FOLDABLES™ Study Organizer

GET READY to Study

Be sure the following Key Concepts are noted in your Foldable.

Points, Lines, Planes *Angles*

Length and Perimeter *Angle Measure*
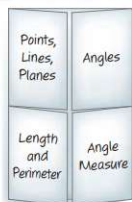
Key Concepts

Points, Lines, and Planes (Lesson 1-1)
- There is exactly one line through any two points.
- There is exactly one plane through any three noncollinear points.

Distance and Midpoints (Lesson 1-3)
- On a number line, the measure of a segment with endpoint coordinates a and b is given by $|a - b|$.
- In the coordinate plane, the distance between two points (x_1, y_1) and (x_2, y_2) is given by

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

- On a number line, the coordinate of the midpoint of a segment with endpoints that have coordinates a and b is $\dfrac{a + b}{2}$.
- In the coordinate plane, the coordinates of the midpoint of a segment with endpoints that are (x_1, y_1) and (x_2, y_2) are $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$.

Angles (Lessons 1-4 and 1-5)
- An angle is formed by two noncollinear rays that have a common endpoint. Angles can be classified by their measures.
- Adjacent angles are two angles that lie in the same plane and have a common vertex and a side but no common interior parts.
- Vertical angles are two nonadjacent angles formed by two intersecting lines.
- A linear pair is a pair of adjacent angles with noncommon sides that are opposite rays.
- Complementary angles are two angles with measures that have a sum of 90.
- Supplementary angles are two angles with measures that have a sum of 180.

Key Vocabulary

acute angle (p. 32)
adjacent angles (p. 40)
angle (p. 31)
angle bisector (p. 35)
area (p. 51)
bases (p. 60)
between (p. 15)
circumference (p. 51)
collinear (p. 6)
complementary angles (p. 42)
concave (p. 49)
cone (p. 61)
congruent (p. 15)
construction (p. 16)
convex (p. 49)
coplanar (p. 6)
cylinder (p. 61)
degree (p. 31)
edges (p. 60)
face (p. 60)
line (p. 6)
linear pair (p. 40)

line segment (p. 13)
midpoint (p. 22)
obtuse angle (p. 32)
opposite rays (p. 31)
perimeter (p. 51)
perpendicular (p. 43)
plane (p. 6)
point (p. 6)
polygon (p. 49)
polyhedron (p. 60)
prism (p. 60)
pyramid (p. 60)
ray (p. 31)
right angle (p. 32)
segment bisector (p. 25)
sides (p. 31)
space (p. 8)
sphere (p. 61)
supplementary angles (p. 42)
undefined term (p. 6)
vertex (p. 31)
vertical angles (p. 40)

Vocabulary Check

State whether each sentence is *true* or *false*. If *false*, replace the underlined word or phrase to make a true sentence.

1. A <u>line</u> is determined by points and has no thickness or width.
2. Points that lie on the same plane are said to be <u>collinear</u>.
3. The symbol ≅ is read <u>*is equal to*</u>.
4. Two angles whose measures have a sum of 180° are <u>complementary angles</u>.
5. A <u>ray</u> can be measured because it has two endpoints.

Lesson-by-Lesson Review

Points, Lines, and Planes (pp. 6–11)

Draw and label a figure for each relationship.

6. Lines ℓ and m are coplanar and meet at point C.

7. Points S, T, and U are collinear, but points S, T, U, and V are not.

8. **FLAGS** The Wyoming state flag is shown below. Identify the geometric figures that could be represented by this flag.
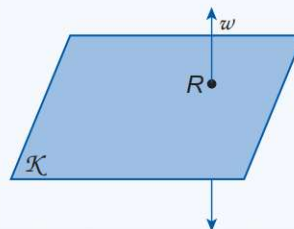
Example 1 Draw and label a figure for the relationship below.

Line w intersects plane $\mathcal{K}$ at R.

Draw a surface to represent plane $\mathcal{K}$ and label it.

Draw a line intersecting the plane and label it.

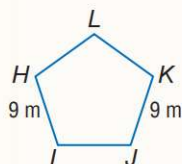Draw a dot where the line and the plane meet and label it.

Linear Measure and Precision (pp. 13–20)

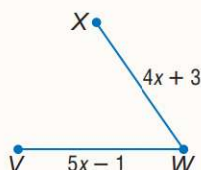**Find the value of the variable and PB, if P is between A and B.**

9. $AP = 7$, $PB = 3x$, $AB = 25$

10. $AP = s + 2$, $PB = 4s$, $AB = 8s - 7$

11. $AP = -2k$, $PB = k + 6$, $AB = 11$

Determine whether each pair of segments is congruent.
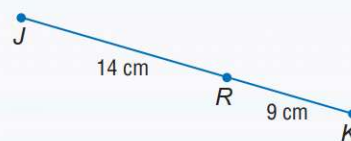
12. $\overline{HI}$, $\overline{KJ}$ 13. $\overline{VW}$, $\overline{WX}$

14. **HEIGHT** Gregory measured his height to be 71.5 inches. Find and explain the precision for this measurement.

