New Bedford Public Schools
Division of Adult & Continuing Education

New Bedford High School Evening Extension

2019 – 2020 School Year
Trimester III

Learning Packet
for
Geometry

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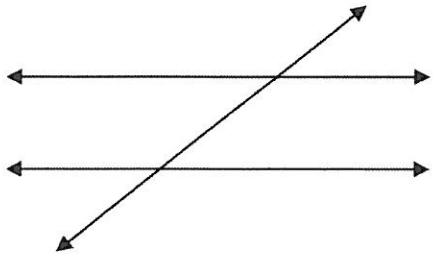
Due date: April 7, 2020

Geometry Evening At-home Learning Packet

Name: _____ **Date:** _____

1. If two parallel lines are cut by a nonperpendicular transversal, which type of angles are *not* congruent?



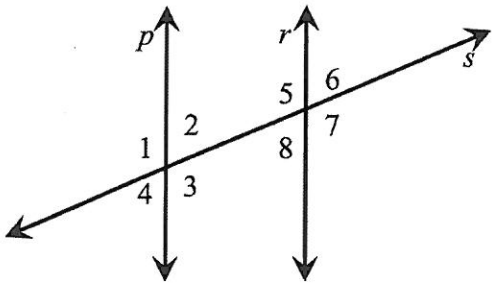
A. corresponding angles

B. alternate interior angles

C. alternate exterior angles

D. same-side interior angles

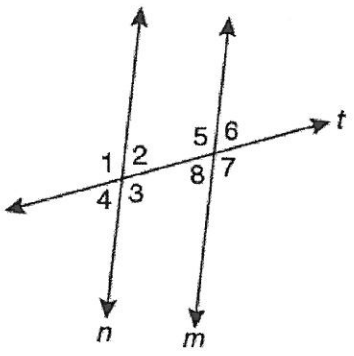
2. In the diagram below, lines p and r are parallel. Line s is a transversal that is not perpendicular to lines p and r.



Which angle is *not* congruent to $\angle 5$?

A. $\angle 1$ B. $\angle 2$ C. $\angle 3$ D. $\angle 7$

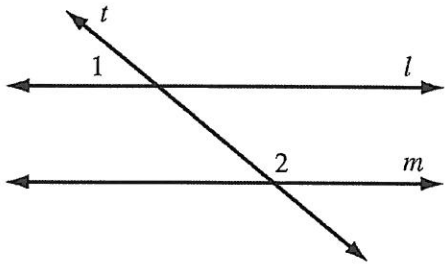
3. In the diagram below, transversal t intersects parallel lines m and n.



Which of the following angles is *not* congruent to $\angle 1$?

A. $\angle 3$ B. $\angle 5$ C. $\angle 7$ D. $\angle 8$

4. In the accompanying diagram, parallel lines l and m are cut by transversal t.



Which statement about angles 1 and 2 *must* be true?

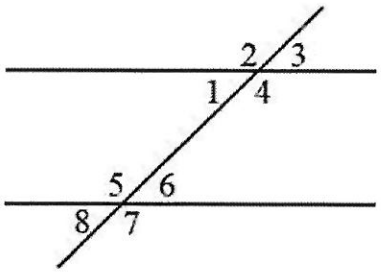
A. $\angle 1 \cong \angle 2$.

B. $\angle 1$ is the complement of $\angle 2$.

C. $\angle 1$ is the supplement of $\angle 2$.

D. $\angle 1$ and $\angle 2$ are right angles.

5. A transversal crosses two parallel lines. Which statement should be used to prove that the measures of angles 1 and 5 sum to 180°?



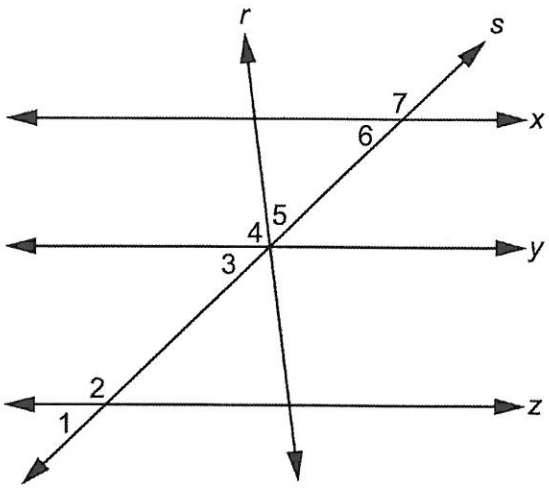
A. Angles 1 and 8 are congruent as corresponding angles; angles 5 and 8 form a linear pair.

B. Angles 1 and 2 form a linear pair; angles 3 and 4 form a linear pair.

C. Angles 5 and 7 are congruent as vertical angles; angles 6 and 8 are congruent as vertical angles.

D. Angles 1 and 3 are congruent as vertical angles; angles 7 and 8 form a linear pair.

6. In the diagram below, lines x, y, and z are all parallel, and lines r and s intersect at line y.



Which equation must be true?

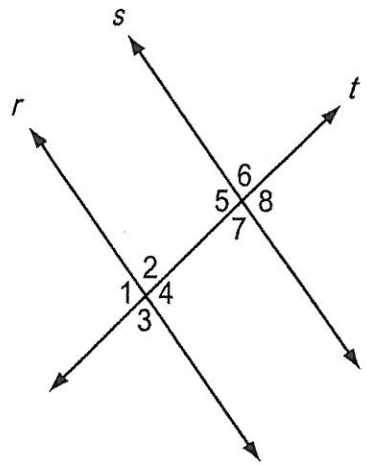
A. $m\angle 1 = 180° - m\angle 7$

B. $m\angle 2 = 90° + m\angle 5$

C. $m\angle 3 + m\angle 4 = m\angle 7$

D. $m\angle 5 + m\angle 6 = m\angle 7$

7. Parallel lines r and s are cut by transversal t, as shown in the diagram below.



Which of the following *must* be true?

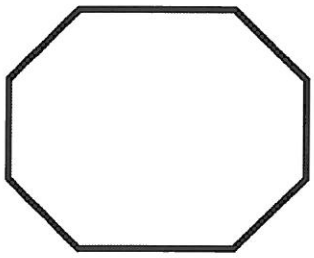
A. $m\angle 1 + m\angle 5 = 180°$

B. $m\angle 2 + m\angle 8 = 180°$

C. $m\angle 1 = m\angle 7$

D. $m\angle 3 = m\angle 8$

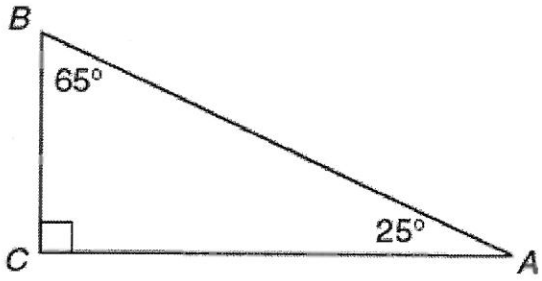
8.



How many angles does this shape have?

A. 4 B. 6 C. 8 D. 10

9. If the sum of the measures of two angles is 90°, then the angles are complementary. In triangle ABC, $m\angle A = 25°$, $m\angle B = 65°$, $m\angle C = 90°$.



Which valid conclusion follows directly from the previous statements?

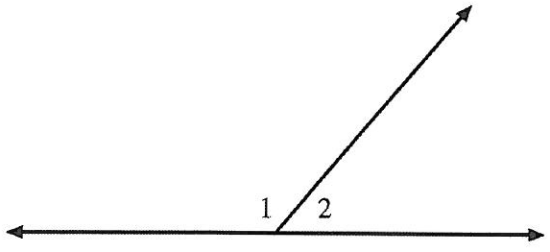
A. $\angle C$ is a complementary angle.

B. $\angle B$ and $\angle C$ are complementary angles.

C. $\angle A$ and $\angle C$ are complementary angles.

D. $\angle A$ and $\angle B$ are complementary angles.

10. Which is a true statement about angles 1 and 2 shown below?



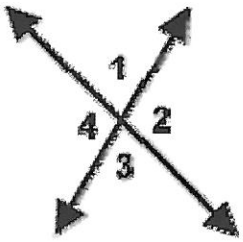
A. $\angle 1$ is complementary to $\angle 2$.

B. $\angle 1$ is supplementary to $\angle 2$.

C. Both angles are obtuse.

D. Both angles are acute.

11. The diagram below shows angles formed by intersecting lines.



Which answer reflects the relationship between $\angle 2$ and $\angle 3$?

A. $\angle 2$ and $\angle 3$ are vertical angles.

B. $\angle 2$ and $\angle 3$ are corresponding angles.

C. $\angle 2$ and $\angle 3$ are alternate exterior angles.

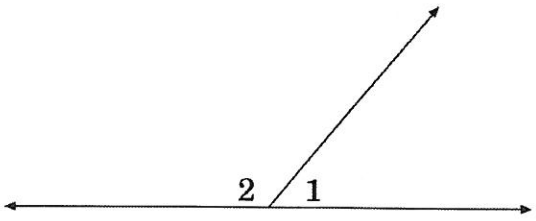
D. $\angle 2$ and $\angle 3$ are adjacent supplementary angles.

12. Which two angle measurements (in degrees) are complementary?

A. 33 and 47 B. 42 and 48

C. 51 and 69 D. 63 and 37

13. Which term describes $\angle 1$ and $\angle 2$?

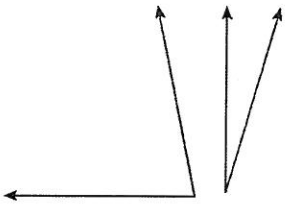


A. supplementary B. complementary

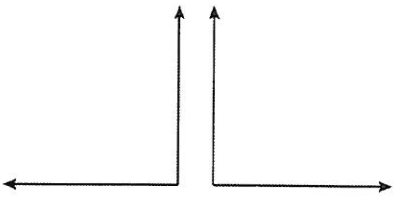
C. vertical D. congruent

14. Which of the following is a pair of complementary angles?

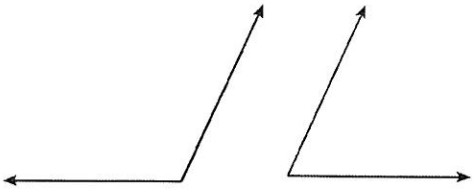
A.



