

Name _____

Date _____

14.3 Translation — worksheet

Translate points and shapes by a vector, describe a translation from an object and its image, and identify corresponding points without a grid. · 51 questions · Show your working.

Remember

- A **translation** slides a shape. Nothing turns and nothing flips.
- It is described by a **vector (across, up)**.
- To translate a point, **add the vector to its coordinates**.
- To find the vector, do **image – object**.
- A negative first number means left; a negative second number means down.
- Two translations one after the other are the same as one translation by the **sum of the vectors**.
- The image is **congruent** to the object: same lengths, same angles, same way round.
- To undo a translation, **reverse the signs** of both parts.
- None of this needs a grid — the arithmetic on the coordinates is the whole method.

A · Fluency — Apply a vector, and read one off.

- 1 Translate the point (2, 3) by (4, 1). Where does it land?

- 2 Translate the point (–1, 5) by (3, –2). Where does it land?

- 3 Translate the point (0, 0) by (–5, 4). Where does it land?

- 4 Translate the point (4, –2) by (–3, –3). Where does it land?

- 5 Translate the point (–4, –1) by (6, 2). Where does it land?

- 6 Translate the point (3, 6) by (–7, –5). Where does it land?

- 7 Translate the point (–2, 2) by (5, –6). Where does it land?

- 8 Translate the point (1, –4) by (–4, 7). Where does it land?

- 9 Translate the point (5, 1) by (–2, –4). Where does it land?

- 10 Translate the point (–3, –5) by (4, 8). Where does it land?

- 11 Translate the point (6, 0) by (–6, 3). Where does it land?

- 12 Translate the point (–5, 4) by (2, –9). Where does it land?

- 13** A point moves from $(2, 3)$ to $(6, 4)$. Write the translation as a vector, in the form (across, up).

- 14** A point moves from $(-1, 5)$ to $(2, 3)$. Write the translation as a vector, in the form (across, up).

- 15** A point moves from $(0, 0)$ to $(-5, 4)$. Write the translation as a vector, in the form (across, up).

- 16** A point moves from $(4, -2)$ to $(1, -5)$. Write the translation as a vector, in the form (across, up).

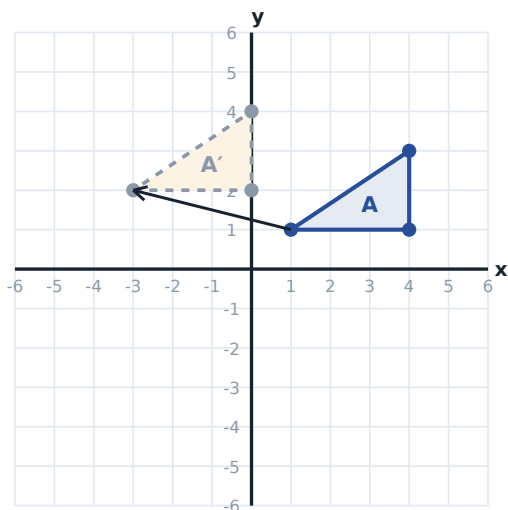
- 17** A point moves from $(-4, -1)$ to $(2, 1)$. Write the translation as a vector, in the form (across, up).

- 18** A point moves from $(3, 6)$ to $(-4, 1)$. Write the translation as a vector, in the form (across, up).

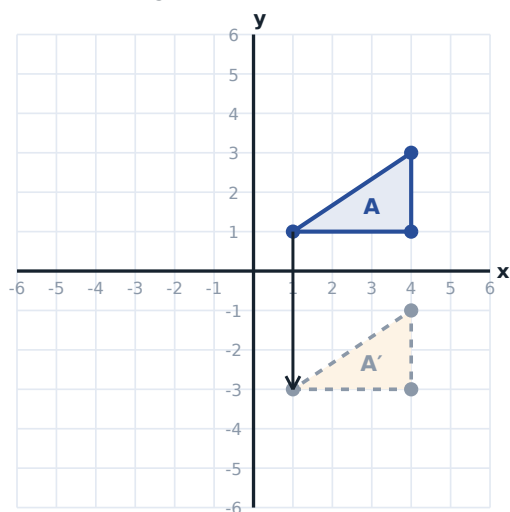
- 19** A point moves from $(-2, 2)$ to $(3, -4)$. Write the translation as a vector, in the form (across, up).

- 20** A point moves from $(1, -4)$ to $(-3, 3)$. Write the translation as a vector, in the form (across, up).

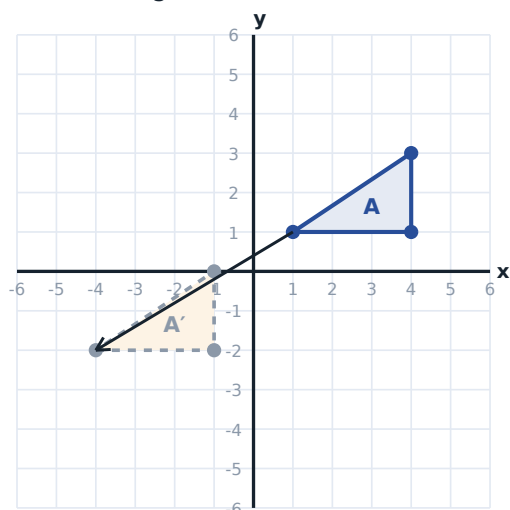
- 21** Triangle A has vertices $(1, 1)$, $(4, 1)$ and $(4, 3)$. It is translated by $(-4, 1)$. Where does the vertex $(1, 1)$ go?



