

Family Letter

Study Link
4.12

Unit 5: Geometry: Congruence, Constructions, and Parallel Lines

In *Fourth and Fifth Grade Everyday Mathematics*, students used a compass and straightedge to construct basic shapes and create geometric designs. In Unit 5 of *Sixth Grade Everyday Mathematics*, students will review some basic construction techniques and then devise their own methods for copying triangles and quadrilaterals and for constructing parallelograms. The term **congruent** will be applied to their copies of line segments, angles, and 2-dimensional figures. Two figures are congruent if they have the *same size* and the *same shape*.

Another approach to congruent figures in Unit 5 is through isometry transformations. These are motions that take a figure from one place to another while preserving its size and shape. Reflections (flips), translations (slides), and rotations (turns) are basic isometry transformations (also known as rigid motions). A figure produced by an isometry transformation (the image) is congruent to the original figure (the preimage).

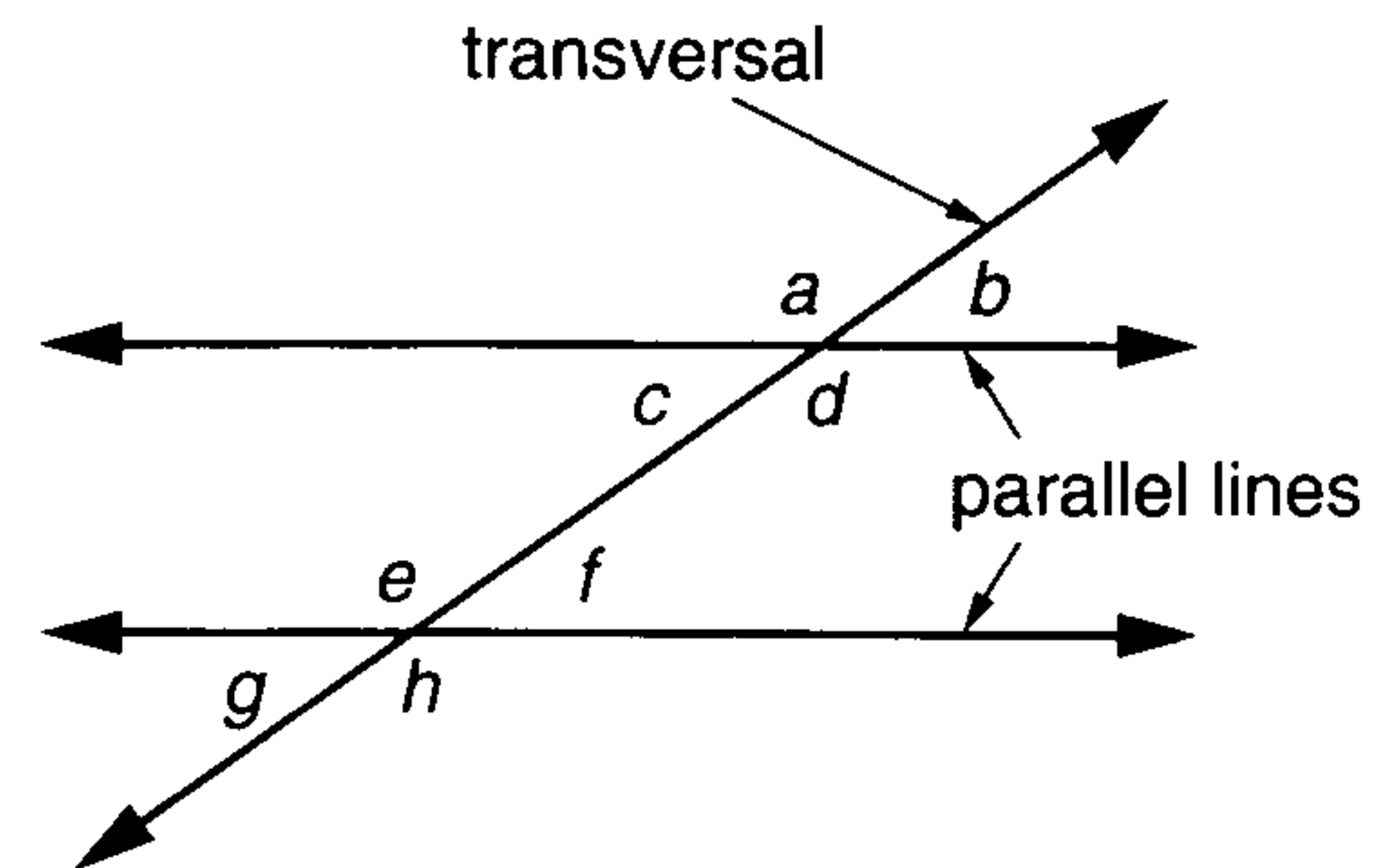
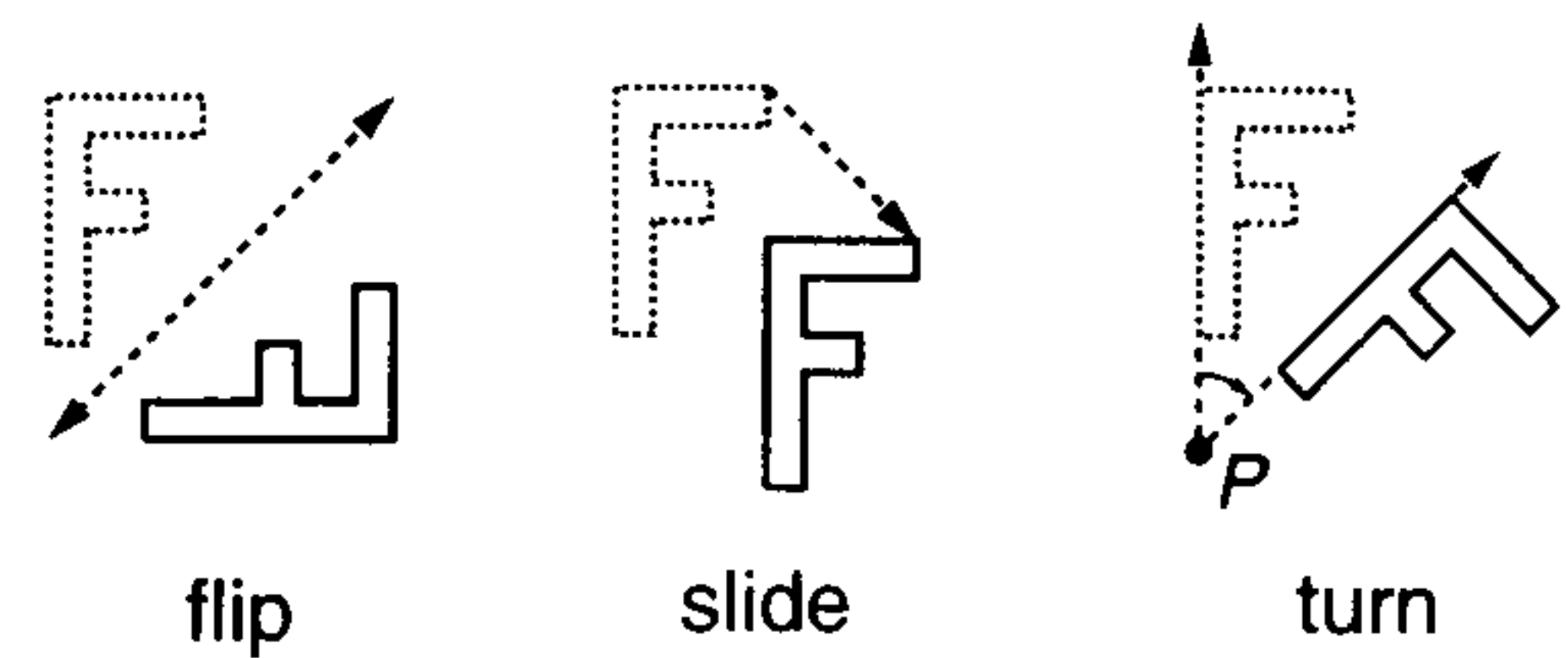
Students will continue to work with the Geometry Template, a tool that was introduced in *Fifth Grade Everyday Mathematics*. The Geometry Template contains protractors and rulers for measuring, and cutouts for drawing geometric figures. The class will review how to measure and draw angles using both the full-circle and half-circle protractors.

