Points, lines, and planes are the building blocks for all other geometric figures. Both lines and planes extend through space forever.

Use the diagram on the right to answer the following questions.

a. Give two different names for the line.
   Two possible names for the line are line \( n \) and \( \overrightarrow{XY} \).

b. Name two collinear points and three noncollinear points.
   Points \( X \) and \( Y \) are collinear, and points \( X, Y, \) and \( Z \) are noncollinear.

c. Give two different names for the plane.
   Two possible names for the plane are plane \( WYZ \) and plane \( Q \).

Practice
Use the diagram on the right to complete questions 1–5.

1. Label the plane as plane \( W \).

2. Draw and label coplanar points \( C, D, \) and \( E \) on the plane.

3. Draw line \( CD \) on the plane.

4. Place point \( K \) on the plane so that it is collinear with point \( C \) but not on \( \overrightarrow{CD} \).

5. What is another name for plane \( W \)?
   ______________________________

Use the diagram on the right to complete questions 6–10.

6. Give another name for plane \( M \). ________________
   ________________

7. Name three collinear points. ______________________

8. Give three points that are noncollinear. ________________
   ________________________________

9. Are any of the points noncoplanar? ___

10. Name two coplanar lines. ________________
Two lines intersect at exactly one point. When two planes intersect, their intersection is an infinite number of points and creates a line. When a plane and a line intersect, their intersection may be just a point or the entire line.

Use the diagram on the right to answer the following questions.

a. What is the intersection of \( \overrightarrow{MN} \) and \( \overrightarrow{PQ} \)?
   Point L is the intersection of \( \overrightarrow{MN} \) and \( \overrightarrow{PQ} \).

b. What is the intersection of planes S and T?
   The intersection of planes S and T is \( \overrightarrow{MN} \).

c. What is the intersection of plane T and \( \overrightarrow{PQ} \)?
   The intersection of plane T and is \( \overrightarrow{PQ} \).

Practice
Use the diagram on the right to complete questions 15–19.

11. Label the planes A and B.

12. Draw and label the intersection of planes A and B as \( \overrightarrow{GH} \).

13. Draw and label \( \overrightarrow{WX} \) so that it intersects plane A at every point and plane B at point G.

14. Draw and label \( \overrightarrow{YZ} \) so that it intersects \( \overrightarrow{WX} \) at point G. The two lines are not on the same plane.

15. Draw and label point T so that it is coplanar with points Y and Z.

Identify each of the following from the diagram.

16. What is the intersection of plane J and \( \overrightarrow{QR} \)? 

17. What is the point of intersection of line P and \( \overrightarrow{MN} \)? 

18. What is the intersection of planes J and K? 

19. What is the intersection of \( \overrightarrow{QR} \) and \( \overrightarrow{QS} \)? 

20. What is the intersection of plane K and \( \overrightarrow{MN} \)? 

21. What is the intersection of plane J and \( \overrightarrow{MN} \)? 

22. What is the intersection of plane K and \( \overrightarrow{QR} \)? 

You have learned that a line is a straight path that extends forever. Now you will work with line segments.

Find each distance.

a. XY
   Point X = 5 and point Y = -3.
   So |Point X – Point Y| = |5 - (-3)| = |8| = 8.

b. YZ
   Point Y = -3, and point Z = 1.
   So |Point Y – Point Z| = |(-3) - 1| = |-4| = 4.

Practice
Complete the steps to find each distance.

1. Find PQ.
   |Point P - Point Q| = |4 - _____| = |__| __

2. Find NS.
   |Point N - Point S| = |_____ - 1| = |__| __

3. Find MR.
   |Point M - Point R| = |__ - (-3)| = |__| __

Find each distance.

4. AB
5. BD
6. DE

7. DC
8. FD
9. AF
Use the Segment Addition Postulate to find each length.

a. Find \( AB \) if \( AC = 28 \) and \( BC = 11 \).

\[
AB + BC = AC \quad \text{Segment Addition Postulate}
\]

\[
AB + 11 = 28
\]

Substitute.

\[
AB + 11 - 11 = 28 - 11
\]

Subtract 11 from both sides.

\[
AB = 17
\]

Simplify.

b. Find \( PR \) in terms of \( x \).

\[
PR = PQ + QR \quad \text{Segment Addition Postulate}
\]

\[
PR = (3x + 4) + (4x - 1)
\]

Substitute.

\[
PR = 7x + 3
\]

Simplify.

