1	**Lesson12-1 Conjectures and Counterexamples**	**(EX5,18-23)**	**706, 708**
	Disprove conjectures by using counterexamples		

1

Which of the following values for n serves as a counterexample to the conjecture: "If n is a real number, then $\frac{1}{n} < n$"?

- A. $n = 2$
- B. $n = 10$
- C. $n = \frac{1}{2}$
- D. $n = 100$

2

Which of the following scenarios represents a counterexample to the conjecture: "If a line intersects a segment at its midpoint, then the line is perpendicular to the segment"?

- A. A line intersects a segment at its midpoint at a 90° angle.
- B. A line intersects a segment at its midpoint at a 45° angle.
- C. A line intersects a segment at one of its endpoints.
- D. A line is parallel to the segment and does not intersect it.

3

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

Which of the following values for n serves as a counterexample to prove the conjecture is false?

- A. $n = 5$
- B. $n = 10$
- C. $n = -4$
- D. $n = 0.5$

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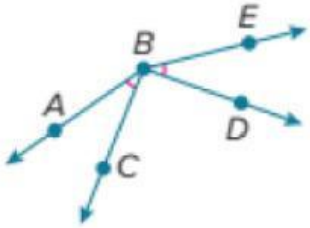
4

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



Which statement describes the counterexample shown in the figure?

- A. The angles are vertical, but they are not congruent.
- B. The angles are congruent, but they are not vertical angles.
- C. The angles are neither congruent nor vertical.
- D. The angles are vertical and congruent.

5

18. Determine the validity of the conjecture: "If n is a prime number, then $n+1$ is not prime."

- A. True
- B. False; counterexample $n = 3$
- C. False; counterexample $n = 2$
- D. False; counterexample $n = 4$

6

19. Determine the validity of the conjecture: "If x is an integer, then $-x$ is positive."

- A. True
- B. False; counterexample $x = -5$
- C. False; counterexample $x = 5$
- D. False; counterexample $x = 0$

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7

20. Determine the validity of the conjecture: "If $\angle 2$ and $\angle 3$ are supplementary angles, then $\angle 2$ and $\angle 3$ form a linear pair."

- A. True
- B. False; supplementary angles must be vertical angles.
- C. False; supplementary angles must be adjacent to form a linear pair.
- D. False; linear pairs are always complementary.

8

21. Determine the validity of the conjecture: "If you have three points A, B, and C, then A, B, and C are noncollinear."

- A. True
- B. False; the three points could lie on the same line.
- C. False; the three points must form a triangle.
- D. False; you need four points to determine collinearity.

9

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

- A. True
- B. False; the triangle is obtuse.
- C. False; the triangle is acute.
- D. False; the triangle is equilateral.

10

23. Determine the validity of 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
- B. False; counterexample: length = 5 m, width = 4 m
- C. False; counterexample: length = 20 m, width = 20 m
- D. False; counterexample: length = 10 m, width = 10 m

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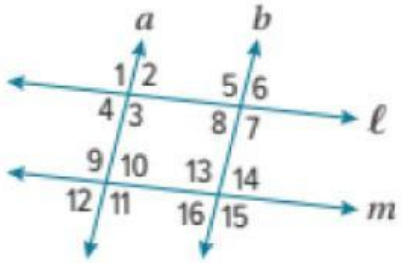
2	**Lesson12-9 Proving Lines Parallel**	**(EX1-1-6)**	**776,779**
	Apply angle relationship theorems to identify parallel lines and find missing values		

11



Question 1 (Part a)

Given: $\angle 2 \cong \angle 8$

Question: Based on the given information, which lines are parallel and what is the justification?

- A. Lines ℓ and m are parallel by the Corresponding Angles Converse.
- B. Lines a and b are parallel by the Alternate Interior Angles Converse.
- C. Lines a and b are parallel by the Alternate Exterior Angles Converse.
- D. Lines ℓ and m are parallel by the Consecutive Interior Angles Converse.

12

Question 2 (Part b)

Given: $\angle 3 \cong \angle 11$

Question: Based on the given information, which lines are parallel and what is the justification?

