



## Similar figures and scale factor worksheet answer key

Similarity (when two objects are identical except for proportional differences in lengths and areas.) Enlargement (a copy of a given figure that is proportionately larger) · Image (the resulting figure when a given figure is enlarged /stretched or shrunk) · Correspondence (given a figure and an image of it, knowing which segments or vertices in the original figure correspond to segments or vertices in the image) • Transformation (changing a figure in a consistent way) • Transformation rule (defines how a figure is to be transformed, often given in (x,y) coordinate form) • Scale factor (number multiplied by the dimensions of the original figure to transform it into an image similar to the original figure). Reptiles (figures made with copies of a given figure) Map scales (linear scales given on maps that can be used to find distances and areas) Similar triangles (triangles which have congruent corresponding angles) Ratio (comparison of two quantities that gives the scale factor between them) Solve problems using properties of similar triangles · Enlarge and shrink plane figures (with rubber-band stretcher and scale factors) · Subdivide figures (to determine scale factors) · Use scale maps, diagrams, and figures (use scale factors to find actual distances/areas with scale maps, diagrams, and similar figures) · Compute applications of similarity · Identify and draw angles, circles, diameters, radii, attitudes and two-dimensional figures with given specifications, including their reflections and translations on a coordinate grid Locate and plot coordinates in all four quadrants (including missing vertex in a parallelogram) Recognize and compute Compute fractions and decimals (four basic operations). Compare, order, and convert measurements and area using common reference points (within and between US and metric systems). equivalent representations (fractions, decimals, and percents) · Recognize that pi is the ratio between the circumference and diameter of any Apply of circle attributes in real life problems (i.e. radius, diameter, circumference, and area) · Apply knowledge of triangles (measures of interior angles add up to 180°) · Model and explain how scale change in linear dimensions affects perimeter/circumference and area of a two dimensional figure In order to continue enjoying circle our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. In order to continue enjoying our site, we ask that you very much for your cooperation. Transcript Similar Figures Answer Key Vocabulary: image, preimage, scale factor, similar Prior Knowledge Questions (Do these BEFORE using the Gizmo.) [Note: The purpose of these questions is to activate prior knowledge and get students thinking. Students thinking. Students thinking. Students the picture to a photo store and asks them to enlarge the picture so that it is 8 inches tall. 1. What are the dimensions of the enlarged picture? 12 inches wide by 8 inches tall 2. Will the enlarged picture is greater than the 10-inch side of the frame. Gizmo Warm-up In the Similar Figures Gizmo<sup>™</sup>, you will experiment with similar figures. Similar figures have the same shape, but are not necessarily the same size. 1. Click the triangle button (). Set Scale factor to 1.0 and Rotation, in degrees to 0. (To set the value of a slider, drag the slider or select the number in the text field, type in a new value, and hit Enter.) A. Do the pink and green triangles appear to be the same size and shape? Yes. B. These triangles are congruent. What is true about corresponding side lengths and then Show angle measures to check. C. Drag the Rotation, in degrees slider. Are the triangles still congruent? Yes. 2. Set Rotation, in degrees to 0. Drag the Scale factor slider. Notice that the size of  $\Delta$ EFG (the image) changes, but  $\Delta$ ABC (the preimage) stays the same. A. How do the image and preimage compare when the scale factor is less than one? The image is smaller than the preimage. Get the Gizmo ready: Activity A: Similar polygons • Set the Scale factor to 3.0 and Rotation, in degrees to 0. 1. Make sure the triangle button () is selected. A. Similar figures have pairs of corresponding angles and pairs of corresponding sides, just like congruent figures. Name the part of  $\Delta$ EFG that corresponds to each of the following parts of  $\triangle ABC$ .  $\angle ABC$  and  $\angle FGE$  AB and EF BC and FGE AB an sides in simplest form. [The actual ratios will vary, but should all equal 3.] 3 EF = = 3 1 AB 3 FG = = 3 1 AB remain similar? Yes, Explain. The side lengths and angle measures do not change when the triangles are rotated. 2. Experiment more with similar triangles by dragging the vertices of either triangles by dragging the vertices of either triangles are rotated. lengths. What is true about the lengths of the corresponding sides? The ratios of the lengths of each pair of corresponding sides are equal. (Activity A continued on next page) 3. Select the button to change the figures to quadrilaterals. Experiment with a variety of similar quadrilaterals by changing the scale factor and rotation, and dragging their vertices. A. Select Show angle measures. What do you notice? For each pair of similar quadrilaterals, the measures of each pair of similar quadrilaterals, the measures of each pair of similar quadrilaterals, the measures of each pair of corresponding sides are equal. 4. Use the buttons at the top left of the Gizmo to explore other types of figures, and vary the scale factor and rotation. A. What do you notice about the angle measures? For each pair of similar figures, the measures of each pair of corresponding angles are the same. B. What do you notice about the side lengths? For each pair of similar figures, the ratios of the lengths of each pair of corresponding sides are equal. 5. Select the button to view two similar trapezoid ABCD so that AB = 18, BC = 16, CD = 20, and DA = 16. A. If EF = 9, what is the scale factor? 0.5 Explain. EF and AB are corresponding sides, so the scale factor is 9:18, or 0.5. B. Use the scale factor from above to find the lengths of the other three sides of trapezoid EFGH. Show your work in the space below. Then check your answers in the Gizmo by setting the Scale factor to the value you calculated above. FG = 8 GH = 10 FG = 0.5 • 16 = 8 GH = 0.5 • 20 = 10 HE = 0.5 • 16 = 8 HE = 8 C. If you know the measures of the angles of trapezoid ABCD, how do you find the measures of the angles are the same, so just find the corresponding angles. Select Show angle measures of the angles of trapezoid EFGH? The measures of the angles are the same, so just find the corresponding angles. Get the Gizmo ready: • Be sure the triangle button is selected. 1. State whether each statement is always, sometimes, or never true. Then explain your answer, and check it in the Gizmo. A. Congruent triangles are similar. B. Equilateral triangles are similar. Always. The measure of all angles of all equilateral triangles is 60°, so each pair of corresponding angles are similar only if all pairs of corresponding angles are similar. Sometimes. Isosceles triangles are similar. Always. Two triangles with congruent corresponding angles are always the same shape. 2. Ken wants to find the height of a building, but realizes that the building. A. Ken is 6 feet tall and his shadow is 4 feet long. The shadow of the building is 10 feet long. Make a sketch of this situation in the space at right. 6 ft 10 ft 4 ft B. How can Ken use similar triangles to find the height of the building? Two similar triangles are formed. The scale factor. C. Find the height of the building. Show your work in the space to the right. Then check your answer in the Gizmo. Building height = 15 feet Scale factor = 10 4 = 2.5 Building height = 6 • 2.5 = 15 Transformations change the size of a shape. Two triangles are said to be similar if their corresponding angles are congruent and the corresponding sides are in proportion. In other words, similar triangles are congruent if, in addition to this, their corresponding sides are of equal lengths of two similar triangles are proportional. That is, if  $\Delta U V W$  is similar to  $\Delta X Y Z$ , then the following equation holds: U V X Y = U W X Z = V W Y Z This common ratio is called the scale factor. The symbol ~ is used to indicate similarity. Example:  $\Delta U V W \sim \Delta X Y Z$ . If U V = 3, V W = 4, U W = 5 and X Y = 12, find X Z and Y Z. Draw a figure to help yourself visualize. Write out the proportion. Make sure you have the corresponding sides right. 3 12 = 5 X Z = 4 Y Z The scale factor here is 3 12 = 1 4. Solving these equations gives X Z = 20 and Y Z = 16. The concepts of similarity and scale factor can be extended to other figures besides triangles.

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