Practice

Complete the steps to find each length.

10. Find \( LN \) in terms of \( x \).

\[
LN = \_ + \_
\]

\[
LN = (2x - 3) + (\_)
\]

\[
LN = 
\]

Simplify.

11. Point \( G \) lies on \( \overline{FH} \) between \( F \) and \( H \).

Find \( GH \) if \( FG = 15 \) and \( FH = 34 \).

\[
FH = FG + GH
\]

\[
34 = \_ + GH
\]

Substitute.

\[
34 - \_ = 15 + GH - \_
\]

Simplify.

Use the Segment Addition Postulate to find each length.

12. Point \( M \) lies on \( \overline{LN} \) between \( L \) and \( N \).

Find \( MN \) if \( LN = 32 \) and \( LM = 14 \).

13. Find \( WY \) in terms of \( n \).

14. Point \( D \) lies on \( \overline{CF} \) between \( C \) and \( F \).

Find \( CD \) if \( DF = 22 \) and \( CF = 45 \).
You have learned about lines and line segments. Now you will learn about rays and angles.

An **acute angle** measures greater than $0^\circ$ and less than $90^\circ$.

An **obtuse angle** measures greater than $90^\circ$ and less than $180^\circ$.

A **right angle** measures exactly $90^\circ$.

A **straight angle** measures exactly $180^\circ$.

**Classify each angle and use a protractor to find its measure.**

a. $\angle MNP$

   Angle $MNP$ is a right angle with a measure of $90^\circ$.

b. $\angle QRS$

   Angle $QRS$ is an acute angle with a measure of $30^\circ$.

c. $\angle TUV$

   Angle $TUV$ is an obtuse angle with a measure of $160^\circ$.

**Practice**

**Measure each angle and complete each statement.**

1. Angle $QRT$ is a/an _____ angle with a measure of $57^\circ$.

2. Angle $TRS$ is an obtuse angle with a measure of ____.

3. Angle $QRS$ is a/an ______ angle with a measure of $180^\circ$.

Give two names for each angle. Classify the angle and use a protractor to find its measure.

4. ___________________  5. ___________________
The measure of $\angle KLN$ is 42° and the measure of $\angle NLJ$ is 83°. Find $m\angle KLJ$ and then classify the angle.

$m\angle KLJ = m\angle KLN + m\angle NLJ$ \hspace{1cm} \text{Angle Addition Postulate}

$m\angle KLJ = 42° + 83°$ \hspace{1cm} \text{Substitute.}

$m\angle KLJ = 125°$ \hspace{1cm} \text{Simplify.}

Angle $KLJ$ is an obtuse angle.

Practice
Use the diagram to complete each statement.

6. $m\angle WZY = m\angle \underline{\hspace{2cm}} + m\angle \underline{\hspace{2cm}}$ \hspace{1cm} \text{Angle Addition Postulate}

$m\angle WZY = \underline{\hspace{2cm}} + 72°$ \hspace{1cm} \underline{\hspace{2cm}}

$m\angle WZY = \underline{\hspace{2cm}}$ \hspace{1cm} \text{Simplify.}

$m\angle WZY$ is a/an $\underline{\hspace{2cm}}$ angle.

7. $m\angle ABC = m\angle \underline{\hspace{2cm}} + m\angle \underline{\hspace{2cm}}$ \hspace{1cm} \text{Angle Addition Postulate}

$m\angle ABC = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$ \hspace{1cm} \text{Substitute.}

$m\angle ABC = \underline{\hspace{2cm}}$ \hspace{1cm} \underline{\hspace{2cm}}

$\angle ABC$ is a/an $\underline{\hspace{2cm}}$ angle.

Use the diagram to classify and find the measure of each angle.

