Chapter 1 Parent Guide
Exploring Geometry

What is geometry? Geometry is the study of points, angles, lines, and figures and how they relate to one another. This geometry course includes reasoning, trigonometry, traditional and nontraditional geometries, and proof.

Geometry is used in a variety of fields. Electricians, architects, plumbers, sculptors, carpenters, landscapers, and clothing designers are among the many professionals who use geometry regularly in their career.

Chapter 1 begins with the basic terms and definitions. Chapter 2 introduces the logic and reasoning used throughout the course. Chapters 3 through 5 combine geometric concepts in a study of parallel lines and angles in polygons, congruence, properties of two-dimensional figures, and perimeter and area. Chapters 6 and 7 develop concepts involving three-dimensional figures and their surface area and volume.

Most of the rest of the course focuses again on two-dimensional figures involving similarity, circles, basic trigonometry, more proof and logic, and some non-Euclidean geometries.

Using pictures to represent a problem is an important mathematical skill. Geometry will help your child develop this skill as well as hone mathematical reasoning skills.

Homework is an important element in this course. Besides helping your child practice content learned in class, homework serves as an ongoing review. Students who do daily homework naturally perform better on tests than those who don't. Also, students with parents who take an interest in their mathematical studies tend to do better in mathematics.

In Chapter 1, your child will explore the fundamental basis of geometry. Lesson 1.1 begins with the basic terms used throughout the course. Lessons 1.2 and 1.3 focus on measurements of segments and angles. Lesson 1.4 uses paper folding to develop an intuitive understanding of special pairs of geometric lines. Lesson 1.5 focuses on altitudes, medians, and angle bisectors in triangles. Lessons 1.6 and 1.7 study rigid transformations in the geometric plane and the coordinate plane.

The following activity will keep you informed as to what your child is learning. You will need a protractor.

PROBLEM FOR DISCUSSION (See textbook page 25)

Angle measure is used in many professions. For example, pilots use an angle measure known as the "heading" of an airplane to navigate safely through the skies. A protractor is used to measure angles. As on a ruler, the intervals on a protractor must be equal. Then you can be sure that if two angles have the same measure they are congruent, and vice versa.

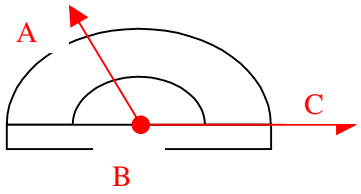
1. Discuss how to use a protractor to measure an angle.

The process for using a protractor is as follows:

1. Place the center of the protractor on the vertex of the angle.
2. Align one of the rays of the angle with the straightedge of the protractor; it should pass through 0 on the protractor.

3. Read the measure of the angle, in degrees at the point where the other ray intersects the scale on the protractor.

For example, to measure the angle ∠ABC place the protractor as pictured.

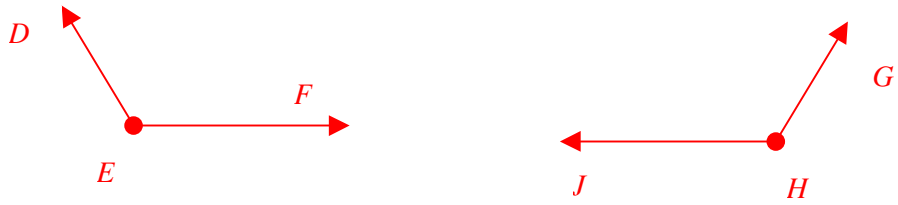


2. When the center of the protractor is on the vertex of the angle, one angle side will always align with what other part of the protractor?

The angle side will always align with the straightedge, which measures 0° or 180°.

3. How do you know which set of numbers on the protractor to use to read the angle measure?

It depends on how the angle "opens." For example $\angle DEF$ opens to the right and $\angle GHJ$ opens to the left.



When the angle opens to the right, you read the numbers from right to left, or counter clockwise.

When the angle opens to the left, you read the numbers from left to right, or clockwise.

4. Summarize how to use a protractor to measure an angle.

Place the center of the protractor on the vertex of the angle and align one of the rays with the straightedge part of the protractor. The other ray will pass through a degree measure. When the angle opens to the right, you read the numbers from right to left. When the angle opens to the left, you read the numbers from left to right.

The following are complete worked out solutions to selected exercises in the student textbook. These solutions are provided to you so that you can help your child with their homework. Your child's classroom notes, example problems in the text, and these worked out solutions are all useful tools to help you and your child work through their assignment.

Chapter 1 - Solutions to Selected Exercises from the Student Textbook

Lesson 1.1

20. False. Two intersecting lines are contained in exactly one plane. Three intersecting lines may be contained in two planes.

