

Geometry - Dilations and Similarity - Answer Key

Common Core G-SRT.A.1, G-SRT.A.2, G-SRT.A.3 · maths-pdf.fr/en/

Use this answer key to check the 20 problems on dilations. Every solution shows the formula or theorem used, each step of the work, and the final answer in bold. If an answer differs from yours, compare the steps line by line to find where the work changed.

Geometry · Common Core State Standards: **G-SRT.A.1, G-SRT.A.2, G-SRT.A.3**

Exercise 1 - Dilate a point

$$(3 \cdot 3, 3 \cdot (-2)) = (9, -6)$$

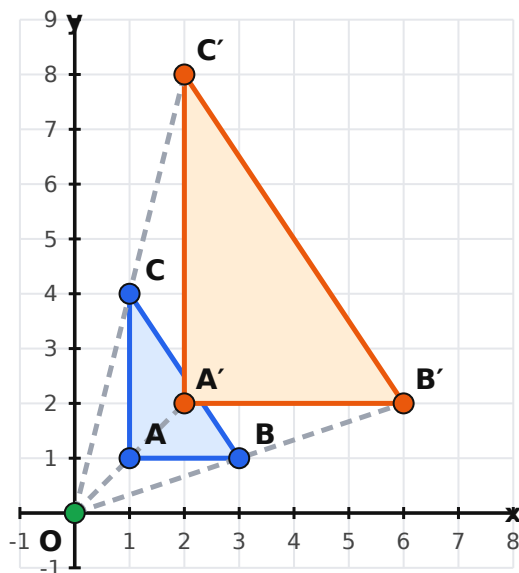
(9, -6)

Exercise 2 - Reduction

$$\left(\frac{8}{4}, \frac{12}{4}\right) = (2, 3)$$

(2, 3)

Exercise 3 - Dilate a triangle



Dilation with center O and scale factor 2: every distance from O doubles.

$A'(2,2), B'(6,2), C'(2,8)$

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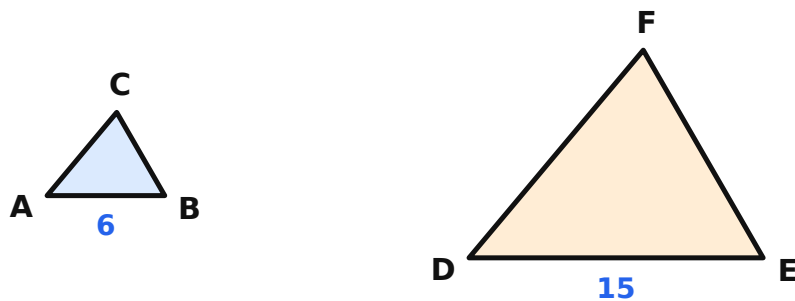
Exercise 4 - Shrinking a poster

Scale factor = image width $\div$ original width: $9 \div 24 = 0.375$.

Image height: $0.375 \cdot 40 = 15$ inches.

$k = 0.375$; height 15 inches

Exercise 5 - Find the scale factor



$$k = 15/6 = 2.5.$$

Scale factor = image length $\div$ original length.

$$\frac{15}{6} = 2.5$$

$k = 2.5$

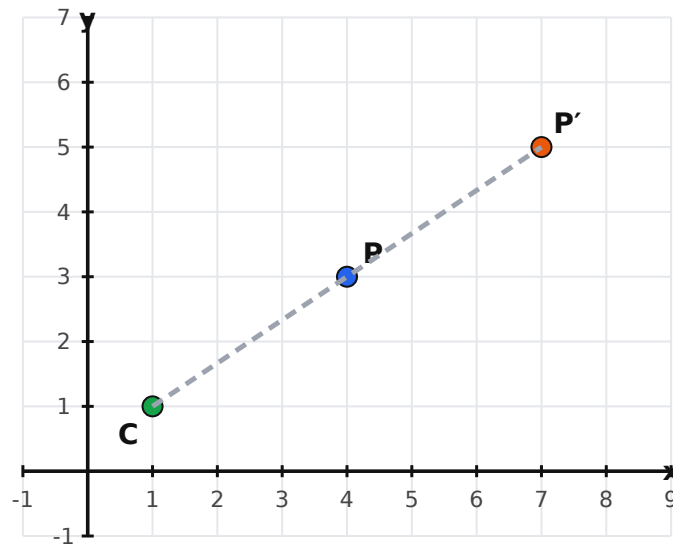
Exercise 6 - Enlargement or reduction?

$k > 1$: enlargement (1.4).

