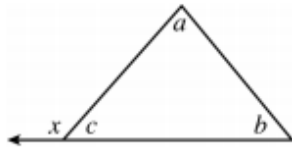


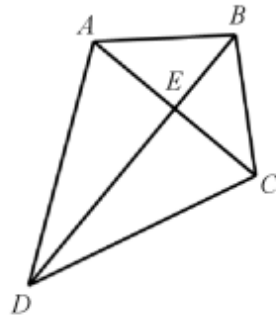
_____ 1. In the diagram below, which expression represents x , the degree measure of the exterior angle shown?



- a. $a + b$ b. $a - b$ c. $a + c$ d. $b + c$

_____ 2. In the proof below, which triangle congruence property is missing in the last step?

Given: $ABCD$ is a kite
Prove: $\triangle ABE \cong \triangle CBE$



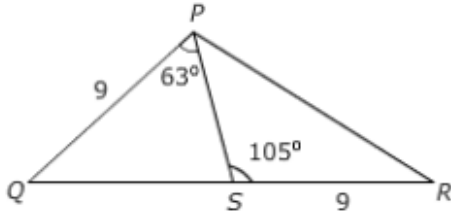
Statement	Reason
1. $ABCD$ is a kite	1. Given
2. $\overline{AB} \cong \overline{BC}$; $\overline{AD} \cong \overline{CD}$	2. Definition of a kite
3. $\overline{BD} \cong \overline{BD}$	3. Reflexive Property
4. $\triangle ABD \cong \triangle CBD$	4. SSS
5. $\angle ABE \cong \angle CBE$	5. CPCTC
6. $\overline{BE} \cong \overline{BE}$	6. Reflexive Property
7. $\triangle ABE \cong \triangle CBE$	7. ?

- a. SAS c. AAS
 b. SSS d. ASA

_____ 3. An exterior angle of a regular polygon has a measure of 18° . How many sides does the polygon have?

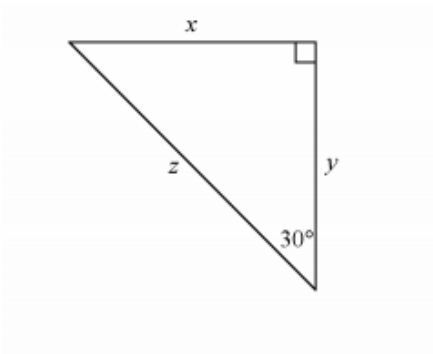
- a. 10 b. 16 c. 18 d. 20

___ 4. Compare PR and QS .



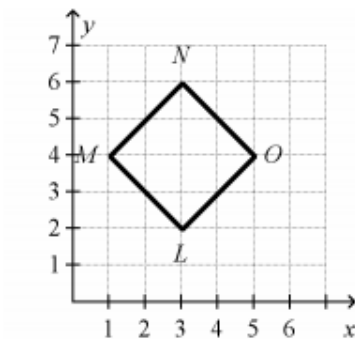
- a. $PR = QS$
- b. $PR < QS$
- c. $PR > QS$
- d. $PR < QS$

___ 5. In the triangle below, $x = 7$ yards. What is the value of y ?



- a. 7 yards
- b. $7\sqrt{3}$ yards
- c. 14 yards
- d. $14\sqrt{3}$ yards

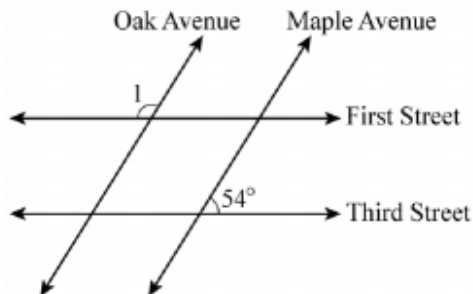
___ 6. Quadrilateral $LMNO$ has vertices as shown below. Each side has a length of $2\sqrt{2}$ units.



