# Unit 2 Summary

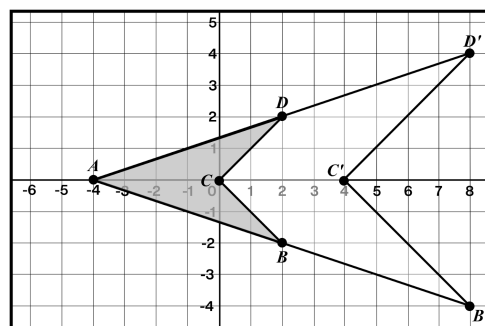| Prior Learning | Grade 8, Unit 2 | Later in Grade 8 | High School |
|---|---|---|---|
| Grade 7<br>• Proportional relationships<br><br>Grade 8, Unit 1<br>• Rigid transformations<br><br>• Congruent figures | • Non-rigid transformations (dilations)<br><br>• Similar figures<br><br>• Introduction to slope | Unit 3<br>• Linear relationships | • Transformations as functions<br><br>• Trigonometry and similar triangles<br><br>• Average rate of change |

## Dilations

Definition
**A transformation in which each point on a figure moves along a line and changes its distance from a fixed point.**

Facts/Characteristics
**The fixed point is the center of the dilation. All of the original distances are multiplied by the same scale factor.**
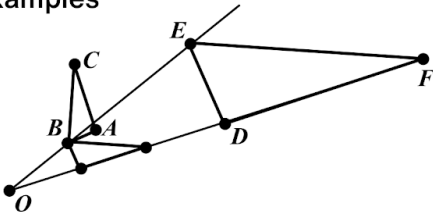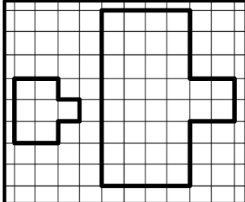
Examples

**Dilation**

Non-Examples
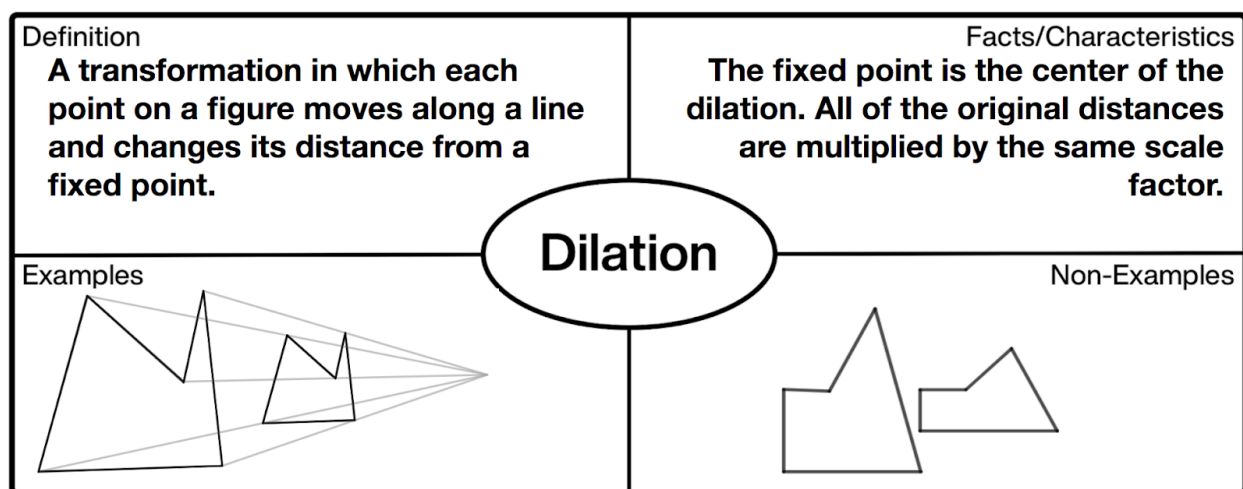


The scale factor from figure $ABCD$ to figure $AB'C'D'$ is $2$.

Each point in $AB'C'D'$ is twice as far from the center of dilation $(A)$ as it is in $ABCD$.

The scale factor from figure $AB'C'D'$ to figure $ABCD$ is $\frac{1}{2}$.

## Similarity

| Definition | Facts/Characteristics |
|---|---|
| Two figures are similar if one can fit exactly over the other after rigid transformations and dilations. | If $ABC$ is rotated around point $B$ and then dilated with center point $O$, then it will fit exactly over $DEF$. This means that they are similar. |
| Examples | Non-Examples |

**Similar Figures**

These figures are not similar. Corresponding sides have the same scale factor, but corresponding angles are not congruent.
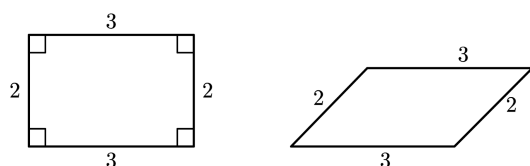
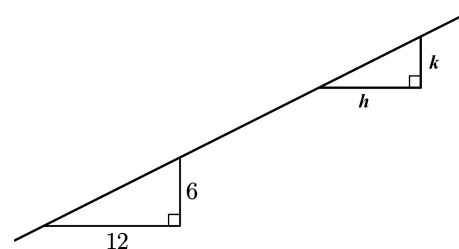Triangles are similar if they have two pairs of congruent corresponding angles.
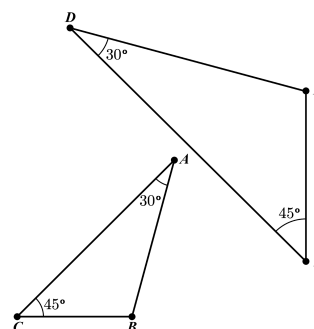
## Slope

All triangles on the same line are similar. Triangles like these are often called **slope triangles**.

