

Geometry Semester 1 Exam

Specifications Sheet

Part I - Free Response

- 1 Definition
- 2 Logic
- 3 Formula Derivation
- 4 Theorem / Postulate
- 5 Geometric Proof
- 6 Coordinate Geometry Proof

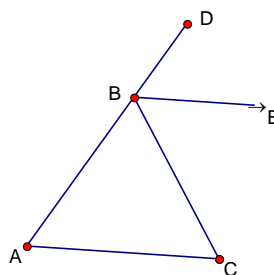
Part II - Multiple Choice

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- 3 Polygon Properties
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- 46 Logic
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- 49 Logic
- 50 Logic

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Free Response

4. What is the Triangle Exterior Angle Theorem?

5. Given: $\triangle ABC$, \overline{BE} bisects $\angle CBD$,
 $\overline{BE} \parallel \overline{AC}$.
Prove: $\overline{AB} \cong \overline{BC}$

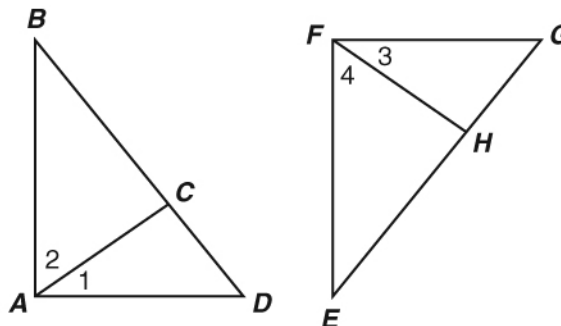


6. Quadrilateral $ABCD$ has vertices $A(0, -2)$, $B(9, 1)$, $C(4, 6)$, and $D(1, 5)$.
Prove by coordinate geometry that $ABCD$ is a trapezoid.

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1. Mandy was doing the following proof:

In the figures below, $\overline{AB} \perp \overline{AD}$, $\overline{EF} \perp \overline{FG}$, and $\angle 1 \cong \angle 3$.



Prove: $\angle 2 \cong \angle 4$

Proof:

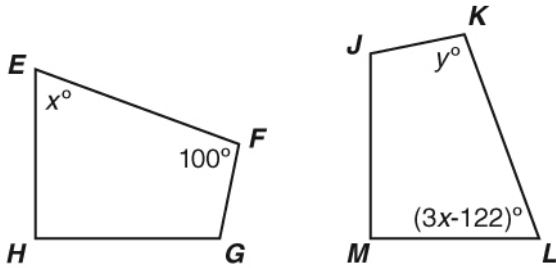
Statements	Reasons
1. $\overline{AB} \perp \overline{AD}$, $\overline{EF} \perp \overline{FG}$, and $\angle 1 \cong \angle 3$	1. Given
2. $m\angle 1 + m\angle 2 = 90^\circ$, $m\angle 3 + m\angle 4 = 90^\circ$	2. Definition of perpendicularity
3. $\angle 1$ is complementary to $\angle 2$ $\angle 3$ is complementary to $\angle 4$	3. Two angles that form a 90° angle are complementary to each other.
4. $\angle 2 \cong \angle 4$	4. ?

What is the missing reason for the last step of Mandy's proof?

- A. Definition of perpendicular lines
- B. Transitive property of equality
- C. If 2 angles are congruent to equal angles, then the 2 angles are congruent.
- D. If 2 angles are complementary to congruent angles, then the 2 angles are congruent.

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2. In the diagram below, $EFGH \cong LKJM$.



What is the value of x ?

