

Disprove conjectures by using counterexamples



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف التاسع المتقدم ← رياضيات ← الفصل الثالث ← ملفات متنوعة ← الملف

تاريخ إضافة الملف على موقع المناهج: 18:58:18 2026-06-01

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المزيد من مادة
رياضيات:

إعداد: Abdalla Ali .Mr

التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة رياضيات في الفصل الثالث

ملزمة هيكل 2026

1

Reveal Coverage Grade 9 Advanced

2

Reveal Coverage Grade 9 Advanced

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تجميعية هيكل الفيزياء 2026

4

هيكل الرياضيات

5

1

Disprove conjectures by using counterexamples

(EX5,18-23)

706, 708

Find a counterexample to show that each conjecture is false.

a. If n is a real number, then $-n$ is a negative number.

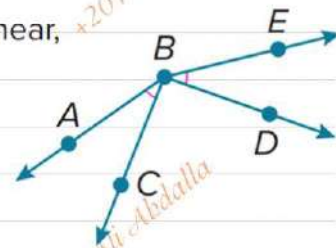
When n is -4 , $-n$ is $-(-4)$ or 4 , which is a positive number. Because $-n$ is not negative, this is a counterexample.

b. If $\angle ABC \cong \angle DBE$, then $\angle ABC$ and $\angle DBE$ are vertical angles.

When points A , B , and D are noncollinear and points E , B , and C are noncollinear, the conjecture is false.

In the figure, $\angle ABC \cong \angle DBE$, but $\angle ABC$

and $\angle DBE$ are not vertical angles.



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Find a counterexample to show that each conjecture is false.

a. If n is a real number, then $\frac{1}{n} < n$. Select all that apply.

A. $n = -3$ B. $n = \frac{1}{4}$ C. $n = 1$ D. $n = 5$ E. $n = 100$

b. If a line intersects a segment at its midpoint, then the line is perpendicular to the segment. Draw a diagram to represent the counterexample.



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Determine whether each conjecture is *true* or *false*. Find a counterexample for any false conjecture.

18. If n is a prime number, then $n + 1$ is not prime.
19. If x is an integer, then $-x$ is positive.
20. If $\angle 2$ and $\angle 3$ are supplementary angles, then $\angle 2$ and $\angle 3$ form a linear pair.
21. If you have three points A , B , and C , then A , B , and C are noncollinear.
22. If in $\triangle ABC$, $(AB)^2 + (BC)^2 = (AC)^2$, then $\triangle ABC$ is a right triangle.
23. If the area of a rectangle is 20 square meters, then the length is 10 meters and the width is 2 meters.



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Reveal

18. Which of the following best evaluates the conjecture: "If n is a prime number, then $n + 1$ is not prime"?

- A) True, because adding 1 to an odd prime always results in an even number, which is composite.
- B) False; a counterexample is $n = 3$, since $3 + 1 = 4$, which is prime.
- C) False; a counterexample is $n = 2$, since $2 + 1 = 3$, and 3 is a prime number.
- D) True, because consecutive integers cannot both be prime.

19. Evaluate the conjecture: "If x is an integer, then $-x$ is positive." Is it true or false, and what is a valid counterexample if false?

- A) True, because the negative sign forces the integer to become positive.
- B) False; a counterexample is $x = 5$, because $-(5) = -5$, which is negative.
- C) False; a counterexample is $x = -5$, because $-(-5) = 5$, which is positive.
- D) True, because absolute values are always positive numbers.



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20. Consider the conjecture: "If $\angle 2$ and $\angle 3$ are supplementary angles, then they form a linear pair."
Which statement is correct?

- A) True, because supplementary angles always add up to 180° and must be adjacent.
- B) False; a linear pair consists of complementary angles, not supplementary angles.
- C) False; supplementary angles can be non-adjacent, such as two separate angles in different locations that each measure 90° .
- D) True, because linear pairs and supplementary angles are exactly the same geometric concept.

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21. Is the following conjecture true or false? "If you have three points A , B , and C , then A , B , and C are noncollinear."

- A) True, because any three randomly placed points will always form a triangle.
- B) False; a counterexample is when points A , B , and C all lie perfectly on the exact same line.
- C) False; a counterexample is when points A , B , and C are the vertices of a right triangle.
- D) True, because a line can theoretically only contain exactly two points.

22. Evaluate the conjecture: "If in $\triangle ABC$, $(AB)^2 + (BC)^2 = (AC)^2$, then $\triangle ABC$ is a right triangle."

- A) False; it is an acute triangle.
- B) False; this formula only applies to isosceles triangles.
- C) True; this is guaranteed by the Law of Sines.
- D) True; this is guaranteed by the converse of the Pythagorean Theorem.

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23. Analyze the conjecture: "If the area of a rectangle is 20 square meters, then the length is 10 meters and the width is 2 meters."

- A) True, because $10 \times 2 = 20$.
- B) False; a counterexample is a rectangle with a length of 5 meters and a width of 4 meters.
- C) False; a counterexample is a rectangle with a length of 10 meters and a width of 10 meters.
- D) True, because the length of a rectangle must always be an even number.

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Answer Key & Explanations

- 18: C (2 is the only even prime number, making $2 + 1 = 3$ the only instance where n and $n + 1$ are both prime).
- 19: B (If you start with a positive integer, making it negative results in a negative number, breaking the conjecture).
- 20: C (Linear pairs *must* share a vertex and a side, but supplementary angles just need to mathematically add up to 180° regardless of physical placement).
- 21: B (Collinear points exist; if three points are drawn on the same line, they are not noncollinear).
- 22: D (The standard Pythagorean Theorem states that if it is a right triangle, then $a^2 + b^2 = c^2$. The converse states the reverse, making this conjecture logically true).
- 23: B (5×4 and 20×1 both yield an area of 20, meaning dimensions of 10 and 2 are not the *only* conclusion).

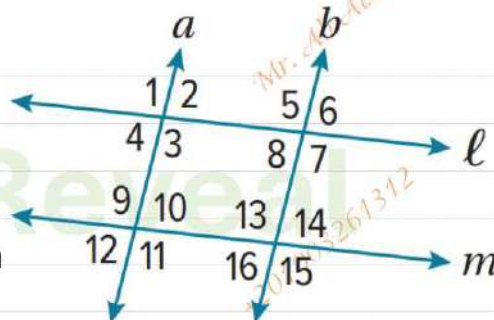
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

a. $\angle 2 \cong \angle 8$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles Converse



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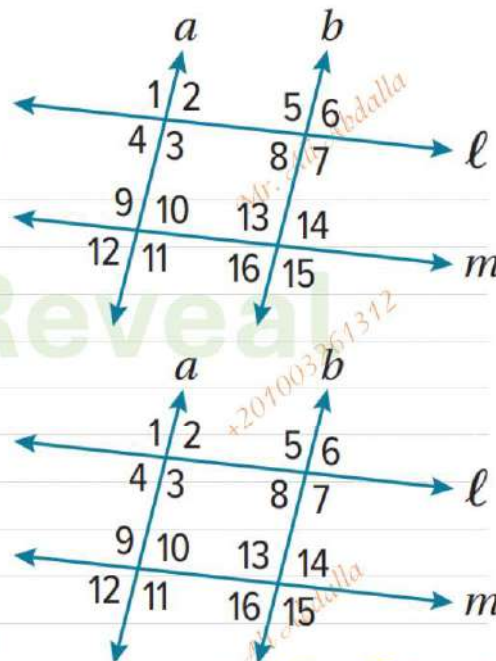
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b. $\angle 3 \cong \angle 11$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by Converse of Corresponding Angles Theorem

c. $\angle 12 \cong \angle 14$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by the Alternate Exterior Angles Converse
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by Converse of Corresponding Angles Theorem



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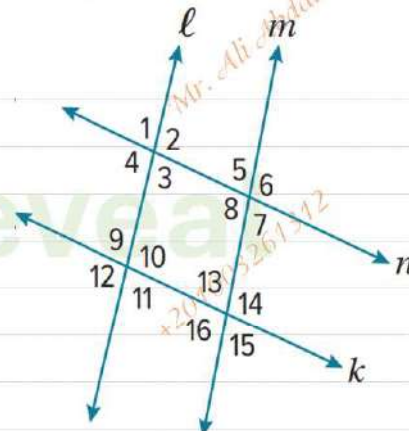
Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

a. $\angle 1 \cong \angle 15$

- ☐ It is not possible to determine whether the lines are parallel.
- ☐ $n \parallel k$ by the Alternate Exterior Angles Converse
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by Converse of Corresponding Angles Theorem

b. $m\angle 3 + m\angle 10 = 180$

- ☐ $n \parallel k$ by the Consecutive Interior Angles Converse.
- ☐ $n \parallel k$ by the Alternate Exterior Angles Converse
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles Converse



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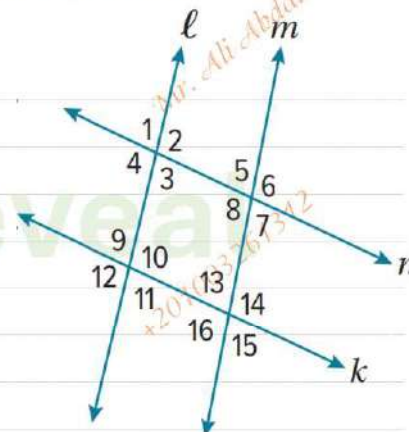
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

c. $\angle 3 \cong \angle 5$

- ☐ It is not possible to determine whether the lines are parallel.
- ☐ $n \parallel k$ by the Alternate Interior Angles Converse
- ☐ $\ell \parallel m$ by the Alternate Interior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles Converse



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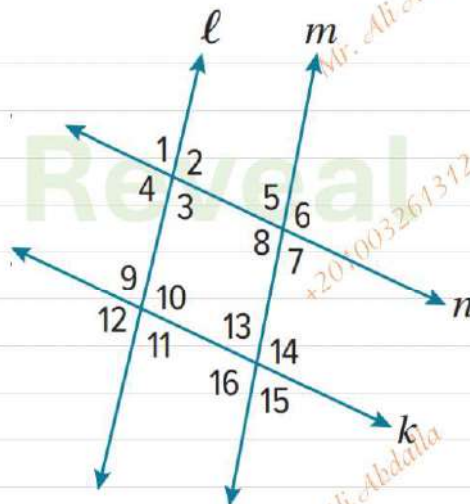
If $\angle 2 \cong \angle 12$, determine which lines are parallel. إذا كان $\angle 2 \cong \angle 12$ ، حدّد أي المستقيمات متوازية.

A n, m

B n, k

C l, k

D l, m



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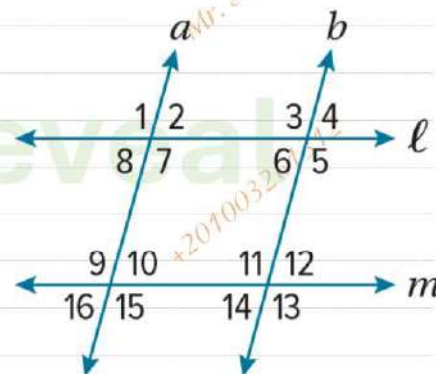
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

1. $\angle 3 \cong \angle 7$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles



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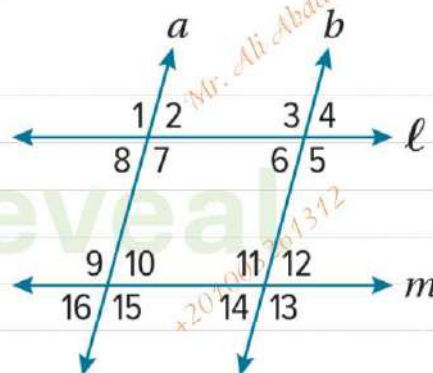
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

2. $\angle 9 \cong \angle 11$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles



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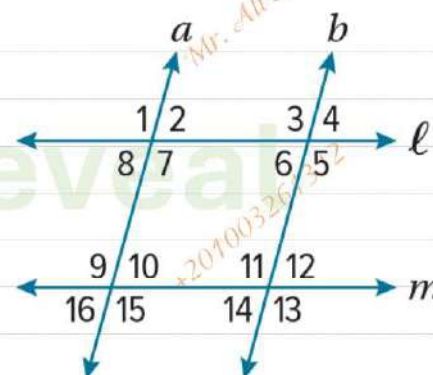
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

3. $\angle 2 \cong \angle 16$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
- ☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
- ☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
- ☐ $\ell \parallel m$ by the Consecutive Interior Angles



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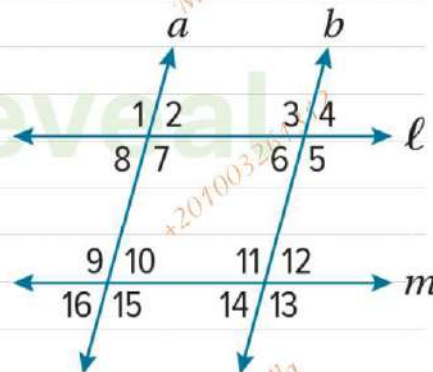
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

4. $m\angle 5 + m\angle 12 = 180^\circ$

- ☐ $a \parallel b$ by the Alternate Interior Angles Converse.
☐ $a \parallel b$ by Converse of Corresponding Angles Theorem
☐ $\ell \parallel m$ by the Alternate Exterior Angles Converse.
☐ $\ell \parallel m$ by the Consecutive Interior Angles



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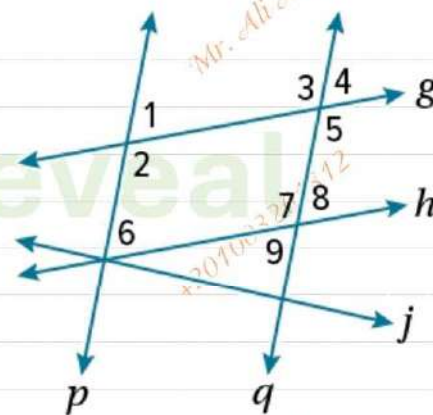
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

5. $\angle 1 \cong \angle 6$

- ☐ $g \parallel h$ by the Alternate Interior Angles Converse.
☐ $g \parallel h$ by Converse of Corresponding Angles Theorem
☐ $g \parallel j$ by the Alternate Interior Angles Converse.
☐ $p \parallel q$ by the Consecutive Interior Angles



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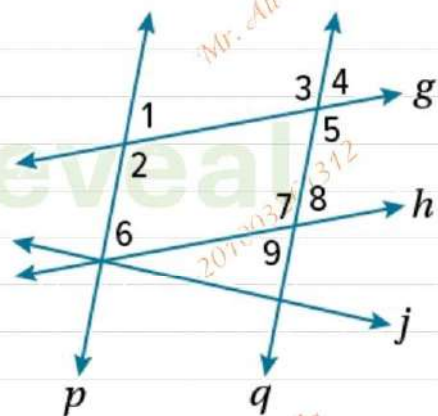
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Use the given information to determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.

