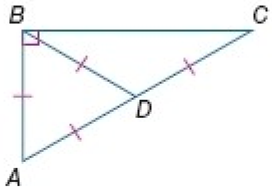
Practice Test - Chapter 4

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



1. ΔABD

SOLUTION:
Since ΔABD has three congruent sides, it has three congruent angles. Therefore it is equiangular (and equilateral).

ANSWER:
equiangular

2. ΔABC

SOLUTION:
ΔABC is a right triangle, since $m\angle ABC = 90$.

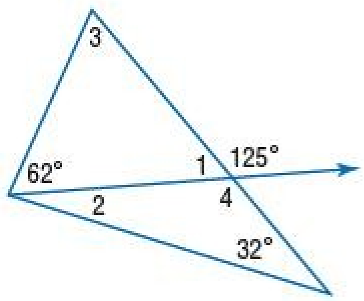
ANSWER:
right

3. ΔBDC

SOLUTION:
ΔBDC is obtuse, since $m\angle BDC > 90$.

ANSWER:
obtuse

Find the measure of each numbered angle.



4. $\angle 1$

SOLUTION:

Here, $\angle 1$ and $125°$ form a linear pair. So, $m\angle 1 + 125 = 180$.
Solve for $m\angle 1$.

$$m\angle 1 + 125 - 125 = 180 - 125$$
$$m\angle 1 = 55$$

ANSWER:

55

5. $\angle 2$

SOLUTION:

Here, $\angle 1$ and $125°$ angle form a linear pair. So, $m\angle 1 + 125 = 180$.

Solve for $m\angle 1$.

$$m\angle 1 + 125 - 125 = 180 - 125$$
$$m\angle 1 = 55$$

By the Exterior Angle Theorem, $m\angle 2 + 32 = m\angle 1$.
Substitute $m\angle 1 = 55$.

$$m\angle 2 + 32 = 55$$
$$m\angle 2 + 32 - 32 = 55 - 32$$
$$m\angle 2 = 23$$

ANSWER:

23

6. $\angle 3$

SOLUTION:

By the Exterior Angle Theorem, $62 + m\angle 3 = 125.$
Solve for $m\angle 3$.

$$62 + m\angle 3 - 62 = 125 - 62$$
$$m\angle 3 = 63$$

ANSWER:

63

7. $\angle 4$

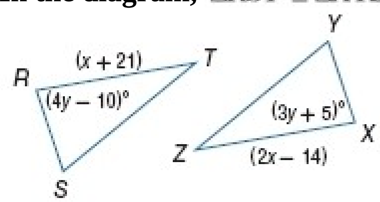
SOLUTION:

By the Vertical Angle Theorem, $m\angle 4 = 125$

ANSWER:

125

In the diagram, $\Delta RST \cong \Delta XYZ$.



8. Find *x*.

SOLUTION:

By CPCTC, $\overline{RT} \cong \overline{ZX}$. Since $\overline{RT} \cong \overline{ZX}$, *RT* = *ZX*.
Substitute.

$$x + 21 = 2x - 14$$
$$x + 21 - 2x = 2x - 14 - 2x$$
$$-x + 21 = -14$$
$$-x + 21 - 21 = -14 - 21$$
$$-x = -35$$
$$x = 35$$

ANSWER:

35

9. Find y.

SOLUTION:

By CPCTC, $\angle R \cong \angle X$. Since $\angle R \cong \angle X$, $m\angle R = m\angle X$.
Substitute.

$$\begin{aligned} 4y - 10 &= 3y + 5 \\ 4y - 10 - 3y &= 3y + 5 - 3y \\ y - 10 &= 5 \\ y - 10 + 10 &= 5 + 10 \\ y &= 15 \end{aligned}$$

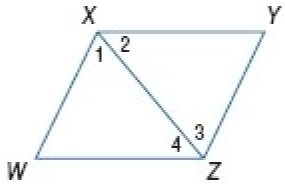
ANSWER:

15

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

Given: $\overline{XY} \parallel \overline{WZ}$ and $\overline{XW} \parallel \overline{YZ}$

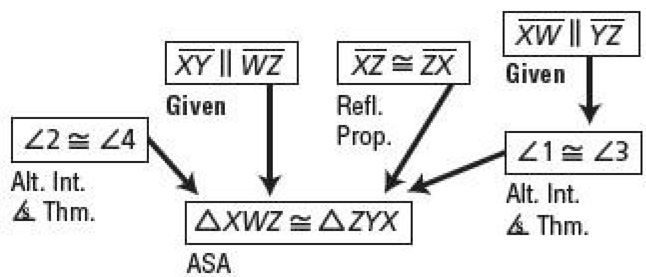
Prove: $\triangle XWZ \cong \triangle ZYX$



