

LessonTitle: Measuring Angles**Pre 7.3a, b****Utah State Core Standard and Indicators** Prealgebra Standard 4 Process Standards 1-4**Summary**

In 7.3a,b, students explore the basic concept of an angle using a hinged mirror and pattern blocks. In 7.3c,d, they classify and measure angles, build different triangles with specified kinds of angles, and examine the angles of regular polygons.

Enduring Understanding

We orient ourselves by the circle which surrounds us at any given time. Anything we create on a plane surface or in space also must have a circular orientation. Therefore angles which measure circular distance are extremely important to any kind of directional orientation or construction in our world.

Essential Questions

What are angles? How do we use them?

Skill Focus

- Measuring angles
- Identifying different kinds of angles
- Creating polygons with different sides and angles
- Using hinged mirrors to understand angle reflection
- Polygon angles

Vocabulary Focus**Assessment****Materials**

- For 7.3a Angles with Hinged Mirrors, you will need pattern blocks, hinged mirrors, strips of centimeter graph paper, scissors, string.
- For 7.3b Creating a Protractor, you will need the angle sheet (see below) and scissors and the different protractors (see link).

Launch

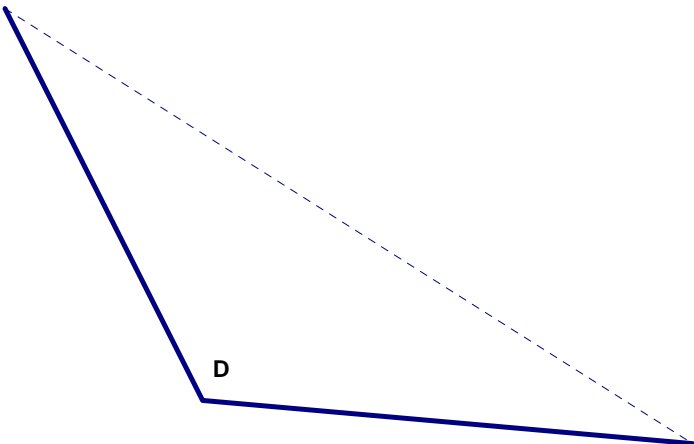
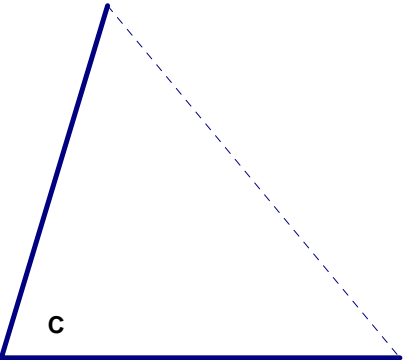
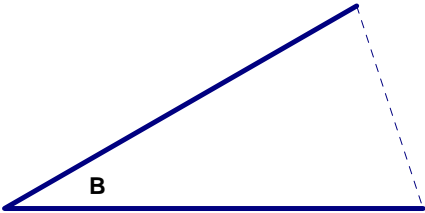
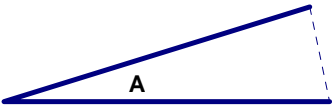
You may wish to use the book [Sir Cumference and the Great Knight of Angleland](#).