Students will also use a protractor to construct circle graphs that represent data collections. This involves converting the data to percents of a total, finding the corresponding degree measures around a circle, and drawing sectors of the appropriate size.

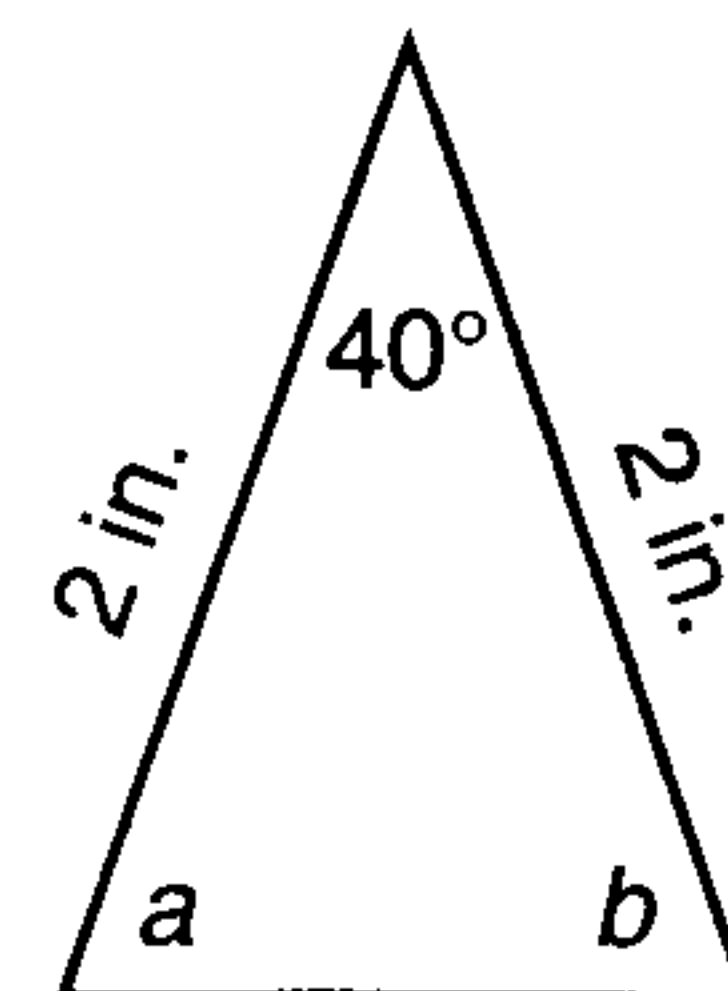
Often, measures can be determined without use of a measuring tool. Students will apply properties of angles and sums of angles to find unknown measures in figures like the ones at the right.

One lesson in Unit 5 is a review and extension of work with the coordinate grid. Students will plot and name points on a four-quadrant coordinate grid and use the grid for further study of geometric shapes.

Please keep this Family Letter for reference as your child works through Unit 5.



If the measure of any one angle is given, the measures of all the others can be found without measuring.



The sum of the angles in a triangle is 180° . Angles a and b have the same measure, 70° .