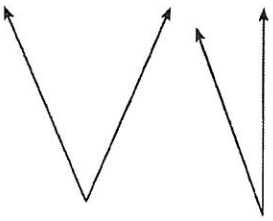
B.



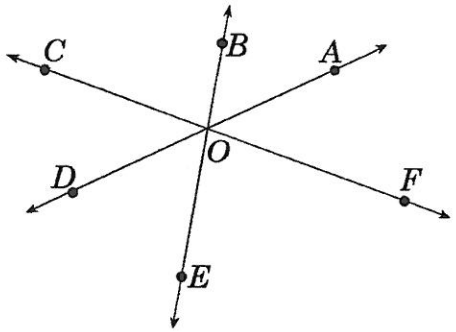
C.



D.



15. Which of the following is a pair of supplementary angles?

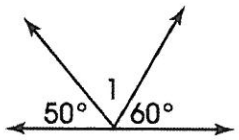


A. $\angle BOF$ and $\angle BOA$ B. $\angle COD$ and $\angle DOE$

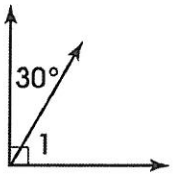
C. $\angle COF$ and $\angle AOF$ D. $\angle DOE$ and $\angle DOB$

16. In which figure is the measure of $\angle 1$ not equal to $60°$?

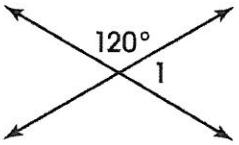
A.



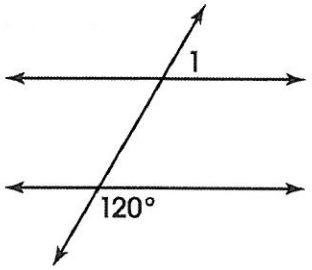
B.



C.

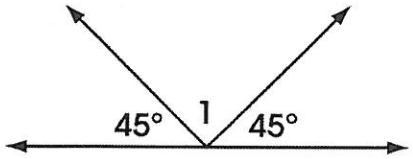


D.

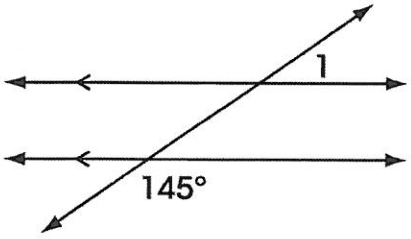


17. In which figure is the measure of $\angle 1$ equal to $45°$?

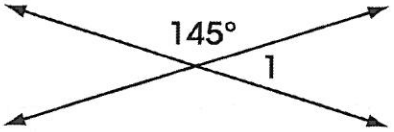
A.



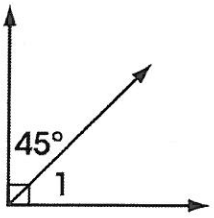
B.



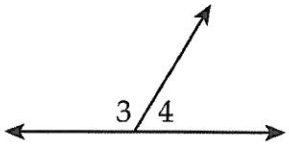
C.



D.



18. Harriet drew the figure below on a piece of paper.



Which describes a relationship between $\angle 3$ and $\angle 4$ in the figure?

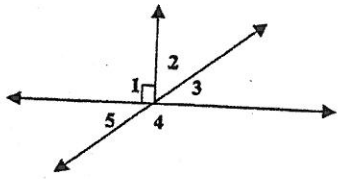
A. complementary angles

B. obtuse angles

C. supplementary angles

D. vertical angles

19. Which angles are complementary?



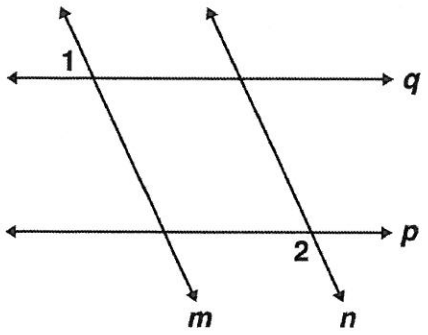
A. $\angle 2$ and $\angle 3$

B. $\angle 3$ and $\angle 4$

C. $\angle 4$ and $\angle 5$

D. $\angle 1$ and $\angle 2$

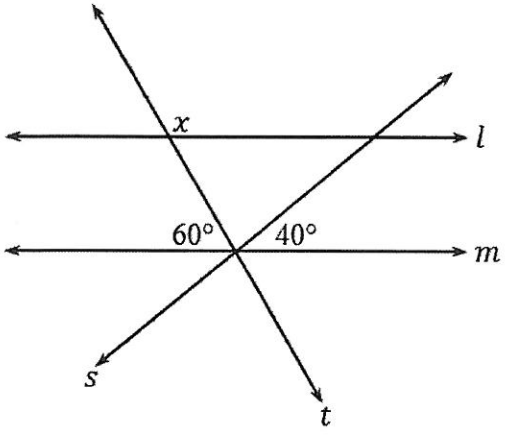
20. Given: $p \parallel q$;
$m \parallel n$;
$m\angle 1 = 75°$



What is $m\angle 2$?

A. 15° B. 75° C. 90° D. 105°

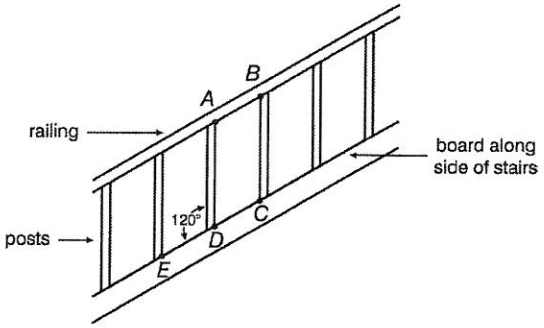
21. Lines l and m are parallel to one another and cut by transversals s and t.



What is the value of x?

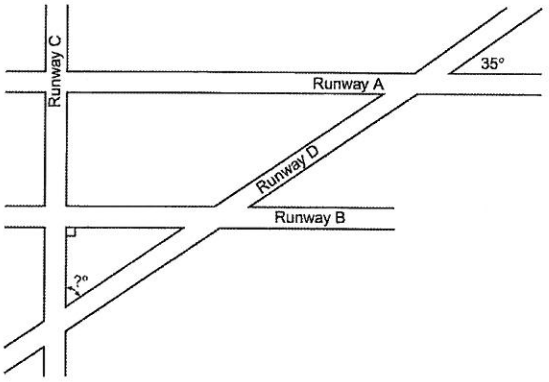
A. 40° B. 80° C. 120° D. 140°

22. *Use the figure below to answer the question.*



Ms. Barnes is building a railing for her stairs. The board along the side of the stairs, the railing, and the posts form parallelograms. If $\angle EDA$ shown in the figure measures 120°, what is the measure of $\angle ABC$?

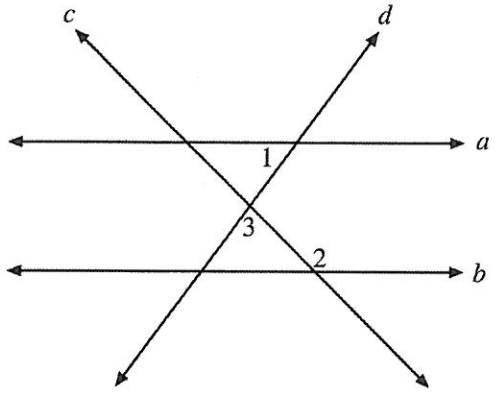
23. Use the diagram below to answer the following question(s).



Runways A and B are parallel to each other and perpendicular to Runway C. If Runway D makes a 35° angle with Runway A as shown in the diagram, what is the measure of the angle marked in the diagram between Runways C and D?

24. The diagram below has the following properties:

- Line a is parallel to line b.
- $m\angle 1 = 62°$
- $m\angle 2 = 122°$



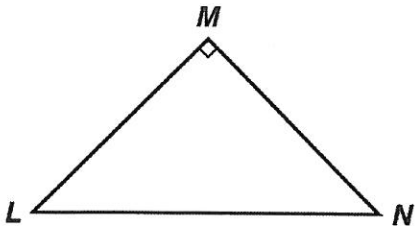
What is $m\angle 3$?

A. 56° B. 58° C. 60° D. 62°

25. Two angles of a triangle add up to 65°. What is the measure of the third angle?

A. 25° B. 55° C. 115° D. 295°

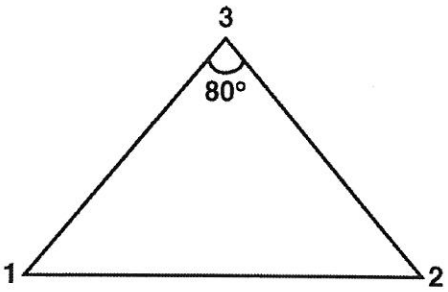
26.



Triangle LMN is a right triangle, and angles L and N are equal. What is the measure of angle L?

A. 25° B. 45° C. 70° D. 90°

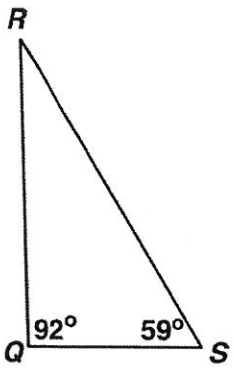
27. Andrew constructed a triangle so that $\angle 1$ and $\angle 2$ were the same size and $\angle 3$ measured 80°.



What is the measure of $\angle 1$?

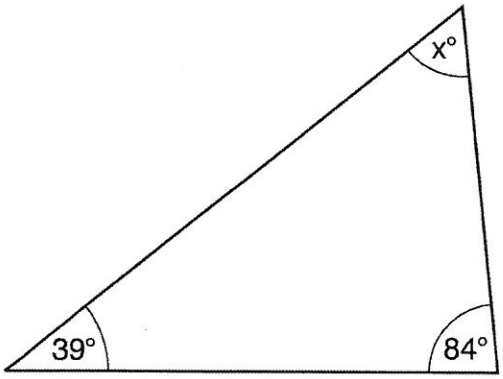
A. 50° B. 60° C. 80° D. 100°

28. What is the measure of angle R?



A. 17° B. 29° C. 31° D. 39°

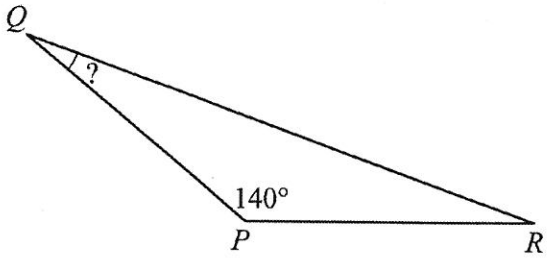
29. Use the figure below to answer the following question.