- A. 61
 B. 74
 C. 80
 D. 100
3. Triangle WTY has point R on side WT and point Q on side WY . If $\overline{RQ} \parallel \overline{TY}$, which of the following relationships **MUST** be true?
- A. $\angle RQW \cong \angle QRW$
 B. $\angle RTY \cong \angle QYT$
 C. $\angle WRQ \cong \angle RTY$
 D. $\angle RWQ \cong \angle TYQ$

4. Which statement is true about all right triangles?
- A. A right triangle has 3 equal sides.
 B. A right triangle has 3 obtuse angles.
 C. A right triangle has no parallel sides.
 D. A right triangle has 2 pairs of parallel sides.
5. Which term should **NOT** be used to describe a square?
- A. parallelogram
 B. rhombus
 C. rectangle
 D. trapezoid
6. Which combination of triangle classifications is **NOT** possible?
- A. right obtuse
 B. right scalene
 C. obtuse isosceles
 D. acute equilateral
7. Which statement explains why a rectangle is a parallelogram?
- A. They are both rhombuses.
 B. They are both quadrilaterals.
 C. They both have two pairs of parallel sides.
 D. They are both quadrilaterals with four right angles.

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8. Which has only one pair of parallel sides?

- A. square
- B. rhombus
- C. rectangle
- D. trapezoid

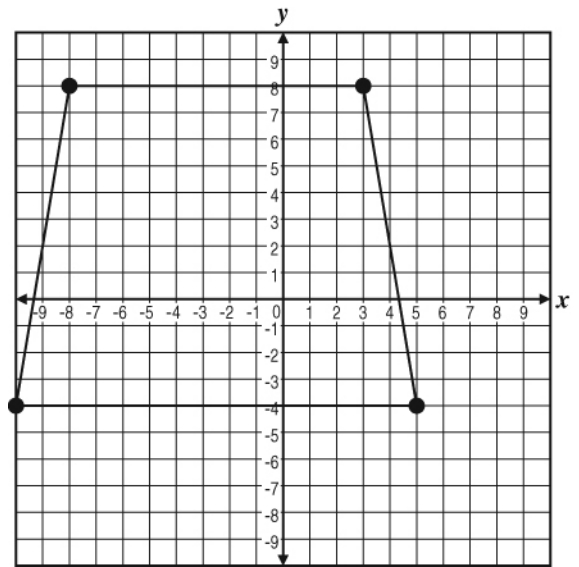
9. Which of the following statements is NOT true?

- A. The diagonals of a square always bisect each other.
- B. The diagonals of a rhombus always bisect each other.
- C. The diagonals of a trapezoid always bisect each other.
- D. The diagonals of a parallelogram always bisect each other.

10. Which word describes a quadrilateral that has 4 congruent sides and 2 different pairs of congruent angles?

- A. square
- B. rhombus
- C. rectangle
- D. trapezoid

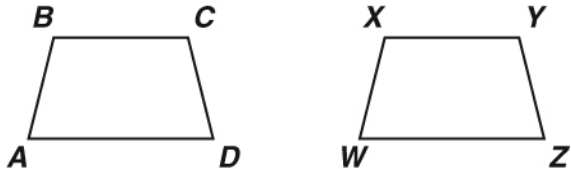
11. What are the coordinates that connect the median of the isosceles trapezoid below?



- A. $(-9, 0)$ and $(4, 0)$
- B. $(-9, 2)$ and $(4, 2)$
- C. $(-2.5, 5)$ and $(-2.5, -4)$
- D. $(-9.21, -2)$ and $(9.21, 2)$

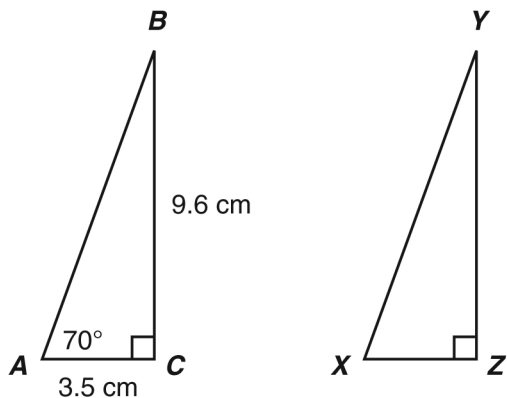
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12. Trapezoids $ABCD$ and $WXYZ$ are shown below.



Which statement provides enough information to conclude that these quadrilaterals are congruent?