Explore

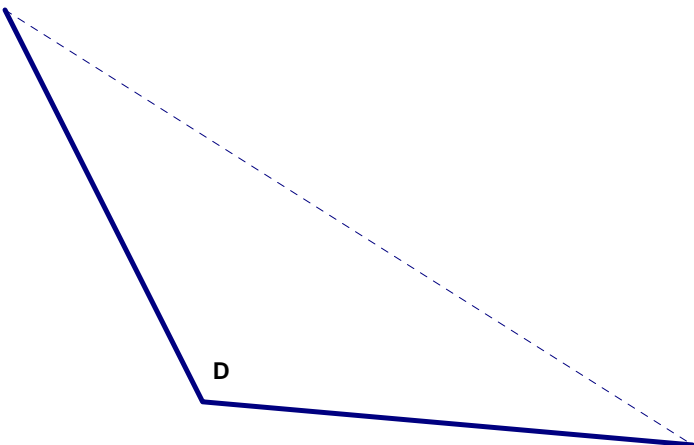
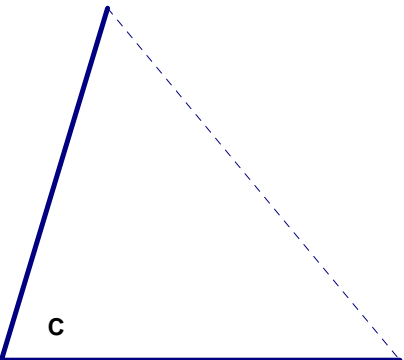
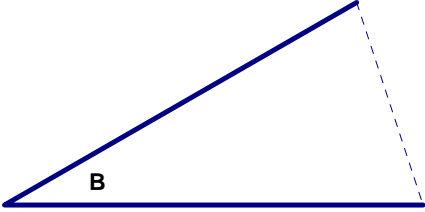
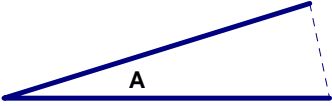
- What are angles and how do you measure them?
- How do you explain the view of an object using different hinged mirror angles?
- What is the pattern for the sums of angles in different polygons? How do you explain that pattern?

Summarize**Apply**

Angle Sheet

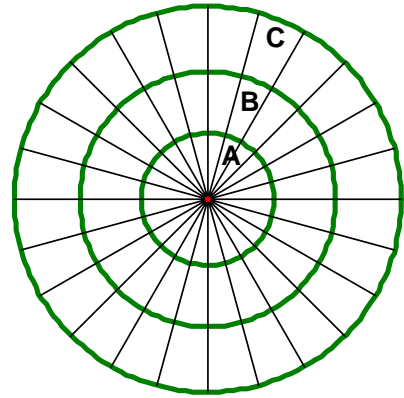


Angle Sheet



Angles with Hinged Mirrors

1) What is an angle? Use the circle drawing to help you understand and explain.



2) Why can angles in circle A be the same size as angles circle B and C?

in

3) Nest a square pattern block between hinged mirrors. Draw what you see in the mirrors.

Why do you see what you see?

4) If there are 360 degrees in a circle, use the hinged mirrors to figure out the size of the angles in the following pattern blocks.

- Green Triangle angles = _____
- Yellow Hexagon angles = _____
- Blue Rhombus Small angle = _____
- Large angle = _____
- White Rhombus Small angle = _____
- Large angle = _____
- Red Trapezoid Small angle = _____
- Large angle = _____

5) Draw a dot and a line (as below) on a small sheet of paper. Use the mirrors. Place them so the dot is inside and near the vertex of the mirrors. Make certain the mirrors cross the line. Move the hinged mirrors from a small opening (angle) to a large opening (angle)

What do you see? How does the angle of the hinged mirror affect what you see in the mirror? Record your ideas about what you see.

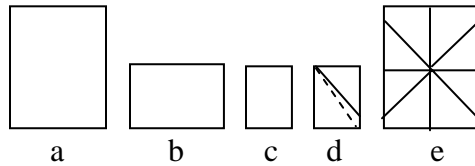


Pre 7.3b

Creating a Protractor

1) A protractor is the tool we use to measure angles. To understand how protractors work, we will create our own protractor.

- Take 1 full sheet of paper (a).
- Fold it in half (b)).
- Fold the sheet into fourths.



- Fold the upper corner down to create equal angles (d)—do not fold on the dotted line—fold to create equal angles.
- Open the paper up to look like (e). This is your 8 wedge protractor.

2) Now cut out the angles from your angle sheet. Place one at a time over the 8wedge protractor—Find the number of wedges in the angles—measure to the nearest wedge.

Angle A _____wedges Angle B _____wedges
 Angle C _____wedges Angle D _____wedges

3) What is the problem measuring with our protractor?

4) Try measuring with the 16 wedge protractor—to the nearest wedge.

Angle A _____wedges Angle B _____wedges
 Angle C _____wedges Angle D _____wedges

5) What do you notice?

6) Now measure with three different protractors—to the nearest wedge. Record.

Angle	10 Wedge Protractor	20 Wedge Protractor	40 Wedge Protractor
A			
B			
C			
D			

7)What patterns do you notice? What conclusion do you draw?