6. $m\angle 7 + m\angle 6 = 180^\circ$

- ☐ $g \parallel h$ by the Alternate Interior Angles Converse.
☐ $g \parallel h$ by Converse of Corresponding Angles Theorem
☐ $p \parallel q$ by the Alternate Interior Angles Converse.
☐ $p \parallel q$ by the Consecutive Interior Angles



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3

Prove theorems about angles by using the Angle Addition Postulate

(EX1,1-3)

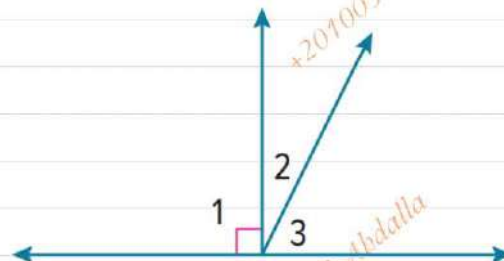
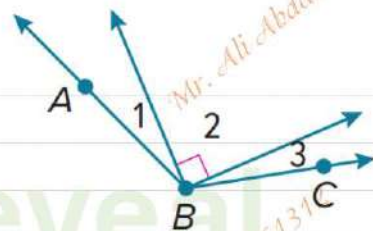
747,753

What is $m\angle 3$ if $m\angle 1 = 23^\circ$ and $m\angle ABC = 131^\circ$?

- ☐ 45° ☐ 18°
☐ 90° ☐ 36°

What is $m\angle 3$ if $m\angle 2 = 26^\circ$?

- ☐ 26° ☐ 18°
☐ 46° ☐ 64°



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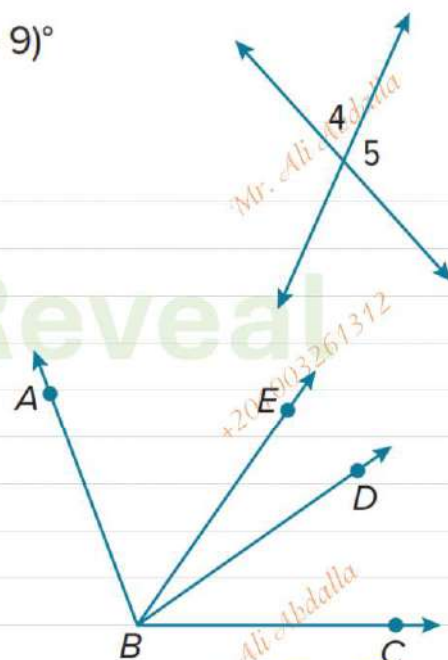
What is $m\angle 4$ if $m\angle 5 = (2x^\circ)$ and $m\angle 4 = (x + 9)^\circ$

- ☐ 57° ☐ 114°
☐ 66° ☐ 85°

Find the measure of each angle.

1. Find $m\angle ABC$ if $m\angle ABD = 70^\circ$ and $m\angle DBC = 43^\circ$.

- ☐ 35° ☐ 113°
☐ 70° ☐ 85°



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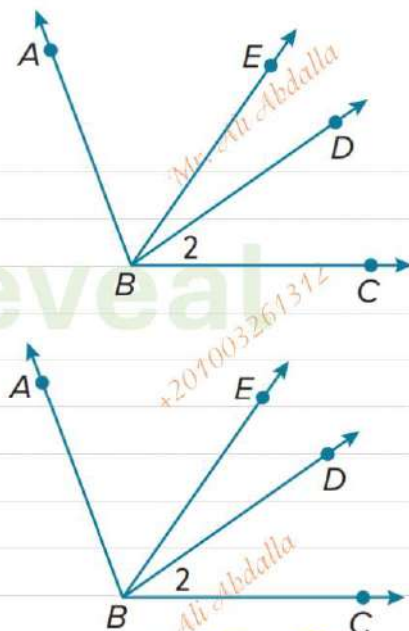


2. If $m\angle EBC = 55^\circ$ and $m\angle EBD = 20^\circ$, find $m\angle 2$.

- ☐ 35° ☐ 113°
☐ 70° ☐ 75°

3. Find $m\angle ABD$ if $m\angle ABC = 110^\circ$ and $m\angle 2 = 36^\circ$.

- ☐ 45° ☐ 74°
☐ 70° ☐ 85°

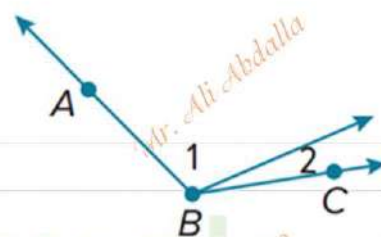


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If $m\angle 1 = 113^\circ$ and
 $m\angle ABC = 131^\circ$.
Find $m\angle 2$.

إذا كان $m\angle 1 = 113^\circ$ و
 $m\angle ABC = 131^\circ$
أوجد $m\angle 2$



- ☐ A $m\angle 2 = 108^\circ$
- ☐ B $m\angle 2 = 113^\circ$
- ☐ C $m\angle 2 = 18^\circ$
- ☐ D $m\angle 2 = 23^\circ$

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4

Prove theorems about angles by using properties and theorems of angle congruence

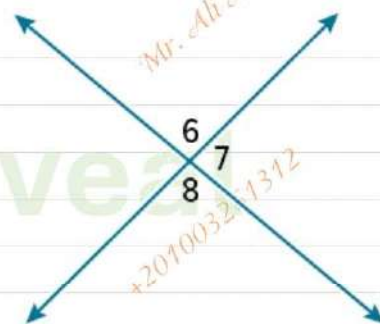
(13-18)

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Find the measure of each numbered angle and name the theorems that you used to justify your work.

13. $m\angle 6 = (2x - 21)^\circ$ and $m\angle 7 = (3x - 34)^\circ$

- ☐ $m(\angle 6) = 47^\circ$
- ☐ $m(\angle 6) = 73^\circ$
- ☐ $m(\angle 7) = 117^\circ$
- ☐ $m(\angle 8) = 73^\circ$



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Find the measure of each numbered angle and name the theorems that you used to justify your work.

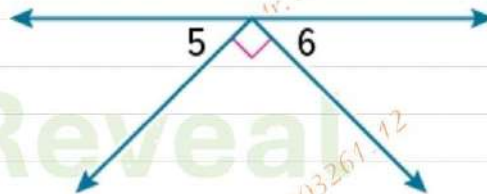
14. $m\angle 5 = m\angle 6$

A $m\angle 5 = 45^\circ$

B $m\angle 5 = 40^\circ$

C $m\angle 5 = 90^\circ$

D $m\angle 5 = 180^\circ$



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Find the measure of each numbered angle and name the theorems that you used to justify your work.

15. $\angle 2$ and $\angle 3$ are complementary and $\angle 1 \cong \angle 4$ and $m\angle 2 = 28^\circ$.

$m\angle 2 + m\angle 3 = 90^\circ$

Definition of complementary

$m\angle 3 = 90^\circ - m\angle 2$

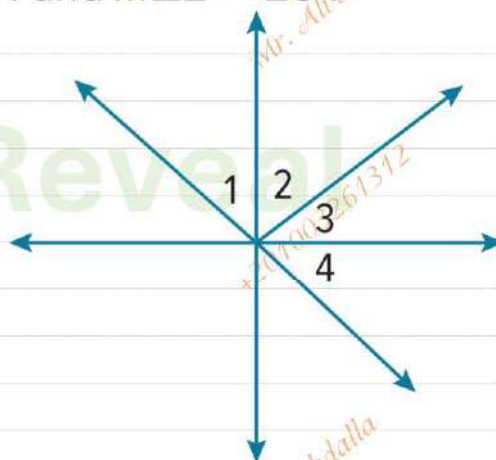
Subtraction Property of Equality

$m\angle 3 = 90^\circ - 28^\circ$

Substitution Property of Equality

$m\angle 3 = 62^\circ$

Substitution Property of Equality



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Reveal

Find the measure of each numbered angle and name the theorems that you used to justify your work.

16. $\angle 2$ and $\angle 4$ and $\angle 4$ and $\angle 5$ are supplementary
 $m\angle 4 = 105^\circ$.



$$m\angle 4 + m\angle 5 = 180^\circ$$

$$105^\circ + m\angle 5 = 180^\circ$$

$$m\angle 5 = 75^\circ$$

$$m\angle 2 = m\angle 5 = 75^\circ$$

$$m\angle 2 + m\angle 3 = 180^\circ$$

$$75^\circ + m\angle 3 = 180^\circ$$

$$m\angle 3 = 105^\circ$$

Definition of supplementary

Substitution Property of Equality

Subtraction Property of Equality

Transitive Property of Congruence

Definition of a linear pair

Substitution Property of Equality

Subtraction Property of Equality



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Reveal

Find the measure of each numbered angle and name the theorems that you used to justify your work.

17. $m\angle 9 = (3x + 12)^\circ$ and $m\angle 10 = (x - 24)^\circ$

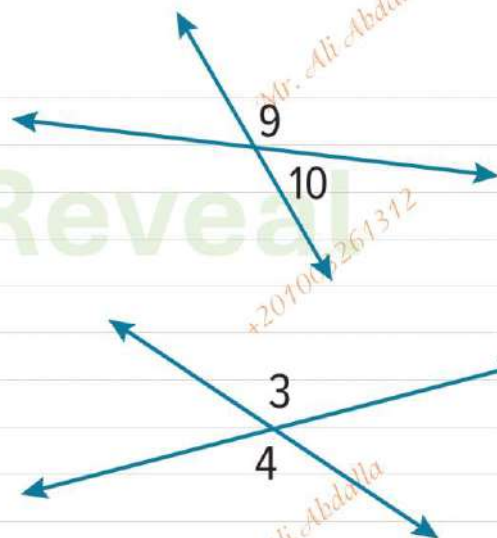
☐ $m(\angle 9) = 24^\circ$

☐ $m(\angle 10) = 156^\circ$

☐ $m(\angle 9) = 156^\circ$

☐ $m(\angle 9) = 48^\circ$

18. $m\angle 3 = (2x + 23)^\circ$ and $m\angle 4 = (5x - 112)^\circ$



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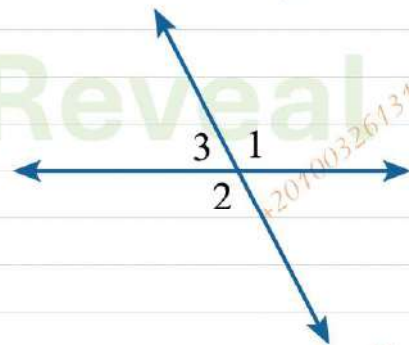
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Find $m\angle 1$ if $m\angle 2 = x^\circ$ and
 $m\angle 3 = (x - 36)^\circ$.

أوجد $m\angle 1$ إذا كان $m\angle 2 = x^\circ$ و
 $m\angle 3 = (x - 36)^\circ$.



A $m\angle 1 = 72^\circ$

B $m\angle 1 = 145^\circ$

C $m\angle 1 = 108^\circ$

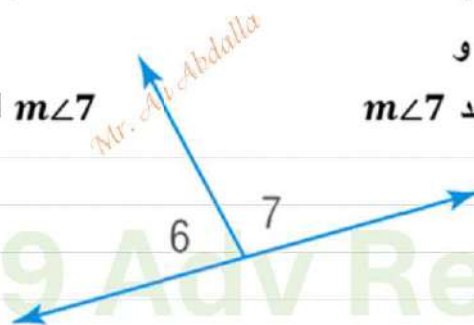
D $m\angle 1 = 26^\circ$

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$\angle 6$ and $\angle 7$ form linear pair. If
 $m\angle 6 = 3x + 32$ and
 $m\angle 7 = 5x + 12$, find $m\angle 7$

$\angle 6$ و $\angle 7$ يشكلان زوجًا خطيًا.
إذا كان $m\angle 6 = 3x + 32$ و
 $m\angle 7 = 5x + 12$ ، أوجد $m\angle 7$



A $m\angle 7 = 97^\circ$

B $m\angle 7 = 17^\circ$

C $m\angle 7 = 83^\circ$

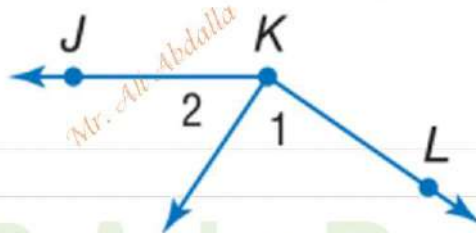
D $m\angle 7 = 152^\circ$

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Find $m\angle 1$ if $m\angle 2 = 58^\circ$ and $m\angle JKL = 145^\circ$.

جد $m\angle 1$ إذا كان $m\angle 2 = 58^\circ$ و $m\angle JKL = 145^\circ$.



