Geometry Cumulative Study Guide

Test 7
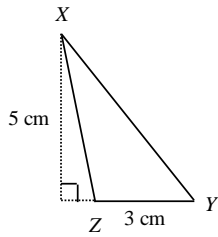
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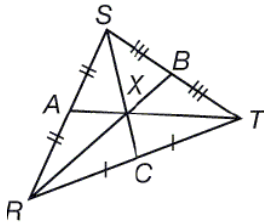
Numeric Response

1. Determine the area of $\triangle XYZ$ in square centimeters.

5 cm

3 cm

X, Y, Z

2. Find the area, in square inches, of a circle with a radius of 6 inches. Use 3.14 for π.

3. In $\triangle RST$, $SC = 24$. Find CX.

Problem

4. Determine the midpoint of the line segment with endpoints (4, 2) and (5, –4).

5. Consider the following conjecture.

If the product of two numbers is negative, then both numbers are negative.
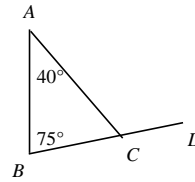
What is the hypothesis of the conjecture? What is its conclusion? Find a counterexample to the conjecture.

6. Determine whether polygon *AFGD* is convex or concave. Explain.
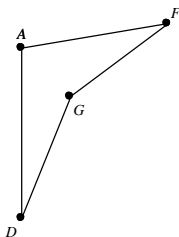
7. Determine the contrapositive of the statement below.
If an angle is acute, its measure is less than 90°.

8. For $\triangle ABC$, determine the measure of $\angle ACD$.

9. For the following statements, use the Law of Detachment to write a valid concluding statement.

If a triangle is obtuse, then it contains one obtuse angle.

$\triangle FGH$ is obtuse.

10. Find the area of a parallelogram with a height of $8y$ and a base of $3x$.

11. The area of a rectangular photograph is 40 square inches. The photograph's length is $(4x + 4)$ inches, and the photograph's width is $5x$ inches. Find the dimensions of the photograph. Provide a justification for each step.

12. What is $m\overset{\frown}{CD}$?
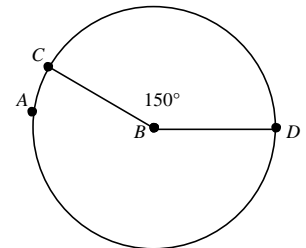
13. Prove Theorem 5-4: If two lines are perpendicular, then they form congruent adjacent angles.
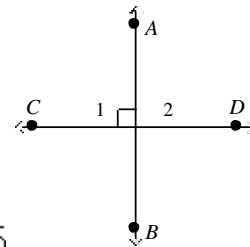
Given: $\overline{AB} \perp \overline{CD}$
         $\angle 1$ and $\angle 2$ form a linear pair

Prove: $\angle 1 \cong \angle 2$

14. Determine whether the pair of triangles is congruent by the SAS Postulate.

15. Find the unknown length in the triangle below. Do the side lengths form a Pythagorean triple?
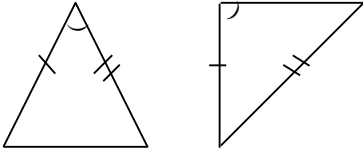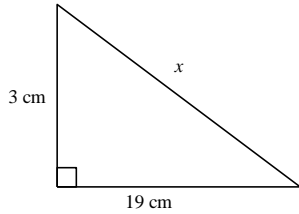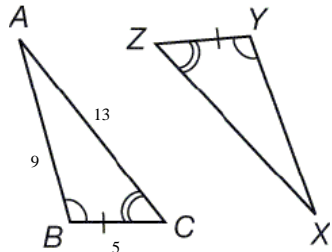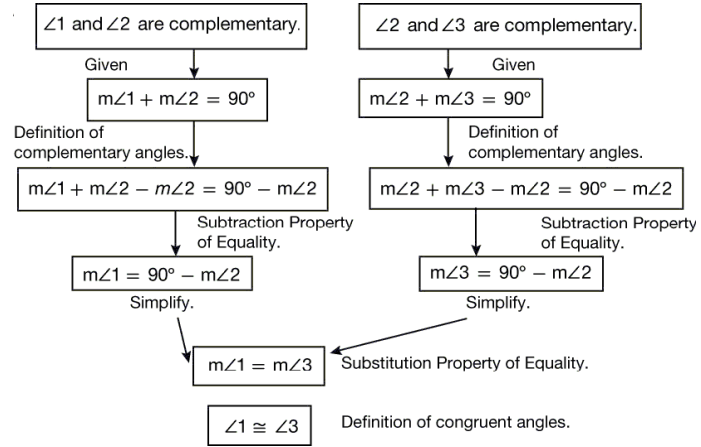
x

3 cm

19 cm

16. Use ASA congruence to determine the measures of the sides of $\triangle XYZ$.

17. Use the given flowchart to write a two-column proof.

A

Z

Y

13

9

B

5

C

X

Given: $\angle 1$ and $\angle 2$ are complementary.
$\angle 2$ and $\angle 3$ are complementary.