Example 2 Use the figure to find the measurement $\overline{JK}$.

$$JK = JR + RK \quad \text{Betweenness of points}$$
$$= 14 + 9 \quad \text{Substitution}$$
$$= 23 \quad \text{Simplify.}$$

So, $\overline{JK}$ is 23 centimeters long.

Example 3 Find the precision for 62 miles.

The measurement is precise to within 0.5 miles. So, a measurement of 62 miles could be 61.5 to 62.5 miles.

1-3 **Distance and Midpoints** (pp. 21–29)

Use the Pythagorean Theorem to find the distance between each pair of points.

15. $A(1, 0)$, $B(-3, 2)$

16. $G(-7, 4)$, $L(3, 3)$

Use the Distance Formula to find the distance between each pair of points.

17. $J(0, 0)$, $K(4, -1)$

18. $M(-4, 16)$, $P(-6, 19)$

Find the coordinates of the midpoint of each segment.

19. $U(-6, -3)$, $V(12, -7)$

20. $R(3.4, -7.3)$, $S(-2.2, -5.4)$

21. WALKING Paul and Susan are standing outside City Hall. Paul walks three blocks north and two blocks west while Susan walks five blocks south and four blocks east. If City Hall represents the origin, find the coordinates of the midpoint of Paul and Susan's locations.

Example 4 Find the distance between $A(3, -4)$ and $B(-2, 10)$.

Let $(x_1, y_1) = (3, -4)$ and $(x_2, y_2) = (-2, -10)$.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$= \sqrt{(-2 - 3)^2 + (-10 - (-4))^2}$$
$$= \sqrt{(-5)^2 + (-6)^2}$$
$$= \sqrt{61}$$

The distance from A to B is $\sqrt{61}$ units or about 7.8 units.

Example 5 Find the coordinates of the midpoint between $G(5, -2)$ and $N(-1, 6)$.

Let $(x_1, y_1) = (5, -2)$ and $(x_2, y_2) = (-1, 6)$.

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$
$$= M\left(\frac{5 + (-1)}{2}, \frac{-2 + 6}{2}\right)$$
$$= M(2, 2)$$

The coordinates of the midpoint are (2, 2).
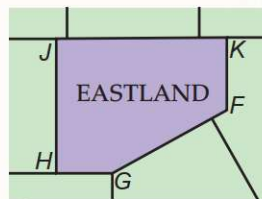
1-4 **Angle Measure** (pp. 31–38)

Refer to the figure in Example 6.
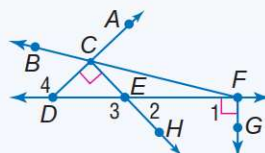
22. Name the vertex of $\angle 4$.

23. Name the sides of $\angle 2$.

24. Write another name for $\angle 2$.

25. COUNTIES Refer to the map of Eastland County. Measure each of the five angles and classify them as *right*, *acute*, or *obtuse*.
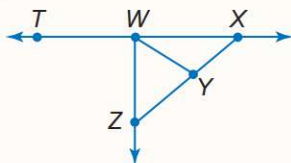
Example 6 Refer to the figure. Name all angles that have E as a vertex.

$\angle 3$, $\angle 2$, $\angle HEF$, $\angle DEH$, $\angle CED$, $\angle CEF$, $\angle CEH$, $\angle DEF$

1-5 **Angle Relationships** (pp. 40–47)

Refer to the figure.

26. Name a linear pair whose vertex is Y.

27. Name an angle supplementary to $\angle XWY$.

28. If $m\angle TWZ = 2c + 36$, find c so that $\overline{TW} \perp \overline{WZ}$.

29. **DRIVING** At the intersection of 3rd and Main Streets, Sareeta makes a 110° turn from Main onto 3rd. Tyrone, behind her, makes a left turn onto 3rd. If 3rd and Main are straight lines, what is the angle measure of his turn?

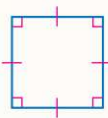**Example 7** Refer to the figure. Name a linear pair whose vertex is P.
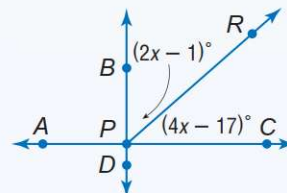
Sample answers: $\angle APR$ and $\angle RPC$, $\angle APD$ and $\angle DPC$, $\angle DPA$ and $\angle APB$, $\angle APB$ and $\angle BPC$, $\angle BPR$ and $\angle RPD$.

1-6 **Two-Dimensional Figures** (pp. 49–57)

Name each polygon by its number of sides. Then classify it as *convex* or *concave* and *regular* or *irregular*.

30.

31.

32. **BEES** A honeycomb is formed by repeating regular hexagonal cells, as shown. The length of one side of a cell can range from 5.21 millimeters to 5.375 millimeters. Find the range of perimeters of one cell.

Example 8 Name the polygon by its number of sides. Then classify it as *convex* or *concave* and *regular* or *irregular*.

There are 8 sides, so this is an octagon. A line containing two of the sides will pass through the interior of the octagon, so it is concave. Since it is concave, it cannot be regular.