A $m\angle 1 = 87^\circ$

B $m\angle 1 = 80^\circ$

C $m\angle 1 = 35^\circ$

D $m\angle 1 = 122^\circ$



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5 Solve problems involving equilateral triangles

(8-15)

880

8. Find the value of x .

☐ $x = 10$

☐ $x = 4$

☐ $x = 12$

☐ $x = 3.5$

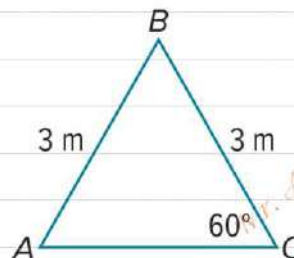
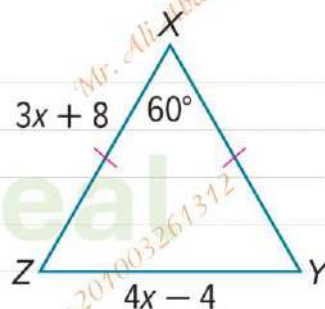
9. Find $m\angle B$ and AC .

☐ $AC = 3m$

☐ $AC = 4m$

☐ $AC = 6m$

☐ $AC = 60m$



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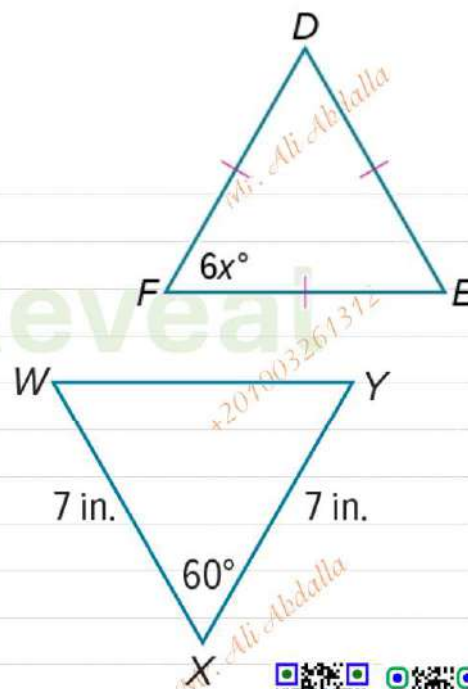
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10. Find the value of x .

- ☐ $x = 10^\circ$
- ☐ $x = 4^\circ$
- ☐ $x = 12^\circ$
- ☐ $x = 60^\circ$

11. Find $m\angle Y$ and WY .

- ☐ $WY = 14 \text{ in}$
- ☐ $WY = 7 \text{ in}$
- ☐ $WY = 6 \text{ in}$
- ☐ $WY = 60 \text{ in}$



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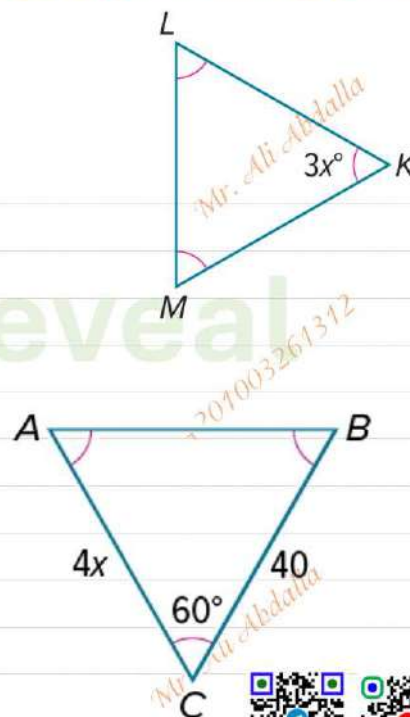


12. Find the value of x .

- ☐ $x = 10^\circ$
- ☐ $x = 60^\circ$
- ☐ $x = 30^\circ$
- ☐ $x = 20^\circ$

13. Find the value of x .

- ☐ $x = 40$
- ☐ $x = 10$
- ☐ $x = 20$
- ☐ $x = 60$



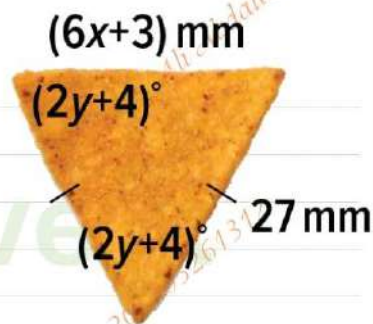
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14. **CHIPS** Some tortilla chips can be modeled by a triangle.

a. Solve for x .

b. Solve for y .



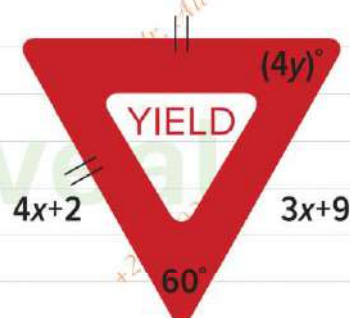
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15. **SIGNS** Yield signs notify drivers to slow down and allow oncoming vehicles to proceed first.

a. Solve for x .

b. Solve for y .



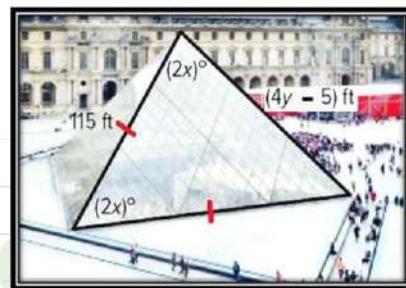
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Find the value of variables.

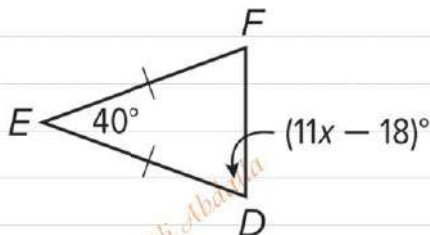
- ☐ $x = 60, y = 15$
- ☐ $x = 30, y = 15$
- ☐ $x = 30, y = 30$
- ☐ $x = 15, y = 60$

أوجد قيمة المتغيرات.



Find the value of x .

- ☐ A 5.3
- ☐ B 8
- ☐ C 14.4
- ☐ D 70



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6	Classify lines as parallel, perpendicular, or neither by comparing the slopes of the lines	(1-6)	771
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Determine whether $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are *parallel*, *perpendicular*, or *neither*. Graph each line to verify your answer.

1. $A(1, 5), B(4, 4), C(9, -10), D(-6, -5)$
2. $A(-6, -9), B(8, 19), C(0, -4), D(2, 0)$

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Determine whether $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are *parallel*, *perpendicular*, or *neither*.
Graph each line to verify your answer.

3. $A(4, 2)$, $B(-3, 1)$, $C(6, 0)$, $D(-10, 8)$

4. $A(8, -2)$, $B(4, -1)$, $C(3, 11)$, $D(-2, -9)$

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Determine whether $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are *parallel*, *perpendicular*, or *neither*.
Graph each line to verify your answer.

5. $A(8, 4)$, $B(4, 3)$, $C(4, -9)$, $D(2, -1)$

6. $A(4, -2)$, $B(-2, -8)$, $C(4, 6)$, $D(8, 5)$

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Determine the relationship between the pair of lines $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$.

حدد العلاقة بين المستقيمين $\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$.

A

Perpendicular

متعامدان

B

Neither perpendicular nor parallel

ليس متعامدين ولا متوازيين

C

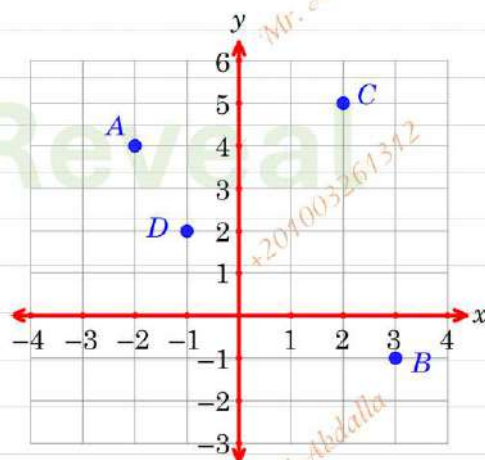
Parallel

متوازيان

D

Coincident

متطابقان



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7

Find the distance between parallel lines by using perpendicular distance

(9-14)

790

Find the distance between each pair of parallel lines with the given equations.

9. $y = 7$

$y = -1$

10. $x = -6$

$x = 5$

☐ 6☐ 7☐ 8☐ 9☐ 6☐ 9☐ 11☐ 1

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Find the distance between each pair of parallel lines with the given equations.

11. $y = 3x$
 $y = 3x + 10$

- ☐ 10
☐ $\frac{\sqrt{10}}{10}$
☐ $\sqrt{10}$
☐ $\sqrt{15}$

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Other solution

Find the distance between each pair of parallel lines with the given equations.

11. $y = 3x$
 $y = 3x + 10$

12. $y = -5x$
 $y = -5x + 26$

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Find the distance between each pair of parallel lines with the given equations.

13. $y = x + 9$
 $y = x + 3$

- ☐ $\sqrt{2}$
☐ $3\sqrt{2}$
☐ $2\sqrt{2}$
☐ 6

14. $y = -2x + 5$
 $y = -2x - 5$

- ☐ $2\sqrt{3}$
☐ $5\sqrt{2}$
☐ $2\sqrt{5}$
☐ 10



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Classify lines as parallel, perpendicular, or neither by comparing the equations of the lines

(EX5,22-25)

770,772

Write an equation in slope-intercept form for the line parallel to $y = -\frac{3}{4}x + 3$ containing $(-3, 6)$.

The slope of $y = -\frac{3}{4}x + 3$ is $-\frac{3}{4}$, so the slope of the line parallel to it is $-\frac{3}{4}$.

$y = mx + b$

Slope-intercept form

$6 = -\frac{3}{4}(-3) + b$

$m = -\frac{3}{4}$ and $(x, y) = (-3, 6)$

$6 = \frac{9}{4} + b$

Simplify.

$\frac{15}{4} = b$

Subtract $\frac{9}{4}$ from each side.

So, the equation is $y = -\frac{3}{4}x + \frac{15}{4}$.



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Write an equation in slope-intercept form for the line parallel to $y = \frac{1}{2}x + \frac{5}{2}$ containing $(\frac{3}{2}, 1)$.

A) $y = \frac{1}{2}x + \frac{1}{4}$

B) $y = -2x + 4$

C) $y = \frac{1}{2}x - \frac{7}{4}$

D) $y = \frac{1}{2}x + 1$

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22. Write an equation in slope-intercept form for the line that passes through $(-7, -4)$, perpendicular to $y = \frac{1}{2}x + 9$

☐ $y = -2x - 18$

☐ $y = \frac{1}{2}x - 0.5$

☐ $y = 2x + 10$

☐ $y = -2x + 18$

23. Write an equation in slope-intercept form for the line that passes through $(-1, -10)$, parallel to $y = 7$

☐ $x = -1$

☐ $y = -1$

☐ $y = -10$

☐ $x = -10$

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24. Write an equation in slope-intercept form for the line that passes through $(6, 2)$, parallel to $y = -\frac{2}{3}x + 1$

☐ $y = \frac{3}{2}x - 7$

☐ $y = -\frac{2}{3}x + 6$

☐ $y = -\frac{2}{3}x - 6$

☐ $y = -\frac{2}{3}x + 4$

25. Write an equation in slope-intercept form for the line that passes through $(-2, 2)$, perpendicular to $y = -5x - 8$

☐ $y = \frac{1}{5}x + \frac{12}{5}$

☐ $y = -5x - 8$

☐ $y = -\frac{1}{5}x + \frac{8}{5}$

☐ $y = \frac{1}{5}x + \frac{8}{5}$



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Write an equation in slope-intercept form for the line perpendicular to $y = -\frac{3}{4}x + 1$ containing $(-3, 6)$.

اكتب معادلة المستقيم بصورة الميل والمقطع للمستقيم العمودي على $y = -\frac{3}{4}x + 1$ الذي يحتوي $(-3, 6)$.

☐ $y = -\frac{3}{4}x + 6$

☐ $y = -\frac{4}{3}x - 6$

☐ $y = \frac{4}{3}x + 10$

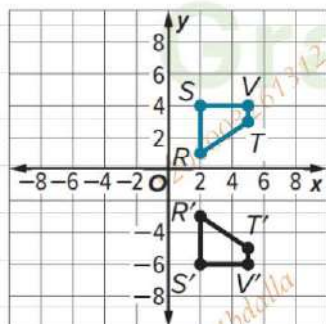
☐ $y = \frac{3}{4}x + 10$



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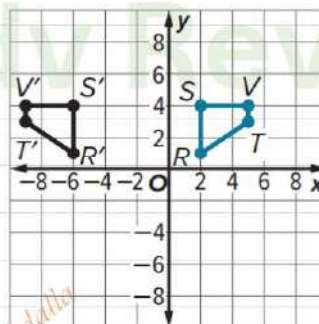
Consider quadrilateral $RSTV$ with vertices at $R(2, 1)$, $S(2, 4)$, $T(5, 3)$, and $V(5, 4)$. Graph the image of quadrilateral $RSTV$ under each reflection. Determine the coordinates of the image.

a. in the line $y = -1$



$R'(2, -3)$, $S'(2, -6)$,
 $T'(5, -5)$, $V'(5, -6)$

b. in the line $x = -2$



$R'(-6, 1)$, $S'(-6, 4)$,
 $T'(-9, 3)$, $V'(-9, 4)$

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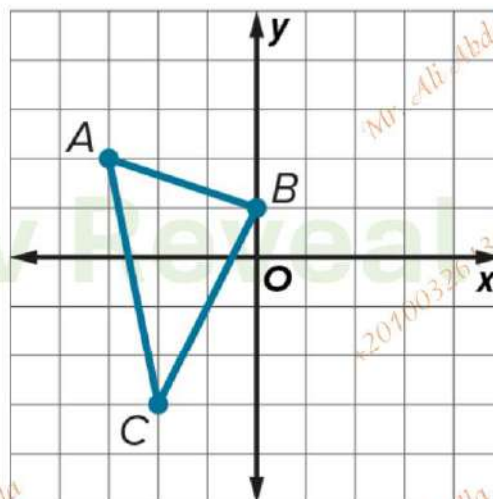
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Graph the image of each figure under the given reflection. Determine the coordinates of the image.

