LESSON 7-1

Points, Lines, Planes, and Angles

Lesson Objectives

Classify and name figures

Vocabulary

point (p. 324) _____

line (p. 324) _____

_____

plane (p. 324) _____

segment (p. 324) _____

ray (p. 324) _____

_____

angle (p. 325) _____

_____

right angle (p. 325) _____

acute angle (p. 325) _____

_____

obtuse angle (p. 325 _____

_____

complementary angles (p. 325) _____

_____

supplementary angles (p. 325) _____

_____

vertical angles (p. 325) _____

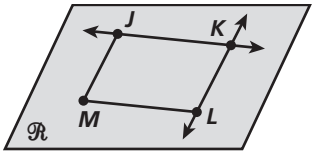
_____

congruent (p. 325) _____

_____

Additional Examples

Example 1



A. Name 4 points in the figure.

B. Name a line in the figure.

Any ____ points on a line can be used.

C. Name a plane in the figure.

Any ____ points in the plane that form a triangle can be used.

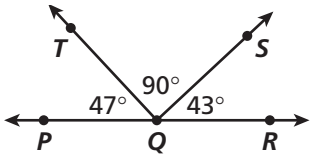
D. Name four segments in the figure.

Write the 2 points in any order, for example ____ or ____.

E. Name four rays in the figure.

Write the ____ first.

Example 2



A. Name a right angle in the figure.

B. Name two acute angles in the figure.

C. Name two obtuse angles in the figure.

$\_\_\_\_$ $m\angle SQP =$ $\_\_\_\_$°, $m\angle RQT =$ $\_\_\_\_$°

D. Name a pair of complementary angles in the figure.

$\_\_\_\_$ $m\angle TQP + m\angle RQS =$ $\_\_\_\_$° + $\_\_\_\_$° $= 90°$

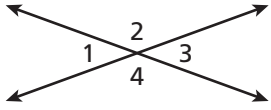
E. Name two pairs of supplementary angles in the figure.

$\_\_\_\_$ $m\angle TQP + m\angle TQS =$ $\_\_\_\_$° + $\_\_\_\_$° $= 180°$

$\_\_\_\_$ $m\angle SQP + m\angle SQR =$ $\_\_\_\_$° + $\_\_\_\_$° $= 180°$

Example 3

In the figure, $\angle 1$ and $\angle 3$ are vertical angles, and $\angle 2$ and $\angle 4$ are vertical angles.



A. If $m\angle 1 = 37°$, find $m\angle 3$.

The measures of $\angle 1$ and $\angle 2$ add to 180° because they are $\_\_\_\_$, so $m\angle 2 =$ $\_\_\_\_$° − $\_\_\_\_$° = $\_\_\_\_$°.

The measures of $\angle 2$ and $\angle 3$ add to 180° because they are $\_\_\_\_$, so $m\angle 3 =$ $\_\_\_\_$° − $\_\_\_\_$° = $\_\_\_\_$°.

B. If $m\angle 4 = y°$, find $m\angle 2$.

$m\angle 3 = 180° - y°$

$m\angle 2 = 180° - (180° - y°)$

$= 180° - 180° + y°$ Distributive Property

$=$ $\_\_\_\_$ $m\angle 2$ $\_\_\_\_$ $m\angle 4$

LESSON 7-2

Parallel and Perpendicular Lines

Know it! Note

Lesson Objectives

Identify parallel and perpendicular lines and the angles formed by a transversal

Vocabulary

parallel lines (p. 330) _____

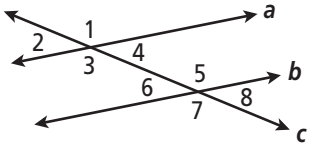
perpendicular lines (p. 330) _____

transversal (p. 330) _____

Additional Examples

Example 1

Measure the angles formed by the transversal and parallel lines. Which angles seem to be congruent?

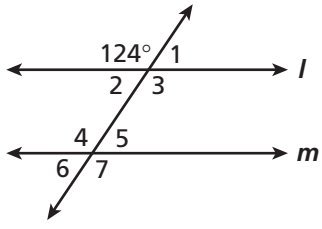


∠1, ∠3, ∠5, and ∠7 all measure 150°.

∠2, ∠4, ∠6, and ∠8 all measure ____°.

Example 2

In the figure, line *l* ∥ line *m*. Find the measure of each angle.



A. ∠4

m∠4 = ____°

All obtuse angles in the figure are ____.

B. ∠2

m∠2 + 124° = ____°

∠2 is ____ to the angle 124°.