8. $\angle AGC$ \hspace{1cm} \underline{\hspace{2cm}}

9. $\angle AGB$ \hspace{1cm} \underline{\hspace{2cm}}

10. $\angle CGD$ \hspace{1cm} \underline{\hspace{2cm}}

11. $\angle BGD$ \hspace{1cm} \underline{\hspace{2cm}}

12. $\angle AGD$ \hspace{1cm} \underline{\hspace{2cm}}

13. Determine the measure $m\angle JFH$ if $m\angle KFG$ is 125°.

$m\angle JFH = \underline{\hspace{2cm}}$
You have learned about points, lines, and planes. Now you will learn about the postulates and theorems that explain the relationships between and among points, lines, and planes.

**Name the following.**

a. five points  
   V, W, X, Y, Z  

b. two planes  
   planes G and H  

c. two lines  
   \( \overline{XY} \) and \( \overline{WZ} \)  

d. four coplanar points  
   W, X, Y, and Z

**Practice**

**Complete the following statements.**

1. Through any two points there is exactly one line.

2. Through any three noncollinear points there exists exactly one plane.

3. Give three conditions for defining a plane. Draw a figure to display each condition.

   a. ____________________________

   ![Diagram](image)

   b. ____________________________

   ![Diagram](image)

   c. ____________________________

   ![Diagram](image)
a. Identify the intersection of planes $P$ and $Q$.
   The intersection of planes $P$ and $Q$ is $\overrightarrow{EG}$.
b. Identify a point of intersection of plane $P$ and $\overrightarrow{CD}$.
   Point $F$
c. Identify all points of intersection of lines on plane $Q$.
   Points $D$, $E$, and $F$

**Practice**

**Use the figure at the right to complete problems 4–8.**

4. The intersection of ______ and _______ is $\overrightarrow{XY}$.
5. The intersection of line ___ and line ___ is point $V$.
6. The intersection of line ___ and line ___ is point $W$.
7. Plane $A$ and line $m$ intersect at ______.
8. Plane ___ and line ___ intersect at point $W$.
9. Plane $A$ and line $n$ intersect at ______.
10. Line $m$ and plane $B$ intersect at ______.

**Complete the following statements.**

11. If two planes intersect, then their intersection is ______.
12. ______ define a line, ______ points define a plane, and ___ noncoplanar ______ define space.

**Use the figure to answer problems 13–19**

13. What is the intersection of planes $Y$ and $Z$? ______
14. Identify a line on plane $Z$. ___
15. Identify a line that intersects $\overrightarrow{HJ}$. What is the intersection? ______
16. Are points $P$ and $L$ coplanar? __
17. Identify three points that are coplanar but not collinear.
   ____________________________________________
18. What is the intersection of plane $Z$ and $\overrightarrow{LM}$? ______
19. What is the intersection of plane $Z$ and $\overrightarrow{NP}$? ___
You will learn about special relationships of lines and planes.

Both planes and lines can be parallel or perpendicular. Lines can have one additional relationship, which is called skew.

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>parallel</td>
<td>lines that lie in the same plane and do not intersect</td>
<td>( LK \parallel MN )</td>
</tr>
<tr>
<td>perpendicular</td>
<td>lines that form 90° angles</td>
<td>( LK \perp JK )</td>
</tr>
<tr>
<td>skew</td>
<td>lines that do not lie in the same plane and do not intersect</td>
<td>( JK ) and ( MN )</td>
</tr>
</tbody>
</table>

If two parallel planes are cut by a third plane, then the lines of intersection are parallel.

Planes \( GHI \) and \( KLM \) are parallel.

**Name two pairs of parallel lines.**
\( GH \parallel KL \) and \( IJ \parallel MN \)

**Practice**

Use the diagram at the right to complete 1–7.

1. \( \overrightarrow{PQ} \parallel \overrightarrow{TU} \) and \( \overrightarrow{PQ} \parallel \) __________
2. \( \overrightarrow{PS} \parallel \) __________ and \( \overrightarrow{PS} \parallel \) __________
3. \( \overrightarrow{PT} \perp \) __________ and \( \overrightarrow{PT} \perp \) __________ on plane \( PQR \)
4. \( \overrightarrow{RV} \perp \) __________ and \( \overrightarrow{RV} \perp \) __________ on plane \( TUV \)
5. Name a line that is skew to \( \overrightarrow{SW} \). ________________
6. Name a line that is parallel to \( \overrightarrow{UV} \). ________________
7. Name a line that is perpendicular to \( \overrightarrow{UV} \). ________________