Which of the following would be sufficient to prove that $LMNO$ is a square?

- a. \overline{MN} and \overline{LO} have the same slope.
- b. \overline{MO} bisects \overline{LN} .
- c. The product of the slopes of \overline{MO} and \overline{LN} is -1 .
- d. The product of the slopes of \overline{MN} and \overline{LM} is -1 .

7. A city engineer reviews a plan for four city streets. The numbered streets will be parallel and run East and West. The plan below shows two other parallel roadways that intersect First Street and Third Street. Maple Avenue forms a 54° angle with Third Street as shown.

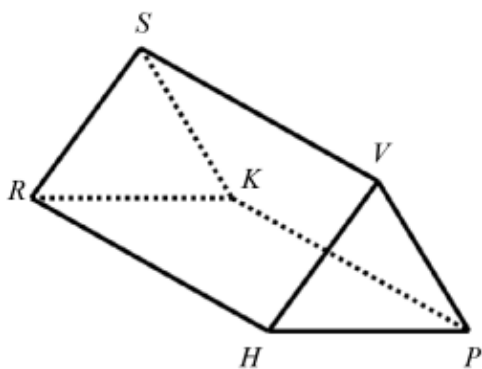


What is the measure of $\angle 1$?

- a. 36° b. 54° c. 126° d. 136°
8. The side lengths of the smaller hexagon were increased by a factor of $\sqrt{2}$ to make the larger hexagon. If the area of the smaller hexagon is $9\sqrt{3}$ square units, what is the area of the larger hexagon?

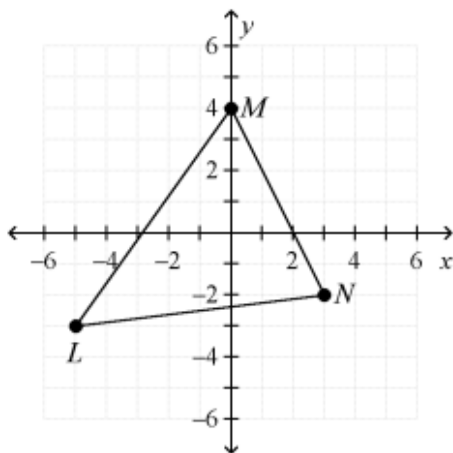


- a. $36\sqrt{3}$ square units c. $18\sqrt{6}$ square units
 b. $18\sqrt{3}$ square units d. $9\sqrt{6}$ square units
9. Which statement is NOT true about the figure?



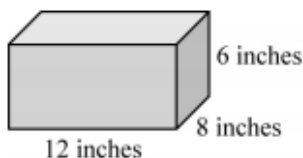
- a. It has 6 vertices.
 b. It has 8 edges.
 c. It has 5 faces.
 d. It is a triangular prism.

- ___ 10. Triangle LMN has the vertices shown on the coordinate grid.



What is the length of \overline{MN} ?

- a. $3\sqrt{5}$ units b. $2\sqrt{13}$ units c. $\sqrt{58}$ units d. $\sqrt{65}$ units
- ___ 11. Francesco built a box to store his baseball cards. The box is shown below.



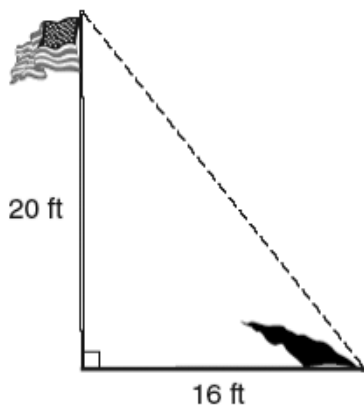
Francesco needed more storage and built a similar box that was one-half of each the length, the width, and the height of the first box. By what factor does the change in dimension between the two boxes affect the volume?