- A. Both figures are the same shape.
 B. The sum of two adjacent angles is 180° .
 C. Corresponding sides have the same length.
 D. Corresponding parallel sides have the same length.
13. Triangle ABC is congruent to Triangle XYZ , as shown below.



Which statement must be true?

- A. $m \angle X = 70^\circ$
 B. $m \angle Z = 70^\circ$
 C. $XY = 3.5$ cm
 D. $XZ = 9.6$ cm

14. What is the slope of the line that contains points $(-3, -5)$ and $(2, 7)$?

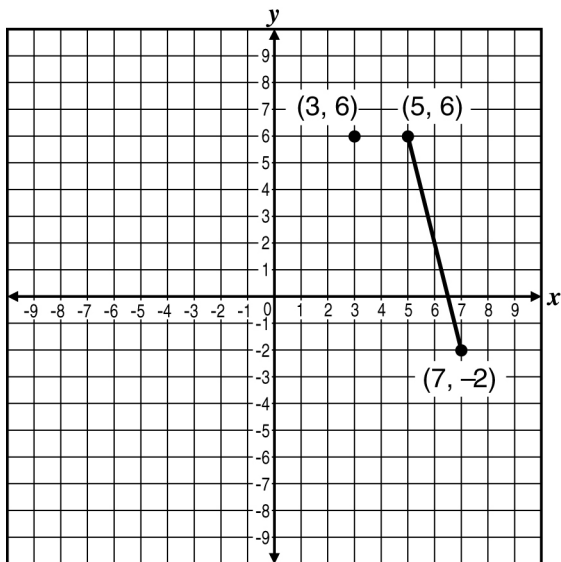
- A. -2
 B. $-\frac{1}{2}$
 C. $\frac{5}{12}$
 D. $\frac{12}{5}$

15. A parallelogram has vertices $(0, 7)$, $(-6, -5)$, and $(9, -5)$. Which of the following coordinates could NOT be its fourth vertex?

- A. $(-15, 7)$
 B. $(-3, -17)$
 C. $(3, -17)$
 D. $(15, 7)$

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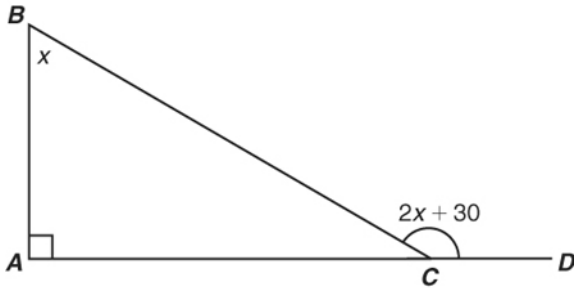
16. What is the distance between the point $(3, 6)$ and the midpoint of the line segment connecting $(5, 6)$ and $(7, -2)$?



- A. 3
B. 5
C. 9
D. 25
17. What is the value of y if the slope of a line is 3 and two points on the line are $(0, y)$ and $(2, 4)$?
- A. -10
B. -2
C. 10
D. 14
18. Given three non-collinear points $A, B,$ and $C,$ what does the statement $AC = AB$ make true about $\triangle ABC$?
- A. $\triangle ABC$ is a right triangle.
B. $\triangle ABC$ is an isosceles triangle.
C. $\triangle ABC$ is an equilateral triangle.
D. A is the midpoint of \overline{BC} .
19. Which statement accurately describes skew lines?
- A. Skew lines always intersect.
B. Skew lines are always parallel.
C. Skew lines always lie in the same plane.
D. Skew lines always lie in the different planes.
20. Which statement is NOT true about the diagonals of a rectangle?
- A. The diagonals are always congruent.
B. The diagonals always bisect each other.
C. The diagonals are always perpendicular.
D. The diagonals are always in the interior of the rectangle.

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21. Right triangle ABC is shown below.