1. $\triangle ABC$ in the line $y = x$



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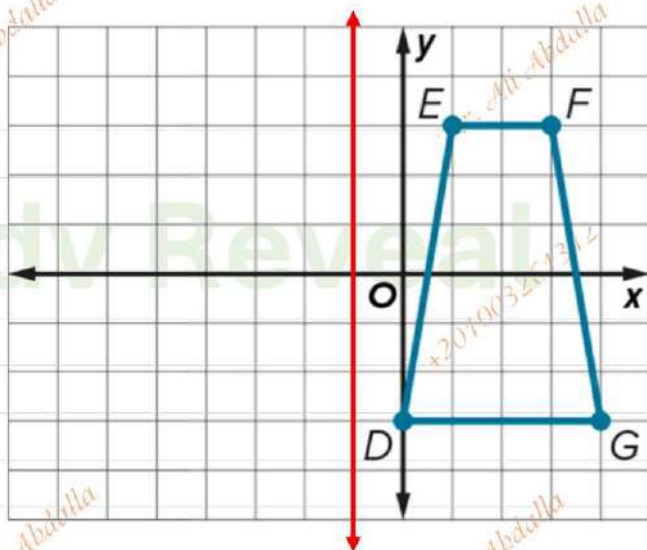
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Graph the image of each figure under the given reflection. Determine the coordinates of the image.

2. trapezoid $DEFG$ in the line $x = -1$



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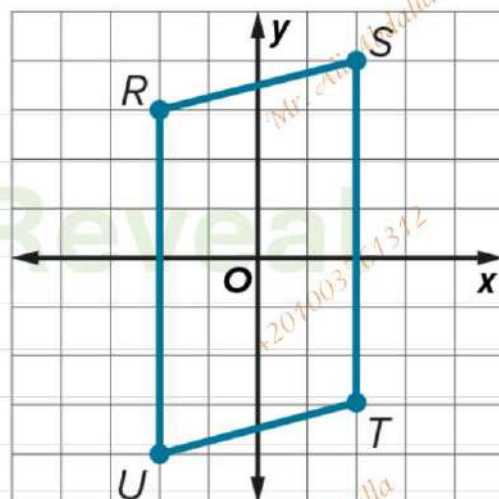
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Graph the image of each figure under the given reflection. Determine the coordinates of the image.

3. parallelogram $RSTU$ in the line $y = x$



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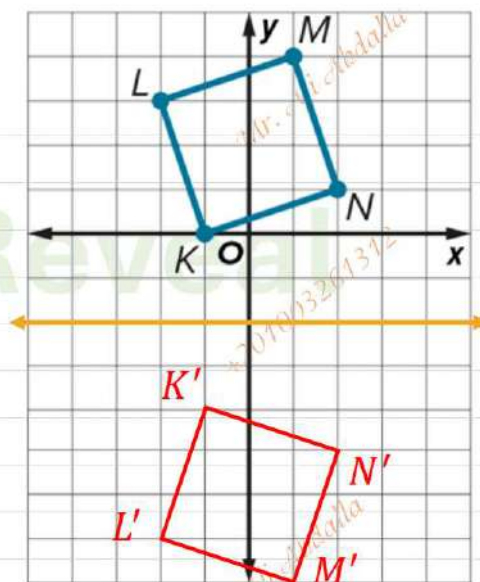
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Graph the image of each figure under the given reflection. Determine the coordinates of the image.

4. square $KLMN$ in the line $y = -2$



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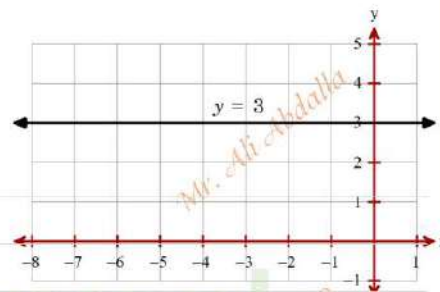
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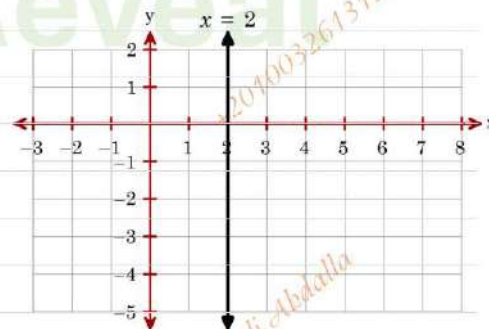
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5. Determine the coordinates of $S(-7, 1)$ after a reflection in the line $y = 3$.



6. Determine the coordinates of $Q(6, -4)$ after a reflection in the line $x = 2$.



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Rectangle $DEFG$ has coordinates. $D(-3, 4)$, $E(-1, 4)$, $F(-1, -2)$ and $G(-3, -2)$. Select the coordinates of the vertices of the image after a reflection in the line $X = 1$.

المستطيل $DEFG$ إحداثياته.

$D(-3, 4)$, $E(-1, 4)$, $F(-1, -2)$

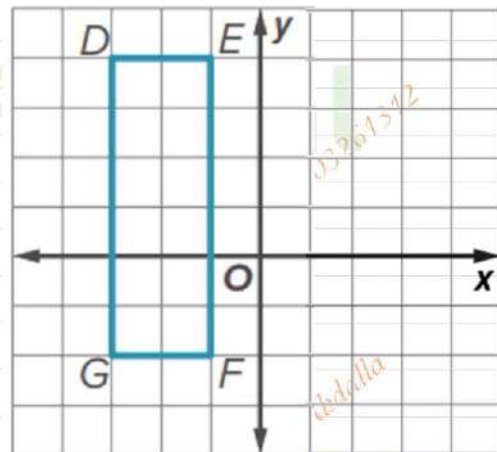
و $G(-3, -2)$. اختر إحداثيات رؤوس صورته بعد الإنعكاس حول المستقيم $X = 1$.

☐ $E'(1, 4)$, $F'(1, -2)$, $G'(3, -2)$, $D'(3, 4)$

☐ $E'(3, 3)$, $F'(3, -1)$, $G'(5, -1)$, $D'(5, 3)$

☐ $E'(3, 4)$, $F'(3, -2)$, $G'(5, -2)$, $D'(5, 4)$

☐ $E'(4, 4)$, $F'(4, -2)$, $G'(3, -2)$, $D'(4, 4)$



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Determine the translation vector

(EX1,1-2)

803,805

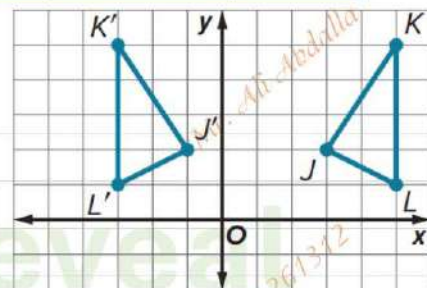
Determine whether a translation maps $\triangle JKL$ onto $\triangle J'K'L'$. If so, find the translation vector. If not, explain why.

☐ No, because the orientation of the figure changed (it is a reflection, not a translation).

☐ Yes, with a translation vector of $\langle -6, 0 \rangle$.

☐ Yes, with a translation vector of $\langle -8, 0 \rangle$.

☐ No, because the side lengths of the two triangles are not equal.



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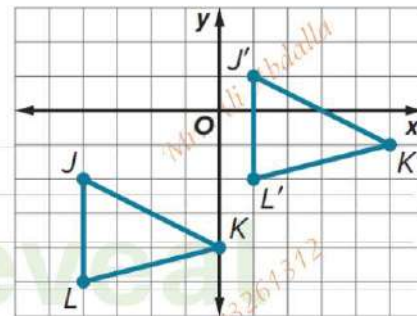
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Determine whether a translation maps $\triangle JKL$ onto $\triangle J'K'L'$.
If so, find the translation vector. If not, explain why.

- A yes; $\langle 5, 3 \rangle$
- B yes; $\langle 3, 5 \rangle$
- C No; this is a reflection.
- D No; the triangles are not congruent.



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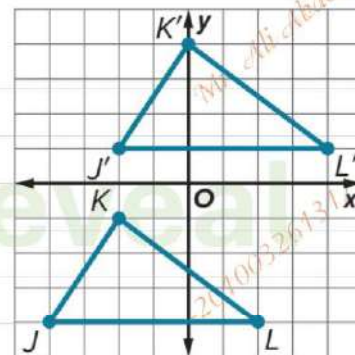
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1. Determine whether a translation maps $\triangle JKL$ onto $\triangle J'K'L'$.
If so, find the translation vector. If not, explain why.

- ☐ Yes, with a translation vector of $\langle 2, 5 \rangle$.
- ☐ Yes, with a translation vector of $\langle -2, -5 \rangle$.
- ☐ Yes, with a translation vector of $\langle 2, 5 \rangle$.
- ☐ No, because the vertices did not move in the same direction.



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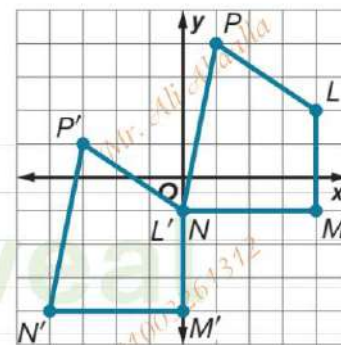
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2. Determine whether a translation maps quadrilateral $LMNP$ onto quadrilateral $L'M'N'P'$. If so, find the translation vector. If not, explain why.



- ☐ No, because the vertices do not all move the same distance and direction.
- ☐ Yes, with a translation vector of $\langle -3, -4 \rangle$.
- ☐ Yes, with a translation vector of $\langle -4, -3 \rangle$.
- ☐ No, because the figure underwent a vertical reflection across the x -axis.

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- 11 Use rigid motions to rotate figures about points that are not the origin and describe the effects of the rotations

(EX1,1-4)

807-809

Triangle ABC has vertices $A(-8, 5)$, $B(-6, 9)$, and $C(-3, 6)$. Graph $\triangle ABC$ and its image after a rotation of 180° about $(-5, 3)$.

Step 1 Graph $\triangle ABC$.

Step 2 Map the center of rotation to the origin.

To map the center of rotation to the origin, translate the center of rotation along the vector $\langle 5, -3 \rangle$. Then translate the vertices of $\triangle ABC$ along the same vector.

$$(x, y) \rightarrow (x + 5, y - 3)$$

$$A(-8, 5) \rightarrow (-3, 2) \quad B(-6, 9) \rightarrow (-1, 6) \quad C(-3, 6) \rightarrow (2, 3)$$

Step 3 Rotate 180° about the origin.

$$(x, y) \rightarrow (-x, -y)$$

$$A(-3, 2) \rightarrow (3, -2)$$

$$B(-1, 6) \rightarrow (1, -6)$$

$$C(2, 3) \rightarrow (-2, -3)$$

Step 4 Map the center of rotation to its original position.

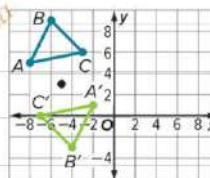
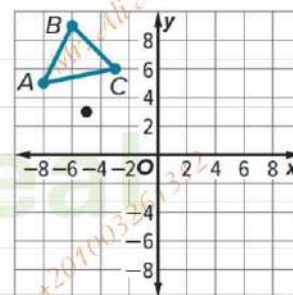
To map the center of rotation to its original position, translate the center of rotation along the vector $\langle -5, 3 \rangle$. Then translate the vertices of the rotated triangle along the same vector.

$$(x, y) \rightarrow (x - 5, y + 3)$$

$$A(3, -2) \rightarrow A'(-2, 1)$$

$$B(1, -6) \rightarrow B'(-4, -3)$$

$$C(-2, -3) \rightarrow C'(-7, 0)$$



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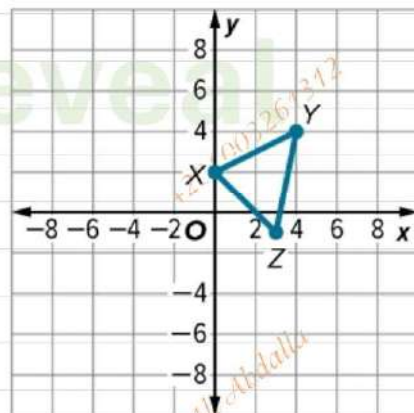
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1. Triangle XYZ has vertices $X(0, 2)$, $Y(4, 4)$, and $Z(3, -1)$. Graph $\triangle XYZ$ and its image after a rotation of 180° about $(2, -3)$.



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2. Triangle ABC has vertices $A(1, 7)$, $B(3, 2)$, and $C(-2, -2)$. Graph $\triangle ABC$ and its image after a rotation of 270° counterclockwise about $(-4, 2)$.

Step 1: translation by using vector $\langle 4, -2 \rangle$

$$\begin{array}{lcl} A(1, 7) & \xrightarrow{\langle 4, -2 \rangle} & (5, 5) \\ B(3, 2) & \xrightarrow{\quad} & (7, 0) \\ C(-2, -2) & \xrightarrow{\quad} & (2, -4) \end{array}$$

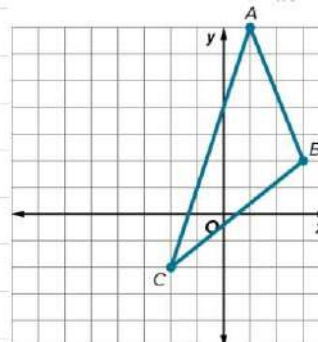
Step 3: translation by using vector $\langle -4, 2 \rangle$

$$\begin{array}{lcl} (5, 5) & \xrightarrow{\quad} & (1, 3) A' \\ (7, 0) & \xrightarrow{\quad} & (3, -2) B' \\ (2, -4) & \xrightarrow{\quad} & (-2, -2) C' \end{array}$$

Step 2: Rotation of 270° about Origin.

$$(x, y) \rightarrow (y, -x)$$

$$\begin{array}{lcl} (5, 5) & \xrightarrow{\quad} & (5, -5) \\ (7, 0) & \xrightarrow{\quad} & (0, -7) \\ (2, -4) & \xrightarrow{\quad} & (-4, -2) \end{array}$$



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3. Triangle FGH has vertices $F(-3, 4)$, $G(2, 0)$, and $H(-1, -2)$. Graph $\triangle FGH$ and its image after a rotation of 180° about $(-3, -6)$.