What is the measure of angle x in the figure above?

A. 57° B. 77° C. 237° D. 257°

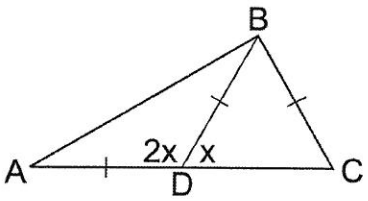
30. In triangle PQR, shown below, angle P measures 140°.



Angle Q has the same measure as angle R. What is the measure of angle Q?

A. 20° B. 40° C. 70° D. 80°

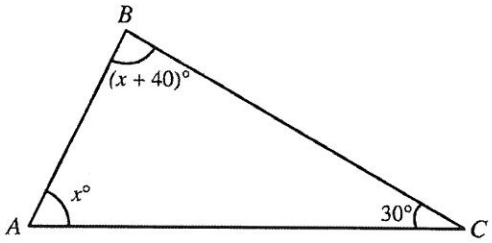
31. If $AD = BD = BC$ and the measure of $\angle ADB$ is twice the measure of $\angle BDC$, what is the measure of $\angle ABC$?



A. 70° B. 80° C. 90° D. 100°

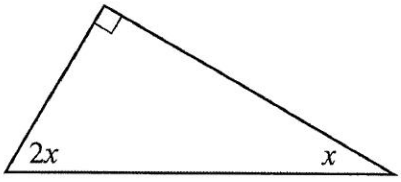
32. Degree measures for the angles in $\triangle ABC$ are given below.

- $m\angle A = x°$
- $m\angle B = (x + 40)°$
- $m\angle C = 30°$



What is the degree measure of $\angle A$ in $\triangle ABC$?

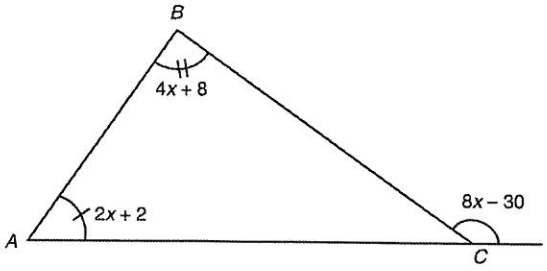
33. A right triangle is shown below.



Based on the measures in the triangle, what is x?

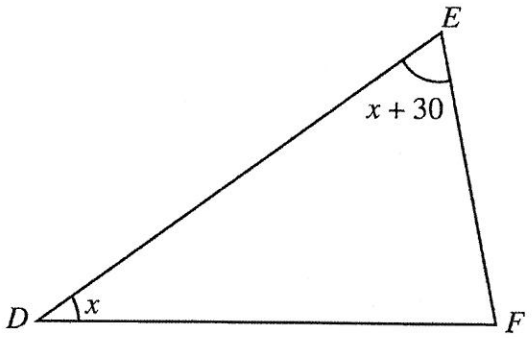
A. 15° B. 30° C. 45° D. 60°

34. In the diagram shown, what is the measure of $\angle BAC$?



A. 30 B. 42 C. 50 D. 130

35. Use the diagram below to answer the



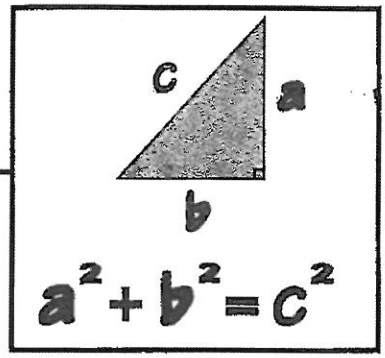
In $\triangle DEF$ above, the measure of $\angle F$ is 24° less than the sum of the measures of $\angle D$ and $\angle E$. Which expression represents the measure of $\angle F$?

A. $x - 24$ B. $2x - 24$

C. $2x + 6$ D. $-2x - 6$

Chapter 5

Geometry, Part 1



Standards

10.G.1 Identify figures using properties of sides, angles, and diagonals. Identify the figures' type(s) of symmetry.

10.G.2 Draw congruent and similar figures using a compass, straightedge, protractor, and other tools such as computer software. Make conjectures about methods of construction. Justify the conjectures by logical arguments.

10.G.3 Recognize and solve problems involving angles formed by transversals of coplanar lines. Identify and determine the measure of central and inscribed angles and their associated minor and major arcs. Recognize and solve problems associated with radii, chords, and arcs within or on the same circle.

10.G.4 Apply congruence and similarity correspondences (e.g., $\Delta ABC \approx \Delta XYZ$) and properties of the figures to find missing parts of geometric figures and provide logical justification.

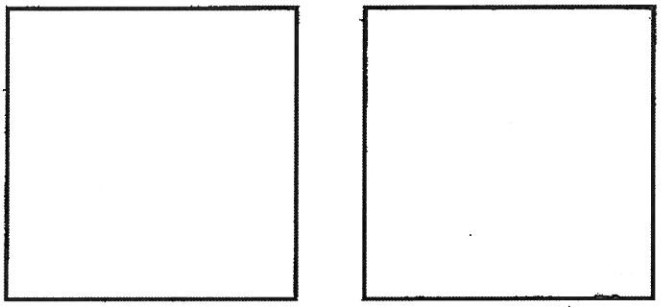
10.G.5 Solve simple triangle problems using the triangle angle sum property and/or the Pythagorean theorem.

10.G.6 Use the properties of special triangles (e.g., isosceles, equilateral, 30°-60°-90°, 45°-45°-90°) to solve problems.

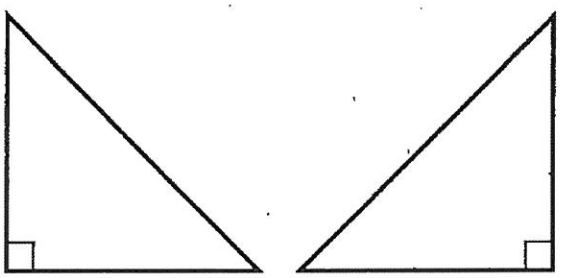
In this chapter, you'll learn some properties for plane (flat) figures. And you'll learn how to tell if figures are congruent and similar. It's important to learn the properties of the figures discussed in this chapter, since you will be asked questions about them. You'll also learn about lines and angles in this chapter and you'll learn how to use the Pythagorean theorem to find the length of a missing side in a triangle.

Congruent Figures

Figures that are **congruent** are exactly the same size and shape. If you place two congruent figures on top of each other, they will fit exactly. The rectangles below are congruent. The sign indicating that figures are congruent is $\approx$.



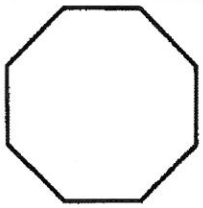
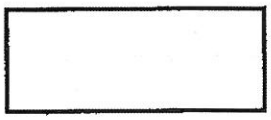
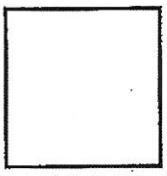
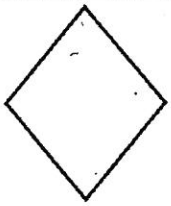
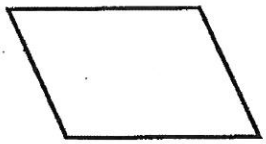
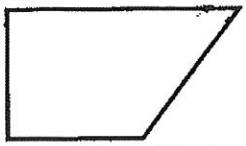
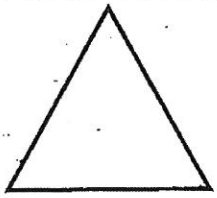
These triangles are also congruent:



Plane Figures

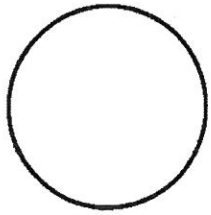
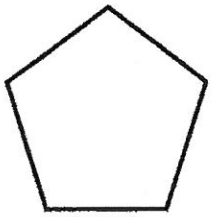
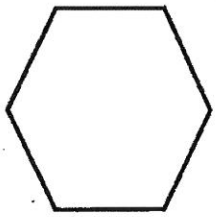
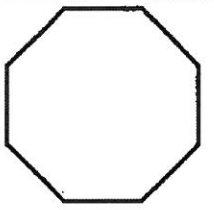
Some questions on the MCAS will ask you about the properties of plane figures. A **plane figure** is a flat, closed figure. The chart below lists some common plane figures.

PLANE FIGURES

Polygon	A closed figure formed by three or more line segments. A triangle is a polygon. A square is also a polygon. A regular polygon is both equilateral and equiangular.	
Quadrilateral	A polygon with four sides. A square and a rectangle are examples of quadrilaterals.	
Rectangle	Has four right angles and four sides; sides across from each other are parallel and equal in length. The sum of the angles in a rectangle is 360°.	
Square	Has four right angles and four sides equal in length. The sum of the angles in a square is 360°.	
Rhombus	Has four equal sides, may or may not have right angles. The sum of the angles in a rhombus is 360°.	
Parallelogram	Has four sides and two pair of opposite, parallel sides, may or may not have right angles. The sum of the angles in a parallelogram is 360°.	
Trapezoid	Has four sides and one pair of parallel sides; may or may not have a right angle. The sum of the angles in a trapezoid is 360°.	
Triangle	Has three sides; may or may not have a right angle. The sum of all angles in a triangle is 180°.	

(continued)

PLANE FIGURES (continued)

Circle	Has no sides. The sum of the degrees in a circle is 360°.	
Pentagon	Has five sides that may or may not be equal. The sum of the angles in a pentagon is 540°. In a regular pentagon, each angle measures 108°.	
Hexagon	Has six sides that may or may not be equal. Note that a regular hexagon has equal sides. The sum of the angles in a hexagon is 720°. In a regular hexagon, each angle is 120°.	
Octagon	Has eight sides that may or not be equal. Note that a regular octagon has equal sides. The sum of the angles in an octagon is 1,080°. Each angle in a regular octagon measures 135°.	