Prove: $\angle 1 \cong \angle 3$

$\angle 1$ and $\angle 2$ are complementary.	$\angle 2$ and $\angle 3$ are complementary.
Given	Given

$m\angle 1 + m\angle 2 = 90°$ $m\angle 2 + m\angle 3 = 90°$

Definition of complementary angles.   Definition of complementary angles.

$m\angle 1 + m\angle 2 - m\angle 2 = 90° - m\angle 2$ $m\angle 2 + m\angle 3 - m\angle 2 = 90° - m\angle 2$

Subtraction Property of Equality.   Subtraction Property of Equality.

$m\angle 1 = 90° - m\angle 2$ $m\angle 3 = 90° - m\angle 2$

Simplify.   Simplify.

$m\angle 1 = m\angle 3$ Substitution Property of Equality.

$\angle 1 \cong \angle 3$ Definition of congruent angles.

18. Find the value of x in the triangle below. Write your answer in simplified radical form.

x

2

4
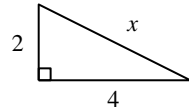
19. A banner is shaped like a parallelogram with a diagonal of 3 feet, as shown. Calculate the values of x and y to the nearest hundredth.

x

$(6y - 7)°$ 3 ft   2x

$(4y - 6)°$
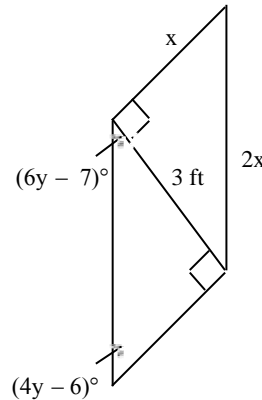
20. Find the arc length L of a circle with a radius of 6 feet and an arc measure of 120°. Give the answer in terms of π.

Geometry Cumulative Study Guide Test 7
Answer Section

NUMERIC RESPONSE

1. ANS: 7.5

   PTS: 1   REF: Lesson 13: Introduction to Triangles
   NAT: NCTM M.2b   TOP: Cumulative Test 7
   MSC: Geom_S02_00073

2. ANS: 113.04

   PTS: 1   REF: Lesson 23: Introduction to Circles   NAT: NCTM M.2b
   TOP: Cumulative Test 7   MSC: Geom_S03_00064

3. ANS: 8

   PTS: 1   REF: Lesson 32: Altitudes and Medians of Triangles
   NAT: NCTM G.1d   TOP: Cumulative Test 7

PROBLEM

4. ANS:
   (4.5, –1)

   PTS: 1   REF: Lesson 11: Finding Midpoints   NAT: NCTM G.1d
   TOP: Cumulative Test 7   MSC: Geom_S02_00080

5. ANS:
   Hypothesis: The product of two numbers is negative.
   Conclusion: Both numbers are negative.
   Sample counterexample: $(2)(-3) = -6$

   PTS: 1   REF: Lesson 14: Disproving Conjectures with Counterexamples
   NAT: NCTM RP.1b   TOP: Cumulative Test 7
   MSC: Geom_S02_00092

6. ANS:
   Concave.
   $\overline{FD}$ contains points in the exterior of the polygon.

   PTS: 1   REF: Lesson 15: Introduction to Polygons
   NAT: NCTM G.1a   TOP: Cumulative Test 7

7. ANS:
   If an angle's measure is not less than 90°, then it is not acute.

   PTS: 1   REF: Lesson 17: More Conditional Statements
   NAT: NCTM RP.1c   TOP: Cumulative Test 7
   MSC: Geom_S02_00101

8. ANS:
   115°

   PTS: 1   REF: Lesson 18: Triangle Theorems   NAT: NCTM G.1d
   TOP: Cumulative Test 7   MSC: Geom_S02_00108

9. ANS: MSC: Geom_S04_00055
   Therefore, $\triangle FGH$ contains one obtuse angle.

   PTS: 1   REF: Lesson 21: Laws of Detachment and Syllogism
   NAT: NCTM RP.1b   TOP: Cumulative Test 7
   MSC: Geom_S03_00074

10. ANS:
    $24xy$

    PTS: 1   REF: Lesson 22: Finding Areas of Quadrilaterals
    NAT: NCTM M.2b   TOP: Cumulative Test 7
    MSC: Geom_S03_00077

11. ANS:
    The formula for the area of a rectangle is $A = lw$, so $A = 40$, $l = (4x + 4)$, and $w = 5x$.

$A = 40$	Given
$l = (4x + 4)$	Given
$w = 5x$	Given

$A = lw$	Area formula for a rectangle
$40 = (4x + 4)(5x)$	Substitution Property of Equality
$40 = 20x^2 + 20x$	Distributive Property
$20x^2 + 20x = 40$	Symmetric Property of Equality
$\dfrac{20x^2 + 20x}{20} = \dfrac{40}{20}$	Division Property of Equality
$x^2 + x = 2$	Simplify
$x^2 + x - 2 = 2 - 2$	Subtraction Property of Equality
$x^2 + x - 2 = 0$	Simplify
$(x + 2)(x - 1) = 0$	Factor