- A. Lines a and b are parallel by the Alternate Interior Angles Converse.
- B. Lines ℓ and m are parallel by the Alternate Exterior Angles Converse.
- C. Lines ℓ and m are parallel by the Corresponding Angles Converse.
- D. Lines a and b are parallel by the Corresponding Angles Converse.

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13

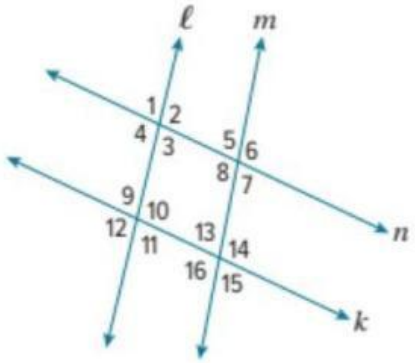
Question 3 (Part c)

Given: $\angle 12 \cong \angle 14$

Question: Based on the given information, which lines are parallel and what is the justification?

- A. Lines ℓ and m are parallel by the Alternate Interior Angles Converse.
- B. Lines a and b are parallel by the Alternate Exterior Angles Converse.
- C. Lines a and b are parallel by the Corresponding Angles Converse.
- D. Lines ℓ and m are parallel by the Alternate Exterior Angles Converse.

14



Question 1 (Part a)

Given: $\angle 1 \cong \angle 15$

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

- A. $\ell \parallel m$; Alternate Exterior Angles Converse
- B. $n \parallel k$; Alternate Exterior Angles Converse
- C. $\ell \parallel m$; Converse of Corresponding Angles Theorem
- D. It is not possible to determine whether the lines are parallel.

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15

Question 2 (Part b)

Given: $m\angle 3 + m\angle 10 = 180^\circ$

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

- A. $\ell \parallel m$; Consecutive Interior Angles Converse
- B. $n \parallel k$; Converse of Consecutive Interior Angles Theorem
- C. $n \parallel k$; Alternate Interior Angles Converse
- D. $\ell \parallel m$; Converse of Corresponding Angles Theorem

16

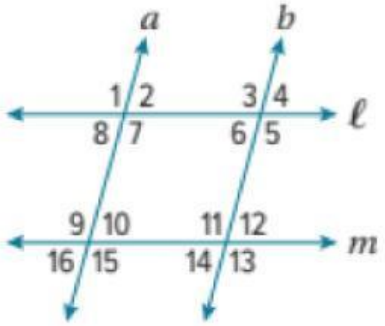
Question 3 (Part c)

Given: $\angle 3 \cong \angle 5$

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

- A. $\ell \parallel m$; Alternate Interior Angles Converse
- B. $\ell \parallel m$; Consecutive Interior Angles Converse
- C. $n \parallel k$; Alternate Interior Angles Converse
- D. It is not possible to determine whether the lines are parallel.

17



Question 1

Given: $\angle 3 \cong \angle 7$

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

- A. $\ell \parallel m$; Alternate Interior Angles Converse
- B. $a \parallel b$; Alternate Exterior Angles Converse
- C. $a \parallel b$; Alternate Interior Angles Converse
- D. It is not possible to determine.

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18

Question 2

Given: $\angle 9 \cong \angle 11$

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

- A. $\ell \parallel m$; Corresponding Angles Converse
- B. $a \parallel b$; Corresponding Angles Converse
- C. $a \parallel b$; Alternate Interior Angles Converse
- D. $\ell \parallel m$; Alternate Exterior Angles Converse

19

Question 3

Given: $\angle 2 \cong \angle 16$

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

- A. $\ell \parallel m$; Alternate Exterior Angles Converse
- B. $a \parallel b$; Alternate Interior Angles Converse
- C. $\ell \parallel m$; Corresponding Angles Converse
- D. $a \parallel b$; Consecutive Interior Angles Converse

20

Question 4

Given: $m\angle 5 + m\angle 12 = 180^\circ$

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

- A. $a \parallel b$; Consecutive Interior Angles Converse
- B. $\ell \parallel m$; Alternate Exterior Angles Converse
- C. $\ell \parallel m$; Consecutive Interior Angles Converse
- D. $a \parallel b$; Corresponding Angles Converse