- a. The volume of the smaller box is $\frac{1}{16}$ of the volume of the larger box.
b. The volume of the smaller box is $\frac{1}{8}$ of the volume of the larger box.
c. The volume of the smaller box is $\frac{1}{4}$ of the volume of the larger box.
d. The volume of the smaller box is $\frac{1}{2}$ of the volume of the larger box.
- ___ 12. What is the converse of the statement below?

“If today is Friday, then tomorrow is Saturday.”

- a. If tomorrow is not Saturday, then today is not Friday.
b. If today is Saturday, then tomorrow is not Friday.
c. If tomorrow is Saturday, then today is Friday.
d. If today is not Friday, then tomorrow is not Saturday.

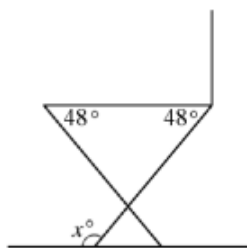
13. The picture below represents a 20-foot-tall flagpole that casts a 16-foot-long shadow.



The dashed line in the figure represents the point where the shadow ends to the top of the flag. What is the approximate angle of elevation formed by the ground and the dashed line?

- a. 37°
- b. 39°
- c. 51°
- d. 53°

14. Monica is building a chair for her front porch. She cuts each leg so that they form a 48° angle with the base of the seat of the chair as shown in the diagram below.



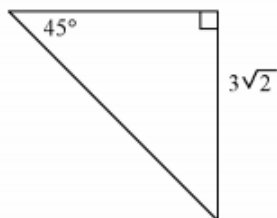
What angle does the front of each leg make with the ground, x , in order to ensure that the seat of the chair is parallel with the ground?

- a. 48°
- b. 90°
- c. 122°
- d. 132°

15. Which conjecture is NOT always true?

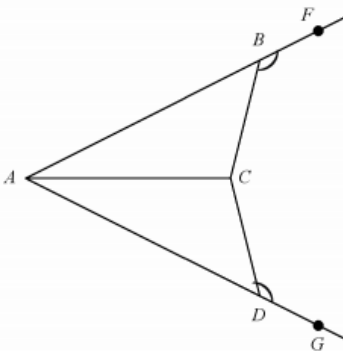
- a. Intersecting lines form 4 pairs of adjacent angles.
- b. Intersecting lines form 2 pairs of vertical angles.
- c. Intersecting lines form 4 pairs of congruent angles.
- d. none of the above

16. What is the length of the hypotenuse?



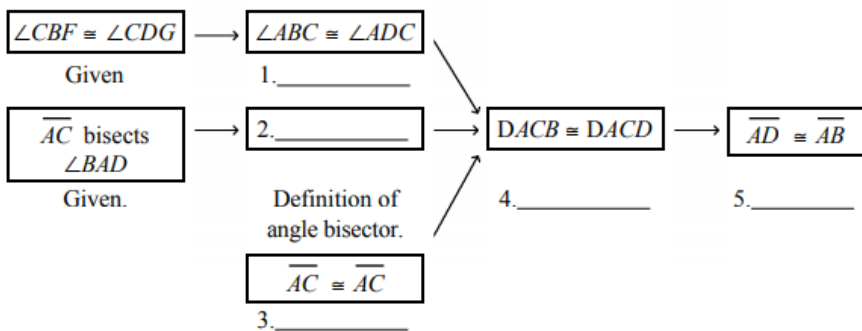
- a. 18
- b. 12
- c. 6
- d. 5

17. **Given:** $\angle CBF \cong \angle CDG$, \overline{AC} bisects $\angle BAD$
Prove: $\overline{AD} \cong \overline{AB}$



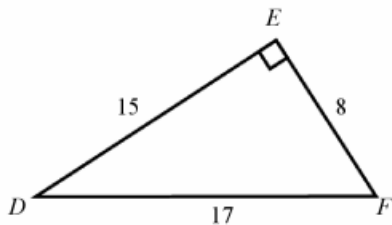
Complete the flowchart proof.