There are two solutions to this factorization, $x = -2$ and $x = 1$. However, $x = -2$ gives a negative length, so it is thrown out. Therefore,

$x - 1 = 0$	Given
$x - 1 + 1 = 0 + 1$	Addition Property of Equality
$x = 1$	Simplify

Substitute $x = 1$ into the expressions for length and width of the rectangle to find the dimensions.

$$\begin{aligned} \text{length} &= (4x + 4) \text{ inches} \\ &= (4(1) + 4) \text{ inches} \\ &= 8 \text{ inches} \\ \text{width} &= 5x \text{ inches} \\ &= 5(1) \text{ inches} \\ &= 5 \text{ inches} \end{aligned}$$

Therefore, the photograph is 8 inches long and 5 inches wide.

PTS: 1   REF: Lesson 24: Algebraic Proofs NAT: NCTM G.1a
TOP: Cumulative Test 7   MSC: Geom_S03_00082

12. ANS:
150°

PTS: 1   REF: Lesson 26: Central Angles and Arc Measure
NAT: NCTM G.1a TOP: Cumulative Test 7

13. ANS:

Statements	Reasons

Statements	Reasons
1. $\overline{AB} \perp \overline{CD}$	1. Given
2. $\angle 1$ is a right angle	2. Definition of perpendicular lines
3. $m\angle 1 = 90°$	3. Definition of a right angle
4. $\angle 1$ and $\angle 2$ form a linear pair	4. Given
5. $m\angle 1 + m\angle 2 = 180°$	5. Linear Pair Theorem
6. $90° + m\angle 2 = 180°$	6. Substitution Property of Equality
7. $90° + m\angle 2 - 90° = 180° - 90°$	7. Subtraction Property of Equality
8. $m\angle 2 = 90°$	8. Simplify
9. $m\angle 2 = m\angle 1$	9. Substitution Property of Equality
10. $\angle 2 \cong \angle 1$	10. Definition of congruent angles
11. $\angle 1 \cong \angle 2$	11. Symmetric Property of Congruence

PTS: 1   REF: Lesson 27: Two-Column Proofs   NAT: NCTM G.1c
TOP: Cumulative Test 7   MSC: Geom_S03_00093

14. ANS:
The triangles cannot be proven congruent by the SAS Postulate

PTS: 1   REF: Lesson 28: Triangle Congruence: SAS
NAT: NCTM G.1b TOP: Cumulative Test 7

15. ANS:
$x = \sqrt{370}$
No, the side lengths do not form a Pythagorean Triple.

PTS: 1   REF: Lesson 29: Using the Pythagorean Theorem
NAT: NCTM G.1d TOP: Cumulative Test 7

16. ANS MSC: Geom_S03_00090
$XY = 9$; $XZ = 13$; $YZ = 5$

PTS: 1 REF: Lesson 30: Triangle Congruence: ASA and AAS
NAT: NCTM G.1b TOP: Cumulative Test 7

17. ANS:

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary.	1. Given
2. $\angle 2$ and $\angle 3$ are complementary.	2. Given
3. $m\angle 1 + m\angle 2 = 90°$	3. Definition of complementary angles
4. $m\angle 2 + m\angle 3 = 90°$	4. Definition of complementary angles
5. $m\angle 1 + m\angle 2 - m\angle 2 = 90° - m\angle 2$	5. Subtraction Property of Equality
6. $m\angle 2 + m\angle 3 - m\angle 2 = 90° - m\angle 2$	6. Subtraction Property of Equality
7. $m\angle 1 = 90° - m\angle 2$	7. Simplify
8. $m\angle 3 = 90° - m\angle 2$	8. Simplify
9. $m\angle 1 = m\angle 3$	9. Substitution Property of Equality
10. $\angle 1 \cong \angle 3$	10. Definition of congruent angles

PTS: 1 REF: Lesson 31: Flowchart and Paragraph Proofs
NAT: NCTM RP.1d TOP: Cumulative Test 7
MSC: Geom_S04_00070

18. ANS:
$2\sqrt{5}$

PTS: 1 REF: Lesson 33: Converse of the Pythagorean Theorem
NAT: NCTM G.1d TOP: Cumulative Test 7 MSC: Geom_S04_00073

19. ANS:
$x = 1.73; y = 10.3$

PTS: 1 REF: Lesson 34: Properties of Parallelograms
NAT: NCTM G.1d TOP: Cumulative Test 7 MSC: Geom_S04_00078

20. ANS:
$L = 4\pi$ feet
MSC: Geom_S03_00103
PTS: 1 REF: Lesson 35: Finding Arc Lengths and Areas of Sectors
NAT: NCTM G.1a TOP: Cumulative Test 7