

12.1 Translations

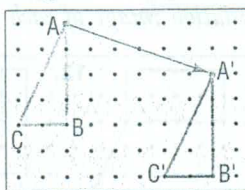
The photo shows a water slide. People riding down the straight part of the slide undergo a **translation**. A translation can be described as a slide in one direction without any turns.

Activity: Study the Diagram

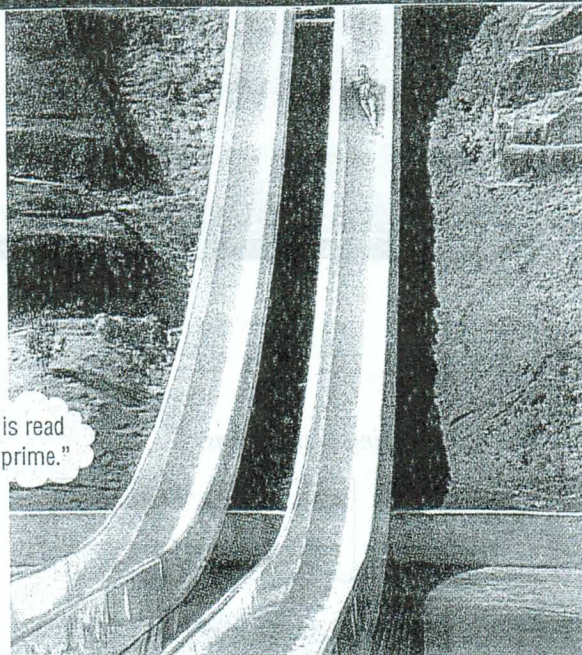
The diagram shows a translation.

An arrow shows both the direction and the length of a translation.

The translation shown by the red arrow matches $\triangle ABC$ with its **translation image** $\triangle A'B'C'$.



A' is read "A prime."



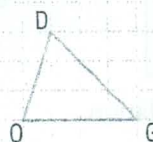
Inquire

1. How many units is $\triangle A'B'C'$ to the right of $\triangle ABC$?
2. How many units is $\triangle A'B'C'$ below $\triangle ABC$?
3. How does the shape of $\triangle A'B'C'$ compare to the shape of $\triangle ABC$?
4. How does the size of $\triangle A'B'C'$ compare to the size of $\triangle ABC$?

A translation is described by the distance and the direction a figure has moved.

Example

Draw the translation image of $\triangle DOG$ six units to the left and four units down.

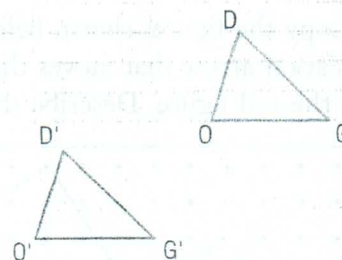
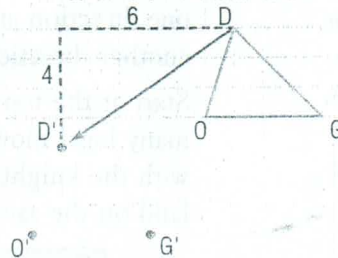
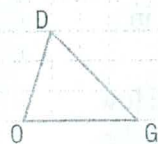


Solution

Draw $\triangle DOG$.

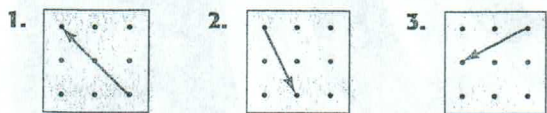
Count 6 units left and 4 units down from D. Mark D'. Repeat for O and G.

Complete $\triangle D'O'G'$. $\triangle D'O'G'$ is the translation image of $\triangle DOG$.



Practice

Describe the following translations.

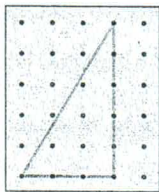


Draw arrows on graph or dot paper to show the following translations.

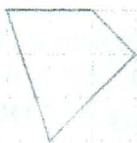
4. 2 units left, 3 units up
5. 1 unit right, 4 units down
6. 5 units down
7. 3 units left, 2 units down

Problems and Applications

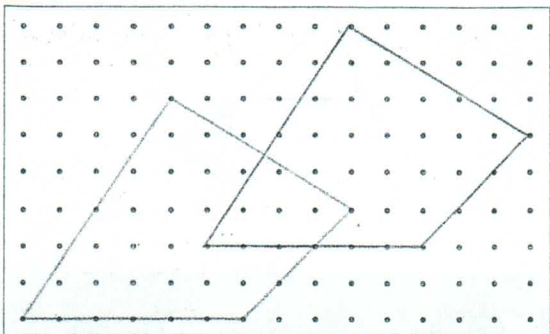
8. Copy the figure. Draw the translation image 4 units right and 3 units up.



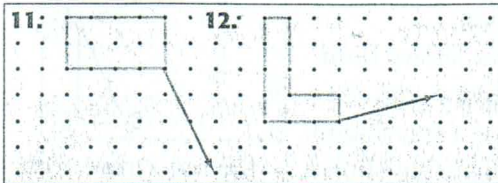
9. Copy the figure. Draw the translation image 5 units left and 3 units down.



10. Copy the figures shown below. Draw the translation arrow that moves the blue figure onto the red figure. Describe the translation.



Copy each figure onto grid or dot paper. Draw the translation image of each for the given translation.



13. a) On grid paper, translate $\triangle ABC$ 4 units to the right and 2 units down.



- b) Translate the image $\triangle A'B'C'$ 2 units to the right and 3 units up to give $\triangle A''B''C''$.
c) What is the one translation that makes $\triangle A''B''C''$ the image of $\triangle ABC$?



14. Is the translation image of a figure always a congruent figure? Explain.



15. Draw a triangle and its translation image on grid or dot paper. Ask a classmate to describe the translation.

LOGIC POWER

In one move in the game of chess, the knight can go 2 squares in one direction and 1 square in another direction, or 1 square in one direction and 2 squares in another direction.

Start at the top left corner. How many legal moves can you make with the knight so that it does not land on the same square twice?