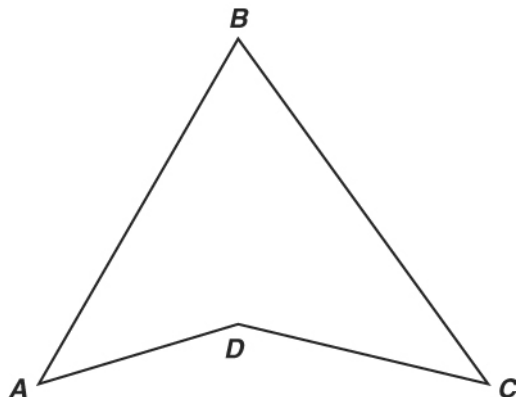


What is the value of x ?

- A. 20°
 - B. 30°
 - C. 40°
 - D. 60°
22. Each exterior angle of a regular polygon has a measure of 18° . How many sides does the polygon have?
- A. 10
 - B. 16
 - C. 18
 - D. 20

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23. In quadrilateral $ABCD$, $m \angle ADC > 180^\circ$.



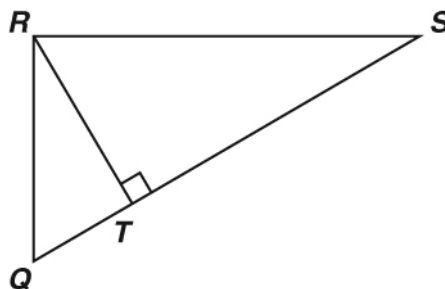
Which statement about quadrilateral $ABCD$ is correct?

- A. $m \angle CDA > m \angle ABC$
- B. $m \angle CDA < m \angle DAB$
- C. $m \angle DAB > m \angle BCD$
- D. $m \angle ABC < m \angle BCD$

24. Jack is designing a T-shirt for his geometry class. The front reads: The polygon in which one angle is 68° and each additional angle increases by 20° . Which of the following is the only possible answer for the back of his shirt?

- A. triangle
- B. quadrilateral
- C. pentagon
- D. hexagon

25. In $\triangle QRS$, $\overline{RT} \perp \overline{SQ}$.



Which statement proves that $m \angle QRS = 90^\circ$?

- A. $\angle RTS \cong \angle RTQ$
- B. $\angle TRS \cong \angle TSR$
- C. $\angle QRT \cong \angle QSR$
- D. $\angle RQT \cong \angle TRQ$

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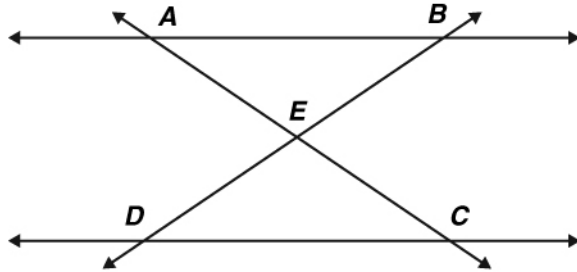
26. Alyssa is writing the following proof:

Given: E is the midpoint of \overline{AC} .

$\overline{AB} \parallel \overline{DC}$

Prove: $\triangle AEB \cong \triangle CED$

Proof:



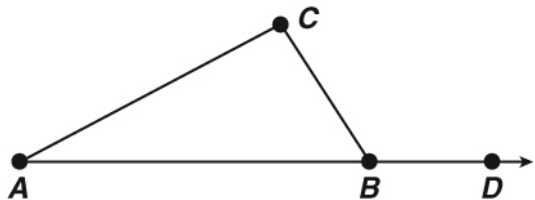
Statements	Reasons
1. E is the midpoint of \overline{AC} .	1. Given
2. $\overline{AB} \parallel \overline{DC}$	2. Given
3. $\overline{AE} \cong \overline{EC}$	3. Definition of midpoint
4. $\angle AEB \cong \angle CED$	4. Vertical angles are congruent.
5. $\angle EAB \cong \angle ECD$	5. If two parallel lines are intersected by a transversal, then alternate interior angles are congruent.
6. $\triangle AEB \cong \triangle CED$	6.

Which of the following is the reason for Statement 6?