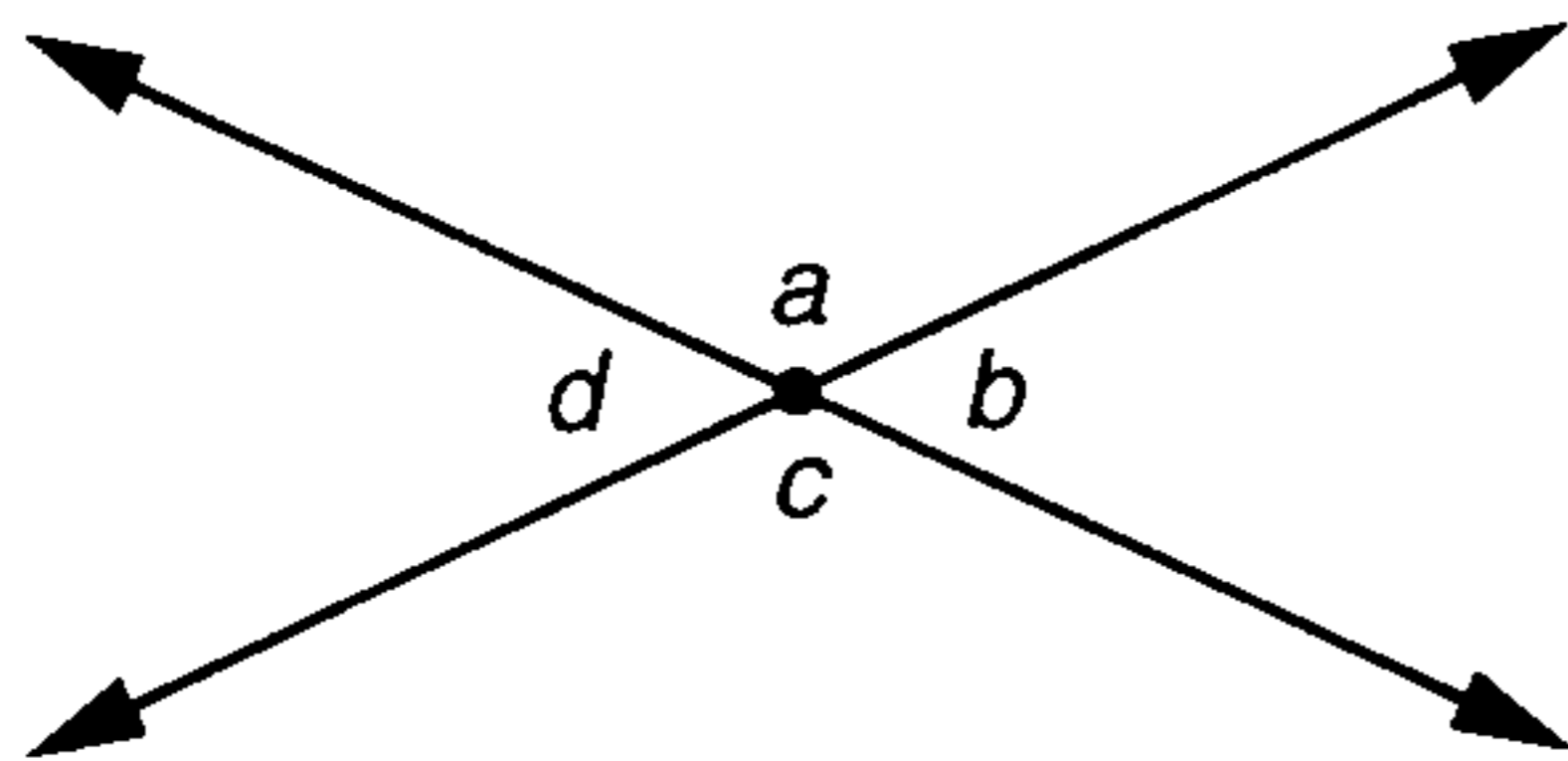
Math Tools

Your child will use a **compass** and **straightedge** to construct geometric figures. You might find that your child needs to practice making circles with a compass. A straightedge is only meant to be used to draw straight lines, not for measuring. The primary difference between a compass-and-straightedge construction and a drawing or sketch of a geometric figure is that measuring is *not* allowed in constructions.

