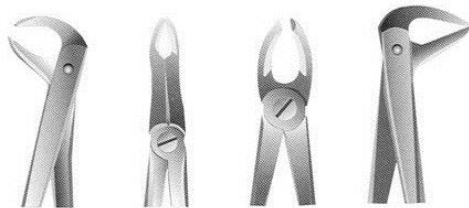


Identify dental instrument classification = Apply geometric concepts to model and solve real world problems

Program Task: Use Black’s Instrument Classification to choose the appropriate instrument angle for the procedure the dentist will perform.

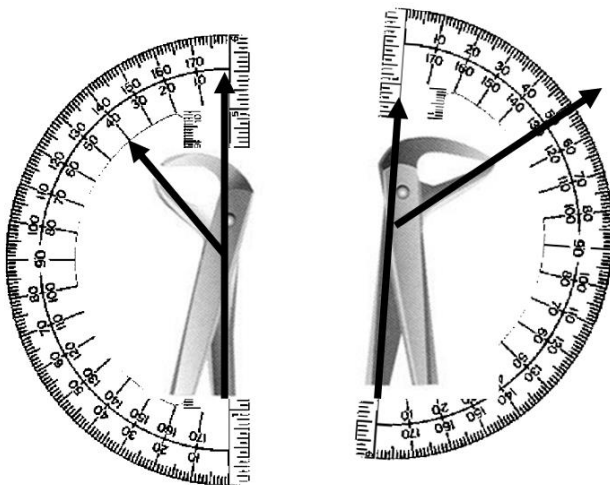
Program Associated Vocabulary:
 BLACKS FORMULA, CUTTING, NONCUTTING, SHANK, WORKING END, NIB, MONANGLE, BIANGLE

Program Formulas and Procedures:
 Dental instruments are site specific. Black’s Formula uses a 3 or 4 numbering system to identify the width of blade, degree of angle, length of blade, and degree of angle from handle. Students need to be able to recognize the correct instrument and angle the doctor will need for different procedures. Learning how to find angles with a protractor and recognizing common angles will help the student with identifying and handling the correct instrument in four handed dentistry.



Example:
 A B C D
 Dr. Jones needs a mandibular extraction forceps to extract tooth #30 requiring a forceps with a 50 degree angle. Using your protractor, measure the angles of the above instrument and choose the one with a 50 degree angle.

Solution:
 B and C are straight. When using the protractor to measure A and D, D is the forceps with the 50 degree angle. A is a 40 degree angle.



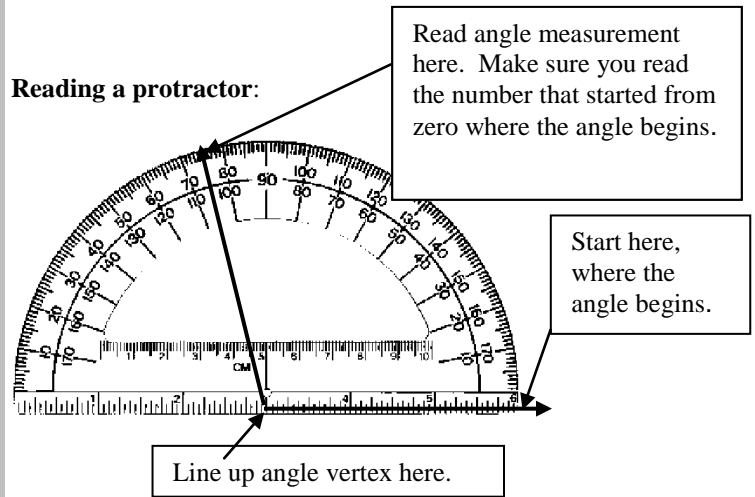
PA Core Standard: CC.2.3.HS.A.14

Description: Apply geometric concepts to model and solve real world problems.

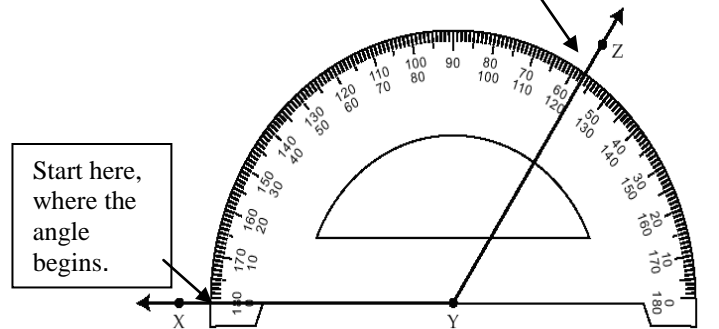
Math Associated Vocabulary:
 ANGLE, DEGREES, INTERIOR ANGLES, EXTERIOR ANGLES, VERTICAL ANGLES, CORRESPONDING ANGLES, PARALLEL, TRANSVERSAL

Formulas and Procedures:

Reading a protractor:



Read angle measurement here. Make sure you read the number that started from zero where the angle begins.