$0 < k < 1$: reduction (0.6).

$k = 1$: same size (congruent).

Exercise 7 - Different center



P' is twice as far from C as P.

Vector from C to P: $(3, 2)$. Doubled: $(6, 4)$.

Add back the center: $(1+6, 1+4) = (7, 5)$.

(7, 5)

Exercise 8 - Reduction about a center

Vector from P to A: $(3, 3)$. One third: $(1, 1)$.

$(2+1, 3+1) = (3, 4)$

(3, 4)

Exercise 9 - Image of a line

The point $(0, 3)$ on the line maps to $(0, 9)$.

A line not through the center maps to a parallel line, so the slope stays 2.

$$y = 2x + 9$$

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Exercise 10 - Line through the center

The line passes through the center, so each of its points moves along the line itself.

The image is the same line $y = x$

Exercise 11 - Angles are preserved

Dilations preserve angle measure, so the image angle is 50° .

Lengths are multiplied by the scale factor.

50° ; ratio 2.5

Exercise 12 - AA similarity

The third angle of triangle 1 is $180^\circ - 110^\circ = 70^\circ$, and the third angle of triangle 2 is 50° .

Both triangles have angles 50° , 60° and 70° , so they are similar by AA.

Yes, by AA

Exercise 13 - Missing side

Scale factor: $\frac{9}{6} = 1.5$.

$$EF = 1.5 \cdot 8 = 12$$

$EF = 12$

Exercise 14 - Area under dilation

Area is multiplied by $k^2 = 9$.

$$9 \cdot 10 = 90$$

90 square units

Exercise 15 - Perimeter under dilation

Perimeter: $1.5 \cdot 24 = 36$ cm.

Area ratio: $1.5^2 = 2.25$.

36 cm; area ratio 2.25

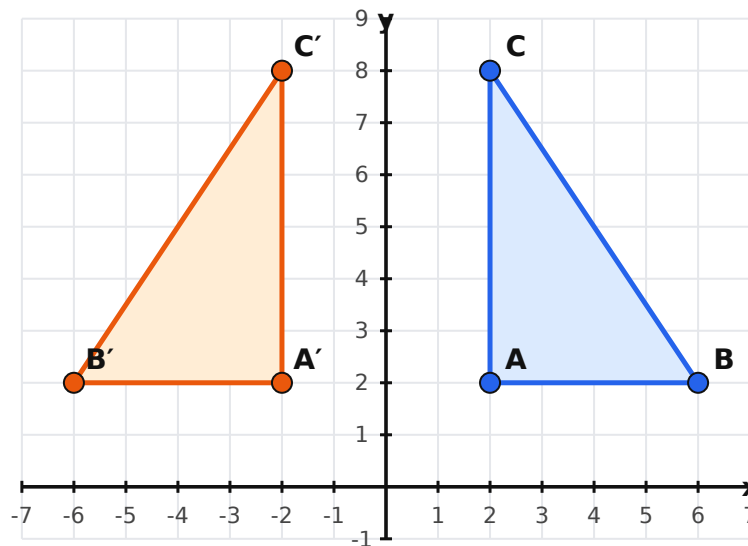
Exercise 16 - Third angle by AA

$m\angle C = 180^\circ - 48^\circ - 62^\circ = 70^\circ$ and the same for F.

Two angle pairs are congruent, so the triangles are similar by AA.

Similar by AA; $m\angle C = m\angle F = 70^\circ$

Exercise 17 - Dilation then reflection



The dilated triangle and its reflection.

After dilation: $A'(2, 2)$, $B'(6, 2)$, $C'(2, 8)$.

After reflection across the y-axis: $A''(-2, 2)$, $B''(-6, 2)$, $C''(-2, 8)$.

A dilation followed by a rigid motion is a similarity transformation, so the triangles are similar.

$A''(-2, 2)$, $B''(-6, 2)$, $C''(-2, 8)$

Exercise 18 - Shadow problem

The sun makes two similar right triangles.

$$\frac{h}{18} = \frac{6}{4}, \text{ so } h = 18 \cdot 1.5 = 27.$$

27 feet

Exercise 19 - Photo enlargement

$$2.5 \cdot 4 = 10 \text{ and } 2.5 \cdot 6 = 15.$$

$$\text{Area ratio: } 2.5^2 = 6.25, \text{ which checks: } \frac{150}{24} = 6.25.$$

10 in by 15 in; area ratio 6.25

Exercise 20 - Model car

$$\text{Real length: } 15 \cdot 12 = 180 \text{ inches.}$$

$$180 \div 18 = 10$$

10 inches