**Use the diagram at the right to answer each question.**

Given: Plane \( ABC \) is parallel to plane \( EFG \)

8. Name two pairs of parallel lines. __________ __________
9. Which line will intersect \( \overrightarrow{CD} \)? __________
10. Which line will intersect \( \overrightarrow{EF} \)? __________
11. Which line is skew to \( \overrightarrow{AB} \)? __________
12. Which line is skew to \( \overrightarrow{EF} \)? __________
In the figure, \( \angle 1 \equiv \angle 2 \), \( \overrightarrow{XY} \parallel \overrightarrow{WZ} \), and \( \overrightarrow{RS} \perp \overrightarrow{WZ} \).

If two lines form congruent adjacent angles, then they are perpendicular.

a. What is the relationship between \( \overrightarrow{WZ} \) and \( \overrightarrow{TU} \)?
   
   Since \( \angle 1 \equiv \angle 2 \), \( \overrightarrow{WZ} \perp \overrightarrow{TU} \).

If a line is perpendicular to one of two parallel lines, then it is perpendicular to the other one.

b. What is the relationship between \( \overrightarrow{XY} \) and \( \overrightarrow{RS} \)?
   
   Since \( \overrightarrow{RS} \perp \overrightarrow{WZ} \) and \( \overrightarrow{XY} \parallel \overrightarrow{WZ} \), \( \overrightarrow{RS} \perp \overrightarrow{XY} \).

If two lines are perpendicular, then they form congruent adjacent angles.

c. What is the relationship between \( \angle 3 \) and \( \angle 4 \)?
   
   Since \( \overrightarrow{RS} \perp \overrightarrow{WZ} \), \( \angle 3 \equiv \angle 4 \).

**Practice**

Use the diagram at the right to answer 13–15.

Given: \( \overrightarrow{EG} \parallel \overrightarrow{FH} \) and \( \angle 2 \equiv \angle 3 \)

13. What is the relationship between \( \overrightarrow{AC} \) and \( \overrightarrow{FH} \)?
   
   Since \( \angle 2 \equiv \angle 3 \), \( \overrightarrow{AC} \parallel \overrightarrow{FH} \).

14. What is the relationship between \( \overrightarrow{AC} \) and \( \overrightarrow{EG} \)?
   
   Since \( \overrightarrow{AC} \perp \overrightarrow{FH} \) and \( \overrightarrow{EG} \parallel \overrightarrow{FH} \), then \( \square \).

15. What is the relationship between \( \angle 1 \) and \( \angle 4 \)?
   
   Since \( \overrightarrow{EG} \perp \overrightarrow{AC} \), \( \square \).

Use the diagram at the right to answer 16–18.

Given: \( \overrightarrow{MN} \perp \overrightarrow{RV} \) and \( \overrightarrow{WX} \parallel \overrightarrow{RV} \)

16. Name each line parallel to \( \overrightarrow{MN} \) \( \square \)

17. What is the relationship between \( \angle 1 \) and \( \angle 2 \)?
   
   \( \square \)

18. How do you know that \( \overrightarrow{MN} \) and \( \overrightarrow{WX} \) are perpendicular?
   
   \( \square \)

\( \square \)
You have solved problems involving pairs of lines. Now you will solve problems involving pairs of angles.

**Complementary and Supplementary Angles**

Two angles are **complementary angles** if their combined measures total 90°.

Two angles are **supplementary angles** if their combined measures total 180°.

**Find the complement of \( \angle ABC \).**

**Step 1:** \( m\angle ABC = 37° \)

Let \( x \) = complement of \( \angle ABC \).

**Step 2:** \( m\angle ABC + \) complement of \( \angle ABC = 90° \)

\[ 37° + x = 90° \]

\[ 37° + x - 37° = 90° - 37° \]

\[ x = 53° \]

The measure of the complement of \( \angle ABC = 53° \)

**Practice**

Complete the steps to find the supplement of \( \angle LMN \). Let \( x \) represent the measure of the complement of \( \angle LMN \).