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4. Quadrilateral $ABCD$ has vertices $A(-2, 4)$, $B(1, 3)$, $C(2, -3)$, and $D(-3, -1)$. Graph quadrilateral $ABCD$ and its image after a rotation of 90° counterclockwise about $(-1, 2)$.

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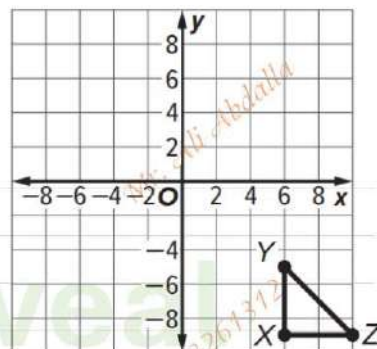
Reveal

Refer to the graph.

In which quadrant will the image be after a rotation of 180° about $(1, -2)$?

تبعاً للرسم المبين

في أي ربع سوف تقع فيه الصورة بعد دوران بزاوية 180° حول النقطة $(1, -2)$



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Reveal

Which is the image of $F(-2, -7)$ after a counterclockwise rotation of 180° about $(-1, 5)$.

(A) $F'(-1, 5)$

(B) $F'(0, 17)$

(C) $F'(1, 12)$

(D) $F'(2, 7)$

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12

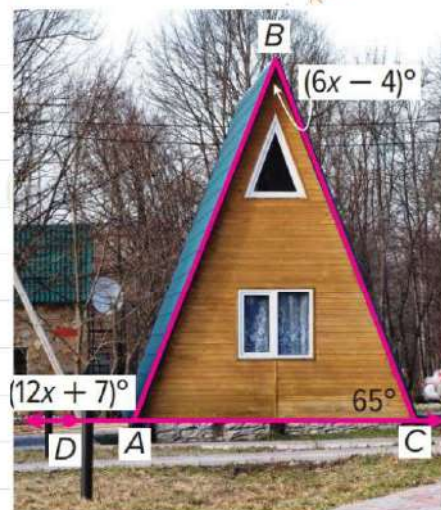
Prove the Exterior Angle Theorem and apply the theorem to solve problems

(EX2,5-8)

841,843

Find the measure of $\angle DAB$ in the front face of the building.

- ☐ 9
- ☐ 115
- ☐ 105
- ☐ 15



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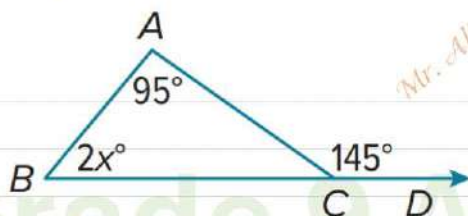
71

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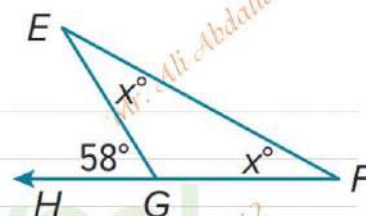
Find each measure.

5. $m\angle ABC$



- ☐ 25°
- ☐ 50°
- ☐ 35°
- ☐ 45°

6. $m\angle F$



- ☐ 19°
- ☐ 39°
- ☐ 29°
- ☐ 122°

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7. A lookout tower sits on a network of struts and posts. Leslie measured two angles on the tower. If $m\angle 1 = (7x - 7)^\circ$, $m\angle 2 = (4x + 2)^\circ$, and $m\angle 3 = (2x + 6)^\circ$, what is $m\angle 1$?



- ☐ 15°
☐ 88°
☐ 98°
☐ 75°

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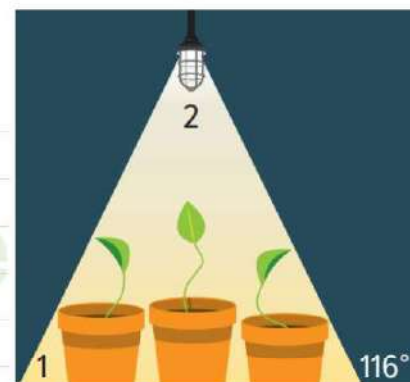
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8. A gardener uses a grow light to grow vegetables indoors. If $m\angle 1 = (8x)^\circ$ and $m\angle 2 = (7x - 4)^\circ$, what is $m\angle 1$?



- ☐ 8°
☐ 64°
☐ 98°
☐ 33°

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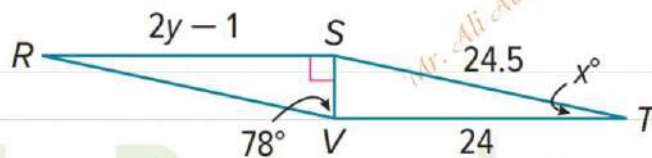
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In the diagram, $\triangle RSV \cong \triangle TVS$. Find the values of x and y .



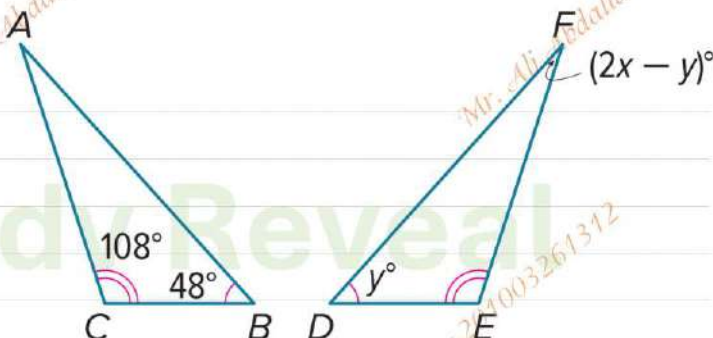
- ☐ $x = 10, y = 12.5$
- ☐ $x = 12, y = 12.5$
- ☐ $x = 12, y = 10$
- ☐ $x = 10, y = 15$

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In the diagram, $\triangle ABC \cong \triangle FDE$.

6. Find the value of x .



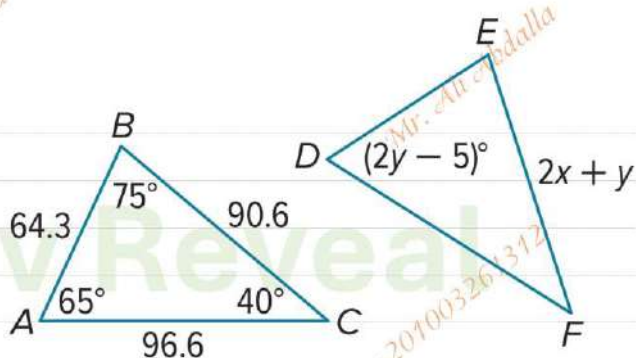
7. Find the value of y .

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In the diagram, $\triangle ABC \cong \triangle DEF$.

10. Find the value of x .

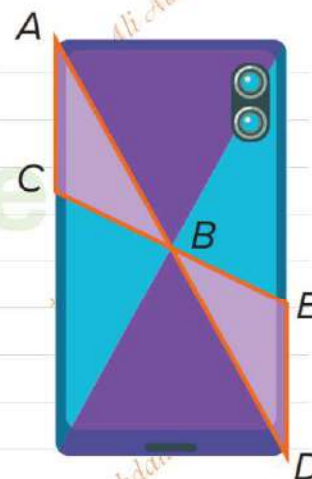


11. Find the value of y .

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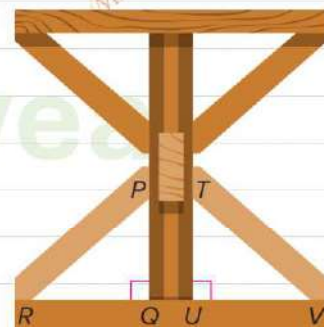
12. Camila is designing a new image for her cell phone case. If $m\angle ABC = 35^\circ$, $m\angle BAC = 29^\circ$, and $\angle ACB \cong \angle DEB$, what is $m\angle DEB$?



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13. Mr. Lewis is building a rustic dining table. Instead of having four legs, the table has a set of supports at each end. If $\angle PRQ \cong \angle TVU$ and $m\angle RPQ = 49^\circ$, what is $m\angle TVU$?



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14

Use the right triangle congruence theorems to prove relationships in geometric figures

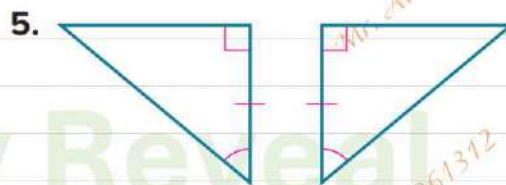
(4-9)

873

Determine whether each pair of triangles is congruent. If yes, include the theorem that applies.



Yes; HL



Yes; LA



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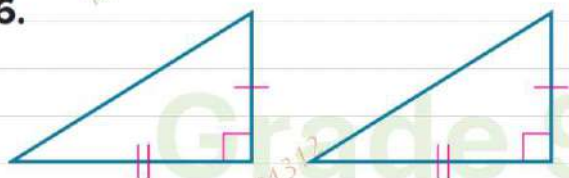
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Reveal

Determine whether each pair of triangles is congruent.

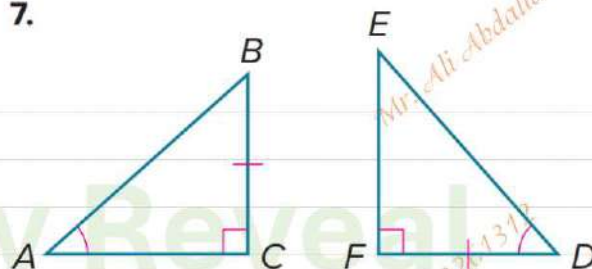
If yes, include the theorem that applies.

6.



Yes; LL

7.



No; not enough information



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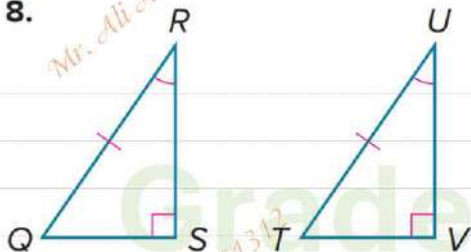
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Reveal

Determine whether each pair of triangles is congruent.

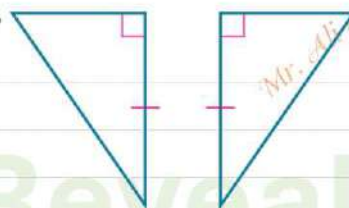
If yes, include the theorem that applies.

8.



Yes, HA

9.



No; not enough information



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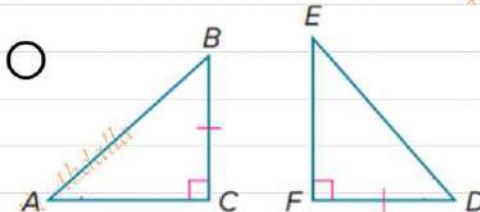
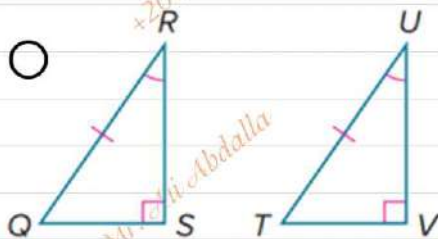
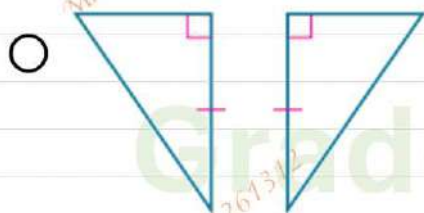
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Which pair of the following triangles are congruent?

أي زوج من المثلثات الآتية هي مثلثات متطابقة؟

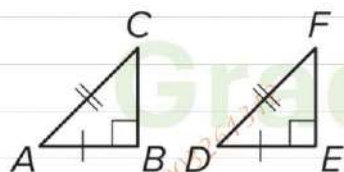


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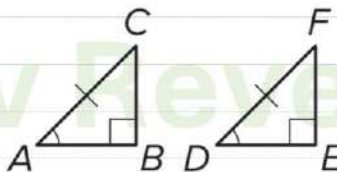


Select all the pairs of triangles that must be congruent to each other.

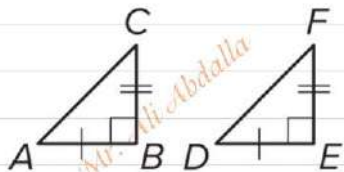
(A)



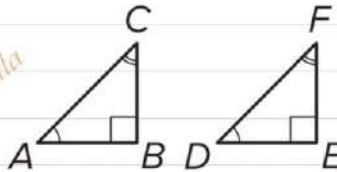
(C)



(B)



(D)

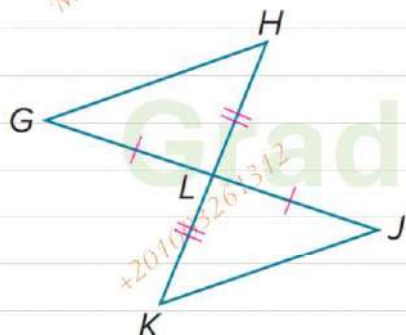


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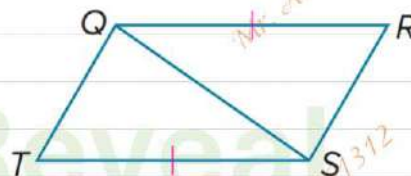
Explain whether there is enough information given in each figure to prove that the triangles are congruent using SSS or SAS.

17.



you can use the given congruent pairs of sides, and the fact that $\angle GLH \cong \angle JLK$ (because they are vertical angles), to state that $\triangle GLH \cong \triangle JLK$ by the SAS Congruence Postulate.

18.