−____° −____°

m∠2 = ____°

LESSON 7-3

Angles in Triangles

Know it! Note

Lesson Objectives

Find unknown angles in triangles

Vocabulary

Triangle Sum Theorem (p. 336) _____

acute triangle (p. 336) _____

right triangle (p. 336) _____

obtuse triangle (p. 336) _____

equilateral triangle (p. 337) _____

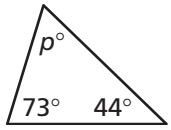
isosceles triangle (p. 337) _____

scalene triangle (p. 337) _____

Additional Examples

Example 1

A. Find *p* in the acute triangle.



$\square^\circ + \square^\circ + p = \square^\circ$

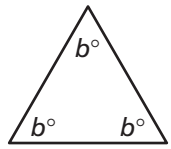
$\square^\circ + p = \square^\circ$

$-\ 117^\circ \qquad -\ 117^\circ$

$p = \square^\circ$

Example 2

A. Find the angle measures in the equilateral triangle.



$3b° =$ ____ ° Triangle ____ Theorem

$\frac{3b°}{\square} = \frac{180°}{\square}$ Divide both sides by ____.

$b° =$ ____ °

Example 3

The second angle in a triangle is six times as large as the first. The third angle is half as large as the second. Find the angle measures and draw a possible picture.

Let $x°$ = the first angle measure. Then $6x°$ = second angle measure, and $\frac{1}{2}(6x°) = 3x°$ = third angle measure.

$x° + 6x° + 3x° =$ ____ ° Triangle ____ Theorem

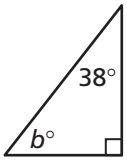
$\frac{10x°}{\square} = \frac{180°}{\square}$ Combine ____ terms. Divide both sides by ____.

$x° =$ ____ °

The angles measure ____ °, ____ °, and ____ °. The triangle is an obtuse ____ triangle.

Try This

1. Find *b* in the right triangle.



LESSON 7-4

Classifying Polygons

Know it! Note

Lesson Objectives

Classify and find angles in polygons

Vocabulary

polygon (p. 341) _____

_____

regular polygon (p. 342) _____

_____

trapezoid (p. 342) _____

_____

parallelogram (p. 342) _____

rectangle (p. 342) _____

rhombus (p. 342) _____

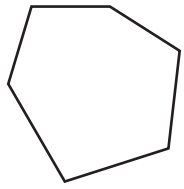
square (p. 342) _____

_____

Additional Examples

Example 1

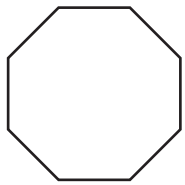
A. Find the sum of the angle measures in a hexagon.



Divide the figure into _____.

_____ · 180° = _____° _____ triangles

B. Find the sum of the angle measures in an octagon.



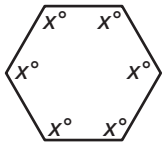
Divide the figure into _____.

_____ · 180° = _____° _____ triangles

Example 2

Find the angle measures in the regular polygon.

A. ☐ congruent angles



$6x = 180°(6 - 2)$

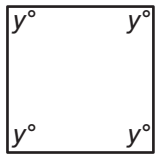
$6x = 180°($☐$)$

$6x =$ ☐°

$\frac{6x}{☐} = \frac{720°}{☐}$

$x =$ ☐°

B. ☐ congruent angles



$4y = 180°(4 - 2)$

$4y = 180°($☐$)$

$4y =$ ☐°

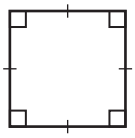
$\frac{4y}{☐} = \frac{360°}{☐}$

$y =$ ☐°

Example 3

Give all the names that apply to each figure.

A.



☐

☐

☐

☐

☐

☐-sided polygon

2 pairs of ☐ sides

4 ☐ angles

4 ☐ sides

4 ☐ sides and

4 ☐ angles

LESSON 7-5

Coordinate Geometry

Know it! Note

Lesson Objectives

Identify polygons in the coordinate plane

Vocabulary

slope (p. 347) _____

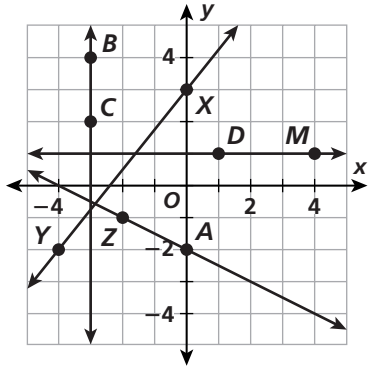
rise (p. 347) _____

run (p. 347) _____

Additional Examples

Example 1

Determine if the slope of each line is positive, negative, 0, or undefined. Then find the slope of each line.



