Classify each triangle as acute, equiangular, obtuse, or right.

1. \( \triangle ABD \)

**SOLUTION:**

Since \( \triangle ABD \) has three congruent sides, it has three congruent angles. Therefore it is equiangular (and equilateral).

2. \( \triangle ABC \)

**SOLUTION:**

\( \triangle ABC \) is a right, since \( m\angle ABC = 90 \).

3. \( \triangle BDC \)

**SOLUTION:**

\( \triangle BDC \) is obtuse, since \( m\angle BDC > 90 \).

**Find the measure of each numbered angle.**

4. \( \angle 1 \)

**SOLUTION:**

Here, \( \angle 1 \) and \( 125^\circ \) form a linear pair. So, \( m\angle 1 + 125 = 180 \).

Solve for \( m\angle 1 \).

\[
m\angle 1 + 125 - 125 = 180 - 125 \]

\[
m\angle 1 = 55
\]
5. \( \angle 2 \)

**SOLUTION:**
Here, \( \angle 1 \) and 125° angle form a linear pair. So, \( m\angle 1 + 125 = 180 \).

Solve for \( m\angle 1 \).

\[
m\angle 1 + 125 = 180 - 125
\]

\[
m\angle 1 = 55
\]

By the Exterior Angle Theorem, \( m\angle 2 + 32 = m\angle 1 \).

Substitute \( m\angle 1 = 55 \).

\[
m\angle 2 + 32 = 55
\]

\[
m\angle 2 + 32 - 32 = 55 - 32
\]

\[
m\angle 2 = 23
\]

6. \( \angle 3 \)

**SOLUTION:**
By the Exterior Angle Theorem, \( 62 + m\angle 3 = 125 \).

Solve for \( m\angle 3 \).

\[
62 + m\angle 3 - 62 = 125 - 62
\]

\[
m\angle 3 = 63
\]

7. \( \angle 4 \)

**SOLUTION:**
By the Vertical Angle Theorem, \( m\angle 4 = 125 \)

**In the diagram, \( \triangle RST \cong \triangle XYZ \).**

8. Find \( x \).

**SOLUTION:**
By CPCTC, \( \overline{RT} \cong \overline{ZX} \). Since \( \overline{RT} \cong \overline{ZX} \), \( RT = ZX \).

Substitute.

\[
x + 21 = 2x - 14
\]

\[
x + 21 - 2x = 2x - 14 - 2x
\]

\[
-x + 21 = -14
\]

\[
-x + 21 - 21 = -14 - 21
\]

\[
-x = -35
\]

\[
x = 35
\]

**SOLUTION:**

By CPCTC, \( \angle R \cong \angle X \). Since \( \angle R \cong \angle X \), \( m \angle R = m \angle X \).

Substitute.

\[
\begin{align*}
4y - 10 &= 3y + 5 \\
4y - 10 - 3y &= 3y + 5 - 3y \\
y - 10 &= 5 \\
y - 10 + 10 &= 5 + 10 \\
y &= 15
\end{align*}
\]

10. **PROOF** Write a flow proof.

Given: \( XY \parallel WZ \) and \( AX \parallel YZ \)

Prove: \( \triangle XWZ \cong \triangle ZYX \)

![Diagram of \( \triangle XWZ \) and \( \triangle ZYX \)]

**SOLUTION:**

Given segment \( XY \) is parallel to segment \( WZ \) yields angle 2 is congruent to angle 4.

Given segment \( XW \) is parallel to segment \( YZ \) yields angle 1 is congruent to angle 3.

By the Reflexive Property segment \( XZ \) is congruent to itself.

Triangle \( XWZ \) is congruent to triangle \( ZYX \) by the Angle-Side-Angle Postulate.

**Proof:**

\[
\begin{align*}
\triangle XWZ &\cong \triangle ZYX \\
\angle 2 &\cong \angle 4 \\
\angle 1 &\cong \angle 3
\end{align*}
\]

11. **MULTIPLE CHOICE** Find \( x \).