You cannot show that triangles QTS and SRQ are congruent by either postulate. Since it is not known whether $\overline{QT} \cong \overline{SR}$ you cannot use SSS. Since none of the angles are known to be congruent, you cannot use SAS. If segments QR and ST were said to be parallel, then you could apply alternate interior angles and use SAS. But just because they appear to be parallel, you cannot assume so.



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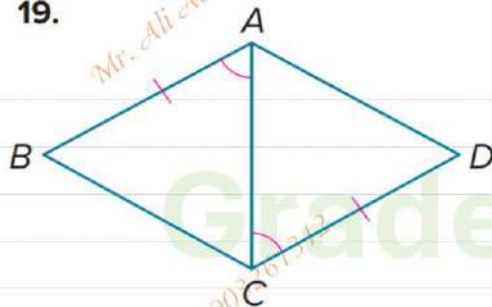
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Explain whether there is enough information given in each figure to prove that the triangles are congruent using SSS or SAS.

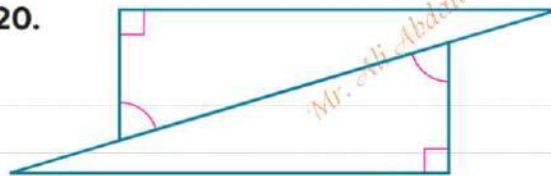
19.



You need to use the given congruent pair of sides and angles, and the fact that they share the side $\overline{AC}$

Since the given congruent angles are included angles, so $\triangle ABC \cong \triangle CDA$ by the SAS Congruence Postulate.

20.



Both triangles must have three pairs of congruent angles from the Third Angles Theorem, but no side lengths are known to be congruent. So, you cannot show that triangles are congruent by either postulate.



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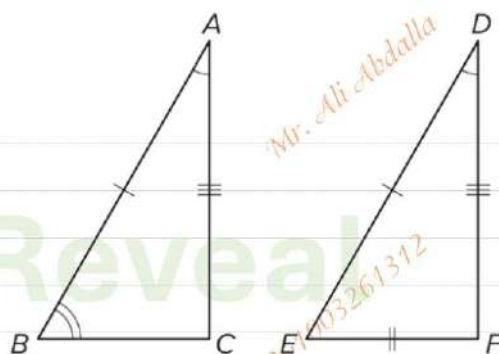
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Which postulate shows $\triangle ABC \cong \triangle DEF$?

- (A) Side-Side-Side
- (B) Angle-Side-Angle
- (C) Side-Angle-Side
- (D) Angle-Angle-Side



In $\triangle JKL$ and $\triangle PQR$, $\overline{JK} \cong \overline{PQ}$ and $\overline{JL} \cong \overline{PR}$. Which additional statement would prove that $\triangle JKL \cong \triangle PQR$?

- (A) $\angle J \cong \angle P$
- (B) $\angle L \cong \angle R$
- (C) $\overline{JK} \cong \overline{PR}$
- (D) $\overline{JL} \cong \overline{KL}$



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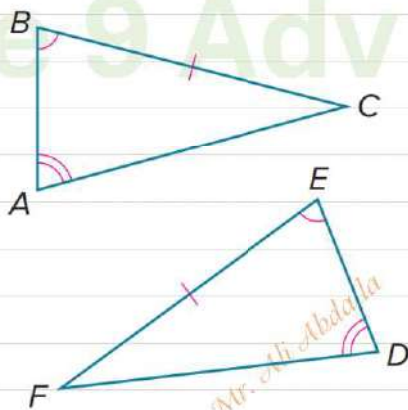
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16	Use the AAS congruence criterion for triangles to prove relationships in geometric figures	theorem, Ex3(12-15)	865,866,869
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Theorem 14.5: Angle-Angle-Side (AAS) Congruence

Words If two angles and the nonincluded side of one triangle are congruent to the corresponding two angles and nonincluded side of a second triangle, then the two triangles are congruent.

Example If $\angle A \cong \angle D$,
 $\angle B \cong \angle E$, and
 $\overline{BC} \cong \overline{EF}$,
then $\triangle ABC \cong \triangle DEF$.



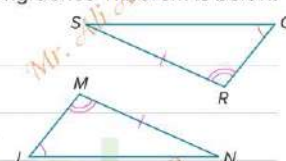
The proof of the AAS Congruence Theorem is below.

Given: $\angle L \cong \angle Q$
 $\angle M \cong \angle R$
 $\overline{MN} \cong \overline{RS}$

Prove: $\triangle LMN \cong \triangle QRS$

Proof:

$\angle L \cong \angle Q$ (Given)
 $\angle M \cong \angle R$ (Given)
 $\overline{MN} \cong \overline{RS}$ (Given)
 $\angle N \cong \angle S$ (Third Angles Theorem)
 $\triangle LMN \cong \triangle QRS$ (ASA)



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Choose the correct statements and reasons to complete the flow proof.

Given: $\overline{RQ} \cong \overline{ST}$ and $\overline{RQ} \parallel \overline{ST}$

Prove: $\triangle RUQ \cong \triangle TUS$

$\overline{RQ} \parallel \overline{ST}$

Given

$\angle RQS \cong \angle TSQ$

Alternate Interior
Angles Theorem

$\overline{RQ} \cong \overline{ST}$

Given

$\triangle RUQ \cong \triangle TUS$

AAS

$\angle RUQ \cong \angle TUS$

Vertical Angles
Theorem



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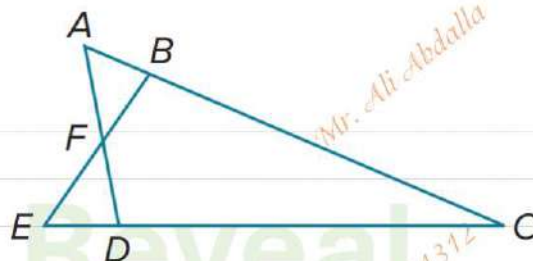
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Choose the correct statements and reasons to complete the proof.

Given: $\angle DAC \cong \angle BEC$ and $\overline{DC} \cong \overline{BC}$

Prove: $\triangle ACD \cong \triangle ECB$



Statements

Reasons

1. $\angle DAC \cong \angle BEC$

1. Given

2. $\overline{DC} \cong \overline{BC}$

2. Given

3. $\angle C \cong \angle C$

3. Reflexive Property of Congruence

4. $\triangle ACD \cong \triangle ECB$

4. AAS

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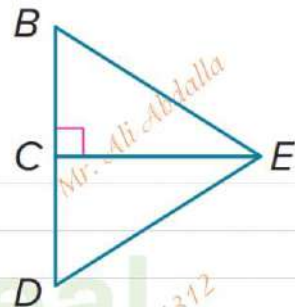
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5. paragraph proof

Given: $\overline{CE}$ bisects $\angle BED$; $\angle BCE$ and $\angle ECD$ are right angles.

Prove: $\triangle ECB \cong \triangle ECD$



Proof: We are given that $\overline{CE}$ bisects $\angle BED$ and that $\angle BCE$ and $\angle ECD$ are right angles. Because all right angles are congruent, $\angle BCE \cong \angle ECD$.

By the definition of angle bisector, $\angle BEC \cong \angle DEC$.

The Reflexive Property tells us that $\overline{EC} \cong \overline{EC}$. By Angle-Side-Angle Congruence Postulate, $\triangle ECB \cong \triangle ECD$.



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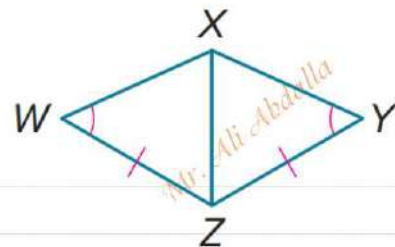
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6. paragraph proof

Given: $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, and $\overline{XZ}$ bisects $\angle WZY$.

Prove: $\triangle XWZ \cong \triangle XYZ$



Proof: It is given that $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, and $\overline{XZ}$ bisects $\angle WZY$.

Therefore, $\angle WZX \cong \angle YZX$ by the definition of angle bisector.

We can now state that $\triangle XWZ \cong \triangle XYZ$ by applying the Angle-Side-Angle Congruence Postulate.



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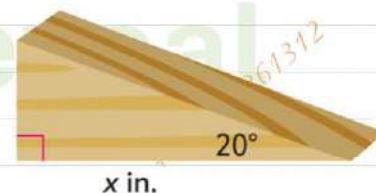
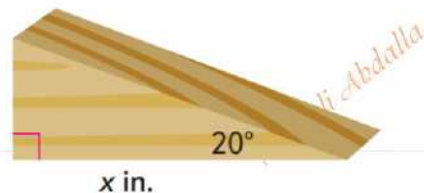
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7. **REASONING** Two doorstops have cross sections that are right triangles. Both have a 20° angle, and the length of the side between the 90° and 20° angles are equal.



- a. Are the cross sections congruent? Explain.
- b. If each cross section has a height of 2 inches and $x = 5$, what is the combined area of the two cross sections?

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In $\triangle RST$, $m\angle R = 85^\circ$, $m\angle S = 33^\circ$, and $RT = 17$. Which set of measurements would make $\triangle RST \cong \triangle MNP$ by the AAS Theorem?

- (A) $m\angle M = 85^\circ$, $m\angle N = 33^\circ$, and $MP = 17$
- (B) $m\angle M = 85^\circ$, $m\angle N = 33^\circ$, and $MN = 17$
- (C) $m\angle M = 33^\circ$, $m\angle N = 85^\circ$, and $MP = 17$
- (D) $m\angle M = 33^\circ$, $m\angle N = 85^\circ$, and $MN = 17$

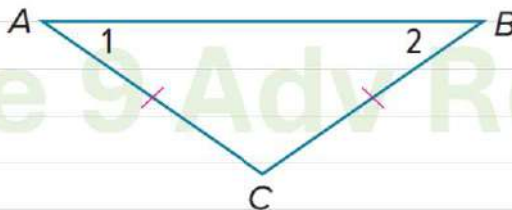
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Theorem 14.10: Isosceles Triangle Theorem

Words If two sides of a triangle are congruent, then the angles opposite those sides are congruent.

Example If $\overline{AC} \cong \overline{BC}$,
then $\angle 2 \cong \angle 1$.



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Find $m\angle B$ and $m\angle C$.

The coordinates of $\triangle ABC$ are $A(0, 3)$, $B(-4, -2)$, and $C(4, -2)$.

$$AB = \sqrt{[0 - (-4)]^2 + [3 - (-2)]^2} = \sqrt{41} \text{ units}$$

$$AC = \sqrt{[0 - 4]^2 + [3 - (-2)]^2} = \sqrt{41} \text{ units}$$

$$CB = \sqrt{[4 - (-4)]^2 + [-2 - (-2)]^2} = 8 \text{ units}$$

So, $\triangle ABC$ is an isosceles triangle with $\overline{AB} \cong \overline{AC}$.

$\angle C \cong \angle B$ by the Isosceles Triangle Theorem.

$$m\angle A + m\angle B + m\angle C = 180^\circ$$

$$m\angle A + 2m\angle B = 180^\circ$$

$$70^\circ + 2m\angle B = 180^\circ$$

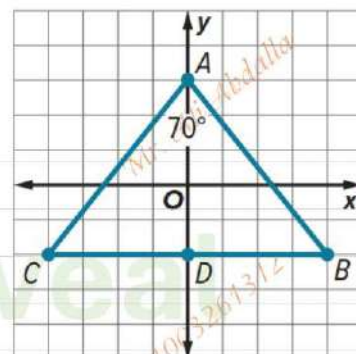
$$m\angle B = m\angle C = 55^\circ$$

Triangle Angle-Sum Theorem

Definition of congruent

Substitute.

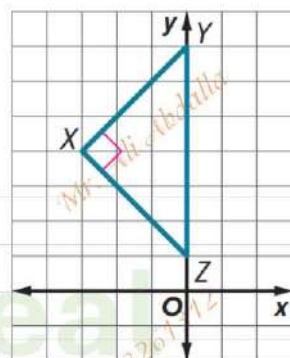
Solve.



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Find $m\angle XYZ$ and $m\angle YZX$.



Grade 9 Adv Reveal

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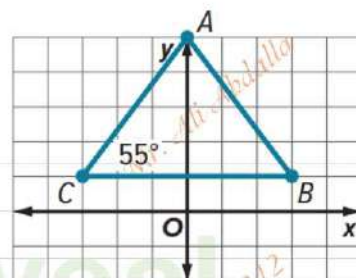
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5. Refer to the figure.

- Find the measures of the sides of $\triangle ABC$. Show your work.
- Find $m\angle A$. Show your work.



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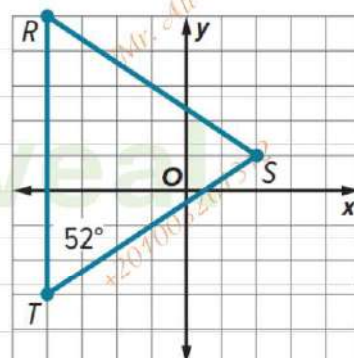


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6. Find SR , ST , RT , $m\angle TRS$, and $m\angle RST$. Round to the nearest tenth, if necessary.



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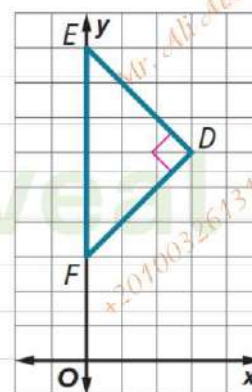
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7. Find the measures of $\angle DEF$ and $\angle EFD$. Round to the nearest tenth, if necessary.



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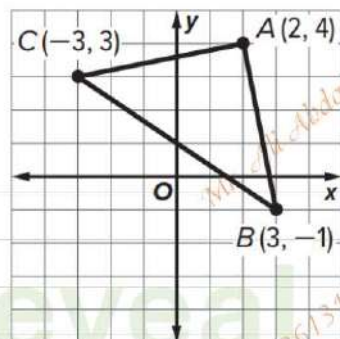
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Reveal

Use coordinate geometry to determine the type of triangle formed below.