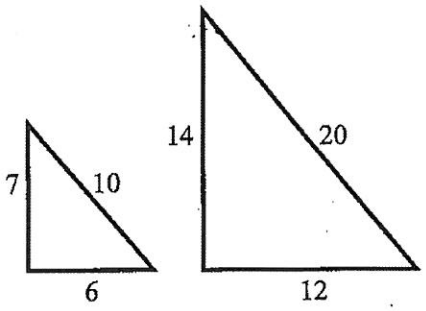
Similar Figures

Congruent figures are exactly the same shape and size. You could place one congruent figure on top of another and it would fit perfectly. If figures are congruent, the sign ≈ is used, as in $\Delta KLM \approx \Delta NOP$. **Similar figures** are not congruent. Similar figures have the same shape but not the same size.

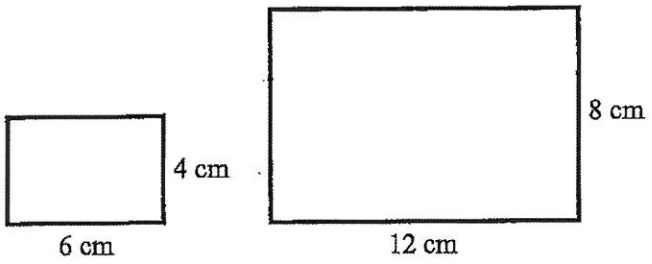
If figures are similar, the ~ sign is used, as in $\Delta KLM \sim \Delta NOP$.

If figures are similar, their corresponding sides can be written as a proportion because one figure is an enlargement of the other.

These triangles are similar:



These rectangles are similar:

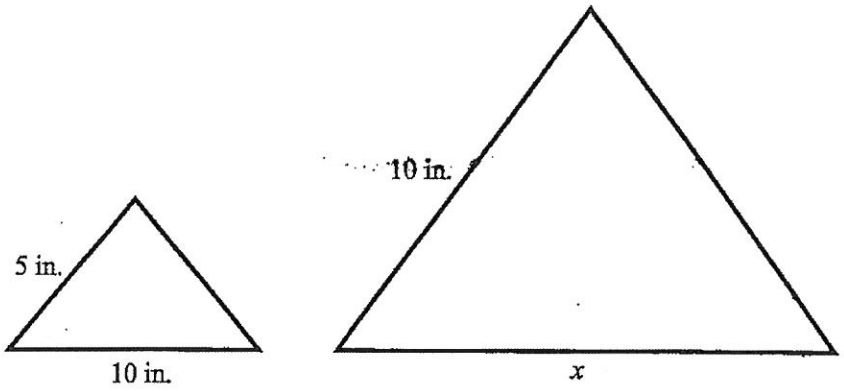


Note that the sides of these rectangles can be written as a proportion that is the same when it is reduced:

$$4 : 6 = 2 : 3$$
$$8 : 12 = 2 : 3$$

On the MCAS, you might be asked to determine the missing side for similar triangles. Read the following question:

Find the missing length (x) for the pair of similar triangles below.



Remember that similar figures have dimensions that can be expressed in the same proportion. The proportion for the first triangle is shown here:

$$5 : 10 = 1 : 2$$
$$10 : x = 1 : 2$$
$$x = 20 \text{ in.}$$

Let's Review 10: Figures and Shapes

Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 5.

1 **Jamie drew a rectangle that measures 12 inches in width and 24 inches in length. If Jamie enlarges the rectangle so that it's 2 feet wide, how long will the rectangle be?**

A. 2 ft

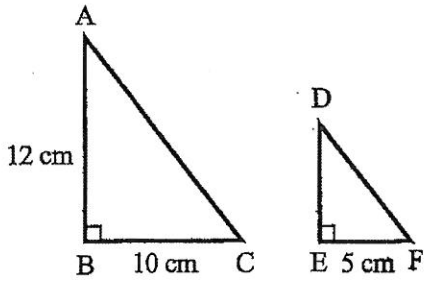
B. 4 ft

C. 6 ft

D. 8 ft

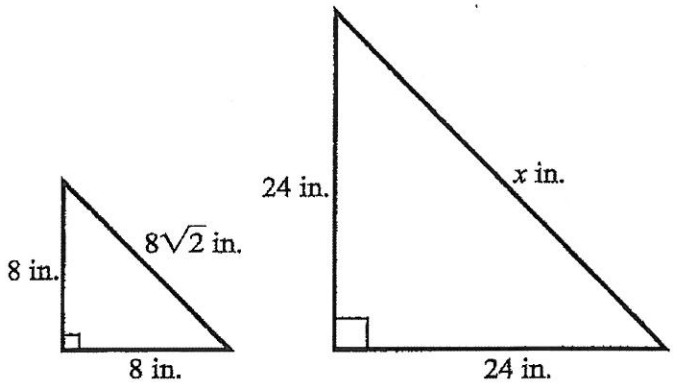
The proportion for 12:24 is the same as 1:2.

2 **Determine the length of DE. Show your work or provide an explanation to support your answer. Triangles ABC and DEF are similar.**



The sides of similar triangles are proportional.

3 If two right triangles are similar, find the measure of side x.



A. 12 in.

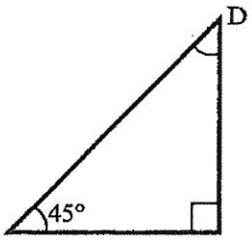
B. $24\sqrt{2}$ in.

C. 24 in.

D. 48 in.

Compare a side in the smaller triangle with its corresponding side in the larger triangle.

4 Look at the triangle below.



What is the measure of $\angle D$?

A. 30°

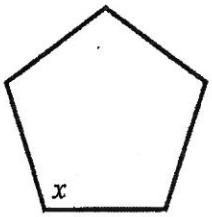
B. 40°

C. 45°

D. 90°

This is a right triangle, so one angle is 90°. Remember that the sum of all angles in a triangle is 180°.

5 **Look at the regular pentagon below.**



What is the measure of angle *x*?

A. 108°

B. 120°

C. 135°

D. 540°

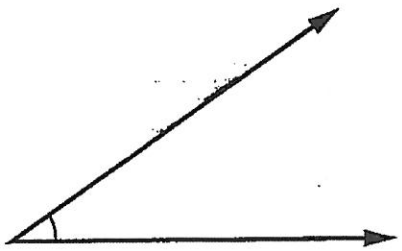
If you're unsure of the answer, go back and study the properties of plane figures.

Lines and Angles

A **line segment** is part of a line. It has two **endpoints**, one at each end, to show that it stops and doesn't keep on going.

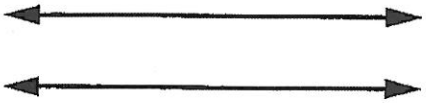
A **ray** is also part of a line, but unlike a line segment, it keeps on going in one direction. A ray has only one endpoint.

Two rays join together to form an **angle**. The place where they join is called the **vertex.**

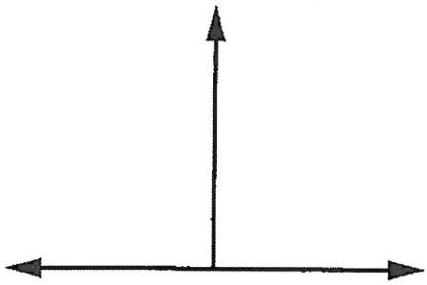


A **line** has an arrow on both ends to show that it keeps going.

Lines that never intersect are called **parallel lines.** Strings on a guitar are parallel, like the lines shown here:



Lines that intersect to form right angles are called **perpendicular lines.** Perpendicular lines form right angles. The place where the lines intersect is called the **point of intersection.**

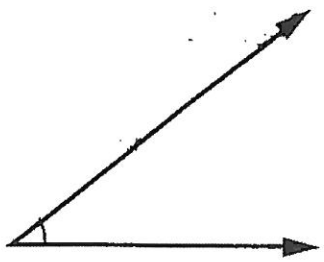


Angles

Angles can be classified by their degree (also called their measure). The following shows some angles that you need to know for the MCAS.

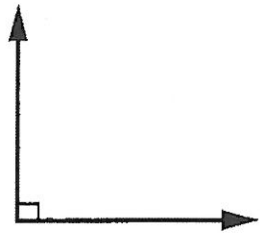
Acute angle

Less than 90 degrees.



Right angle

Exactly 90 degrees.



Obtuse angle

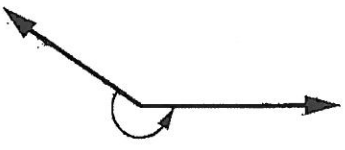
Greater than 90 degrees and less than 180 degrees.

Straight angle

Exactly 180 degrees.

Reflex angle

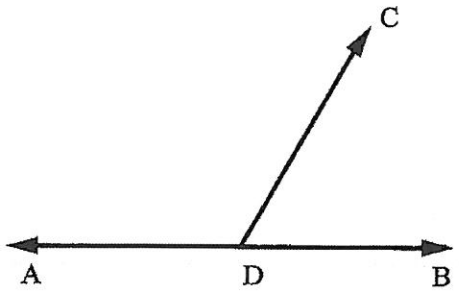
Greater than 180 degrees.



Angle Relationships

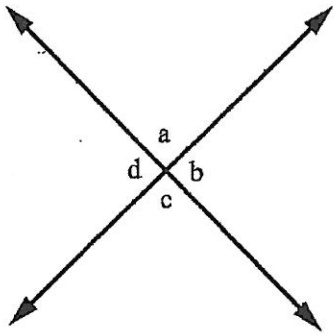
The sign ∠ stands for the word "angle." **Adjacent angles** are angles that share a side.

In the illustration below, ∠ADC and ∠CDB are adjacent angles.

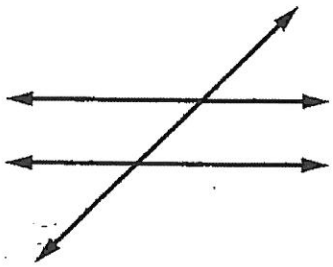


Two angles that add up to 90° are called **complementary angles**. Two angles that add up to 180° are called **supplementary angles**. The angles above are supplementary. ∠ADC measures 125° and ∠CDB measures 55°.

Vertical angles, angles across from each other, are always equal. In the illustration below, angles a and c are equal and angles b and d are equal.



Sometimes parallel lines are intersected by a line. This intersecting line is called a **transversal** and it creates eight angles, four of which are acute and four of which are obtuse. Look at these parallel lines intersected by a transversal:



When parallel lines are intersected by a transversal, the four acute angles are always equal and the four obtuse angles are always equal. Each acute and obtuse angle pair forms a supplementary angle, whose sum is 180°.

Let's Review 11: Lines and Angles

Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 5.