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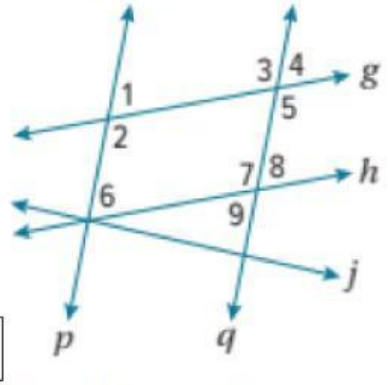

21

Question 1 (Problem 5)

Given: $\angle 1 \cong \angle 6$

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

- A. $g \parallel h$; Corresponding Angles Converse
- B. $p \parallel q$; Alternate Interior Angles Converse
- C. $g \parallel j$; Alternate Exterior Angles Converse
- D. $p \parallel q$; Corresponding Angles Converse

22

Question 2 (Problem 6)

Given: $m\angle 7 + m\angle 6 = 180^\circ$

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

- A. $g \parallel h$; Consecutive Interior Angles Converse
- B. $p \parallel q$; Consecutive Interior Angles Converse
- C. $p \parallel q$; Alternate Interior Angles Converse
- D. $g \parallel j$; Consecutive Interior Angles Converse

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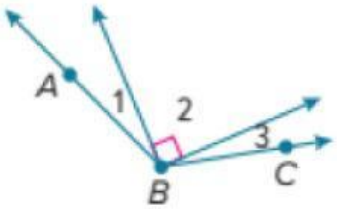
LIVEWORKSHEETS

3	**Lesson 12-6 Proving Angle Relation ships**	**(EX1,1-3)**	**747,753**
	Prove theorems about angles by using the Angle Addition Postulate		

23

Using the Angle Addition Postulate, determine the measure of angle 3 ($m\angle 3$) given that $m\angle 1 = 23^\circ$, $m\angle 2 = 90^\circ$ (indicated by the right angle symbol), and the total angle $m\angle ABC = 131^\circ$.

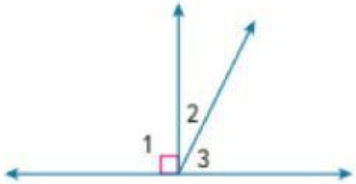
- A. 18°
- B. 41°
- C. 108°
- D. 154°



24

Given that angles 1, 2, and 3 form a straight angle and angle 1 is a right angle (90°), what is the measure of angle 3 ($m\angle 3$) if $m\angle 2 = 26^\circ$?

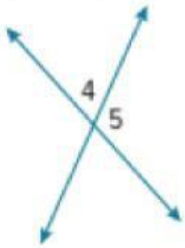
- A. 64°
- B. 154°
- C. 116°
- D. 26°



25

Given that $m\angle 5 = (2x)^\circ$ and $m\angle 4 = (x+9)^\circ$, and knowing that angles 4 and 5 form a linear pair, what is the measure of angle 4 ($m\angle 4$)?

- A. 57°
- B. 114°
- C. 66°
- D. 18°



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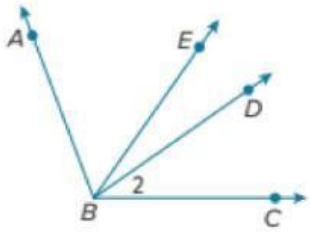
LIVEWORKSHEETS

26

Question 1

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



- A. 27°
- B. 113°
- C. 70°
- D. 43°

26

Question 2

Problem: If $m\angle EBC = 55^\circ$ and $m\angle EBD = 20^\circ$, find $m\angle 2$ (Note: $\angle 2$ represents $\angle DBC$).

- A. 75°
- B. 20°
- C. 35°
- D. 55°

27

Question 3

Problem: Find $m\angle ABD$ if $m\angle ABC = 110^\circ$ and $m\angle 2 = 36^\circ$ (Note: $\angle 2$ represents $\angle DBC$).