- A equilateral
- B isosceles
- C right
- D scalene



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Reveal

18 Write compound statements for conjunctions and disjunctions and determine truth values

Ex1(3,4,6)

711,717

Truth Values

CONJUNCTION TRUTH TABLE		
P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

DISJUNCTION TRUTH TABLE		
P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

NEGATION TRUTH TABLE	
P	$\sim P$
T	F
F	T

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Use the statements to write a compound statement for each conjunction. Then find the truth values. Explain your reasoning.

p : The figure is a trapezoid.

q : The figure has four congruent sides.

r : The figure has four right angles.

CONJUNCTION TRUTH TABLE		
P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

NEGATION TRUTH TABLE	
P	$\sim P$
T	F
F	T



a. p and r

The figure is a trapezoid, and the figure has four right angles.

Although r is true, p is false. So, p and r is false.

b. $\sim p \wedge q$

The figure is not a trapezoid, and the figure has four congruent sides.

Both $\sim p$ and q are true, so $\sim p \wedge q$ is true.

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Use the statements to write a compound statement for each conjunction or disjunction. Then find the truth values. Explain your reasoning.

p : $-3 - 2 = -5$

q : Vertical angles are congruent.

r : $2 + 8 > 10$

1. p and q

2. $p \wedge r$

5. $\sim p \wedge \sim q$

CONJUNCTION TRUTH TABLE		
P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

NEGATION TRUTH TABLE	
P	$\sim P$
T	F
F	T

$-3 - 2 = -5$, and vertical angles are congruent; p is true, and q is true, so p and q is true.

$-3 - 2 = -5$, and $2 + 8 > 10$; p is true, and r is false, so $p \wedge r$ is false.

$-3 - 2 \neq -5$, and not all vertical angles are congruent; $\sim p$ is false, and $\sim q$ is false, so $\sim p \wedge \sim q$ is false.

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Write compound statements for conjunctions and disjunctions and determine truth values of statements

(1,2,5)

717

Use the statements to write a compound statement for each conjunction or disjunction. Then find the truth values. Explain your reasoning.

$p: -3 - 2 = -5$

q : Vertical angles are congruent.

$r: 2 + 8 > 10$

Disjunction Truth Table		
P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

Negation Truth Table	
P	$\sim P$
T	F
F	T

3. $q \vee \sim r$

4. $r \vee q$

6. $\sim r \vee \sim p$

Vertical angles are congruent,
or $2 + 8 \leq 10$; q is true, and $\sim r$
is true, so $q \vee \sim r$ is true.

$2 + 8 > 10$, or vertical angles are
congruent; r is false, and q is
true, so $r \vee q$ is true.

$2 + 8 \leq 10$ or $-3 - 2 \neq -5$; $\sim r$ is
true, and $\sim p$ is false, so $\sim r \vee \sim p$
is true.



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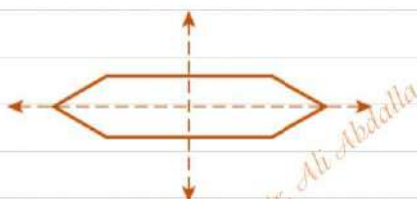
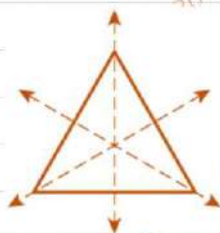
20

Use rotational symmetry to describe the rotations that carry a figure onto itself

(1-6)

829

Determine whether each figure has a line of symmetry. If so, draw the lines of symmetry and state how many lines of symmetry it has.



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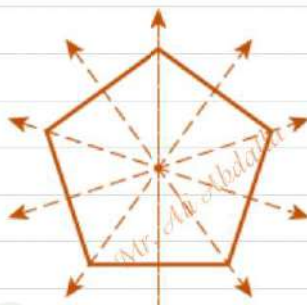
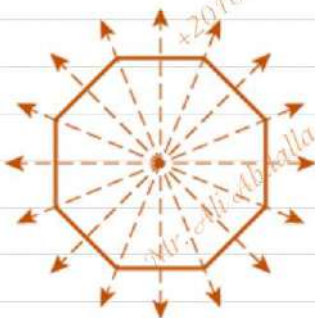
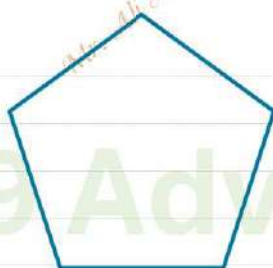
106

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Reveal

Determine whether each figure has a line of symmetry. If so, draw the lines of symmetry and state how many lines of symmetry it has.



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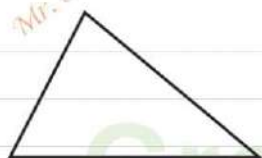
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Reveal

Which figure has 3 lines of symmetry?

أي من الأشكال التالية له ثلاثة خطوط تماثل؟

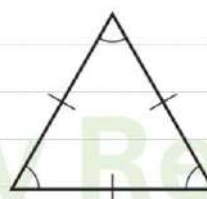
(A)



(B)



(C)



(D)



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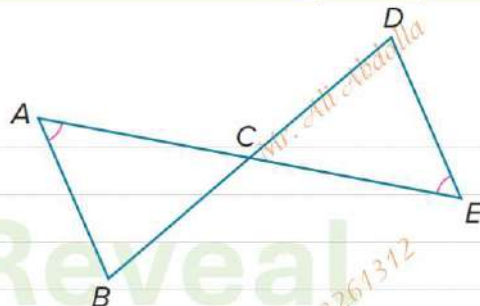
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Complete the two-column proof.

Given: $\angle BAC \cong \angle DEC$; $\overline{BD}$ bisects $\overline{AE}$.

Prove: $\triangle ACB \cong \triangle ECD$



Statements

Reasons

- | | |
|--|-----------------------------------|
| 1. $\angle BAC \cong \angle DEC$ | 1. Given |
| 2. $\overline{BD}$ bisects $\overline{AE}$ | 2. Given |
| 3. $\overline{AC} \cong \overline{EC}$ | 3. Definition of segment bisector |
| 4. $\angle ACB \cong \angle ECD$ | 4. Vertical Angles Theorem |
| 5. $\triangle ACB \cong \triangle ECD$ | 5. ASA |

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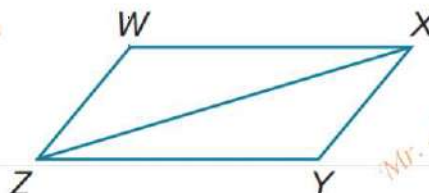
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Complete the two-column proof.

Given: $\overline{WX} \parallel \overline{YZ}$ and $\overline{WZ} \parallel \overline{YX}$

Prove: $\triangle WXZ \cong \triangle YZX$



Statements

Reasons

- | | |
|--|--------------------------------------|
| 1. _____ | 1. Given |
| 2. $\overline{WZ} \parallel \overline{YX}$ | 2. _____ |
| 3. $\angle WXZ \cong \angle YZX$ | 3. _____ |
| 4. _____ | 4. Alternate Interior Angles Theorem |
| 5. _____ | 5. Reflexive Property of Congruence |
| 6. $\triangle WXZ \cong \triangle YZX$ | 6. _____ |

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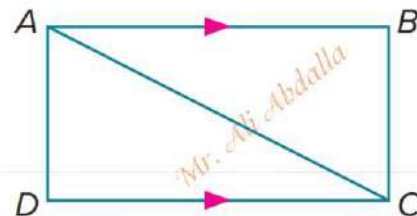
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Reveal

PROOF Write the specified type of proof.

1. two-column proof

Given: $\overline{AB} \parallel \overline{CD}$, $\angle CBD \cong \angle ADB$ Prove: $\triangle ABD \cong \triangle CDB$ 

Statement

Reasons

1. $\overline{AB} \parallel \overline{CD}$

Given

2. _____

Given

3. $\angle ABD \cong \angle CDB$

4. _____

Reflexive Property of Congruence

5. _____

ASA Postulate



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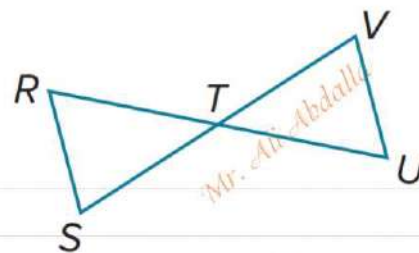
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Reveal

PROOF Write the specified type of proof.

2. two-column proof

Given: $\angle S \cong \angle V$, and T is the midpoint of $\overline{SV}$.Prove: $\triangle RTS \cong \triangle UTV$ 

Statement

Reasons

1. _____

Given

2. _____

Given

3. _____

Definition of midpoint

4. _____

Vertical angles theorem

5. $\triangle RTS \cong \triangle UTV$ 

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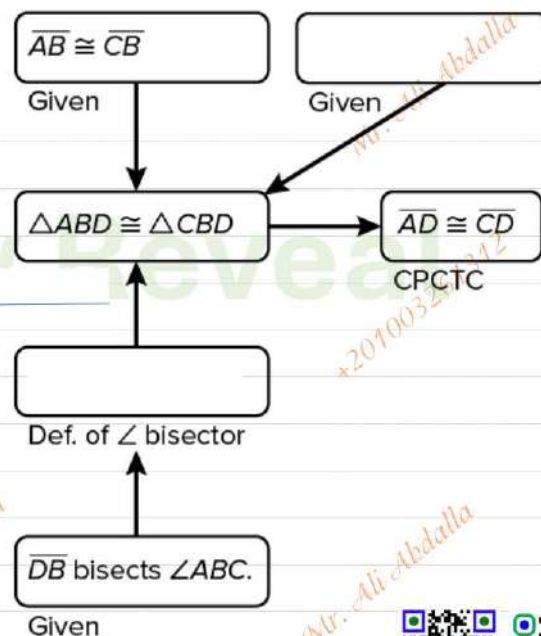
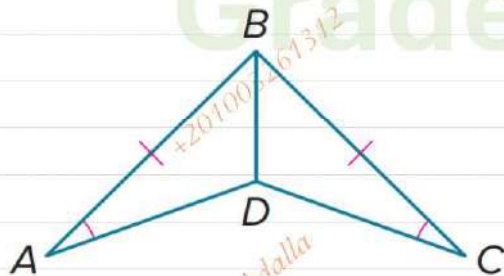
Reveal

PROOF Write the specified type of proof.

3. flow proof

Given: $\overline{AB} \cong \overline{CB}$, $\angle A \cong \angle C$, and
 $\overline{DB}$ bisects $\angle ABC$.

Prove: $\overline{AD} \cong \overline{CD}$



Corresponding Parts of Congruent Triangles are Congruent.

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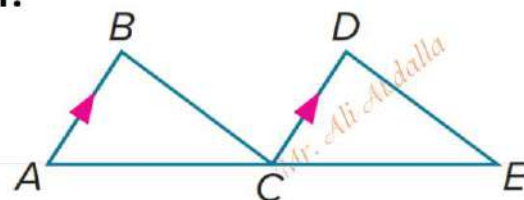
Reveal

PROOF Write the specified type of proof.

4. paragraph proof

Given: $\overline{CD}$ bisects $\overline{AE}$, $\overline{AB} \parallel \overline{CD}$, and $\angle E \cong \angle BCA$.

Prove: $\triangle ABC \cong \triangle CDE$



Proof: It is given that $\angle E \cong \angle BCA$ and $\overline{CD}$ bisects $\overline{AE}$. Since $\overline{CD}$ bisects $\overline{AE}$ by the definition of bisector, $\overline{AC} \cong \overline{CE}$. We are also given that $\overline{AB} \parallel \overline{CD}$. By considering segment AE as the transversal, we can use this to determine that $\angle A$ is congruent to $\angle DCE$ by the Corresponding Angles Theorem. From this we know that $\triangle ABC \cong \triangle CDE$ by the ASA Congruence Postulate.

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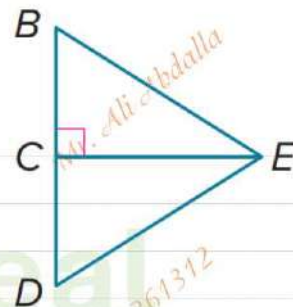
Reveal

PROOF Write the specified type of proof.

5. paragraph proof

Given: $\overline{CE}$ bisects $\angle BED$; $\angle BCE$ and $\angle ECD$ are right angles.

Prove: $\triangle ECB \cong \triangle ECD$



Given: $\overline{CE}$ bisects $\angle BED$, $\angle BCE$ and $\angle ECD$ are right angles.

Prove: $\triangle ECB \cong \triangle ECD$

Proof: We are given that $\overline{CE}$ bisects $\angle BED$ and that $\angle BCE$ and $\angle ECD$ are right angles.

Because all right angles are congruent, $\angle BCE \cong \angle ECD$. By the definition of angle bisector, $\angle BEC \cong \angle DEC$. The Reflexive Property tells us that $\overline{EC} \cong \overline{EC}$.

By Angle-Side-Angle Congruence Postulate, $\triangle ECB \cong \triangle ECD$.



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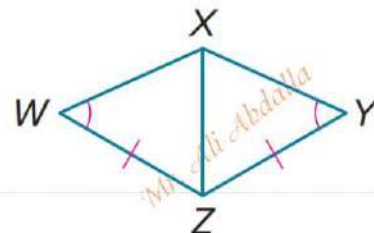
Reveal

PROOF Write the specified type of proof.

6. paragraph proof

Given: $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, and $\overline{XZ}$ bisects $\angle WZY$.

Prove: $\triangle XWZ \cong \triangle XYZ$



Given: $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, and $\overline{XZ}$ bisects $\angle WZY$.

Prove: $\triangle XWZ \cong \triangle XYZ$

Proof: It is given that $\angle W \cong \angle Y$, $\overline{WZ} \cong \overline{YZ}$, and $\overline{XZ}$ bisects $\angle WZY$. Therefore, $\angle WZX \cong \angle YZX$ by the definition of angle bisector. We can now state that $\triangle XWZ \cong \triangle XYZ$ by applying the Angle-Side-Angle Congruence Postulate.