Vocabulary

Important terms in Unit 5:

adjacent angles Angles that are next to each other; adjacent angles have a common side, but no other overlap. In the diagram, angles *a* and *b* are adjacent angles. So are angles *b* and *c*, and so on.

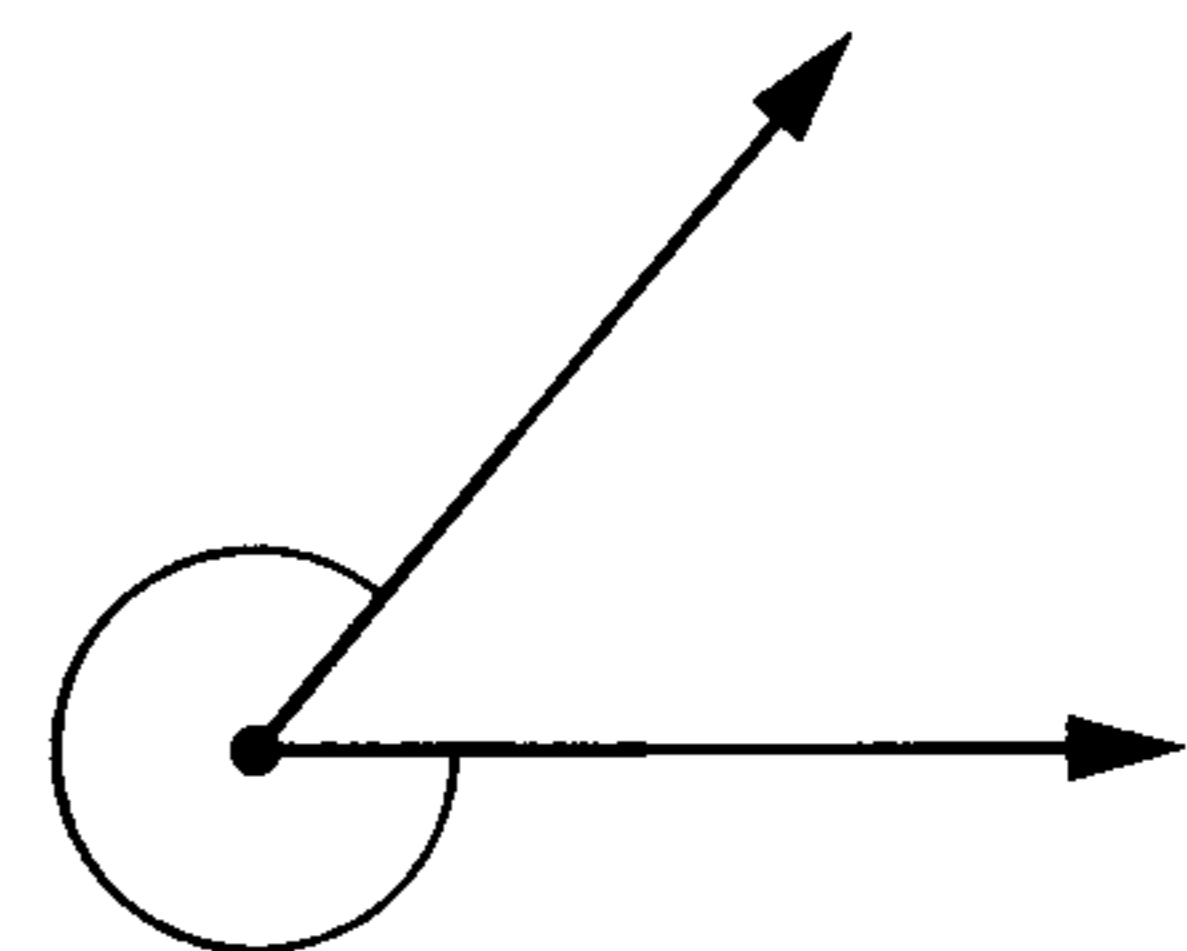


congruent Having exactly the same size and shape. Congruent figures are said to be *congruent* to each other.

ordered number pair Two numbers that are used to locate a point on a coordinate grid. The first number tells the position along the horizontal axis, and the second number gives the position along the vertical axis. Ordered pairs are usually written inside parentheses, for example, (2,3).

reflection (flip) The "flipping" of a figure over a line (line of reflection) so that its image is the mirror image of the original.

reflex angle An angle with a measure between 180° and 360° .