- A. 74°
- B. 146°
- C. 36°
- D. 110°

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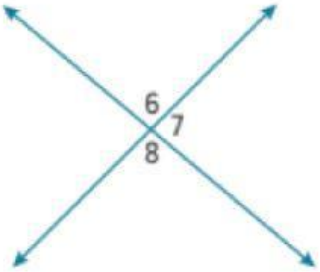
4	**Lesson 12-6 Proving Angle Relation ships**	**(13-18)**	**754**
	Prove theorems about angles by using properties and theorems of angle congruence		

28

Question 1 (Problem 13)

Given: $m\angle 6 = (2x - 21)^\circ$ and $m\angle 7 = (3x - 34)^\circ$. Angles 6 and 7 form a linear pair.

Question: What is the measure of angle 6 ($m\angle 6$)?



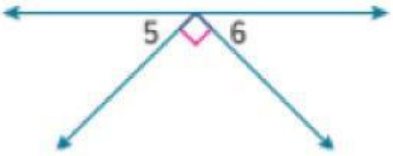
- A. 47°
- B. 73°
- C. 107°
- D. 55°

29

Question 2 (Problem 14)

Given: $m\angle 5 = m\angle 6$. Angles 5 and 6 lie on a straight line with a right angle (90°) between them.

Question: What is the measure of angle 5 ($m\angle 5$)?



- A. 45°
- B. 90°
- C. 135°
- D. 22.5°

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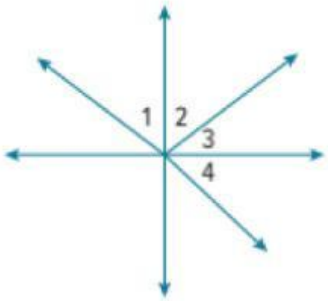
30

Question 3 (Problem 15)

Given: $\angle 2$ and $\angle 3$ are complementary. $m\angle 2 = 28^\circ$.

Question: What is the measure of angle 3 ($m\angle 3$)?

- A. 28°
- B. 62°
- C. 152°
- D. 45°



31

Question 4 (Problem 16)

Given: $m\angle 4 = 105^\circ$. $\angle 4$ and $\angle 5$ are supplementary.

Question: What is the measure of angle 5 ($m\angle 5$)?

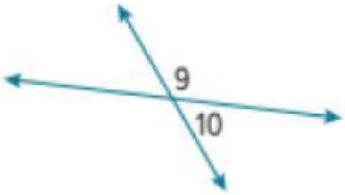
- A. 105°
- B. 75°
- C. 15°
- D. 255°

32

Question 1 (Problem 17)

Problem: Find the measure of angle 9 ($m\angle 9$) given that $m\angle 9 = (3x + 12)^\circ$ and $m\angle 10 = (x - 24)^\circ$. (Note: Angles 9 and 10 form a linear pair, so they are supplementary).

- A. 24°
- B. 48°
- C. 156°
- D. 180°



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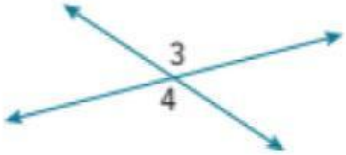
33

Question 2 (Problem 18)

Problem: Find the measure of angle 3 ($m\angle 3$) given that $m\angle 3 = (2x + 23)^\circ$ and $m\angle 4 = (5x - 112)^\circ$. (Note: Angles 3 and 4 are vertical angles, so they are congruent).

- A. 45°
- B. 113°
- C. 135°
- D. 225°



5	**Lesson14-6 Isosceles and Equilateral Triangles**	**(8-15)**	**880**
	Solve problems involving equilateral triangles		

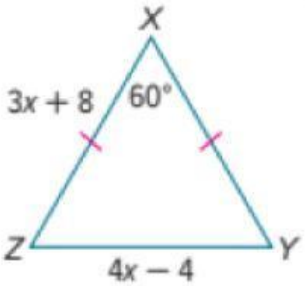
34

Question 1 (Problem 8)

Problem: In $\triangle XYZ$, sides XZ and XY are congruent, and $m\angle X = 60^\circ$. If $XZ = 3x + 8$ and $ZY = 4x - 4$, find the value of x.

(Note: An isosceles triangle with a 60° angle is equilateral, so all sides are equal.)