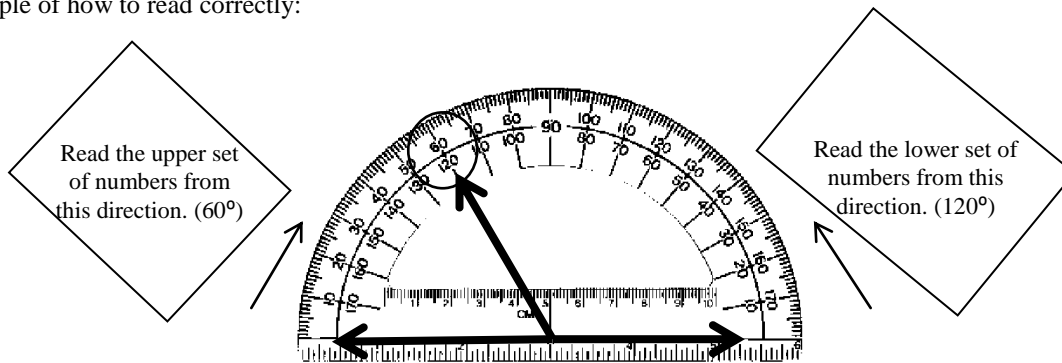
Instructor’s Script – Comparing and Contrasting

Hygienists do not carry around a protractor to measure angles, so it is vital that they can visually identify angle measurements correctly and quickly. A hygienist must identify the exact components of the instrument that determine the angle required. Dental instruments are site specific.

Common Mistakes Made By Students

- Not aligning the index line (line along the bottom of the protractor) with one side of the angle in question
- Not placing the vertex of the angle at the hole or point at the bottom-center of the protractor
- Not clearly specifying a reference or starting point for an angle
- Reading the wrong indicator on the protractor (bottom number versus top number, or vice-versa).

Example of how to read correctly:



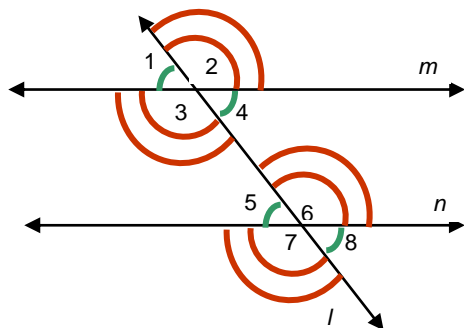
CTE Instructors’ Extended Discussion

To help the students recognize angles quickly and correctly, pull various dental instruments out and have students measure the angles with a protractor. When they have mastered this skill, try to see if they can estimate instrument angles while practicing four handed dentistry chair side.

Note: It is important for CTE instructors to show students how math concepts are relevant in their CTE program and in other real world settings. CTE math should be presented in a way which shows a relationship to the math which CTE students use in their academic school settings.

The information below is needed to solve problem #9 on pages 3 and 4. While this specific technical task (instrument classification) may not use the concepts shown below, students will see questions related to this information on the Keystone Geometry exam.

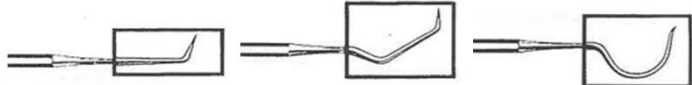

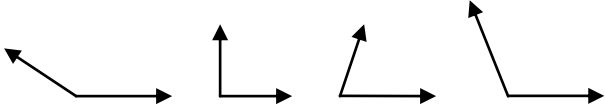

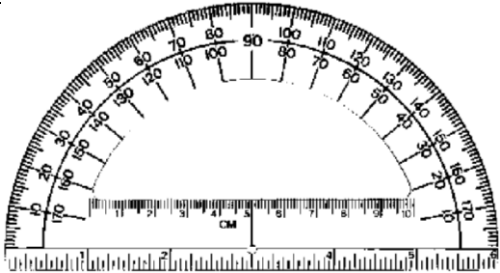
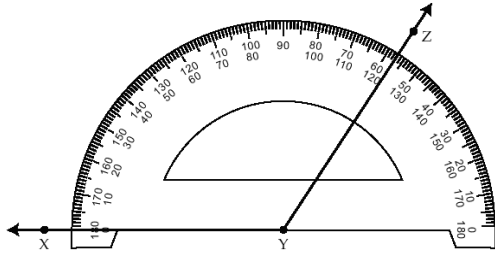
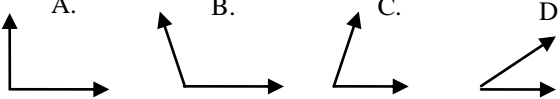
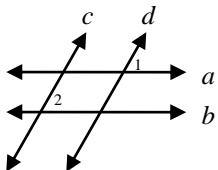
Two parallel lines cut by a transversal




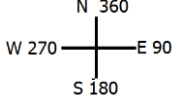
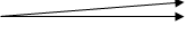
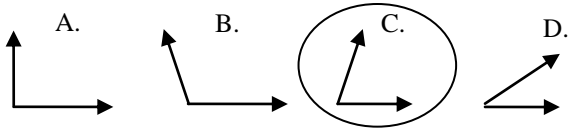
Angles **1&4, 2&3, 5&8, 6&7** are **vertical angles**.
 Angles **1&5, 2&6, 3&7, 4&8** are **corresponding angles**.
 If lines *m* and *n* are parallel then **corresponding angles** are congruent. **Alternate Interior** angles are congruent, and **Alternate Exterior** angles are congruent.
Vertical angles are always congruent.