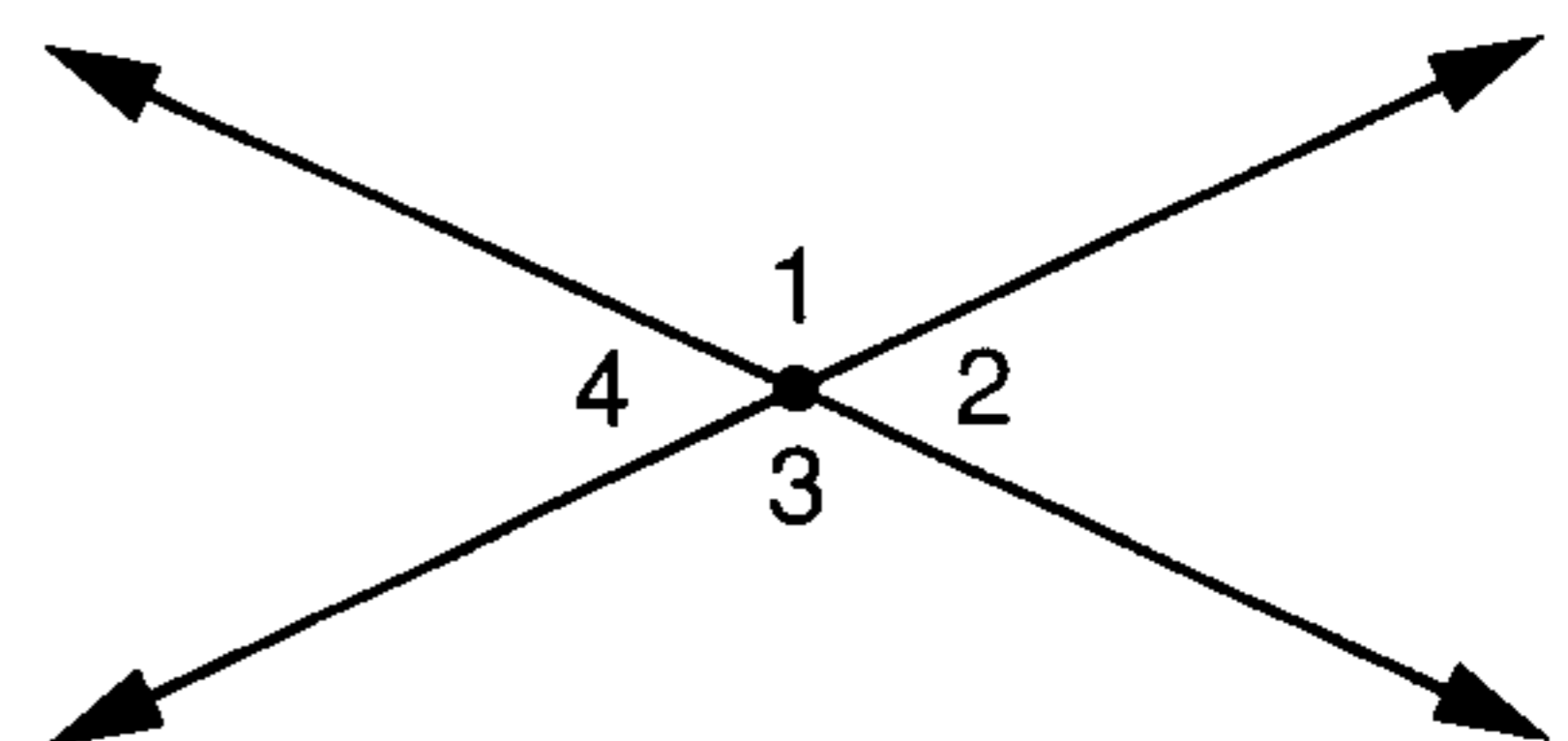
reflex angle

rotation (turn) A movement of a figure around a fixed point or axis; a "turn."