![Diagram of triangle with angles 116°, 72°, and unknown \( x \)]

\[
\begin{align*}
\text{A} &\ 36 \\
\text{B} &\ 32 \\
\text{C} &\ 28 \\
\text{D} &\ 22
\end{align*}
\]
SOLUTION:
The given two triangles are isosceles. First, find the measures of the base angles of the triangles. Let \(a\) and \(b\) be the measures of the base angle of the first triangle and second triangle respectively. The base angles are congruent in each triangle, since they are isosceles.

Consider the first triangle.
\[ a + a + 116 = 180 \]
Solve for \(a\).
\[ 2a + 116 = 180 \]
\[ 2a + 116 - 116 = 180 - 116 \]
\[ 2a = 64 \]
\[ a = 32 \]

Here, angle \(b\) is supplementary to a 32 + 72 or 104 degree angle. So, \(b + 104 = 180\).
Solve for \(b\).
\[ b + 104 - 104 = 180 - 104 \]
\[ b = 76 \]

Now, consider the second triangle. \(76 + 76 + x = 180\).
Solve for \(x\).
\[ 152 + x = 180 \]
\[ 152 + x - 152 = 180 - 152 \]
\[ x = 28 \]

So, the correct option is C.

12. Determine whether \(\triangle JTD \cong \triangle SEK\) given \(T(-4, -2), J(0, 5), D(1, -1), S(-1, 3), E(3, 10),\) and \(K(4, 4)\). Explain.

SOLUTION:
Use the Distance Formula to find the lengths of \(\overline{J}T\), \(\overline{JD}\) and \(\overline{DT}\).
\(\overline{JT}\)
has endpoints \(T(-4, -2)\) and \(J(0, 5)\).
\[ JT = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Practice Test - Chapter 4

Substitute.
\[ TJ = \sqrt{(0 - (-4))^2 + (5 - (-2))^2} \]
\[ = \sqrt{(4)^2 + (7)^2} \]
\[ = \sqrt{16 + 49} \]
\[ = \sqrt{65} \]

\[ JD \] has endpoints \( J(0, 5) \) and \( D(1, -1) \).
\[ JD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Substitute.
\[ JD = \sqrt{(1 - 0)^2 + (-1 - 5)^2} \]
\[ = \sqrt{(1)^2 + (-6)^2} \]
\[ = \sqrt{1 + 36} \]
\[ = \sqrt{37} \]

\[ DT \] has endpoints \( D(1, -1) \) and \( T(-4, -2) \).
\[ DT = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Substitute.
\[ DT = \sqrt{(-4 - 1)^2 + (-2 - (-1))^2} \]
\[ = \sqrt{(-5)^2 + (-1)^2} \]
\[ = \sqrt{25 + 1} \]
\[ = \sqrt{26} \]

Similarly, find the lengths of \( \overline{SE}, \overline{EK} \) and \( \overline{KS} \):
\( \overline{SE} \) has endpoints \( S(-1, 3) \) and \( E(3, 10) \).
\[ SE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Substitute.
\[ SE = \sqrt{(3 - (-1))^2 + (10 - 3)^2} \]
\[ = \sqrt{(4)^2 + (7)^2} \]
\[ = \sqrt{16 + 49} \]
\[ = \sqrt{65} \]

\( \overline{EK} \) has endpoints \( E(3, 10) \) and \( K(4, 4) \).
\[ EK = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]
Substitute.
Classify each triangle as acute, equiangular, obtuse, or right.

1. SOLUTION:
Since ... is (a, 0). The slope of is undefined, so is a vertical line. The slope of is 0, so it is horizontal. Therefore, or.

Practice Test

20. 

19. 

18. 

16. 

15. 

14. 

13. 

Sample answer:

slopes to walk through the proof and prove that line segment the triangle will be above point Then point at (0, 0). Here, you are given that segment the first step is to place a triangle on the coordinate grid and label the coordinates of each vertex. Place vertex You need to walk through the proof step by step. Look over what you are given and what you need to prove.

PROOF

Substitute.