1 **What is the sum of the measures of complementary angles?**

A. 80°

B. 90°

C. 120°

D. 180°

If you're not sure of the total measure of complementary angles, reread this information in the previous section of this chapter.

2 **Two streets in Josh's neighborhood run next to each other in the same direction but do not intersect. These streets are an example of what kind of lines?**

A. perpendicular

B. adjacent

C. supplementary

D. parallel

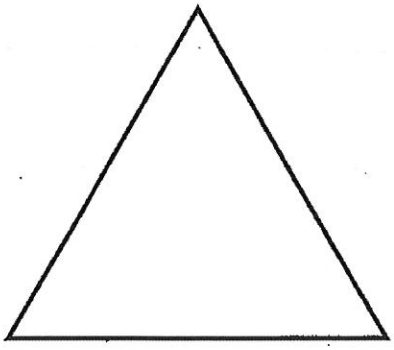
Try to remember the name for two lines that do not intersect.

Triangles

A **triangle** is a plane figure with three sides. Each of the three points on a triangle is called a vertex. You read earlier in this chapter that the sum of the angles in a triangle is 180°.

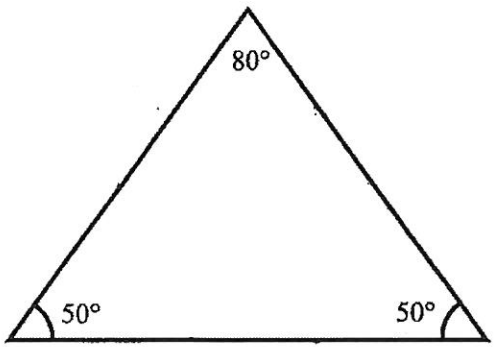
Equilateral triangle

Has three equal sides and three equal angles; each angle is 60°.



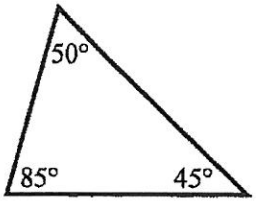
Isosceles triangle

Has two equal sides and two equal angles. For example, an isosceles triangle might have angles measuring 80°-50°-50°.



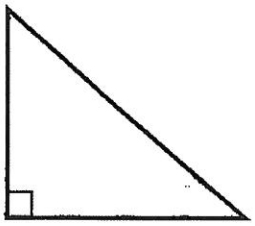
Scalene triangle

Has no equal sides and no equal angles.



Right triangle

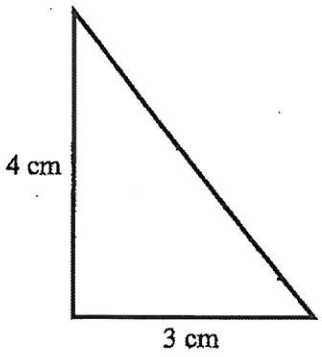
Has one right angle. The side opposite the right angle is called the **hypotenuse.** The other two sides are called **legs.** The legs do not have to be equal.



Pythagorean Theorem

The **Pythagorean theorem** is a formula used to find the length of one side of a right triangle when you know the length of the other two. The formula is $a^2 + b^2 = c^2$, where a and b are the lengths of the legs and c is the length of the hypotenuse.

Look at the triangle below.



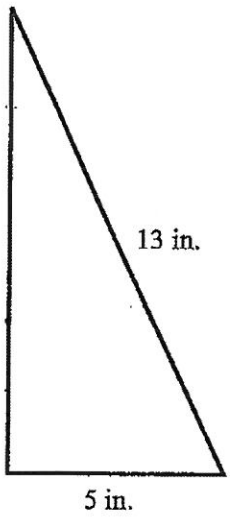
To find the length of the hypotenuse in this triangle, substitute 3 cm and 4 cm into the formula $a^2 + b^2 = c^2$:

$$3^2 + 4^2 = c^2$$
$$9 + 16 = 25$$

Then find the square root of 25. $\sqrt{25} = 5$.

The length of the hypotenuse is 5 cm.

If you are given the length of side c, the hypotenuse, but are missing the length of either leg a or leg b, you can still use the Pythagorean theorem to find the missing side. Look at this triangle:

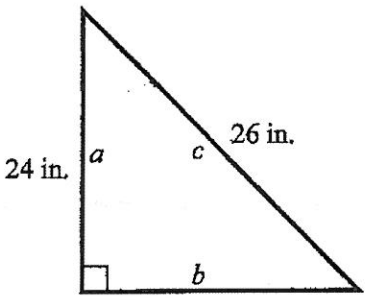


$$c^2 - a^2 = b^2$$
$$13^2 - 5^2 = b^2$$
$$b^2 = 169 - 25$$
$$b^2 = 144$$
$$b = \sqrt{144} = 12 \text{ in.}$$

Let's Review 12: Triangles

Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 5.

1



In the drawing above, the length of side *a* equals 24 inches. The length of side *c* is 26 inches. Which formula would determine the length of side *b*?

A. $a^2 + c^2 = b^2$

B. $b^2 = a^2 - c^2$

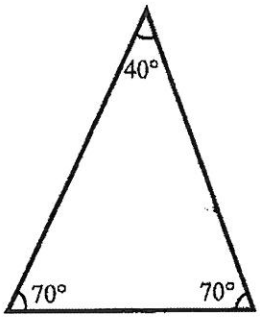
C. $a^2 - b^2 = c^2$

D. $c^2 - a^2 = b^2$

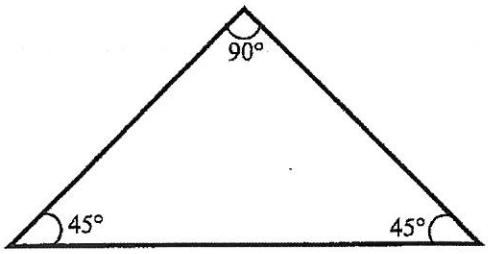
Remember that you need to put side *b* on one side of the equation.

2 Which of the following is an equilateral triangle?

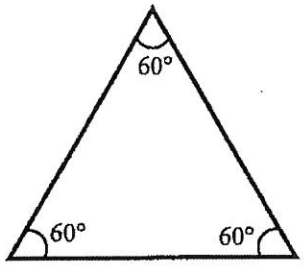
A.



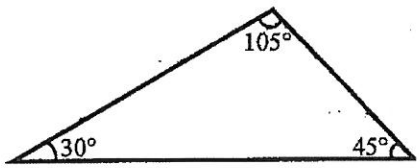
B.



C.



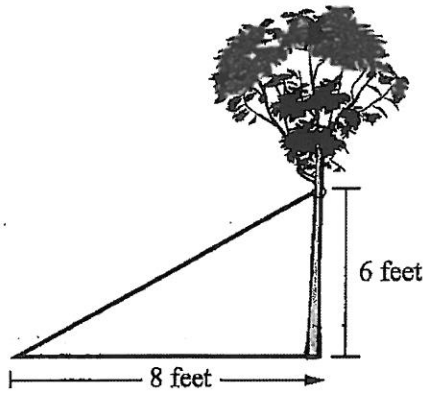
D.



An equilateral triangle has equal sides.

Short-Response Question

3 **To help a tree grow straight, a landscaper attached a brace and a wire to the tree. He then attached the wire to a stake in the ground.**



The brace is 6 feet from the ground and the stake is 8 feet from the base of the tree.

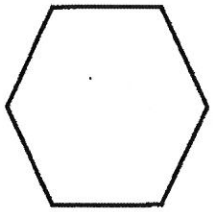
What is the length of the wire?

Use the Pythagorean theorem to find the length of the wire.

Chapter 5 Practice Problems

Complete each of the following practice problems. Check your answers at the end of this chapter. Be sure to read the answer explanations!

1 **The hexagon below is regular. What is the measure of each of its angles?**



A. 90°

B. 108°

C. 120°

D. 180°

2 **An irregular octagon has a perimeter of 64. Seven of its sides measure 4, 4, 9, 8, 8, 5, and 10. What is the length of the remaining side?**

A. 10

B. 12

C. 14

D. 16

3 **What is the measure of ∠DHE?**

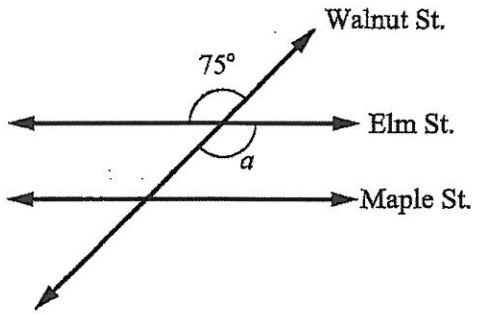
A. 60°

B. 90°

C. 180°

D. 360°

4 **Elm Street and Maple Street are parallel to each other. Walnut Street crosses Elm Street and Maple Street. What is the measure of angle *a*?**



A. 20°

B. 25°

C. 75°

D. 80°

5 **Two streets in Terry's neighborhood intersect and form four right angles. These streets are an example of what kind of lines?**

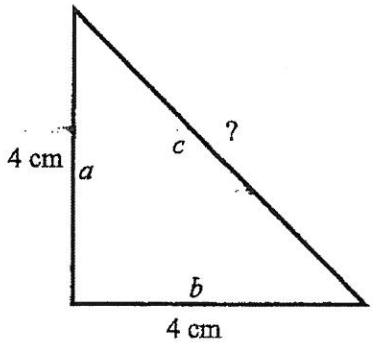
A. perpendicular

B. adjacent

C. supplementary

D. parallel

6 **Look at the right triangle below. What number is closest to the length of side *c*?**



A. 4cm

B. 6 cm

C. 8 cm

D. 16 cm

7 **A polygon was drawn on a piece of paper.**

- **It has two pairs of parallel sides.**
- **The sum of the measures of its interior angles is 360 degrees.**

Which of the following could be the polygon?

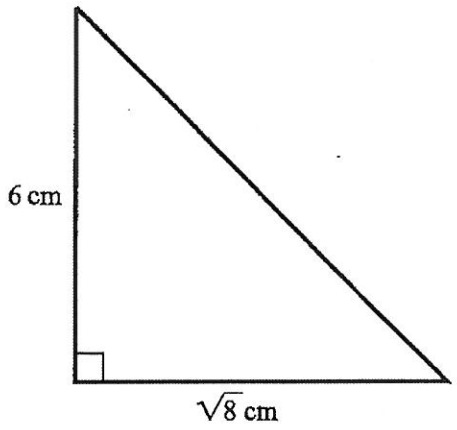
A. an equilateral triangle

B. a regular pentagon

C. a regular octagon

D. a parallelogram

8 **The measurements, in centimeters (cm) of the sides of a right triangle are shown below.**



Which of the following is the length of the hypotenuse of this right triangle?