- A. SSS
- B. SAS
- C. ASA
- D. AAS

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27. Given $\triangle ABC$ and point D on \overrightarrow{AB} , which of the following statements is correct?



- A. $\angle CBD$ is congruent to $\angle ACB$.
B. $\angle CBD$ is complementary to $\angle ABC$.
C. The measure of $\angle CBD$ is the sum of the measures of $\angle BAC$ and $\angle ACB$.
D. The measure of $\angle CBD$ is the sum of the measures of $\angle BAC$ and $\angle ABC$.
28. Which equation represents the line that contains the point $(-3, 14)$ and is parallel to the line represented by $2x + y = 5$?

- A. $y - 14 = -2(x + 3)$
B. $y - 3 = -2(x + 14)$
C. $y + 3 = -2(x - 14)$
D. $y + 14 = -2(x - 3)$

29. What is the slope of a line that is perpendicular to the graph of

$$y + 6 = 4 - \frac{3}{4}x?$$

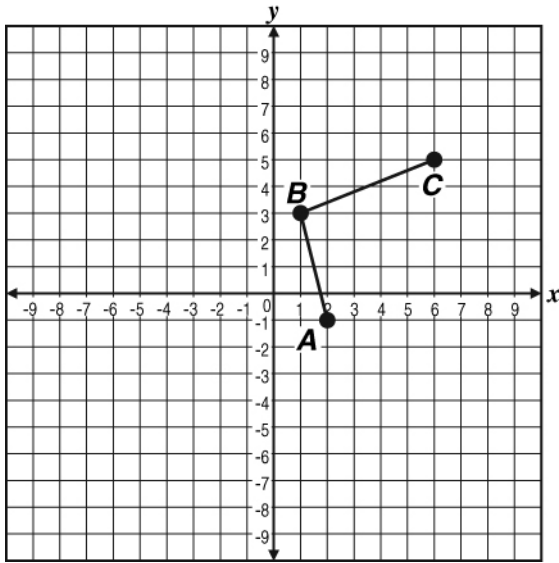
- A. $-\frac{4}{3}$
B. $-\frac{3}{4}$
C. $\frac{3}{4}$
D. $\frac{4}{3}$

30. What is the slope of a line that is parallel to the graph of $5x + 4y = 6$?

- A. $-\frac{5}{4}$
B. $-\frac{4}{5}$
C. $\frac{4}{5}$
D. $\frac{5}{4}$

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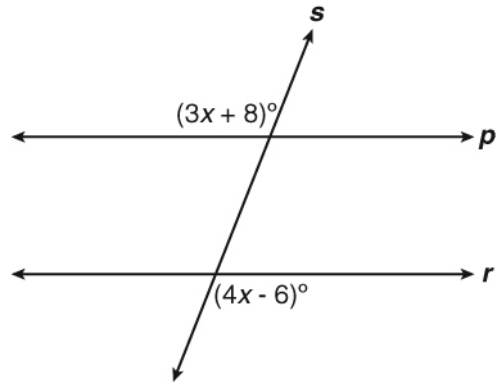
31. Two segments of Parallelogram $ABCD$ are shown below.



Which coordinate pair BEST represents the location of Point D , the fourth vertex of Parallelogram $ABCD$?

- A. (6, 1)
- B. (7, 0)
- C. (8, 2)
- D. (7, 1)

32. Line s intersects lines p and r in the figure below.

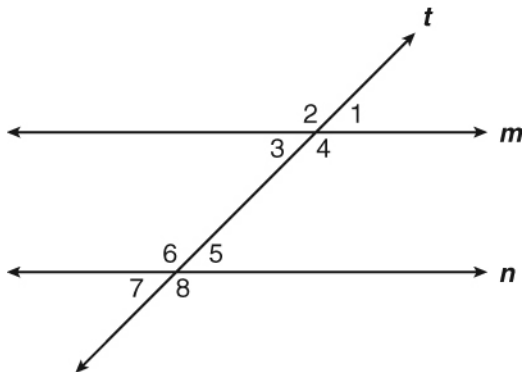


If line p is parallel to line r , what is the value of x ?