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Reveal

Given $\triangle DEF$ and $\triangle JLK$ where $\overline{DE} \cong \overline{JL}$, $\overline{FD} \cong \overline{KJ}$, $\overline{LK} \cong \overline{EF}$, $\angle D \cong \angle J$, $\angle E \cong \angle L$, and $\angle F \cong \angle K$, which of the following conclusions can be made?

- A. $\triangle DEF$ and $\triangle JLK$ are congruent.
- B. $\triangle DEF$ and $\triangle JLK$ are not congruent.
- C. A series of rigid motions will not map $\triangle DEF$ onto $\triangle JLK$.
- D. $\triangle FDE$ and $\triangle KJL$ are not congruent.

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Reveal

22	Apply angle relationship theorems to identify parallel lines and find missing values	Ex2(7-12)	777,779
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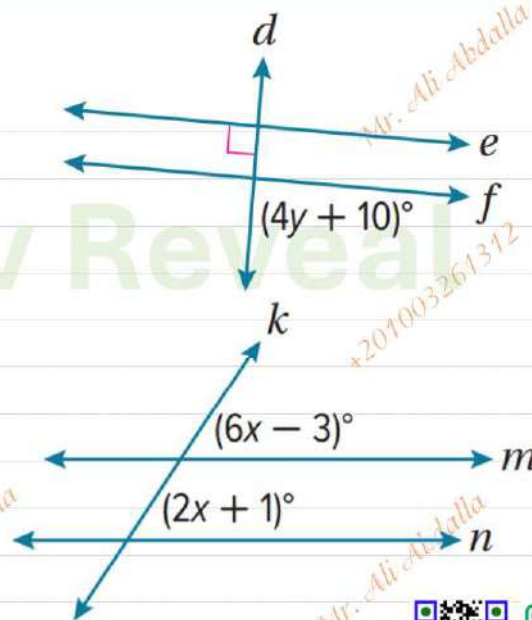
Find the value of y so that $e \parallel f$.

$90 = 4y + 10$ Definition of perpendicular

$80 = 4y$ Subtract 10 from each side.

$20 = y$ Divide each side by 4.

- a. Find the value of x so that $m \parallel n$. Identify the postulate or theorem you used.



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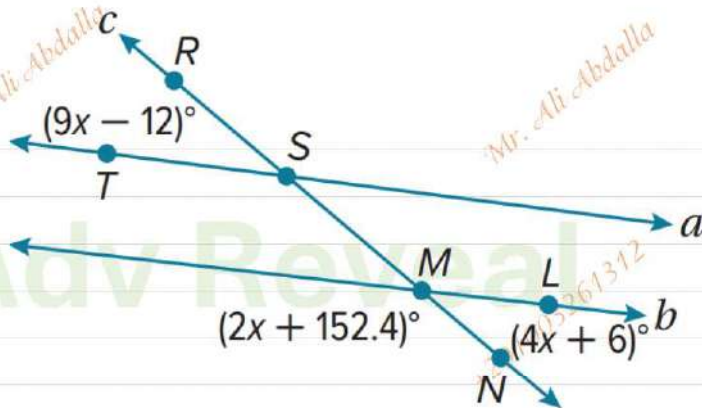
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b. Find $m\angle LMN$ so that $a \parallel b$.

- A. 3.6°
- B. 20.4°
- C. 100°
- D. 159.6°

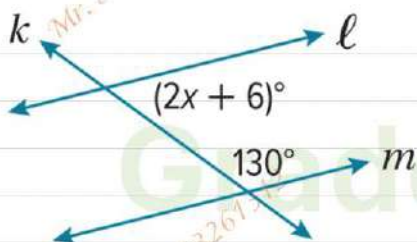


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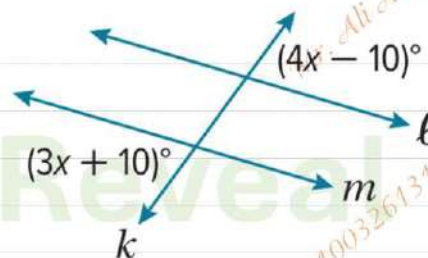


Find the value of x so that $\ell \parallel m$.

7.



8.

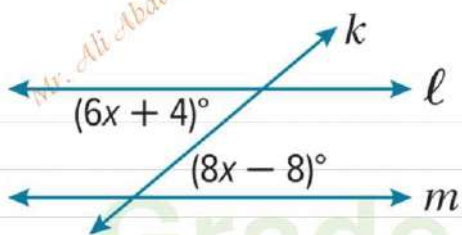


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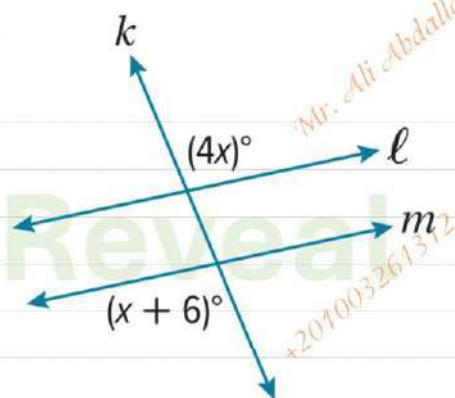


Find the value of x so that $\ell \parallel m$.

9.

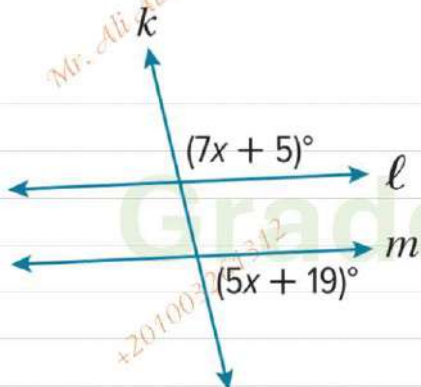


10.

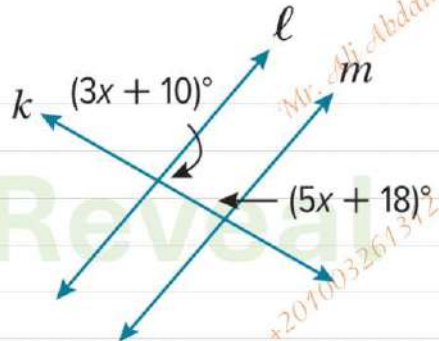


Find the value of x so that $\ell \parallel m$.

11.

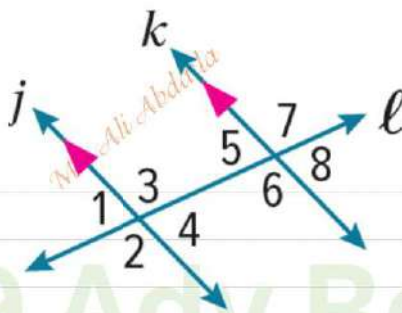


12.



Find y if $m\angle 8 = 68^\circ$
and $m\angle 3 = (3y - 2)^\circ$.

اوجد y إذا كان $m\angle 8 = 68^\circ$
و $m\angle 3 = (3y - 2)^\circ$.



☐ $y = 23.3$

☐ $y = 38$

☐ $y = 68$

☐ $y = 111$

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23

Use the SSS congruence criterion for triangles to solve problems and prove relationships in geometric figures

Ex1(17-20)

855, 861

Write a flow proof to show that $\triangle QRT \cong \triangle SRT$.

Given: $\triangle QRS$ is isosceles with $\overline{QR} \cong \overline{SR}$. $\overline{RT}$ bisects $\overline{QS}$ at point T .

Prove: $\triangle QRT \cong \triangle SRT$

Proof:

$\triangle QRS$ is isosceles
with $\overline{QR} \cong \overline{SR}$.
Given

$\overline{RT}$ bisects $\overline{QS}$
at point T .
Given

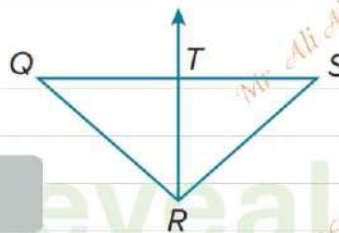
$\overline{RT} \cong \overline{RT}$
Reflexive Property
of Congruence

$\overline{QT} \cong \overline{ST}$

Definition of
segment bisector

$\triangle QRT \cong \triangle SRT$

SSS

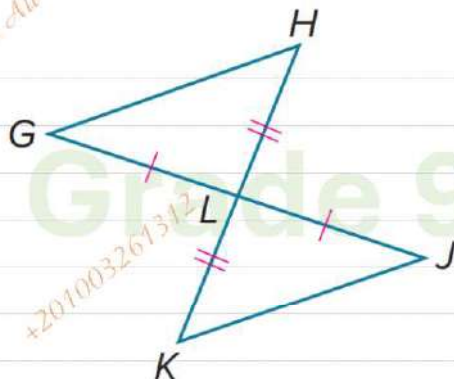


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Explain whether there is enough information given in each figure to prove that the triangles are congruent using SSS or SAS.

17.



18.

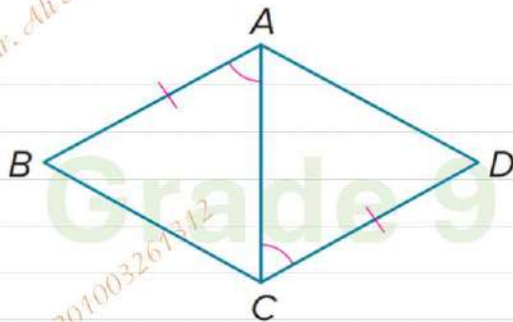


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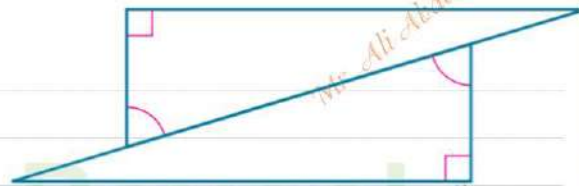


Explain whether there is enough information given in each figure to prove that the triangles are congruent using SSS or SAS.

19.



20.



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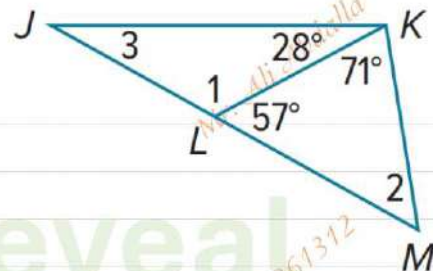
24

Prove the Triangle Angle-Sum Theorem and apply the theorem to solve problems

Ex1(1-4)

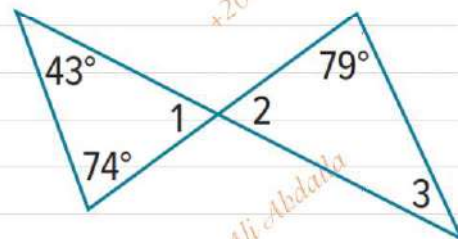
839,843

Find the measure of each numbered angle.



$$m\angle 1 = 123^\circ \quad m\angle 2 = 52^\circ \quad m\angle 3 = 29^\circ$$

Find the measure of each numbered angle.



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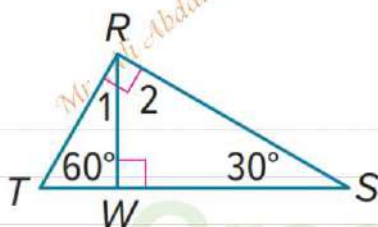
127

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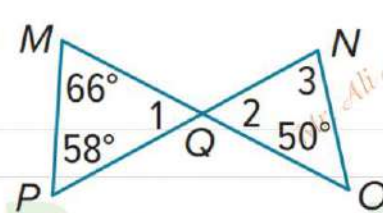
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Find the measure of each numbered angle.

1.



2.



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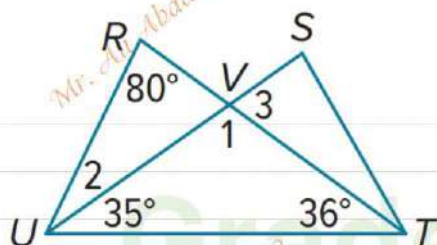
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Find the measure of each numbered angle.

3.



4.



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Find the measures of the numbered angles.

أوجد قياسات الزوايا المرقمة.



- ☐ $m\angle 1 = m\angle 2 = 17^\circ$
- ☐ $m\angle 1 = m\angle 2 = 34^\circ$
- ☐ $m\angle 1 = 14^\circ, m\angle 2 = 20^\circ$
- ☐ $m\angle 1 = 20^\circ, m\angle 2 = 20^\circ$

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Identify the hypothesis and conclusion of each conditional statement.

a. If a polygon has six sides, then it is a hexagon.

Hypothesis: A polygon has six sides.

Conclusion: The polygon is a hexagon.

b. Another performance will be scheduled if the first one is sold out.

Hypothesis: The first performance is sold out.

Conclusion: Another performance will be scheduled.

Even though the "if" is in the middle of the sentence, the hypothesis is always the part that immediately follows the word "if".)



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Identify the hypothesis and conclusion of each conditional statement.

a. If the forecast is rain, then I will take an umbrella.

Hypothesis: _____

Conclusion: _____

b. A number is divisible by 10 if its last digit is a 0.

Hypothesis: _____

Conclusion: _____



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Identify the hypothesis and conclusion for each conditional statement.
Then write each statement in if-then form.

12. Get a free water bottle with a one-year membership.

Hypothesis: _____

Conclusion: _____

if-then: _____

13. Everybody at the party received a gift.

Hypothesis: _____

Conclusion: _____

if-then: _____



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Identify the hypothesis and conclusion for each conditional statement.
Then write each statement in if-then form.

14. The intersection of two planes is a line.

Hypothesis: _____

Conclusion: _____

if-then: _____

15. The area of a circle is πr^2 .

Hypothesis: _____

Conclusion: _____

if-then: _____



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Reveal

Identify the hypothesis and conclusion for each conditional statement.
Then write each statement in if-then form.

16. Collinear points lie on the same line.

Hypothesis: _____

Conclusion: _____

if-then: _____

17. A right angle measures 90 degrees.

Hypothesis: _____

Conclusion: _____

if-then: _____

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