A. $\sqrt{14}$ cm

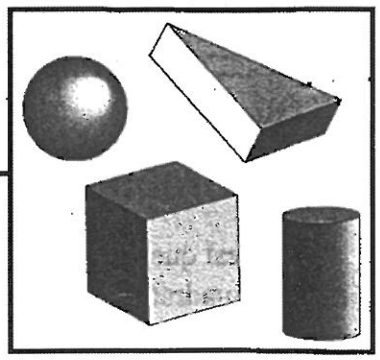
B. $\sqrt{28}$ cm

C. $\sqrt{44}$ cm

D. $\sqrt{48}$ cm

Chapter 6

Geometry, Part 2



Standards

10.G.7 Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points, and apply the results to the solutions of problems.

10.G.8 Find linear equations that represent lines either perpendicular or parallel to a given line and through a point, e.g., by using the "point-slope" form of the equation.

10.G.9 Draw the results, and interpret transformations on figures in the coordinate plane, e.g., translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformations to the solutions of problems.

10.G.10 Demonstrate the ability to visualize solid objects and recognize their projects and cross sections.

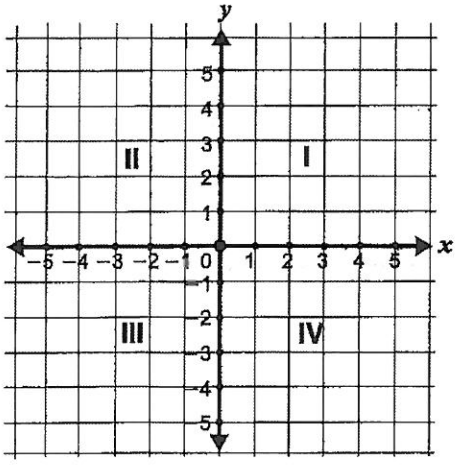
10.G.11 Use vertex-edge graphs to model and solve problems.

10.P.2 Demonstrate an understanding of the relationship between various representations of a line. Determine the line's slope and x- and y-intercepts from its graph or from a linear equation that represents a line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope.

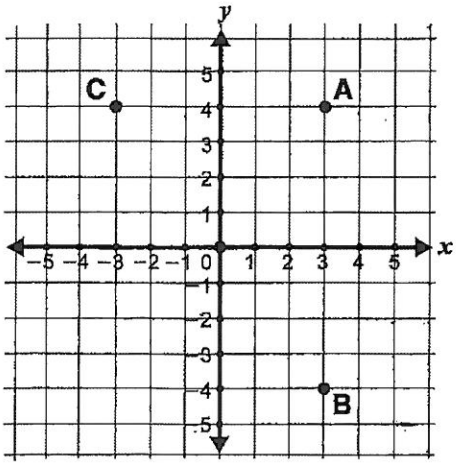
In this chapter, you'll learn about some common types of questions on the MCAS about coordinate grids. Some test questions will ask you to move an object on a coordinate grid. Others might ask you to plot an equation on a coordinate grid or to find the slope of a line. You'll also learn about three-dimensional objects in this chapter.

The Coordinate Plane

Some test questions will be about coordinate planes. A **coordinate plane** is a graph with four quadrants, I, II, III, and IV. It has an x-axis and a y-axis. The x-axis is a horizontal line and the y-axis is a vertical line. Look at the coordinate plane below. Find the x-axis and the y-axis, and look at the different quadrants.



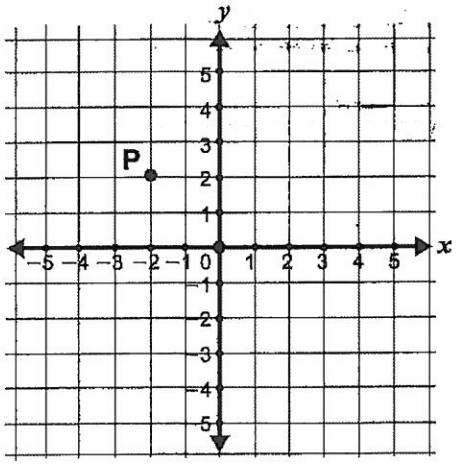
To find coordinates of a point on a coordinate grid, move along the x-axis first. If the number of the first coordinate is positive, move to the right. If it's negative, move to the left. Then move along the y-axis. If the number is positive, move up. If it's negative, move down. Look at the coordinate grid shown here. Note that the coordinates of point A are (3, 4). Note the coordinates of point B are (3, –4), which is point A reflected over the x-axis. Note that the coordinates of point C are (–3, 4), which is point A reflected over the y-axis.



Let's Review 13: The Coordinate Plane

Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 6.

1 **Give the coordinates of point P on the graph below.**



A. $(2, -2)$

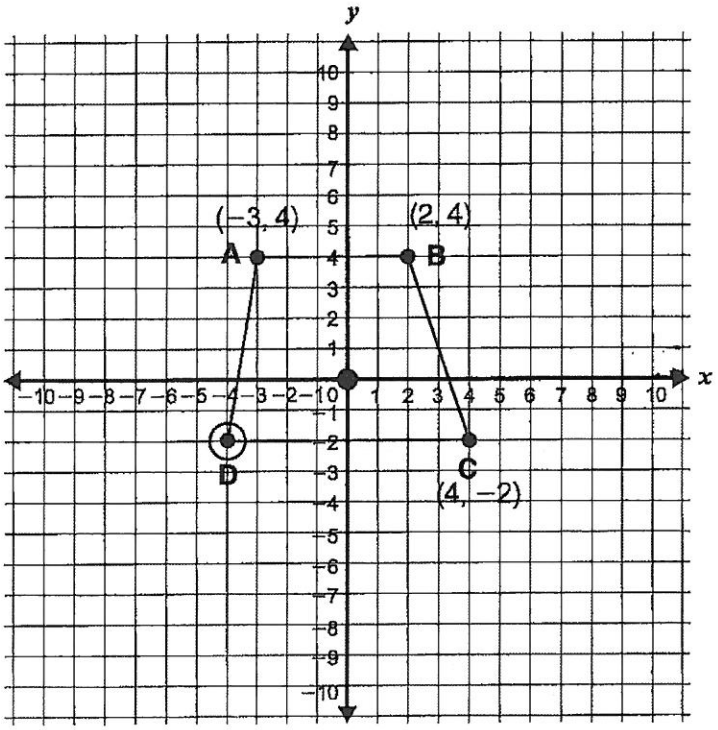
B. $(0, 2)$

C. $(-2, 2)$

D. $(1, -2)$

Remember to move along the *x*-axis first. Then move along the *y*-axis.

2 Look at the trapezoid below.



What are the coordinates of point D?

A. (5, 2)

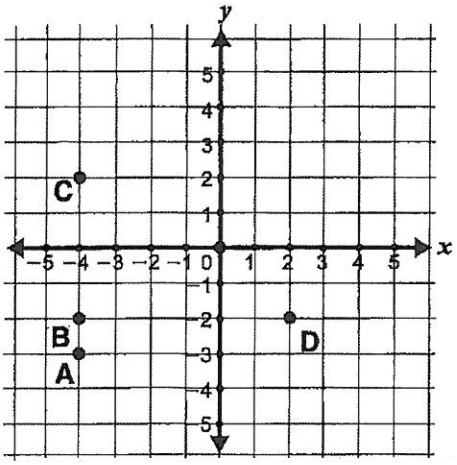
B. (−5, −2)

C. (−4, −2)

D. (−3, −2)

Remember, to find the coordinate of a point, you first move along the *x*-axis and then along the *y*-axis.

3 **Which point on the graph below has the coordinates (−4, −2)?**

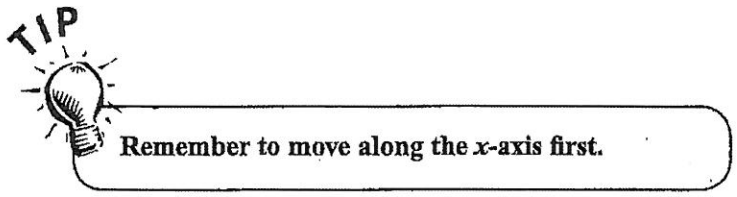


A. point A

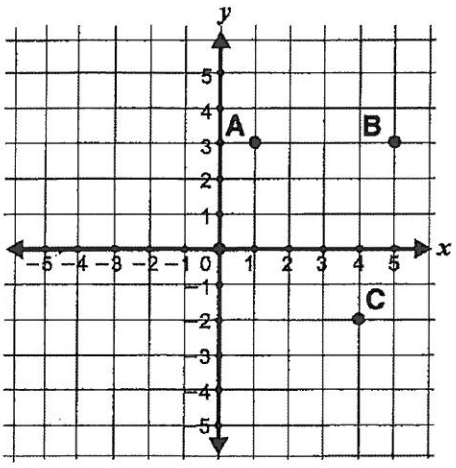
B. point B

C. point C

D. point D



4 **Three of the vertices of a quadrilateral are (1, 3), (5, 3), and (4, −2).**



When used as the last vertex, which point would make the quadrilateral a parallelogram?

A. (1, −2)

B. (0, −2)

C. (−1, −2)

D. (−2, −2)

A parallelogram has two pairs of parallel sides.

Transformations

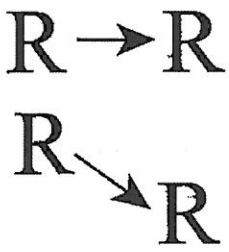
Some test questions will be about transformations, the movement of figures on a coordinate plane. On the MCAS, you might be asked to choose the correct coordinates of a figure moved in a certain way on the coordinate plane, or you might be asked to move a figure on a coordinate grid. The following are some common transformations.

1. Rotation: When you rotate a figure, you move it around a fixed point, which is called the center of rotation. A rotation can be large or small. A rotation of 180° is called a half-turn. A rotation of 90° is called a quarter turn.

R · R R · R

2. Reflection: When a figure is reflected, it is flipped across a line that may or may not be visible. A reflection of a figure is a mirror image.