Proof:



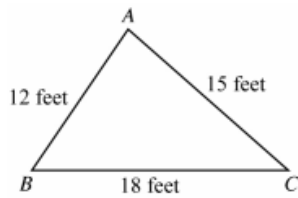
- | | | | |
|----|--------------------------------------|----|-------------------------------------|
| a. | 1. Congruent Complements Theorem | c. | 1. Congruent Supplements Theorem |
| | 2. $\angle ACB \cong \angle ACD$ | | 2. $\angle CAB \cong \angle CAD$ |
| | 3. Transitive Property of Congruence | | 3. Reflexive Property of Congruence |
| | 4. CPCTC | | 4. AAS |
| | 5. AAS | | 5. CPCTC |
| b. | 1. Congruent Supplements Theorem | d. | 1. Congruent Complements Theorem |
| | 2. $\angle CAB \cong \angle CAD$ | | 2. $\angle ACB \cong \angle ACD$ |
| | 3. Transitive Property of Congruence | | 3. Reflexive Property of Congruence |
| | 4. AAS | | 4. CPCTC |
| | 5. CPCTC | | 5. AAS |

18. What is $\sin D$ in the right triangle shown below? Express your answer as a fraction in lowest terms.



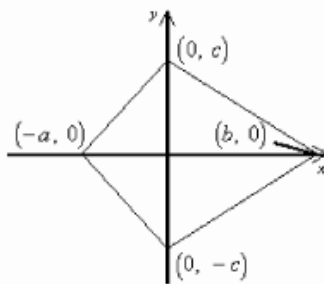
- a. $\frac{8}{15}$
b. $\frac{8}{17}$
c. $\frac{15}{17}$
d. $\frac{17}{8}$

19. Triangle ABC shows the lengths of the three sides. Which expression gives the greatest value?



- a. $m\angle A + m\angle B$
- b. $m\angle A + m\angle C$
- c. $m\angle B + m\angle C$
- d. $\frac{3}{4}m\angle A$

20. Which coordinates are the vertices of a figure that is similar to the figure pictured below?

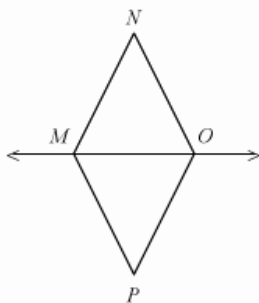


- a. $(-2a, 0), (0, 2c), (2b, 0), (0, -2c)$
- b. $(\frac{1}{2}a, 0), (0, \frac{1}{2}c), (2b, 0), (0, 2c)$
- c. $(-a + 1, 0), (1, c), (b, 1), (0, -c + 1)$
- d. $(2a, 0), (0, 4c), (-2b, 0), (0, 2c)$

21. What is the missing reason in the two-column proof?

Given: \overline{MO} bisects $\angle PMN$ and \overline{OM} bisects $\angle PON$

Prove: $\triangle PMO \cong \triangle NMO$

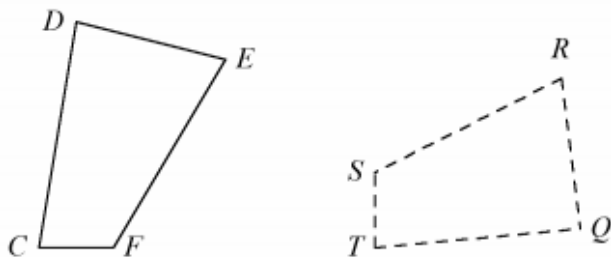


Statements	Reasons
1. \overline{MO} bisects $\angle PMN$.	1. Given
2. $\angle PMO \cong \angle NMO$	2. Definition of angle bisector
3. $\overline{MO} \cong \overline{MO}$	3. Reflexive Property of Congruence
4. \overline{OM} bisects $\angle PON$.	4. Given
5. $\angle POM \cong \angle NOM$	5. Definition of angle bisector
6. $\triangle PMO \cong \triangle NMO$	6. ?