1. \( 135° + x = ____ \)

\[ 135° + x - ____ = 180° - ____ \]

\[ ____ = ____ \]

The measure of the supplement of \( \angle LMN \) is ____

**Find the measure of each of the following angles.**

2. complement of \( \angle RST \) ____

3. supplement of \( \angle DEF \) ____

4. supplement of \( \angle RST \) ____

5. complement of \( \angle DEF \) ____
Pairs of Angles

Adjacent angles have the same vertex and share a common side. In the figure, \( \angle CDE \) is adjacent to \( \angle EDG \).

A linear pair is formed by two adjacent angles whose non-common sides are opposite rays. The sum of the measures of a linear pair is 180°. \( \angle FDC \) and \( \angle CDG \) form a linear pair.

Vertical angles are nonadjacent angles formed by two intersecting lines. \( \angle FDC \) and \( \angle EDG \) are vertical angles.

Tell whether \( \angle YZW \) and \( \angle WZX \) are adjacent angles, form a linear pair, or are vertical angles.

Adjacent angles: \( \angle YZW \) and \( \angle WZX \) have the same vertex and a common side. They are adjacent angles.

Linear pair: The two angles together do not make an angle that is 180°. The angles do not form a linear pair.

Vertical angles: The two angles are not vertical angles, because they are adjacent angles.

Practice
Complete the steps to show that two angles form a linear pair.

6. \( \angle QTS \) and \( \angle STR \) have the same _____ and a common _____.

   The non-common sides have an angle of measure _____ because the non-common sides form a straight _____.

   \( \angle QTS \) and \( \angle STR \) form a __________.

Tell whether the pair of angles are adjacent angles, form a linear pair, or are vertical angles.

7. \( \angle JTY \) and \( \angle YTH \) ________________

8. \( \angle YTZ \) and \( \angle PTZ \) ________________

9. \( \angle JTP \) and \( \angle YTZ \) ________________

10. \( \angle PTZ \) and \( \angle HTZ \) ________________
You have solved problems involving pairs of angles. Now you will use inductive reasoning to make conjectures.

### Making Conjectures
When you make a general rule or conclusion based on a pattern, you are using **inductive reasoning**. A conclusion based on a pattern is called a **conjecture**.

**Find the next two terms in the pattern.**

\(-8, -3, 2, 7, \ldots\)

**Step 1:** Study the pattern and try to find a mathematical relationship between the numbers. Test your conjecture on the given numbers.

**Step 2:** The correct conjecture is that each term is 5 more than the previous term.

\(\begin{align*}
-8 + 5 &= -3 \\
-3 + 5 &= 2 \\
2 + 5 &= 7
\end{align*}\)

**Step 3:** Find the next term by adding 5 to the last term: \(7 + 5 = 12\).

The next term is \(12 + 5 = 17\). The next two terms in the pattern are 12 and 17.

### Practice
Complete the steps to find the next two items in the pattern.

1.

The first angle has measure __ __.

The second angle has measure __ __. It is __ __ of 180°.

The measure of the third angle is __ __. It is __ __ of 90°.

The measure of the fourth angle is __ __ of 45°, or __ __.

The measure of the fifth angle is __ __ of 22.5°, or __ __.

**Find the next two items in each pattern.**

2.

3 6 10
Reteaching continued 7

Proving a Conjecture Is False
Since a conjecture is an educated guess, it may be true, or it may be false. It takes only one example to prove that a conjecture is false.

Show that the conjecture is false.
Conjecture: For any integer \( n \), \( n \leq 4n \).
Step 1: Make a table of sample values of \( n \).
Step 2: Substitute each value into the inequality \( n \leq 4n \) and determine whether that value makes the inequality true or false.

<table>
<thead>
<tr>
<th>( n )</th>
<th>( n \leq 4n )</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>( 3 \leq 4(3) )  ( 3 \leq 12 )</td>
<td>true</td>
</tr>
<tr>
<td>0</td>
<td>( 0 \leq 4(0) )  ( 0 \leq 0 )</td>
<td>true</td>
</tr>
<tr>
<td>(-2)</td>
<td>(-2 \leq 4(-2) ) ( -2 \leq -8 )</td>
<td>false</td>
</tr>
</tbody>
</table>

\( n = -2 \) makes the inequality false, so the conjecture is false.

Practice
Complete the table to show that the conjecture is false.