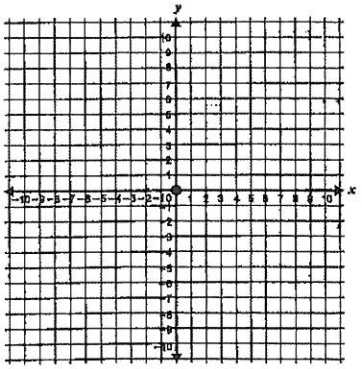
3. Translation: A translation is a "slide." A figure that is translated is moved as if you were sliding it in one direction.



Let's Review 14: Transformations

Complete each of the following questions. When you finish, check your answers with those at the end of Chapter 6.

Open-Response Item



1 **Triangle ABC has vertices with coordinates A (3, 4), B (5, 8), and C (7, 4).**

a. Draw and label triangle ABC on the grid provided.

b. Draw the triangle A′B′C′ by translating each vertex of the triangle two units to the left and two units up. Appropriately label the triangle A′B′C′.

c. Draw the triangle A″B″C″ by reflecting triangle A′B′C′ across the *x*-axis.

2 **Moving a geometric figure around a fixed point is transformation by**

A. inversion.

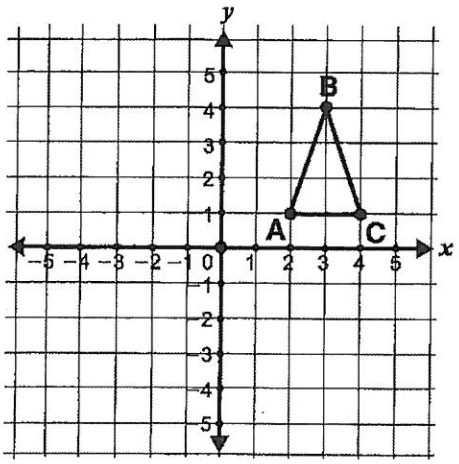
B. reflection.

C. rotation.

D. translation.

Imagine what a figure looks like moving around a fixed point, the way the hands on a clock move.

3 **On the diagram below, draw the image of triangle ABC reflected over the *x*-axis.**



Slope

The **slope** of a line indicates a line's steepness; the greater the slope, the steeper the line. The slope of a line can be positive, negative, or undefined. An **undefined slope** cannot be determined. It might, for example, contain a zero, as in $\frac{3}{0}$.

Lines with a positive slope slant upward from left to right. Lines with a negative slope slant downward from left to right. Lines with 0 slope are horizontal lines. (They are not steep at all!) Horizontal lines have a 0 slope. Vertical lines have an undefined slope.

The ***x*-intercept** is the pair of coordinates at which a line crosses the x-axis, and the ***y*-intercept** is the pair of coordinates at which a line crosses the y-axis.

To determine the slope of a line, use this formula, which is called the **rise over run formula:**

$$\frac{(y_2 - y_1)}{(x_2 - x_1)}$$

Suppose a line has the coordinates listed below. You would use the formula this way:

(1, 5) and (4, −3)

$x_1, y_1 \qquad x_2, y_2$

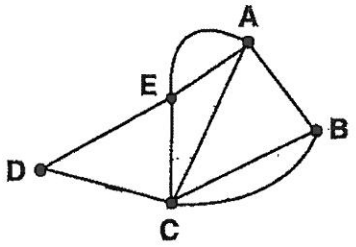
$$\frac{(-3 - 5)}{(4 - 1)}$$

The slope of this line is $-\frac{8}{3}$.

The formula for the equation of any non-vertical line is given by $y = mx + b$, where m represents the slope and b represents the y-intercept. For a vertical line, the equation is given by $x = k$, where k is the x-intercept.

Vertex-Edge Graphs

You might be asked a test question about a vertex-edge graph. A **vertex-edge graph** has a collection of points, called vertices, and line segments, called edges. Note that in this type of graph, some of the lines are curved. Both curved and straight lines are called edges. Look at the vertex-edge graph below. It has 5 vertices and 8 edges.



Let's Review 15: Slope and Vertex-Edge Graphs

Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 6.

1 **Which of the following describes the slope of a line parallel to the *x*-axis?**

A. positive slope

B. negative slope

C. zero slope

D. undefined slope

If you don't remember what you learned about slope, reread this section to find the answer.

2 **What is the slope of a line that passes through the points (2, 5) and (6, 13)?**

A. −2

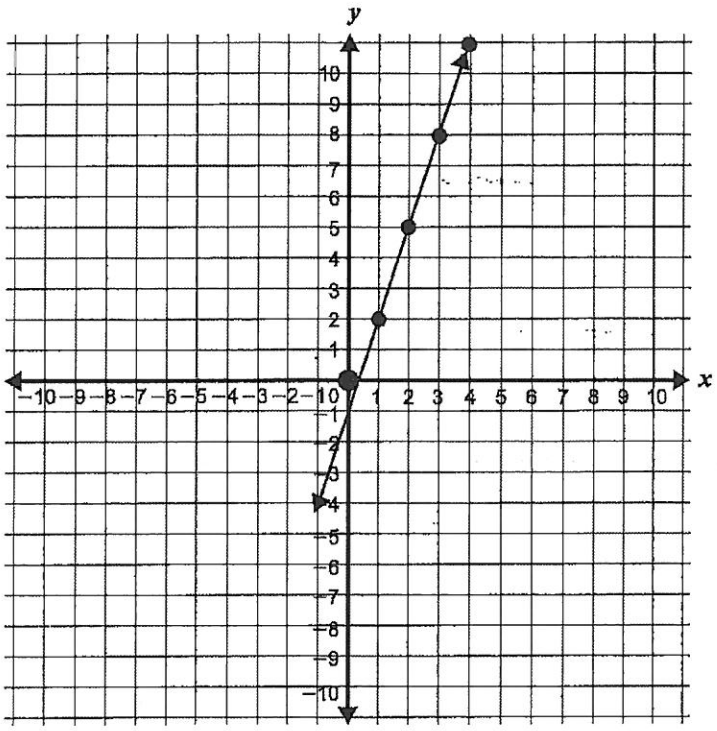
B. 0

C. 1

D. 2

Use the rise over run formula to find the slope of this line.

3 A line is shown on the coordinate grid below.



Which of the following best represents an equation of this line?

A. $y = 2x + 1$

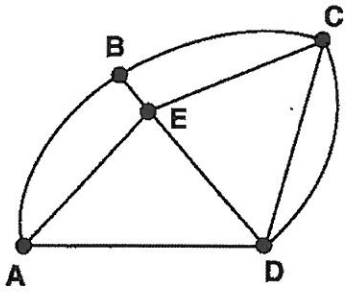
B. $y = 3x - 1$

C. $y = \frac{1}{3}x + 1$

D. $y = \frac{1}{2}x - 1$

Recall that in the form $y = mx + b$, m is the slope (rise divided by run) and b is the y-intercept.

4 **Look at the vertex-edge graph below. How many edges are there?**

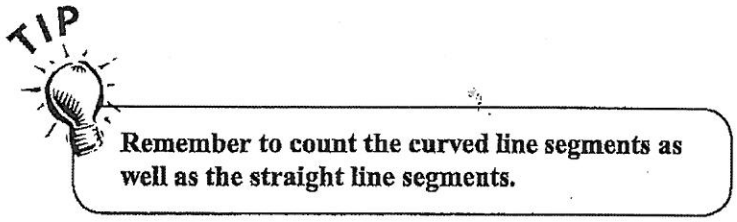


A. 4

B. 6

C. 9

D. 10

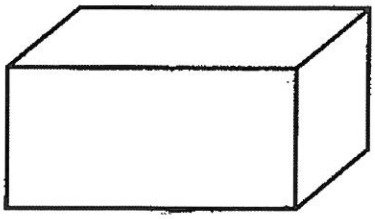


Three-Dimensional Figures

Three-dimensional figures are different from plane figures in that they have depth. Unlike plane figures, three-dimensional figures are not flat. It is a good idea to learn the properties of the following three-dimensional figures before taking the MCAS.

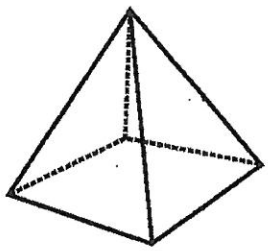
Rectangular Solid

Box with six rectangular faces; each corner is a right angle.



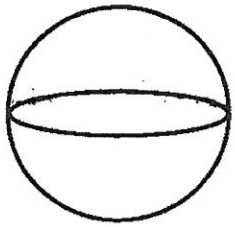
Square Pyramid

Base is a square; has four triangular faces that meet at a vertex.



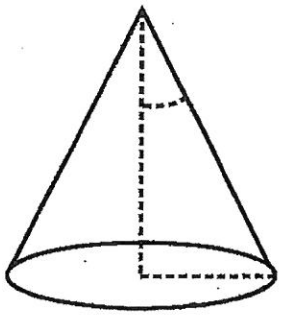
Sphere

A ball where every point on the surface is the same distance from the center.



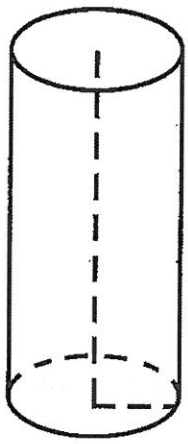
Right Circular Cone

Base is circular; top is shaped like a cone with the vertex directly above the center of the circular base. The distance from the vertex to the circular base is the height.



Right Circular Cylinder

Top and bottom are parallel circles; height is the distance from top to bottom.

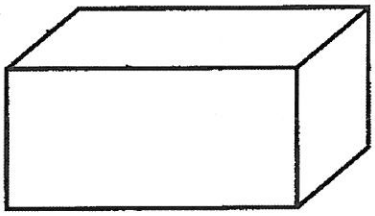


Let's Review 16: Three-Dimensional Figures

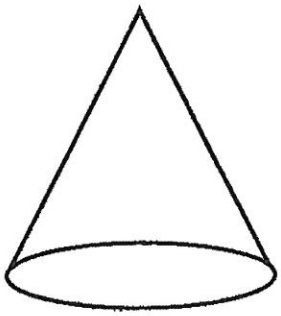
Complete each of the following questions. Use the Tip below each question to help you choose the correct answer. When you finish, check your answers with those at the end of Chapter 6.

1 **Which of the following is a square pyramid?**

A.

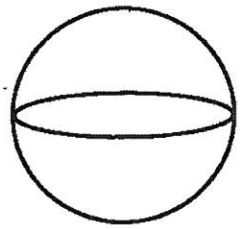


B.