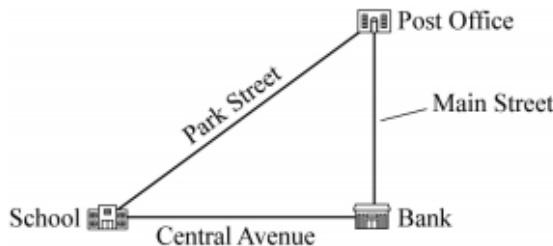
- a. ASA Postulate
- b. AA Postulate
- c. AAS Theorem
- d. SAS Postulate

22. Which regular polyhedron has 12 pentagonal faces?
- dodecahedron
 - tetrahedron
 - icosahedron
 - cube

23. Suppose $CDEF$ represents the wing you built as part of the reconstruction of a vintage airplane model. \overline{CF} is to be attached to the plane with \overline{CD} closest to the propeller. Your friend will build the second wing, $QRST$, congruent to $CDEF$, but needs instructions for how to place their wing exactly like you did. What are your instructions?

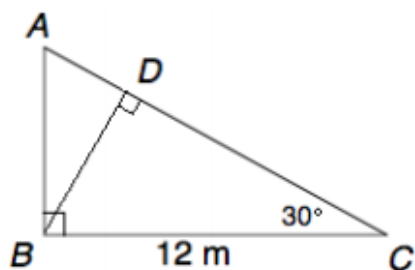


- Attach \overline{QR} to the plane with \overline{SR} closest to the propeller.
 - Attach \overline{QR} to the plane with \overline{QT} closest to the propeller.
 - Attach \overline{ST} to the plane with \overline{QT} closest to the propeller.
 - Attach \overline{ST} to the plane with \overline{SR} closest to the propeller.
24. Grace drew the map shown below. On the map, Main Street is perpendicular to Central Avenue. Which of the following is NOT a valid conjecture Grace can make based on the map below?



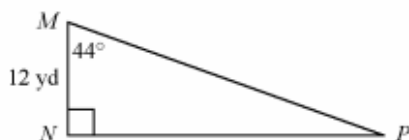
- The distance from the School to the Post Office is greater than the distance from the School to the Bank.
- The angles formed by Park Street and Central Avenue and by Park Street and Main Street are congruent.
- The angle formed by Park Street and Central Avenue is an acute angle.
- The distance from the Post Office to the Bank is less than the distance from the Post Office to the School.

25. Find AD .



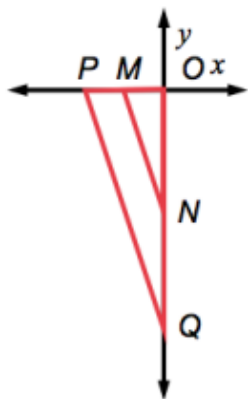
- a. $2\sqrt{3}$ m
- b. $3\sqrt{3}$ m
- c. 6 m
- d. $6\sqrt{3}$ m

26. In the diagram below, $m\angle M = 44^\circ$ and $MN = 12$ yards. What is the length of \overline{MP} to the nearest tenth?



- a. 8.6 yards
- b. 16.7 yards
- c. 17 yards
- d. 17.3 yards

27. Given that $\triangle MON \sim \triangle POQ$, and coordinates $P(-4, 0)$, $M(-2, 0)$ and $Q(0, -12)$, find the coordinates of N and the scale factor of $\triangle POQ$ to $\triangle MON$.



- a. $N(0, -6)$ and scale factor is 2.
- b. $N(0, -8)$ and scale factor is $\frac{2}{3}$.
- c. $N(-6, 0)$ and scale factor is 3.
- d. $N(0, -6)$ and scale factor is $1\frac{1}{2}$.