SOLUTION:

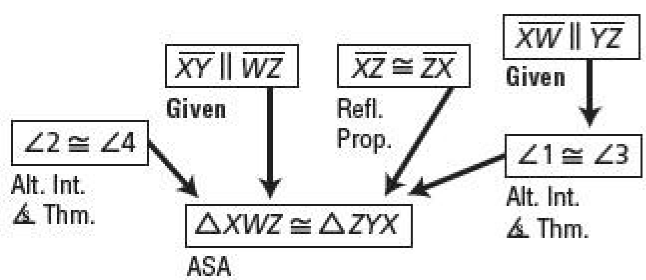
Given segment *XY* is parallel to segment *WZ* yields angle 2 is congruent to angle 4.
Given segment *XW* is parallel to segment *YZ* yields angle 1 is congruent to angle 3.
By the Reflexive Property segment *XZ* is congruent to itself.
Triangle *XWZ* is congruent to triangle *ZYX* by the Angle-Side-Angle Postulate.

Proof:

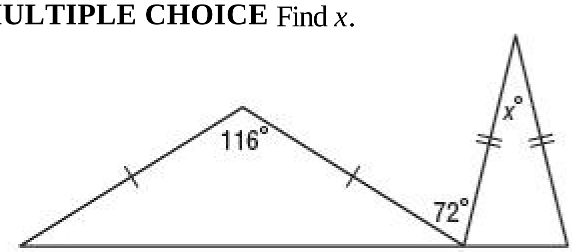


ANSWER:

Proof:



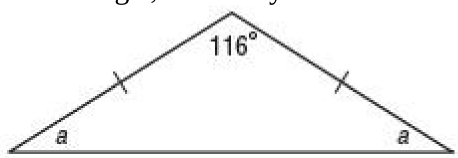
11. **MULTIPLE CHOICE** Find *x*.



A 36
B 32
C 28
D 22

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.

$a + a + 116 = 180$

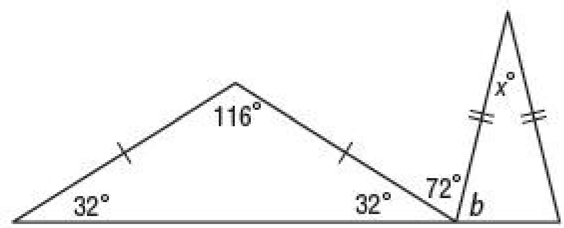
Solve for a.

$2a + 116 = 180$

$2a + 116 - 116 = 180 - 116$

$2a = 64$

$a = 32$

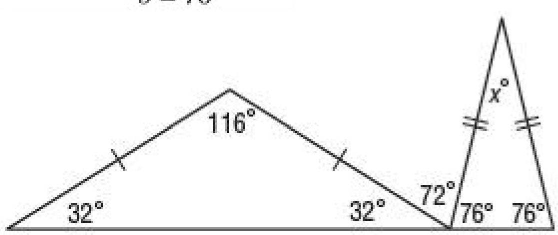


Here, angle b is supplementary to a 32 + 72 or 104 degree angle. So, $b + 104 = 180$.

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.

ANSWER:

C

12. Determine whether $\Delta TJD \cong \Delta SEK$ 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 $\overline{TJ}$, $\overline{JD}$ and $\overline{DT}$.

$\overline{TJ}$

has endpoints $T(-4, -2)$ and $J(0, 5)$.

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

Substitute.

$$\begin{aligned} TJ &= \sqrt{(0-(-4))^2 + (5-(-2))^2} \\ &= \sqrt{(4)^2 + (7)^2} \\ &= \sqrt{16+49} \\ &= \sqrt{65} \end{aligned}$$

$\overline{JD}$ has endpoints $J(0, 5)$ and $D(1, -1)$.

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

Substitute.

$$\begin{aligned} JD &= \sqrt{(1-0)^2 + (-1-5)^2} \\ &= \sqrt{(1)^2 + (-6)^2} \\ &= \sqrt{1+36} \\ &= \sqrt{37} \end{aligned}$$

$\overline{DT}$ has endpoints $D(1, -1)$ and $T(-4, -2)$.

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

Substitute.

$$\begin{aligned} DT &= \sqrt{(-4-1)^2 + (-2-(-1))^2} \\ &= \sqrt{(-5)^2 + (-1)^2} \\ &= \sqrt{25+1} \\ &= \sqrt{26} \end{aligned}$$

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.

$$\begin{aligned} SE &= \sqrt{(3-(-1))^2 + (10-3)^2} \\ &= \sqrt{(4)^2 + (7)^2} \\ &= \sqrt{16+49} \\ &= \sqrt{65} \end{aligned}$$

$\overline{EK}$ has endpoints $E(3, 10)$ and $K(4, 4)$.