supplementary angles Two angles whose measures total 180° .

translation (slide) A movement of a figure along a straight line; a "slide."

vertical (opposite) angles When two lines intersect the angles that do not share a common side. Vertical angles have equal measures. In the diagram, angles 1 and 3 are vertical angles. They have no sides in common. Similarly, angles 4 and 2 are vertical angles.



Do-Anytime Activities

To work with your child on the concepts taught in this unit, try these interesting and rewarding activities:

- 1** While you are driving in the car together, have your son or daughter look for congruent figures: for example, windows in office buildings, circles on stop lights, and many street signs are all congruent figures.
- 2** Look for apparent right angles, or any other type of angles: acute (less than 90°), obtuse (between 90° and 180°). Guide your child to look particularly at bridge supports for a variety of angles.
- 3** Triangulation lends strength to furniture. Encourage your child to find corner, triangular braces in furniture throughout your home. Look under tables, under chairs, inside cabinets, or under bed frames. Have your child count how many instances of triangulation he or she can find in your home.

Building Skills through Games

In this unit, your child will work on his or her skills in measuring angles and using a coordinate grid by playing the following games. For detailed instructions, see the *Student Reference Book*.

Angle Tangle See *Student Reference Book*, page 278

Two players will need a protractor, straightedge, and blank paper to play *Angle Tangle*. Skills practiced include estimating angle measures as well as measuring angles.

Hidden Treasure See *Student Reference Book*, page 296

Hidden Treasure provides practice in using a coordinate grid (reference frames) and in developing strategies. Two players need a pencil, a red pen or crayon, and a gameboard for each player to play the game.

As You Help Your Child with Homework

As your child brings assignments home, you may want to go over the instructions together, clarifying them as necessary. The answers listed below will guide you through some of this unit's Study Links.

Study Link 5.1

- a. $\angle H$ b. $\angle IJK$
c. $\angle D$ d. $\angle ABC, \angle EFG, \angle L$
- About 180° 4. About 360°

Study Link 5.2

- $m\angle y = 120^\circ$
- $m\angle x = 115^\circ$
- $m\angle c = 135^\circ$ $m\angle a = 45^\circ$ $m\angle t = 135^\circ$
- $m\angle q = 120^\circ$ $m\angle r = 80^\circ$ $m\angle s = 70^\circ$
- $m\angle a = 120^\circ$ $m\angle b = 60^\circ$ $m\angle c = 120^\circ$
 $m\angle d = 40^\circ$ $m\angle e = 140^\circ$ $m\angle f = 140^\circ$
 $m\angle g = 80^\circ$ $m\angle h = 100^\circ$ $m\angle i = 100^\circ$
- $m\angle w = 90^\circ$ $m\angle a = 75^\circ$ $m\angle t = 105^\circ$
 $m\angle c = 75^\circ$ $m\angle h = 105^\circ$

Study Link 5.3

1. a.

Age	Percent of Listeners	Degree Measure
18-24	11%	40°
25-34	18%	65°
35-44	24%	86°
45-54	20%	72°
55-64	11%	40°
65+	16%	58°