3. Conjecture: For any real numbers \( x \) and \( y \), if \( x > y \), then \( x^2 > y^2 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
<th>( x^2 &gt; y^2 )</th>
<th>True or False?</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>( 4^2 &gt; )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( 16 &gt; )</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>( 5^2 &gt; )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( 25 &gt; )</td>
<td></td>
</tr>
<tr>
<td>(-4)</td>
<td>(-5)</td>
<td>((-4)^2 &gt; )</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>( 16 &gt; )</td>
<td></td>
</tr>
</tbody>
</table>

Show that each conjecture is false by finding one case that makes the conjecture false.

4. For any number \( n \), \( 2n < n^2 \).
5. For any integer \( n \), \( n > -n \).

6. For any integer \( a \), \( a > \frac{a}{2} \).
7. For any integer \( n \), \( \frac{n}{2n} = \frac{1}{2} \).
You have worked with conjectures. Now you will use formulas in geometry.

**Perimeter and Area of Rectangles and Triangles**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle</td>
<td>( P = 2h + 2b )</td>
</tr>
<tr>
<td>Triangle</td>
<td>( A = \frac{1}{2}bh )</td>
</tr>
</tbody>
</table>

**Find the perimeter of the rectangle.**

**Step 1:** Determine the base. Substitute the given information into the formula and solve for \( h \).

\[
A = bh \\
24 = (6)h \\
\frac{24}{6} = \frac{(6)h}{6} \\
4 = h
\]

**Step 2:** Substitute \( b = 4 \) and \( h = 6 \) into the perimeter formula and simplify:

\[
P = 2b + 2h = 2(4) + 2(6) = 20 \text{ cm}
\]

The perimeter of the rectangle is 20 centimeters.

**Practice**

Complete the steps to find the area of the triangle.

1. \( A = \frac{1}{2}bh \)
   
   \[
   A = \frac{1}{2}(9)(\_)
   \]

2. area of the rectangle

3. perimeter of the triangle

Find each measurement.
The Pythagorean Theorem
In a right triangle, the sum of the square of the legs, $a$ and $b$, is equal to the square of the hypotenuse, $c$: $a^2 + b^2 = c^2$

Use the Pythagorean theorem to solve for the length of $b$.

**Step 1:** Substitute $a = 12$ and $c = 20$.
\[
a^2 + b^2 = c^2 \\
12^2 + b^2 = 20^2
\]

**Step 2:** Simplify.
\[
144 + b^2 = 400 \\
144 + b^2 - 144 = 400 - 144 \\
b^2 = 256 \\
\sqrt{b^2} = \sqrt{256} \\
b = 16
\]
The length of leg $b$ is 16 inches.

**Practice**
Complete the steps in problems 4 and 5.

4. Find the length of side $b$.

   \[
a^2 + b^2 = c^2 \\
8^2 + b^2 = 17^2 \\
64 + b^2 = 289 - \_
\]

   \[
b^2 = \_ \\
b = \sqrt{\_} \\
b = \_
\]

5. Find the hypotenuse.

   \[
a^2 + b^2 = c^2 \\
9^2 + 15^2 = \_
\]

   \[
\_
+ 225 = \_
\]

   \[
\_ = \_
\]

   \[
\_ = c^2 \\
\_ = c
\]
You have worked with geometric formulas. Now you will use the distance formula.

**Distance Between Two Points on a Line**

To find the distance between two points on a number line, take the absolute value of the difference between the points’ coordinates.

\[ d = |a_2 - a_1| \]

**Find the distance between the points on a number line.**

**Step 1:** Choose a point to be \( a_1 \). The other point will be \( a_2 \).

\[ a_1 = -4 \quad a_2 = 2 \]

**Step 2:** Substitute the values into the formula and simplify.

\[ d = |a_2 - a_1| \]
\[ = |2 - (-4)| \]
\[ = |2 + 4| \]
\[ = 6 = 6 \]

The distance is 6 units.

**Practice**

Complete the steps to find the distance between the points on the number line.

1. \[ d = |a_2 - a_1| \]
\[ = |-7 - _| \]
\[ = |-7 - _| \]
\[ = _| = _ \]

Find the distance between each pair of points.

2. 

3. 

4. 

5. 