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

Substitute.

$$\begin{aligned}EK &= \sqrt{(4-3)^2+(4-10)^2}\\ &= \sqrt{(1)^2+(-6)^2}\\ &= \sqrt{1+36}\\ &= \sqrt{37}\end{aligned}$$

$\overline{KS}$ has endpoints $K(4, 4)$ and $S(-1, 3)$.

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

Substitute.

$$\begin{aligned}KS &= \sqrt{(-1-4)^2+(3-4)^2}\\ &= \sqrt{(-5)^2+(-1)^2}\\ &= \sqrt{25+1}\\ &= \sqrt{26}\end{aligned}$$

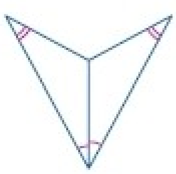
So, $\overline{TJ} \cong \overline{SE}$, $\overline{JD} \cong \overline{EK}$ and $\overline{DT} \cong \overline{KS}$.

Each pair of corresponding sides has the same measure so they are congruent. $\Delta TJD \cong \Delta SEK$ by SSS.

ANSWER:

Yes, by SSS.

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*.

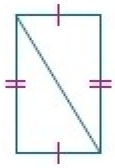
13. 

SOLUTION:

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

ANSWER:

AAS

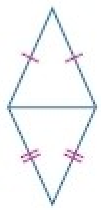
14. 

SOLUTION:

The triangles have two sides marked congruent and share a third side. The SSS postulate proves these two triangles congruent.

ANSWER:

SSS

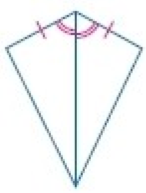
15. 

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.

ANSWER:

not possible

16. 

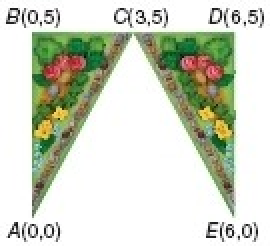
SOLUTION:

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.

ANSWER:

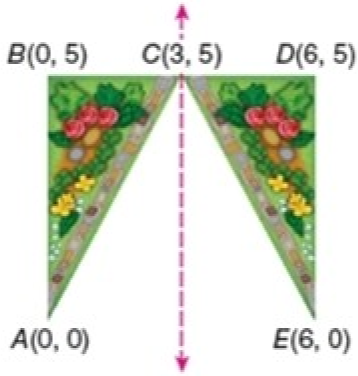
SAS

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 ΔABC to ΔEDC.



SOLUTION:

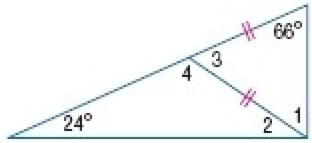
Reflection; Each point of the preimage and its image are the same distance from the line of reflection.



ANSWER:

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.

$m\angle 1 = 66$

ANSWER:

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.

$$66 + m\angle 3 + 66 = 180$$
$$132 + m\angle 3 = 180$$
$$132 + m\angle 3 - 132 = 180 - 132$$
$$m\angle 3 = 48$$

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

Substitute.

$$24 + m\angle 2 = 48$$
$$24 + m\angle 2 - 24 = 48 - 24$$
$$m\angle 2 = 24$$

ANSWER:

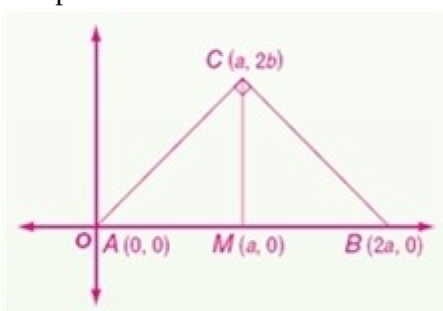
24

20. **PROOF** ΔABC is a right isosceles triangle with hypotenuse $\overline{AB}$. M is the midpoint of $\overline{AB}$. Write a coordinate proof to show that $\overline{CM}$ is perpendicular to $\overline{AB}$.

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 (2*a*, 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 *C*(*a*, 2*b*). 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*.

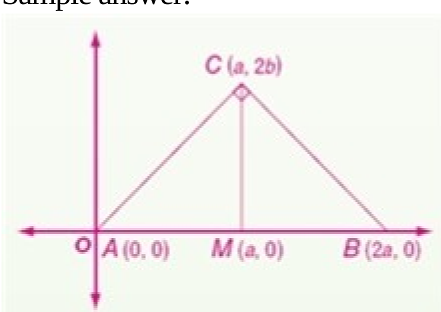
Sample answer:



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

ANSWER:

Sample answer:



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