- A. 2
- B. $12\frac{4}{7}$
- C. 14
- D. $25\frac{3}{7}$

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33. In the figure below, line m and line n are parallel lines intersected by line t .



Which pair of angles is congruent?

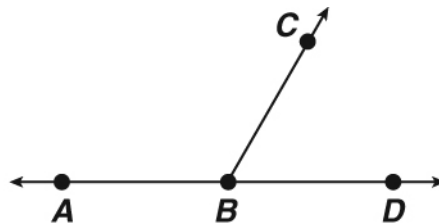
- A. $\angle 1$ and $\angle 6$
- B. $\angle 2$ and $\angle 8$
- C. $\angle 3$ and $\angle 4$
- D. $\angle 4$ and $\angle 7$

34. Quadrilateral $LMNP$ has diagonals \overline{LN} and \overline{MP} . The two diagonals intersect at point D . If D is the midpoint of \overline{LN} and \overline{MP} , which relationship must be true?

- A. $\angle PLD \cong \angle LPD$
- B. $\angle MDN \cong \angle DNM$
- C. $\angle NPL \cong \angle PNM$
- D. $\angle PND \cong \angle DLM$

35. The following statements describe the figure below.

- $\angle ABC$ and $\angle CBD$ form a linear pair
- $m \angle ABC = (3x - 5)^\circ$
- $m \angle CBD = (2x + 10)^\circ$



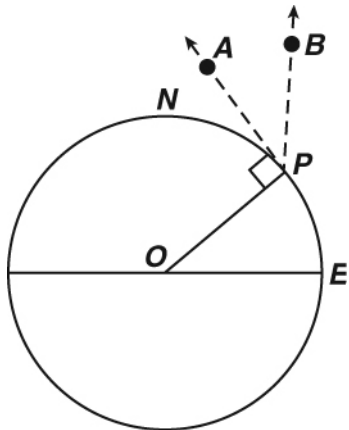
Note: The figure is not drawn to scale.

What is the measure of $\angle CBD$?

- A. 100°
- B. 80°
- C. 46°
- D. 35°

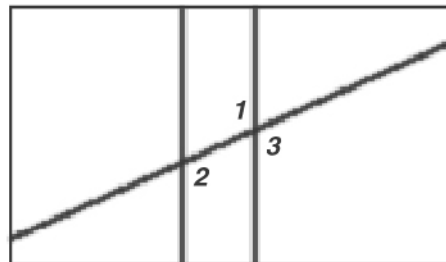
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36. Standing at Point P on Earth were O represents the center, an explorer seeks to determine his latitude ($\angle EOP$) by measuring $\angle APB$ (the inclination of the North Star above the horizon). Given that $\overleftrightarrow{PB} \perp \overleftrightarrow{OE}$, $\angle APO = 90^\circ$, and that $\angle APB = 40^\circ$, what is the measure of $\angle EOP$?



- A. 30°
- B. 40°
- C. 50°
- D. 60°

37. A section of a leaded glass window is shown below.



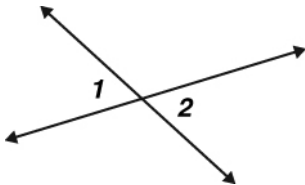
- Each piece of lead in the glass is a straight line segment.
- $\angle 1 \cong \angle 2$
- $\angle 1 \cong \angle 3$

Which reason proves that $\angle 2 \cong \angle 3$?

- A. addition property
- B. transitive property
- C. vertical angles are congruent
- D. alternate interior angles are congruent

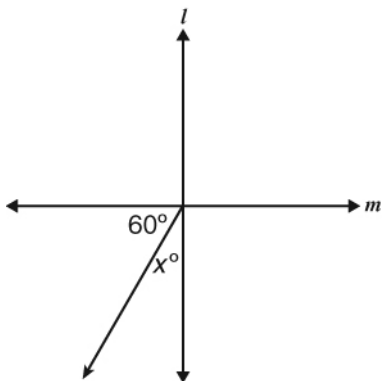
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38. What is the measure of $\angle 2$ if $m\angle 1 = [2(3x + 4)]^\circ$ and $m\angle 2 = (4x + 30)^\circ$?