A. $\overleftrightarrow{XY}$

_____ slope;

slope of $\overleftrightarrow{XY}$ = $\frac{\square}{\square}$ = ☐

B. $\overleftrightarrow{ZA}$

_____ slope;

slope of $\overleftrightarrow{ZA}$ = $\frac{\square}{\square}$ = ☐

C. $\overleftrightarrow{BC}$

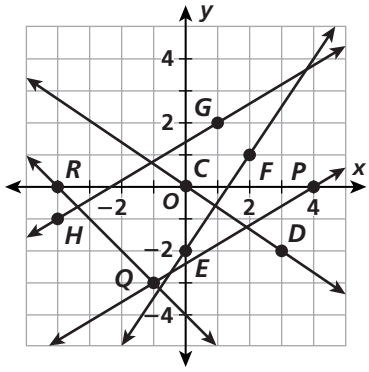
slope of $\overleftrightarrow{BC}$ is _____

D. $\overleftrightarrow{DM}$

slope of $\overleftrightarrow{DM}$ = $\frac{\square}{3}$ = ☐

Example 2

Which lines are parallel?
Which lines are perpendicular?



slope of $\overleftrightarrow{EF} = \frac{3}{\square}$

slope of $\overleftrightarrow{GH} = \frac{3}{\square}$

slope of $\overleftrightarrow{PQ} = \frac{3}{\square}$

slope of $\overleftrightarrow{CD} = \frac{\square}{\square}$ or $\square$

slope of $\overleftrightarrow{QR} = \frac{\square}{\square}$ or -1

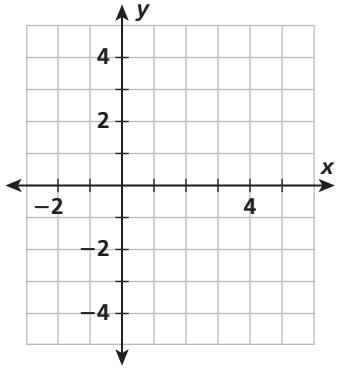
$\square \parallel \square$ The slopes are $\square$. $\frac{3}{5} = \frac{3}{5}$

$\square \perp \square$ The slopes have a $\square$ of -1: $\frac{3}{2} \cdot -\frac{2}{3} = -1$

Example 3

Graph the quadrilateral with the given vertices. Give all of the names that apply to the quadrilateral.

$A(3, -2)$, $B(2, -1)$, $C(4, 3)$, $D(5, 2)$



$\overline{BC} \parallel \overline{AD}$ and $\overline{BA} \parallel \overline{CD}$

$\square$

LESSON 7-6

Congruence

Lesson Objectives

Use properties of congruent figures to solve problems

Vocabulary

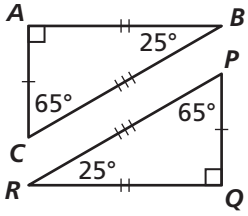
correspondence (p. 354) _____

Additional Examples

Example 1

Write a congruence statement for the pair of polygons.

A.



The first triangle can be named triangle *ABC*. To complete the congruence statement, the vertices in the second triangle have to be written in _____ of the _____.

$\angle A \cong \angle$ _____, so $\angle A$ corresponds to $\angle$ _____.

$\angle B \cong \angle$ _____, so $\angle B$ corresponds to $\angle$ _____.

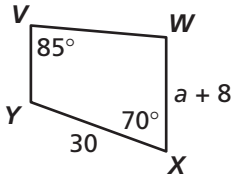
$\angle C \cong \angle$ _____, so $\angle C$ corresponds to $\angle$ _____.

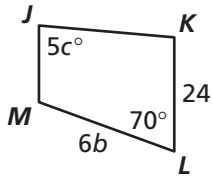
The congruence statement is triangle _____ $\cong$ triangle _____.

Example 2

In the figure, quadrilateral *VWXY* ≅ quadrilateral *JKLM*.

A. Find *a*.





$a + 8 = 24$ $\quad \overline{WX} \cong$ ☐

$-8 \quad -8$ Subtract 8 from both sides.

$a =$ ☐

B. Find *b*.

$6b = 30$ $\quad \overline{ML} \cong$ ☐

$\frac{6b}{6} = \frac{30}{6}$ Divide both sides by 6.

$b =$ ☐

C. Find *c*.

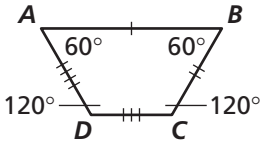
$5c = 85$ $\quad \angle$☐ $\approx \angle$☐

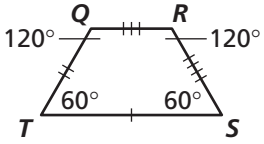
$\frac{5c}{5} = \frac{85}{5}$ Divide both sides by 5.