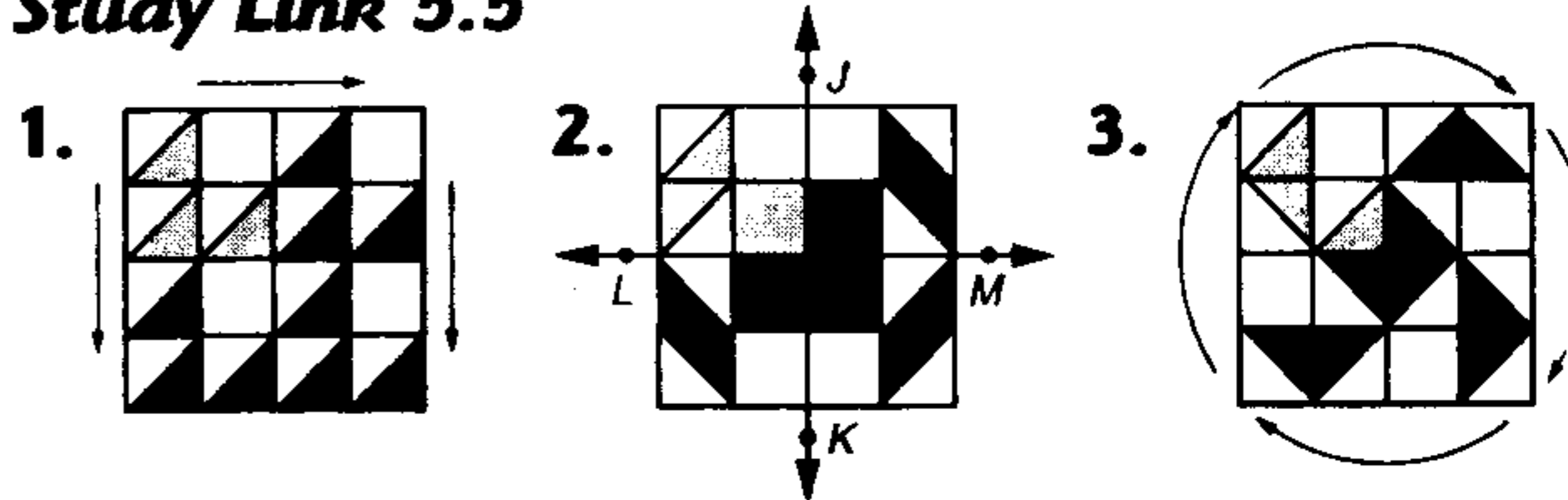
2. a. 1,920,000 adults b. 3,760,000 adults

Study Link 5.4

Sample answers for 1-3:

- Vertex C: (1, 2)
- Vertex F: (5, 10) Vertex G: (3, 7)
- Vertex J: (2, 1) 4. Vertex M: (-2, -3)
- Vertex Q: (8, -3)

Study Link 5.5



Study Link 5.7

- $m\angle r = 47^\circ$ $m\angle s = 133^\circ$ $m\angle t = 47^\circ$
- $m\angle a = 120^\circ$ $m\angle b = 120^\circ$ $m\angle c = 60^\circ$
- $m\angle x = 45^\circ$ $m\angle y = 45^\circ$ $m\angle z = 135^\circ$
- $m\angle NKO = 10^\circ$
- $m\angle c = 114^\circ$ $m\angle a = 57^\circ$ $m\angle t = 57^\circ$
- $m\angle p = 54^\circ$

Study Link 5.8

- $A': (-2, -7)$ $B': (-6, -6)$
 $C': (-8, -4)$ $D': (-5, -1)$
- $A'': (2, 1)$ $B'': (6, 2)$
 $C'': (8, 4)$ $B'': (5, 7)$
- $A''': (1, -2)$ $D''': (2, -6)$
 $C''': (4, -8)$ $D''': (7, -5)$

Study Link 5.9

- Sample answers: All of the vertical angles have the same measure; all of the angles along the transversal and on the same side are supplementary; opposite angles along the transversal are equal in measure.

Study Link 5.10

- a. 50° ; $\angle YZW$ plus the 130° angle equal 180° so $\angle YZW = 50^\circ$. Since opposite angles in a parallelogram are equal, $\angle X$ also equals 50° .
b. 130° ; Since $\angle YZW = 50^\circ$; and it is a consecutive angle with $\angle Y$, and since consecutive angles in a parallelogram are supplementary, $\angle Y = 130^\circ$.
- Opposite sides of a parallelogram are congruent.
- 110° ; Angles with a common side that form a straight line are supplementary.
- square 5. rhombus