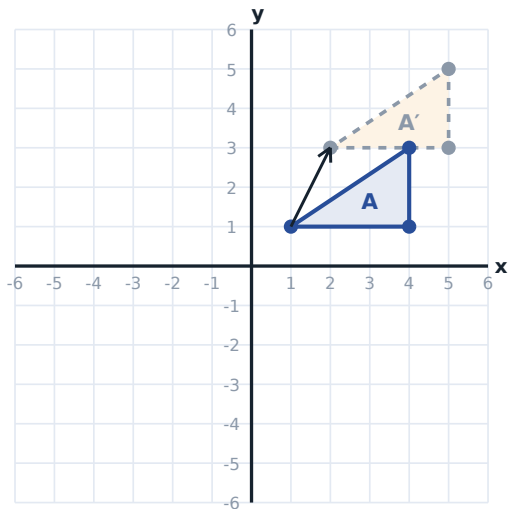
- 22** Triangle A has vertices $(1, 1)$, $(4, 1)$ and $(4, 3)$. It is translated by $(0, -4)$. Where does the vertex $(1, 1)$ go?



- 23** Triangle A has vertices $(1, 1)$, $(4, 1)$ and $(4, 3)$. It is translated by $(-5, -3)$. Where does the vertex $(1, 1)$ go?



- 24** Triangle A has vertices $(1, 1)$, $(4, 1)$ and $(4, 3)$. It is translated by $(1, 2)$. Where does the vertex $(1, 1)$ go?



B · Reasoning — What a slide does and does not change.

- 25** What does a translation do to a shape?
- ☐ Turns it
 - ☐ Flips it
 - ☐ Slides it without turning or flipping
 - ☐ Makes it bigger
- 26** After a translation, the image is ...
- ☐ larger than the object
 - ☐ congruent to the object
 - ☐ a mirror image
 - ☐ similar but not congruent
- 27** In the vector $(-3, 5)$, what does the -3 mean?
- ☐ 3 right
 - ☐ 3 left
 - ☐ 3 down
 - ☐ 3 up
- 28** In the vector $(2, -6)$, what does the -6 mean?
- ☐ 6 left
 - ☐ 6 right
 - ☐ 6 up
 - ☐ 6 down
- 29** How do you find the vector that takes A to B?
- ☐ $B + A$
 - ☐ $A - B$
 - ☐ $B - A$
 - ☐ $A \times B$

- 30** A shape is translated by $(4, -2)$, then by $(-4, 2)$. Where is it?
- ☐ Back where it started
 - ☐ Translated by $(8, -4)$
 - ☐ Translated by $(0, 4)$
 - ☐ It cannot be done
- 31** Does a translation change the size of the angles in a shape?
- ☐ Yes
 - ☐ No
- 32** Do you need a grid to translate a point?
- ☐ Yes
 - ☐ No
- 33** The vector $(0, 0)$ translates a shape ...
- ☐ off the grid
 - ☐ nowhere at all
 - ☐ to the origin
 - ☐ upside down
- 34** A shape is translated by $(5, 3)$. What single vector takes the image back to the object?
- ☐ $(5, 3)$
 - ☐ $(-5, -3)$
 - ☐ $(3, 5)$
 - ☐ $(-3, -5)$

C · Challenge — Chains of translations, and working backwards.

- 35** The point $(2, 3)$ is translated by $(4, -1)$ and then by $(3, 5)$. Where does it end up?
- _____
- 36** The point $(-1, -2)$ is translated by $(-3, 6)$ and then by $(2, -4)$. Where does it end up?
- _____
- 37** The point $(0, 4)$ is translated by $(5, 5)$ and then by $(-6, -2)$. Where does it end up?
- _____
- 38** The point $(3, -3)$ is translated by $(-2, -7)$ and then by $(4, 3)$. Where does it end up?
- _____
- 39** Two translations $(4, -1)$ and $(3, 5)$ are done one after the other. Write the single vector that does the same job.
- _____
- 40** Two translations $(-3, 6)$ and $(2, -4)$ are done one after the other. Write the single vector that does the same job.
- _____
- 41** A translation takes $(3, -2)$ to $(-1, 5)$. Where does it take $(0, 0)$?
- _____
- 42** A translation takes $(-5, 1)$ to $(2, 4)$. Where does it take $(6, -3)$?
- _____

- 43** A square of side 4 is translated by $(6, 2)$. What is the area of the image?
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D · Word problems — Chess, ships, robots and drones.

- 44** A chess piece stands at $(3, 2)$. It moves 4 squares right and 1 square up. Where is it now?
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- 45** A ship at $(-2, 5)$ sails 6 units east and 3 units south. Give its new position.
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- 46** A robot moves from $(1, 1)$ to $(-4, 6)$ in one straight slide. Write the translation as (across, up).
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- 47** A counter at $(4, -1)$ is translated by $(-9, 3)$. Where does it land?
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- 48** A window on a plan has a corner at $(2, 7)$. The whole window is moved 3 units left and 5 units down. Where is that corner now?
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- 49** A drone at $(0, 0)$ flies by $(7, -4)$, then by $(-2, 9)$. Where does it finish?
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- 50** A tile at $(-6, -6)$ is slid to $(-6, 2)$. Where would the same slide take a tile at $(1, 1)$?
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- 51** A rectangle 5 by 3 is translated three times. What is the area of the final image?
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