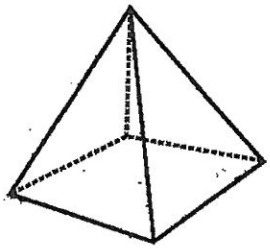


Remember that the base of a square pyramid is a square.

C.



D.



2 **Which of the following has six rectangular faces?**

A. square pyramid

B. right circular cylinder

C. cube

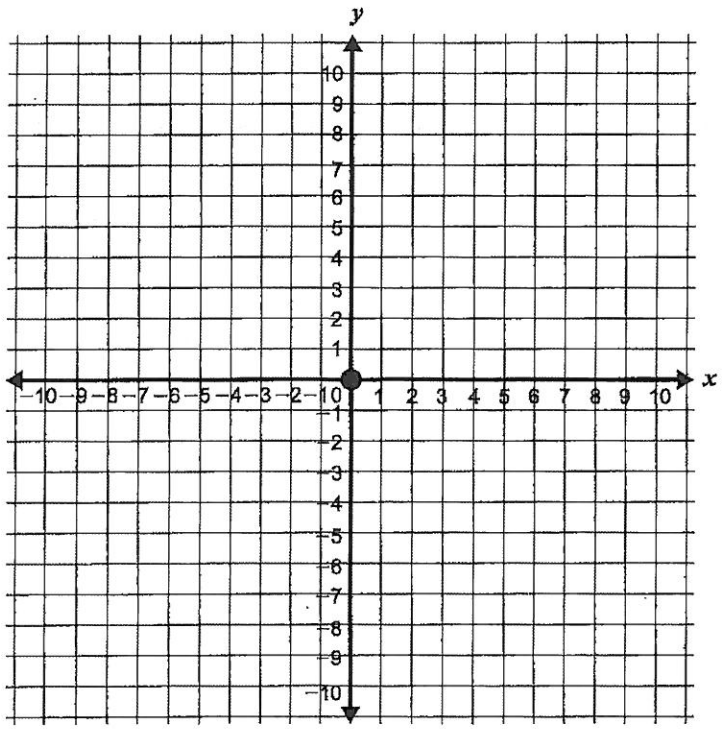
D. rectangular solid

Reread the previous section, three-dimensional figures, if you're not sure.

Chapter 6 Practice Problems

Complete each of the following practice problems. Check your answers at the end of this chapter. Be sure to read the answer explanations!

1 The vertices of a quadrilateral are (−8, −3), (−5, −3), (−3, −5), and (−10, −5).



Which describes this quadrilateral?

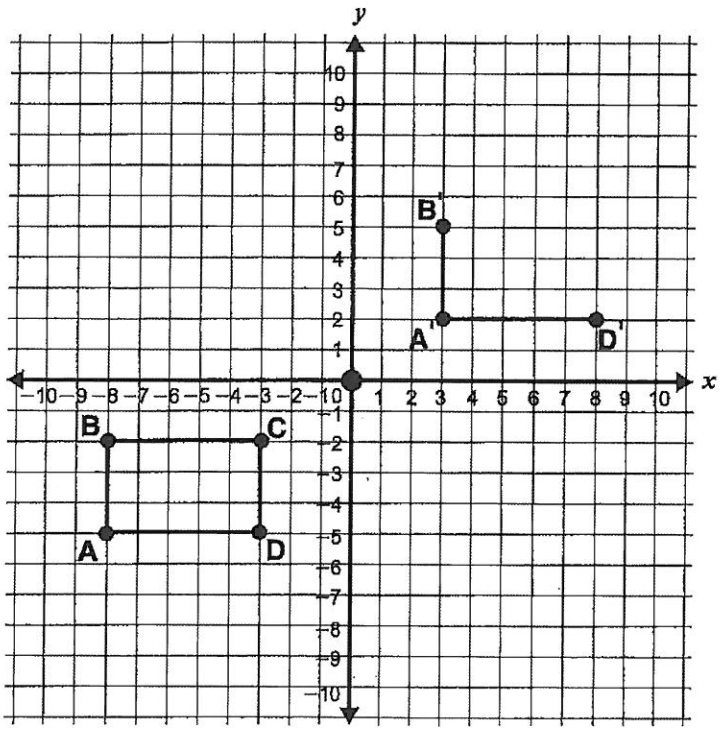
A. parallelogram

B. rectangle

C. rhombus

D. trapezoid

2 **Cheryl is designing a wallpaper border. She is translating rectangle ABCD to create rectangle A′B′C′D′.**



What will be the coordinates of C′?

A. (5, 8)

B. (8, 5)

C. (−5, −3)

D. (−3, −5)

3 **Which is the slope of a line that passes through the points (2, 4) and (−7, 10)?**

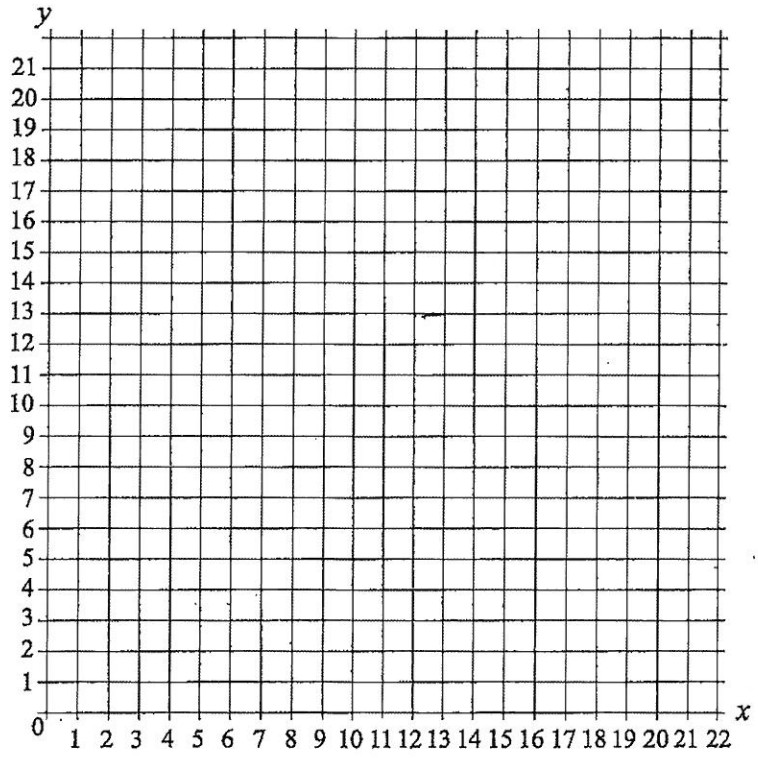
A. $\frac{2}{3}$

B. $-\frac{2}{3}$

C. 2

D. -2

4 **An art student is making geometric designs for a special project. She plots the coordinates of the vertices of a rectangle on a grid. The first three coordinates are (3, 2), (3, 5), and (8, 5). What are the coordinates of the fourth vertex?**



A. (2, 8)

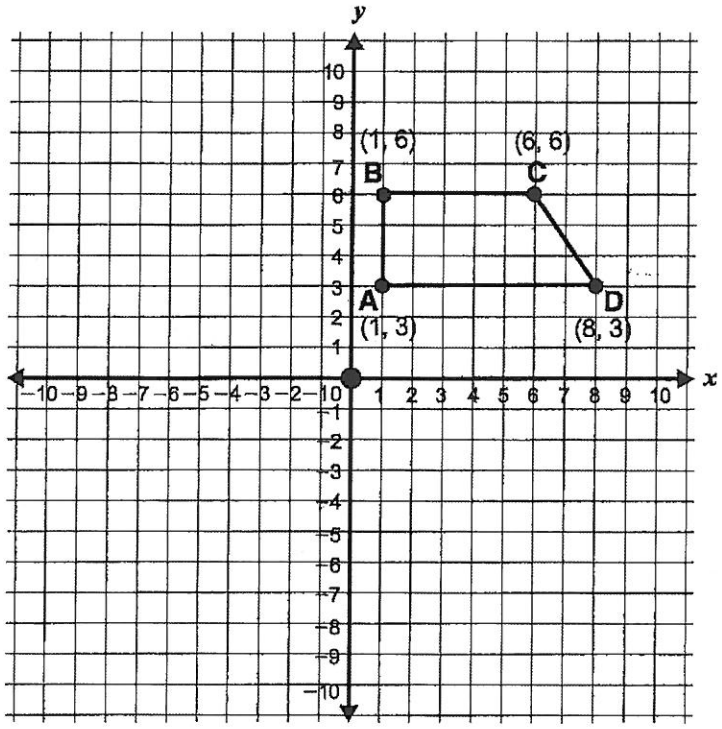
B. (3, 8)

C. (8, 2)

D. (8, 3)

Open-Response Question

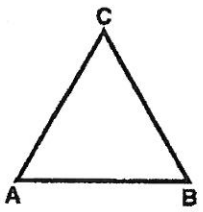
5 **Four points are connected with line segments, as shown on the coordinate plane below.**

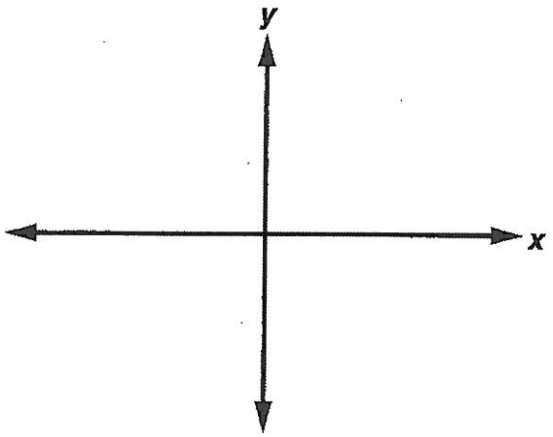


a. Find the slope of each side.

b. Determine if the shape is a trapezoid. Show your work or provide an explanation to your answer.

Short-Response Question





6 **Copy equilateral triangle ABC onto the *x*- and *y*-axes shown above, with AB on the *x*-axis and C on the *y*-axis. Then reflect the triangle over the *x*-axis.**

Chapter 6 Answer Explanations

Let's Review 13: The Coordinate Plane

1. C
To get to point P, you have to move to −2 on the *x*-axis and 2 on the *y*-axis.

2. C
The coordinates of point D are (−4, −2).

3. B
If you move to −4 on the *x*-axis and −2 on the *y*-axis, you will get to point B.