Also, isosceles, the base angles are congruent.

SOLUTION:

The triangle formed by the angles 1, 3, and has endpoints

SOLUTION:

is congruent to triangle

The two triangles share a side in common. They also have another side marked as congruent. The included angle is isosceles, the base angles are congruent.

SOLUTION:

The given two triangles are isosceles. First, find the measures of the base angles of the triangles. Let

SOLUTION:

Determine which postulate or theorem can be used to prove each pair of triangles congruent. If it is not possible to prove them congruent, write not possible.

13. SOLUTION:
Two consecutive angles are congruent and the two triangles have a side in common. The AAS postulate proves these two triangles congruent.

14. SOLUTION:
The triangles have two sides marked congruent and share a third side. The SSS postulate proves these two triangles congruent.
Practice Test - Chapter 4

15. SOLUTION:
The triangles share one side. So, that side is congruent, but that is not enough information to prove the triangles congruent. It is not possible to prove them congruent.

16. SOLUTION:
The two triangles share a side in common. They also have another side marked as congruent. The included angle is also marked as congruent. The SAS postulate proves these two triangles congruent.

17. LANDSCAPING Angie has laid out a design for a garden consisting of two triangular areas as shown below. The points are \(A(0, 0)\), \(B(0, 5)\), \(C(3, 5)\), \(D(6, 5)\), and \(E(6, 0)\). Name the type of congruence transformation for the preimage \(\triangle ABC\) to \(\triangle EDC\).

SOLUTION:
Reflection; Each point of the preimage and its image are the same distance from the line of reflection.
Find the measure of each numbered angle.

18. \( \angle 1 \)

**SOLUTION:**
The triangle formed by the angles 1, 3, and 66° has two congruent sides. Therefore, it is isosceles. Since it is isosceles, the base angles are congruent.

\[ m\angle 1 = 66 \]

19. \( \angle 2 \)

**SOLUTION:**
The triangle formed by the angles 1, 3, and 66° has two congruent sides. Therefore, it is isosceles. Since it is isosceles, the base angles are congruent.

\[ m\angle 1 = 66 \]

Also, \( m\angle 1 + m\angle 3 + 66 = 180 \).

Substitute.

\[
\begin{align*}
66 + m\angle 3 + 66 &= 180 \\
132 + m\angle 3 &= 180 \\
132 + m\angle 3 - 132 &= 180 - 132 \\
m\angle 3 &= 48
\end{align*}
\]

By the Exterior Angle Theorem, \( 24 + m\angle 2 = m\angle 3 \).

Substitute.

\[
\begin{align*}
24 + m\angle 2 &= 48 \\
24 + m\angle 2 - 24 &= 48 - 24 \\
m\angle 2 &= 24
\end{align*}
\]
20. **PROOF** \( \triangle ABC \) is a right isosceles triangle with hypotenuse \( AB \). \( M \) is the midpoint of \( AB \). Write a coordinate proof to show that \( CM \) is perpendicular to \( AB \).

**SOLUTION:**

You need to walk through the proof step by step. Look over what you are given and what you need to prove. The first step is to place a triangle on the coordinate grid and label the coordinates of each vertex. Place vertex \( A \) at \((0, 0)\). Here, you are given that segment \( AB \) is the hypotenuse, then let the hypotenuse run along the \( x \)-axis. Then point \( B \) will be on \((2a, 0)\). The midpoint of the hypotenuse, or segment \( AB \), is \( M \) at \((a, 0)\). The third vertex of the triangle will be above point \( M \) at \((a, 2b)\). This triangle has a right angle at \( C \). Use what you know about slopes to walk through the proof and prove that line segment \( CM \) is perpendicular to line segment \( AB \).

Sample answer:

![Diagram of triangle ABC with midpoint M and right angle at C](image)

The midpoint of \( AB \) is \((a, 0)\). The slope of \( CM \) is undefined, so \( CM \) is a vertical line. The slope of \( AB \) is 0, so it is horizontal. Therefore, \( AB \perp CM \) .