- A. $x = 4$
- B. $x = 12$
- C. $x = 8$
- D. $x = 16$

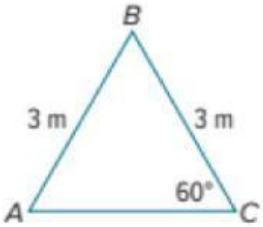


35

Question 2 (Problem 9)

Problem: In $\triangle ABC$, $AB = 3$ m, $BC = 3$ m, and $m\angle C = 60^\circ$. Find $m\angle B$ and the length of AC.

- A. $m\angle B = 60^\circ$, $AC = 3$ m
- B. $m\angle B = 30^\circ$, $AC = 6$ m
- C. $m\angle B = 90^\circ$, $AC = 3$ m
- D. $m\angle B = 60^\circ$, $AC = 6$ m



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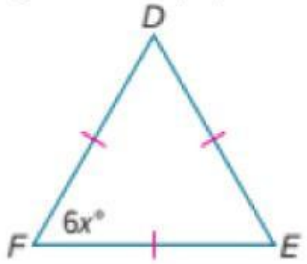
36

Question 3 (Problem 10)

Problem: In $\triangle DEF$, all sides are marked congruent (equilateral triangle). If $m\angle F = (6x)^\circ$, find the value of x.

- A. $x = 6$
- B. $x = 10$
- C. $x = 60$
- D. $x = 36$



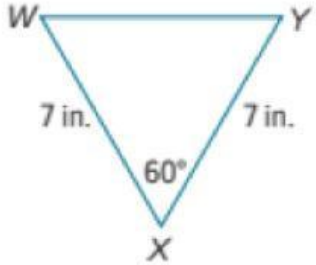
37

Question 4 (Problem 11)

Problem: In $\triangle WXY$, $WX = 7$ in. and the side labeled on the right is also 7 in. (implying $XY = 7$ or $WY = 7$). Given $m\angle X = 60^\circ$, find $m\angle Y$ and the length of side WY.

(Note: An isosceles triangle with a 60° angle is equilateral.)

- A. $m\angle Y = 60^\circ, WY = 7$ in.
- B. $m\angle Y = 70^\circ, WY = 7$ in.
- C. $m\angle Y = 60^\circ, WY = 14$ in.
- D. $m\angle Y = 30^\circ, WY = 7$ in.

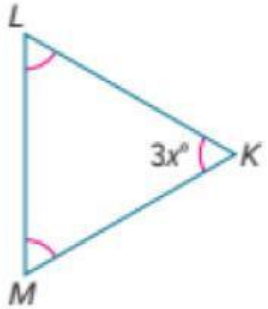


38

Question 5 (Problem 12)

Problem: In $\triangle LMK$, $\angle L \cong \angle M$ and $m\angle K = (3x)^\circ$. Assuming the triangle follows the pattern of the other problems and is equilateral, find the value of x.

- A. $x = 20$
- B. $x = 30$
- C. $x = 60$
- D. $x = 45$



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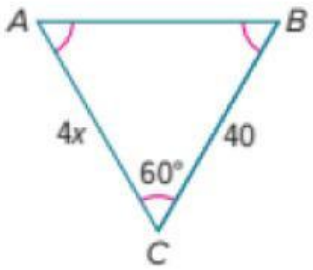
39

Question 6 (Problem 13)

Problem: In $\triangle ABC$, $\angle A \cong \angle B$, $AC = 4x$, $BC = 40$, and $m\angle C = 60^\circ$. Find the value of x.

- A. $x = 10$
- B. $x = 40$
- C. $x = 4$
- D. $x = 60$

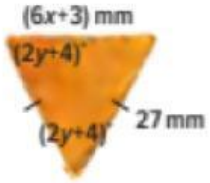


40

Question 1 (Problem 14a)

Problem: A tortilla chip is modeled by a triangle with side lengths $(6x + 3)$ mm, $(2y + 4)$ mm, and 27 mm. The markings indicate the triangle is equilateral. Solve for x.

- A. $x = 3$
- B. $x = 4$
- C. $x = 5$
- D. $x = 6$



41

Question 2 (Problem 14b)

Problem: Using the same tortilla chip triangle from Problem 14, solve for y.

- A. $y = 24$
- B. $y = 26$
- C. $y = 28$
- D. $y = 30$

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LIVEWORKSHEETS