- A. 74°
- B. 82°
- C. 86°
- D. 106°

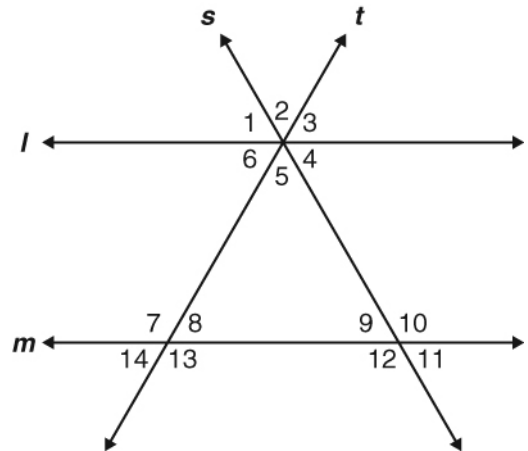
39. In the diagram below, $l \perp m$.



Mark solved for x and got 30 for an answer. Which statement justifies Mark's answer?

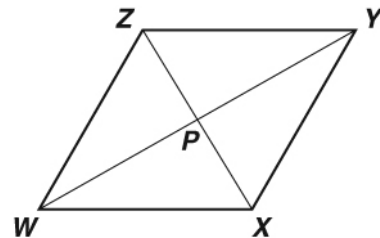
- A. Vertical angles are congruent.
- B. Alternate interior angles are congruent.
- C. If two lines intersect to form a pair of congruent adjacent angles, then the lines are perpendicular.
- D. If two sides of two adjacent angles are perpendicular, then the angles are complementary.

40. Given: $l \parallel m$ and lines s and t are transversals through both l and m . If $m\angle 2 = 45^\circ$ and $m\angle 3 = 55^\circ$, find $m\angle 13$.



- A. 55°
- B. 80°
- C. 100°
- D. 125°

41. In Rhombus $WXYZ$, diagonals \overline{WY} and \overline{XZ} intersect at P .

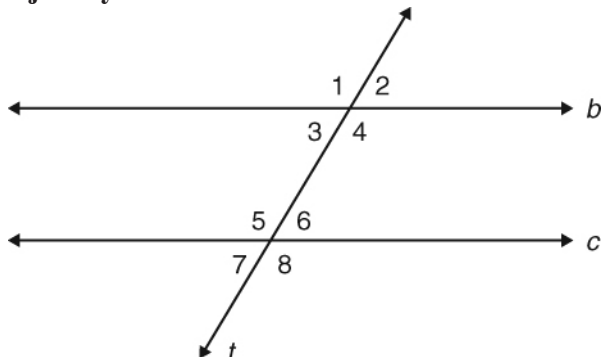


Which pair of angles is congruent?

- A. $\angle ZPY$ and $\angle XPY$
- B. $\angle XWP$ and $\angle WXP$
- C. $\angle ZYP$ and $\angle PZW$
- D. $\angle ZPW$ and $\angle ZYX$

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42. In the figure below, $b \parallel c$ and is cut by transversal t . The informal proof, shown below the figure, lists the reasons needed to justify $\angle 1 \cong \angle 8$.

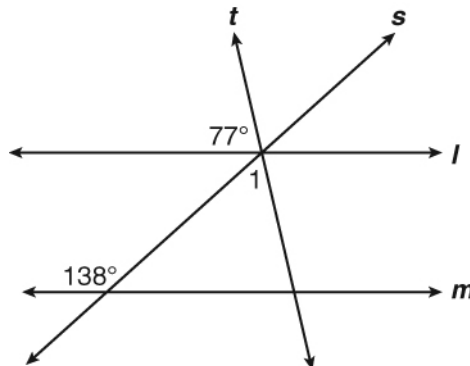


1. $\angle 1 \cong \angle 4$ since vertical angles are congruent.
2. $\angle 4 \cong \angle 5$ since _____.
3. $\angle 5 \cong \angle 8$ since vertical angles are congruent.
4. $\angle 1 \cong \angle 8$ due to the transitive property of equality.