42. $2 + 1 = 3$; $\overline{AB}$, $\overline{AC}$, $\overline{BC}$

46. $1 + 2 = 3$; $\angle AVC$, $\angle AVB$, and $\angle BVC$

Lesson 1.2

14. $AB = |-7 - (-2)| = |-5| = 5$

18. $\overline{AC} \cong \overline{CE} \cong \overline{BD} \cong \overline{DF}$; $\overline{AB} \cong \overline{CD} \cong \overline{EF}$

24. $PQ = 25$
$5x = 25$
$x = 5$
$3x = 15$
$PR = 25 + 15 = 40$

26. $AB = x$, $BC = 2 + 2x$, then
$x + (2 + 2x) = 41$
$3x + 2 = 41$
$3x = 39$
$x = 13$
$AB = 13$ miles; $BC = 2 + 2(13) = 28$ miles

Lesson 1.3

16. $120°$

23. $m\angle 2 = 30°$

31. $m\angle 3 = m\angle 2 = 30°$

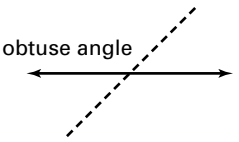
37. $m\angle XZY = 43 - 21 = 22°$

43. $(6x - 6)° = (6(6) - 6)°$
$= (36 - 6)°$
$= 30°$
$m\angle ADB = 30°$

57. Less than 355. The pilot would have to fly more to the west.

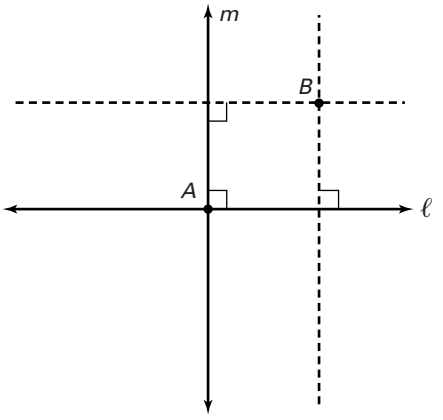
Lesson 1.4

12.



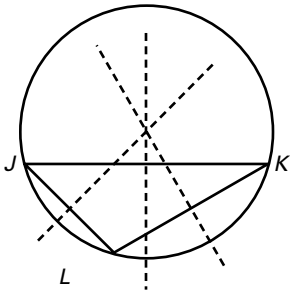
28. Lines ℓ and m are perpendicular.

30.

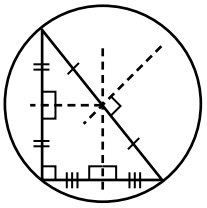


Lesson 1.5

12.

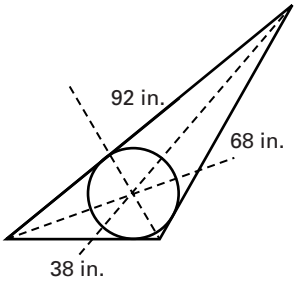


22.



The longest side of the triangle divides the circle into two equal parts.

28.



The diameter of the largest duct can be estimated using a proportion.

$$\frac{\text{length of one side of triangle}}{\text{measure of scaled drawing of that side}} = \frac{\text{radius of inscribed circle}}{\text{measure of scaled drawing}}$$

Note: measurements may vary from those given below but the measurements will be proportional to those given. Thus, the final answer will be the same.

If the side labeled 92 in. measured 52 cm and the radius measured 6.5 cm, we could use the following proportion:

$$\frac{92 \text{ in.}}{52 \text{ cm}} = \frac{r}{6.5 \text{ cm}}$$

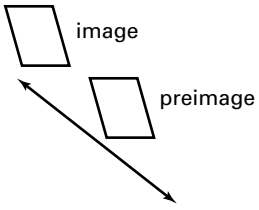
$$r = \frac{92(6.5)}{52} = 11.5$$

diameter $= 2r = 2(11.5) = 23$

The diameter of the largest duct is about 23 inches.

Lesson 1.6

12.



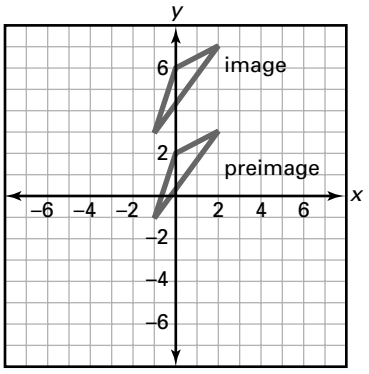
21.

26. The line of reflection is the perpendicular bisector of $\overline{GG'}$, $\overline{HH'}$, and $\overline{II'}$.

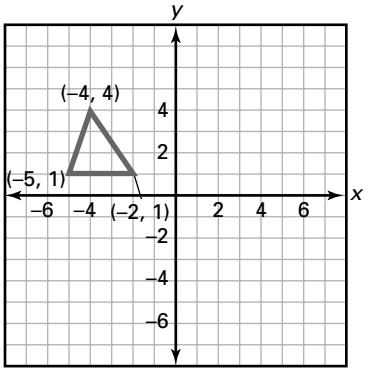
30. Rotate *ABCD* about each of its vertices by 90° counterclockwise. Then rotate *ABEF* 180° clockwise about the point *E*.

Lesson 1.7

10. vertical translation;



19.



$N(x, y) = (-x, y)$

26. translation 4 units down

32.