Examples:

1. If angle 1 = 40°, what is the measure of angle 8?
 Angle 8 must measure 40°, since $\angle 1$ and $\angle 8$ are alternate exterior angles.
2. If $m \angle 2 = 3x + 4$, and $m \angle 3 = x + 8$, solve for *x*
 $3x + 4 = x + 8$ (subtract *x* from both sides)
 $2x + 4 = 8$ (subtract 4 from both sides)
 $2x = 4$ (divide both sides by 2)
 $x = 2$

Problems	Career and Technical Math Concepts	Solutions
<p>1. The dentist needs to check bone loss in a furcation area of tooth number 19. Using your protractor, which explorer has a 145 degree angle from the handle? Why is it necessary to use this probe to check furcation?</p>		
<p>2. In Black's Instrument Classification the 4th number is the degree of the shank from the handle. Which of the following formulas describes the instrument to the right? a) 15, 85, 8, 12 b) 15, 85, 8, 15 c) 15, 85, 8, 20</p>		
<p>3. When prepping a class 1 occlusal cavity, the buccal proximal wall needs to be 75° to accurately condense amalgam. Choose the letter that represents 75°.</p>		<p>A. B. C. D.</p> 
Problems	Related, Generic Math Concepts	Solutions
<p>4. Which angle would you estimate to be the interior angle of the hairpin shown here? How would you describe a "hairpin turn" in the road? a) 10° b) 45° c) 90° d) 120°</p>		
<p>5. Your GPS indicates that you are traveling in a direction (bearing) that is determined to be 270°. If 90° is east, in which direction are you traveling?</p>		
<p>6. To be accessible, the grade of the ramp must not exceed 1 foot of rise per 12 feet of run. This equates approximately to a 5° angle. Use the protractor provided to draw this angle measure.</p>		
Problems	PA Core Math Look	Solutions
<p>7. What is the angle measure of $\angle XYZ$? a) 57° b) 63° c) 123° d) 137°</p>		
<p>8. Which of the angles on the right are closest to 76°?</p>		<p>A. B. C. D.</p> 
<p>9. Given: $a \parallel b, c \parallel d$ If $m\angle 1 = 2x + 16$ and $m\angle 2 = x + 18$, then what is the value of x?</p>		

Dental Technology (51.0601) T-Chart

Problems	Career and Technical Math Concepts	Solutions
1. The dentist needs to check bone loss in a furcation area of tooth number 19. Using your protractor, which explorer has a 145 degree angle from the handle? Why is it necessary to use this probe to check furcation?		The third explorer has a 145 degree angle. Because a furcation is between the roots of the tooth, a 145 degree angle is required to get between and under the root structure.
2. In Black's Instrument Classification the 4 th number is the degree of the shank from the handle. Which of the following formulas describes the instrument to the right? a) 15, 85, 8, 12 b) 15, 85, 8, 15 c) 15, 85, 8, 20		The angle measure is 54°. $\frac{54}{360} = \frac{x}{100} \rightarrow 54(100) = 360x \rightarrow 5400 = 360x \rightarrow \frac{5400}{360} = \frac{360x}{360}$ X = 15, so letter B is the correct classification.
3. When prepping a class 1 occlusal cavity, the buccal proximal wall needs to be 75° to accurately condense amalgam. Choose the letter that represents 75°.		C. is the closest illustration to a 75° angle.
Problems	Related, Generic Math Concepts	Solutions
4. Which angle would you estimate to be the interior angle of the hairpin shown here? How would you describe a "hairpin turn" in the road? a) 10° b) 45° c) 90° d) 120°		The correct answer is (a.) because a 10° interior angle turn would very nearly turn a driver back in the direction from which s/he came. Hairpin turns get their name because they have interior angles similar to a real hairpin.
5. Your GPS indicates that you are traveling in a direction (bearing) that is determined to be 270°. If 90° is east, in which direction are you traveling?		You are traveling West (when your bearing is 270°), 90° is East, 180° is South, and 360° is North. 
6. To be accessible, the grade of a ramp must not exceed 1 foot of rise per 12 feet of run. This equates approximately to a 5° angle. Use the protractor provided to draw this angle measure.		
Problems	PA Core Math Look	Solutions
7. What is the angle measure of ∠ XYZ? a) 57° b) 63° c) 123° d) 137°		c. 123°
8. Which of the angles on the right are closest to 76°?		
9. Given: a b, c d If m ∠ 1 = 2x + 16 and m ∠ 2 = x + 18, then what is the value of x?		Angles 1 and 2 are congruent angles so, $2x + 16 = x + 18 \rightarrow x + 16 = 18 \rightarrow x = 2$ (subtract x from each side, then subtract 16 from each side)