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Instructor Page

Get Into Shape

Activity Instructions

Hints or notes:

A circle will be folded into a variety of geometric shapes. This activity provides the opportunity to assess the concepts, vocabulary and knowledge of relationships between shapes.

If participants use a compass to form the circle, the center will be clearly visible. If desired, use the circle provided on the next page (and in the appendix) to allow students to discover that the center can be found by folding two diagonals.

As the paper constructions are formed, continue discussions to assess participants' knowledge and understanding of the relationships.

Vocabulary:
diameter
radius (radii)
chord
right triangle
hypotenuse
isosceles trapezoid
rhombus
similar
congruent
pyramid
tetrahedron

- Fold a circle with an eight-inch diameter in half and label each half *semicircle.* Can participants name the line segment formed by the fold? Label the segment *diameter*.

- Fold again making a second diameter. What line segments are formed by the two diameters? Label one *radius*. How does the size of the radius compare to the size of the diameter? *The radius is half the diameter.*   What point is formed where the diameters intersect? Label the *center*.

- Fold the top of the circle down to the center. What is this line segment called? Label the *chord*.

- Make a second fold to the center so that the end of the new chord meets an end of the first chord. (This figure resembles a snowcone.) Make a third fold to the center so that the ends of the new chord meet the remaining ends of the previous two chords. What shape is formed? *equilateral triangle (inscribed in a circle)* How many degrees are in each angle of the triangle? *60°* Label the number of degrees at each angle.

- Fold to form the equilateral triangle, how do you know it is equilateral? Fold in half vertically. What type of triangle is formed? *right scalene triangle*. What is the longest side of the right triangle called? *hypontenuse* How many degrees are in each of the angles of the right triangle? *90°* How do you know?   The line of symmetry may also be identified.

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**Participant
Page**
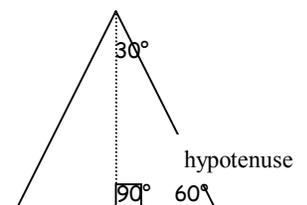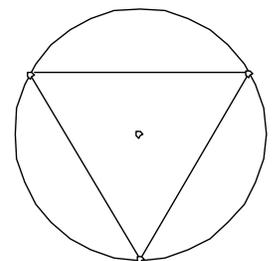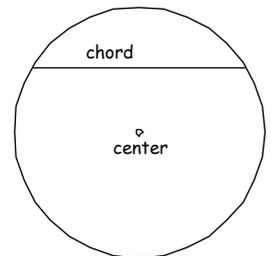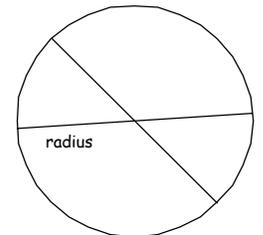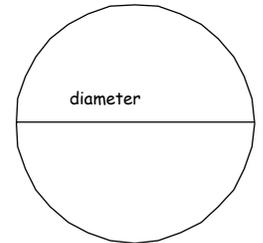
Get Into Shape

**Cut an eight-inch circle out of paper to begin an exploration
of two and three-dimensional shapes. Answer the following
questions as you fold and label your document.**

1. How do the radius and diameter of a circle compare?

2. What is a chord?

3. How many degrees are in each angle of an equilateral triangle?

4. What is the name of the side of the triangle opposite the right angle in a right
   triangle?

5. Describe an isosceles trapezoid.

6. Name the properties of a rhombus.

7. How many faces, edges and vertices does a triangular pyramid have?

8. Choose at least three shapes used in this activity and describe where these shapes
   are seen in our environment.

9. Create your own question about this activity.

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Get Into Shape (continued)

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Activity Instructions (continued)