$c =$ ☐

Try This

1. Write a congruence statement for the pair of polygons.





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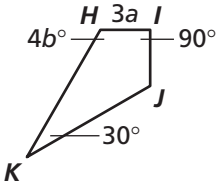
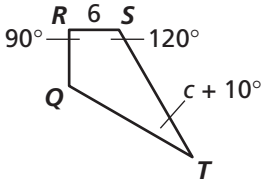
2. In the figure, quadrilateral *JIHK* ≅ quadrilateral *QRST*.
Find *c*.





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LESSON 7-7

Transformations

Lesson Objectives

Transform plane figures using translations, rotations, and reflections

Vocabulary

transformation (p. 358) _____

translation (p. 358) _____

rotation (p. 358) _____

center of rotation (p. 358) _____

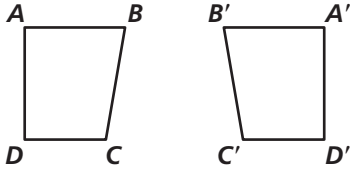
reflection (p. 358) _____

image (p. 358) _____

Additional Examples

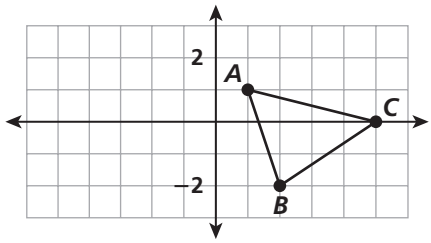
Example 1

Identify as a translation, rotation, reflection, or none of these.



Example 2

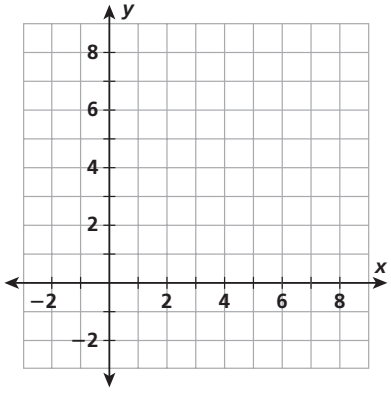
Draw the image of a triangle with vertices *A*(1, 1), *B*(2, −2), and *C*(5, 0) after a 180° counterclockwise rotation around (0, 0).



Example 3

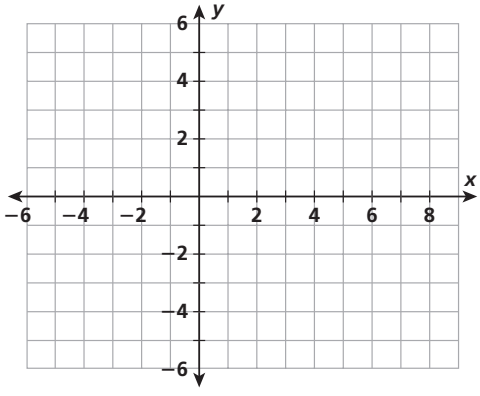
Rectangle *HIJK* has vertices *H*(0, 2), *I*(4, 2), *J*(4, 4), and *K*(0, 4). Find the coordinates of the image of the indicated point after each transformation.

A. translation 2 units up, point *H*



H′ _____

B. 90° rotation around (0, 0), point *I*



I′ _____

LESSON 7-8

Symmetry

Know it! Note

Lesson Objectives

Identify symmetry in figures

Vocabulary

line symmetry (p. 364) _____

line of symmetry (p. 364) _____

rotational symmetry (p. 365) _____

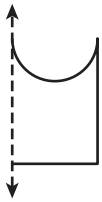
Additional Examples

Example 1

Complete each figure. The dashed line is the line of symmetry.

A.

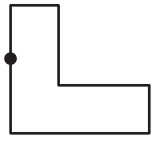
B.



Example 2

Complete each figure. The point is the center of rotation.

A. 2-fold



The figure coincides with itself every _____.

LESSON 7-9

Tessellations

Know it! Note

Lesson Objectives

Create tessellations

Vocabulary

tessellation (p. 368) _____

_____

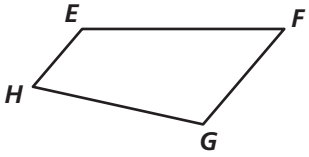
regular tessellation (p. 368) _____

_____

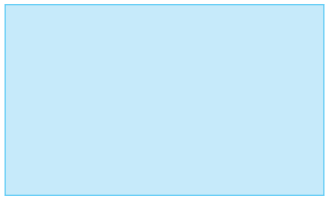
Additional Examples

Example 1

Create a tessellation with quadrilateral *EFGH*.



There must be a copy of each angle of quadrilateral *EFGH* at every vertex.



Example 2

Use rotations to create a variation of the tessellation in Additional Example 1.

Step 1: Find the midpoint of a side.

Step 2: Make a new edge for half of the side.

Step 3: Rotate the new edge around the midpoint to form the edge of the other half of the side.

Step 4: Repeat with the other sides.

Step 5: Use the figure to make a tessellation.