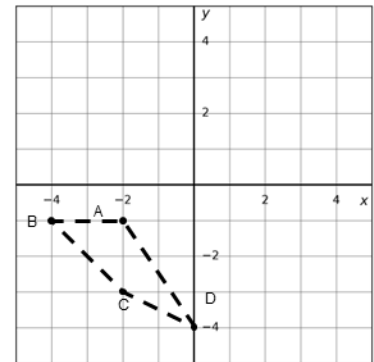
$(x, y) \rightarrow$
 $(x, -y)$

Your turn**1.** Reflect across the y-axis.

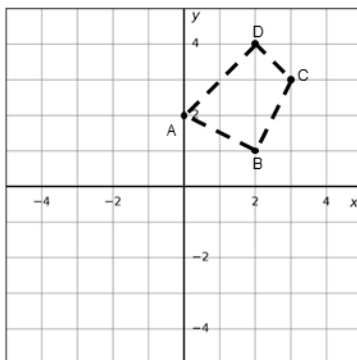
A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

2. Reflect across the x-axis.

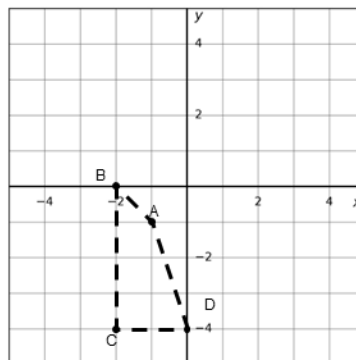
A'(___, ___) B'(___, ___)
C'(___, ___)

3. Reflect across the y-axis.

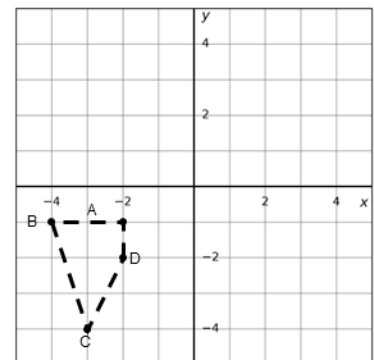
A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

4. Reflect across the x-axis.

A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

5. Reflect across the y-axis.

A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

6. Reflect across the x-axis.

A'(___, ___) B'(___, ___)
C'(___, ___) D'(___, ___)

Directions: Each student made a mistake. Circle the FIRST wrong line, explain what went wrong, then write the correct image.

1. <i>Maya's task:</i> Translate left 4 and up 1. $A(1, 2) \rightarrow A'(5, 3)$ $B(3, 4) \rightarrow B'(7, 5)$ $C(4, 1) \rightarrow C'(8, 2)$ What went wrong? _____ _____ Correct image: _____	2. <i>Jordan's task:</i> Translate right 1 and down 5. $A(2, 1) \rightarrow A'(3, -4)$ $B(4, 3) \rightarrow B'(5, -2)$ $C(3, 5) \rightarrow C'(4, 10)$ What went wrong? _____ _____ Correct image: _____
3. <i>Sam's task:</i> Reflect across the x-axis. $A(-4, 1) \rightarrow A'(4, 1)$ $B(-2, 4) \rightarrow B'(2, 4)$ $C(-1, 2) \rightarrow C'(1, 2)$ What went wrong? _____ _____ Correct image: _____	4. <i>Ava's task:</i> Reflect across the y-axis. $A(1, -1) \rightarrow A'(-1, -1)$ $B(4, -1) \rightarrow B'(-4, -1)$ $C(4, -3) \rightarrow C'(4, 3)$ $D(2, -4) \rightarrow D'(-2, -4)$ What went wrong? _____ _____ Correct image: _____
5. <i>Leo's task:</i> Rotate 90° clockwise about the origin. $A(1, 1) \rightarrow A'(-1, 1)$ $B(4, 1) \rightarrow B'(-1, 4)$ $C(1, 3) \rightarrow C'(-3, 1)$ What went wrong? _____ _____ Correct image: _____	6. <i>Nia's task:</i> Rotate 180° about the origin. $A(2, 1) \rightarrow A'(-2, -1)$ $B(5, 2) \rightarrow B'(-2, -5)$ $C(3, 4) \rightarrow C'(-3, -4)$ What went wrong? _____ _____ Correct image: _____