Which of the following is an acceptable justification for Statement 2?

- A. vertical angles are congruent
- B. corresponding angles are congruent
- C. remote interior angles are congruent
- D. alternate interior angles are congruent

43. In the diagram below, line l is parallel to line m and cut by a transversals s and t .



What is the measure of Angle 1?

- A. 42°
- B. 61°
- C. 103°
- D. 119°

44. Consider these statements.

- Every equilateral triangle is an acute triangle.
- Triangle ABC is not an acute triangle.

Which conclusion can be made using both statements?

- A. Triangle ABC is scalene.
- B. Triangle ABC is not isosceles.
- C. Triangle ABC is a right triangle.
- D. Triangle ABC is not equiangular.

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45. Given two lines that intersect, which of the descriptions **MUST** be true?

- A. The two lines are coplanar.
- B. The two lines are coincident.
- C. The two lines are concurrent.
- D. The two lines are corresponding.

46. Given the statement: **All equilateral triangles are similar.**

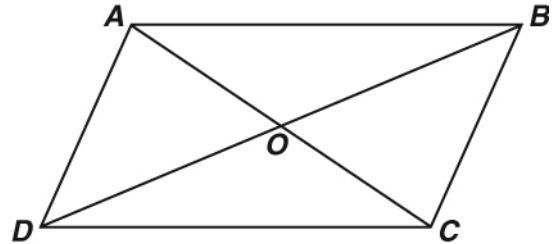
Which of the following is an accurate conclusion?

- A. The statement cannot be shown to be true because the length of a side is not given.
- B. The statement cannot be shown to be true because the triangles may have a side in common.
- C. The statement can be shown to be false by using the fact that two equilateral triangles can have different areas.
- D. The statement can be shown to be true by using the fact that all the angles are 60 degrees, and each triangle has 3 congruent sides.

47. If two triangles have the same area, what additional information is needed to show that they are congruent?

- A. The triangles are both isosceles.
- B. The triangles each have a right angle.
- C. One triangle's altitude is congruent to the other triangle's altitude.
- D. One triangle has two angles that are congruent to two angles of the other triangle.

48. Pablo has drawn Parallelogram $ABCD$ and its diagonals, \overline{AC} and \overline{BD} . Using Side – Side – Side, he has proven that $\triangle BAD$ is congruent to $\triangle DCB$.



Given this, which result is Pablo now able to prove?

- A. $\triangle BOC \cong \triangle AOB$
- B. $\triangle COB \cong \triangle AOD$
- C. $\angle COB$ is an acute angle.
- D. The area of $\triangle BOC$ is equal to the area of $\triangle AOB$.

49. In the statement below, what word or phrase is the hypothesis?

“If a triangle has all angles congruent, then the triangle must be equiangular.”

- A. angles congruent
- B. equiangular
- C. a triangle has all angles congruent
- D. the triangle must be equiangular

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50. What would be the hypothesis that ends with the following conclusion?

"... then $\angle POQ$ is congruent to $\angle QOR$."

- A. If \overrightarrow{OQ} bisects $\angle POR$,
- B. If $\angle PQR$ and $\angle QOR$ are a linear pair,
- C. If $\angle POR$ and $\angle QOR$ are complementary,
- D. If \overrightarrow{OQ} intersects $\angle POR$,



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1	D	26	C
2	A	27	C
3	C	28	A
4	C	29	D
5	D	30	A
6	A	31	D
7	C	32	C
8	D	33	B
9	C	34	D
10	B	35	B
11	B	36	B
12	B	37	B
13	A	38	A
14	D	39	D
15	B	40	D
16	B	41	A
17	B	42	D
18	B	43	B
19	D	44	D
20	C	45	A
21	D	46	D
22	D	47	D
23	A	48	B
24	C	49	C
25	C	50	A