The slope of a line is a measure of its steepness.

We calculate the slope as the ratio of the vertical to the horizontal length of the triangle.

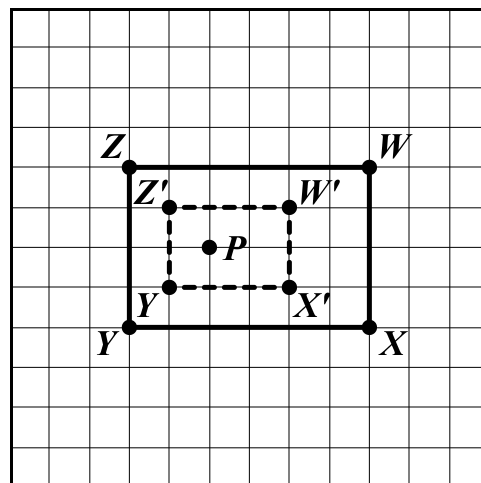The slope of this line is $\dfrac{k}{h} = \dfrac{6}{12} = \dfrac{1}{2}$ .

# Try This at Home

## Dilations

1. Rectangle $A$ is $10$ cm by $24$ cm. Rectangle $B$ is a dilation of rectangle $A$. If rectangle $B$ is $25$ cm by $60$ cm, what is the scale factor?

2.1 Rectangle $WXYZ$ is dilated with center $P$ to $W'X'Y'Z'$. What was the scale factor used?

Explain your thinking.

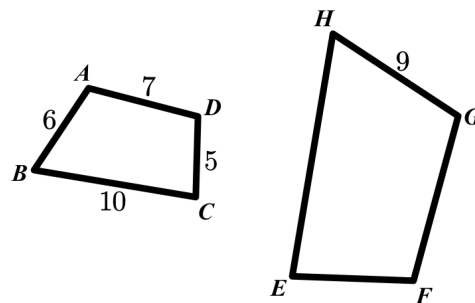2.2 Draw a dilation of $WXYZ$ with a center of point $P$ using a scale factor of $\frac{3}{2}$.

## Similarity

3.1 Quadrilateral $ABCD$ is similar to quadrilateral $GHEF$. What is the perimeter of $EFGH$?

Explain your thinking.

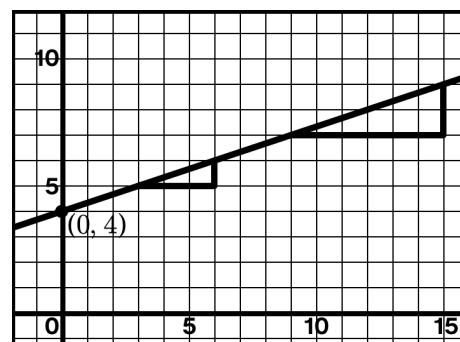3.2 How could you use transformations to show that the two quadrilaterals are similar?

## Slope

4.1 What is the slope of the line on the right?

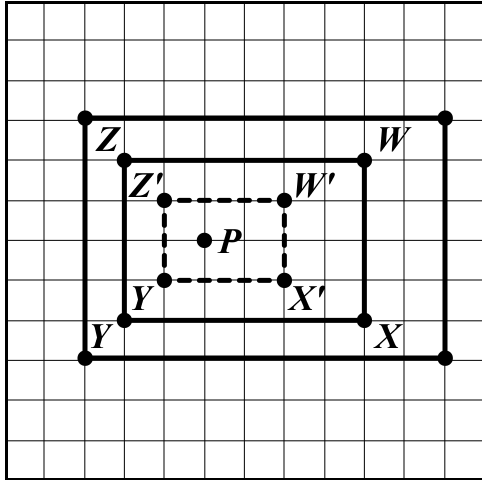4.2 Is the point $(30, 18)$ on the line?

Explain your thinking.

# desmos

**Solutions:**

1. The scale factor is $2.5$ because $10 \cdot 2.5 = 15$ and $24 \cdot 2.5 = 36$.

2.1 The scale factor is $\frac{1}{2}$. *Explanations vary.* Each point in $W'X'Y'Z'$ is half as far from $P$ as it is in $WXYZ$.

2.2



3.1 $42$ units. *Explanations vary.* Segment $GH$ corresponds with segment $AB$, so we can use their relationship to find the scale factor. $6 \cdot 1.5 = 9$, so the scale factor is $1.5$. We can use the scale factor to determine that the other segments in quadrilateral $EFGH$ are $10.5$, $7.5$, and $15$ units. $9 + 10.5 + 7.5 + 15 = 42$.

3.2 *Responses vary.* You could translate figure $ABCD$ until two corresponding points are aligned, such as point $C$ and point $E$. Then, dilate figure $ABCD$ with center $C$ using a scale factor of $1.5$. Then, rotate the shape until it is directly on top of $EFGH$.

4.1 $\frac{1}{3}$

4.2 No. *Explanations vary.* If you draw a slope triangle between $(0, 4)$ and $(30, 18)$, the vertical distance would be $14$ units and the horizontal distance would be $30$ units. This triangle would have a slope of $\frac{14}{30}$, which is not equal to $\frac{1}{3}$.