- Open to the large equilateral triangle then fold down to the midpoint of base of the triangle. What shape is formed? *isosceles trapezoid* Why is it called an isosceles trapezoid? *One pair of parallel sides and one pair of congruent sides* How many degrees are there in each angle of the trapezoid? How do you know? Label them on your shape.
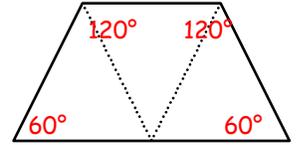
- Now fold one of the 60° angles to the midpoint of the base of the trape- zoid.   What is this new shape called? *right trapezoid* Why? Label the number of degrees in each angle.
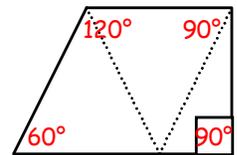
- Next fold the remaining acute angle to form a right angle at the base. What is this new shape? *rectangle*
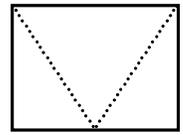
- Open back to the isosceles trapezoid. Fold one small equilateral triangle over the center triangle. What shape is formed? *rhombus*   What makes this shape a rhombus?
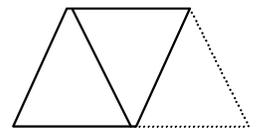
- Fold the other small equilateral triangle over the center triangle to form an equilateral triangle. How does this shape compare to the original equilateral triangle? *similar* How does it compare to the other small equilateral triangles? *congruent*
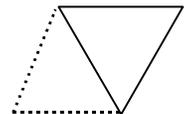
- Hold the shape in the palm of your hand and allow the triangles to open. Hold together to form a tetrahedron or triangular pyramid. How many faces does the figure have? *four* How many edges? *six* How many vertices? *four*
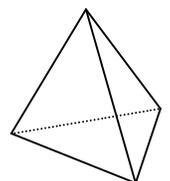
- Open the shape to the original equilateral triangle. Fold the top down to the center of the circle. What shape is formed? *trapezoid*
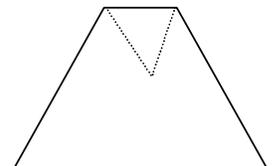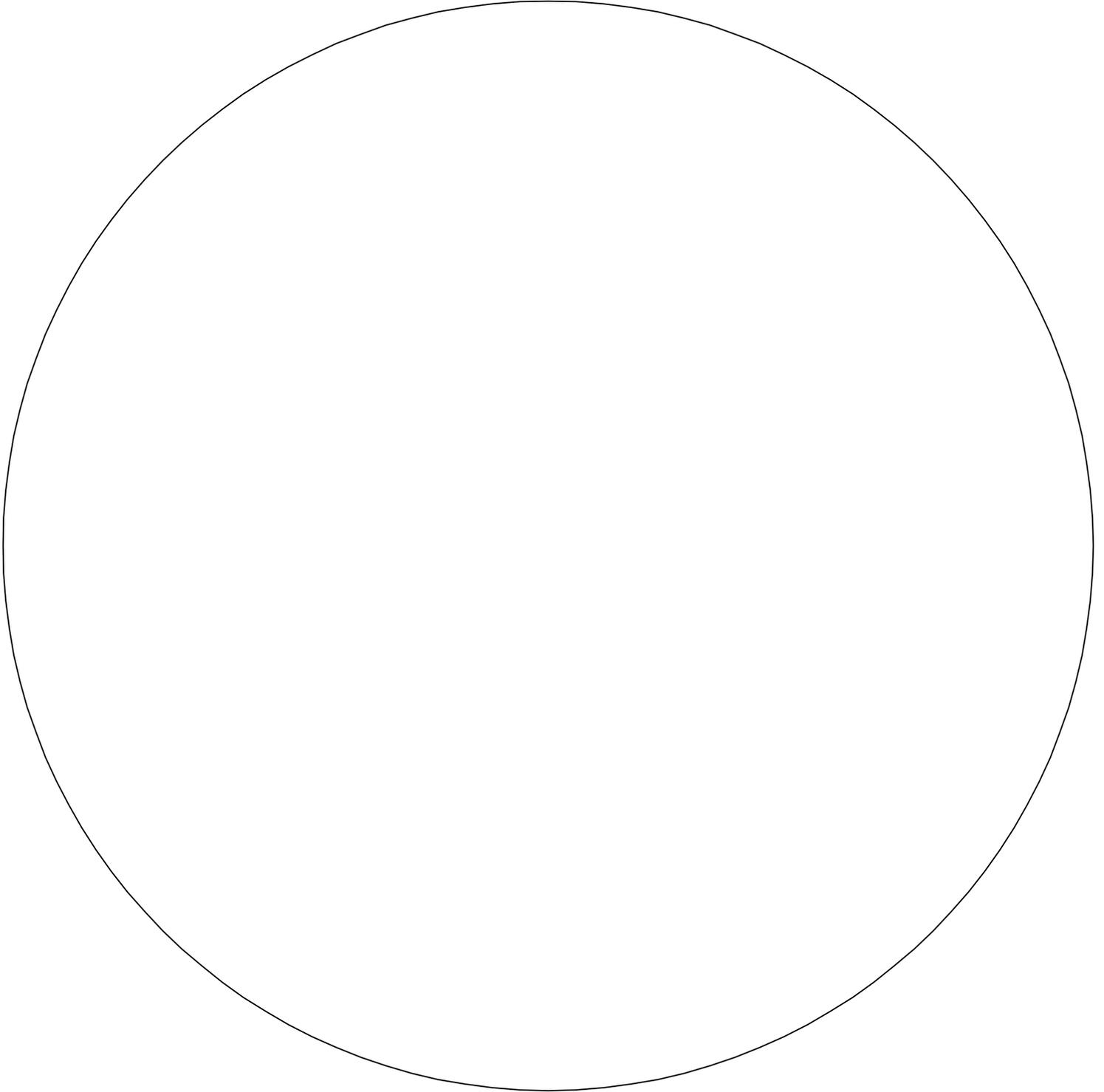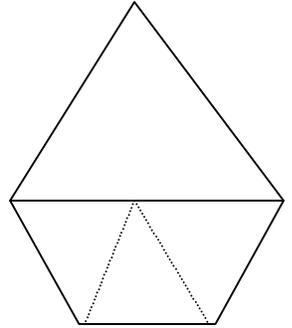
M2T2

Participant
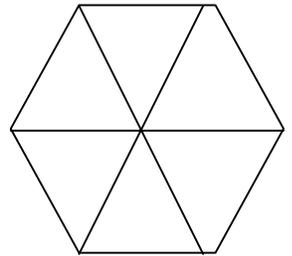Page

Get Into Shape *(continued)*

8 Inch Circle Template

M2T2

Get Into Shape *(continued)*

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Activity Instructions *(continued)*

- Fold a second corner to the center of the circle. What shape is formed?
  pentagon

- Fold the third corner to the center point. What figure is formed?
  regular hexagon

- This figure may then be guided into a three dimensional shape, a
  truncated tetrahedron by guiding the three sections toward the center.
  Count and describe the faces. *2 similar triangles*
  and 3 similar isosceles trapezoids
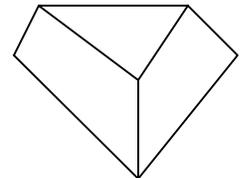
As an architectural connection, twenty congruent truncated tetrahedral may be glued to-
gether to form an icosahedron or geodesic dome. Attach congruent trapezoid faces to-
gether.

This activity was adapted from, *The Magic Circle*, AIMS Education Foundation 1988 News-
letter in which area and surface area were also determined. Another adaptation may also be
found in the 2002 NCTM Yearbook, *Making Sense of Fractions, Ratios, and Proportions*.