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Distance on a Coordinate Plane

The **Distance Formula** can be used to find the distance between two points, \((x_1, y_1)\) and \((x_2, y_2)\), in a coordinate plane: \[ d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}. \]

**Find the distance between the two points. Round your answer to the nearest tenth.**

**Step 1:** Let \((1, 2) = (x_1, y_1)\) and \((7, 6) = (x_2, y_2)\).

**Step 2:** Substitute the coordinates into the distance formula and simplify. Use a calculator to find the square root.

\[

d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
= \sqrt{(7 - 1)^2 + (6 - 2)^2} \\
= \sqrt{(6)^2 + (4)^2} \\
= \sqrt{36 + 16} \\
= \sqrt{52} \\
\approx 7.2
\]

**Practice**

Complete the steps to find the distance between each pair of points. Round your answer to the nearest tenth.

6. \((2, 4)\) and \((-3, 9)\)

\[
d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
= \sqrt{(2 - (\_\_)) + (4 - \_\_)} \\
= \sqrt{(\_\_)^2 + (\_\_)^2} \\
= \sqrt{\_\_ + 25} \\
\approx 7.1
\]

7. \((-7, -2)\) and \((4, 1)\)

\[
d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
= \sqrt{(-7 - 4)^2 + (-2 - 1)^2} \\
= \sqrt{(\_\_)^2 + (\_\_)^2} \\
= \sqrt{\_\_ + 9} \\
\approx 11.4
\]

Find the distance between each pair of points. Round your answer to the nearest tenth.

8. \((6, 2)\) and \((-1, -5)\)

9. \((0, 4)\) and \((-8, 0)\)

10. \((-8, -3)\) and \((5, 5)\)

11. \((4, -2)\) and \((-7, 1)\)
You have found the distance between two points. Now you will work with conditional statements.

**Hypothesis and Conclusion**

A **conditional statement** is a statement in the form “If $p$, then $q$, where $p$ is the **hypothesis** and $q$ is the **conclusion**.

For example:

If two lines are parallel, then they do not intersect.

The hypothesis comes after the word *if*. The conclusion comes after the word *then*.

**Identify the hypothesis and conclusion of the conditional statement.**

If a figure is a quadrilateral, then it has four sides.

**Step 1:** The hypothesis is the phrase that follows the word *if*: A figure is a quadrilateral.

**Step 2:** The conclusion is the phrase that follows the word *then*: It has four sides.

**Practice**

Complete the steps to identify the hypothesis and conclusion of the statements.

1. If $x$ is an even number, then $x$ is divisible by 2.

   **Hypothesis:** _________________________

   **Conclusion:** _________________________

2. If two angles are supplementary, then they form a linear pair.

   **Hypothesis:** _________________________

   **Conclusion:** _________________________

**For each conditional statement, underline the hypothesis and double-underline the conclusion.**

3. If two angles are not adjacent, then they cannot be a linear pair.

4. If the weather is rainy, then the football team will not practice after school.

5. If $3x - 4 = 11$, then $x = 5$. 
Truth Value of a Conditional Statement

Some conditional statements are true, while others are false. This is called the truth value of a conditional statement. A statement is false only when the hypothesis is true and the conclusion is false.

Determine whether the conditional statement is true or false. If it is false, explain your reasoning.

If an acute angle measures 140°, then it is called a straight angle.

Step 1: Determine whether the hypothesis is true or false. The hypothesis is that an acute angle measures 140°. The hypothesis is false because the measure of an acute angle is less than 90°.

Step 2: Determine whether the conditional statement is true or false. This statement has a false hypothesis. When the hypothesis is false, the conditional statement as a whole has a truth value of “true.” The statement cannot have a truth value of “false” unless a situation exists in which the hypothesis is true.

Practice
Circle the correct answers for each conditional statement.

6. If a square has a side length of 5 centimeters, then its area is 20 square centimeters.
   - The hypothesis is true /false.
   - The conclusion is true/ false .
   - The conditional situation is true/ false .

7. If two angles are right angles, then they are congruent.
   - The hypothesis is true /false.
   - The conclusion is true /false.
   - The conditional situation is true /false.

Determine whether the conditional statement is true or false.
If it is false, explain your reasoning.

8. If an angle is obtuse, then it is not a right angle. ____

9. If two right angles are complementary, then they are not congruent. ____