___ 28. How many edges does a tetrahedron have?

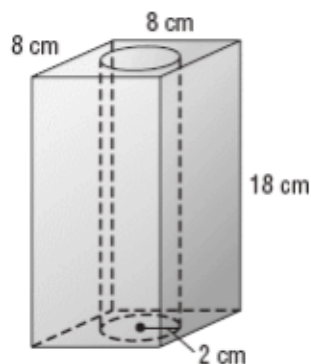
- a. 3
- b. 6
- c. 9
- d. 12

___ 29. How do you write the contrapositive of the conditional statement below?

“If $m\angle 1 = 60^\circ$, then $\angle 1$ is acute.”

- a. If $m\angle 1 = 60^\circ$, then $\angle 1$ is not acute.
- b. If $\angle 1$ is not acute, then $m\angle 1 \neq 60^\circ$.
- c. If $\angle 1$ is acute, then $m\angle 1 = 60^\circ$.
- d. If $m\angle 1 \neq 60^\circ$, then $\angle 1$ is not acute.

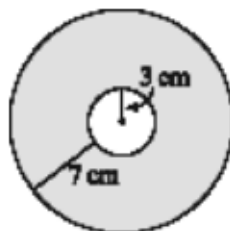
___ 30. A square-based prism has a cylindrical hole bored through the middle as shown in the diagram below.



What is the approximate remaining volume of the prism? Use 3.14 for π .

- a. 226.08 cubic centimeters
- b. 247.68 cubic centimeters
- c. 925.92 cubic centimeters
- d. 1,052 cubic centimeters

___ 31. For the concentric circles shown, the radius of the inner circle is 3 centimeters and the distance from the edge of the inner circle to the edge of the outer circle is 7 centimeters. What is the exact area, in square centimeters, of the shaded outer region?



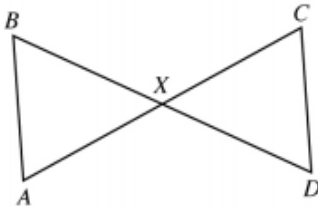
- a. 40π
- b. 49π
- c. 58π
- d. 91π

___ 32. What is the inverse of the statement below?

“If you live in Tallahassee, then you live in Florida.”

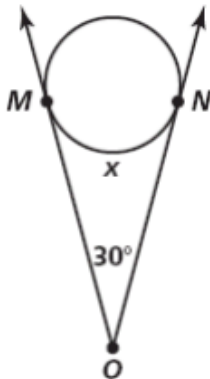
- a. If you do not live in Florida, then you do not live in Tallahassee.
- b. If you do not live in Florida, then you live in Tallahassee.
- c. If you do not live in Tallahassee, then you do not live in Florida.
- d. If you live in Florida, then you live in Tallahassee.

___ 33. Given: $\angle B \cong \angle D$



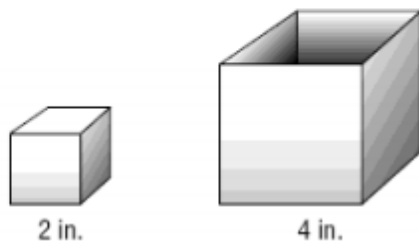
Which of the following conjectures can **NOT** be made based on the diagram and the given information?

- a. $\overline{AB} \parallel \overline{CD}$
 - b. $\triangle AXB \sim \triangle CXD$
 - c. $\overline{BD} \perp \overline{AC}$
 - d. $\angle A \cong \angle C$
- ___ 34. A rectangle has a perimeter of 14 inches. A similar rectangle has a perimeter of 42 inches. The area of the smaller rectangle is 10 square inches. What is the area of the larger rectangle?
- a. 3.3 square inches
 - b. 30.0 square inches
 - c. 38.0 square inches
 - d. 90.0 square inches
- ___ 35. Rob wants to take a picture of a fountain. His camera is at the vertex of the angle formed by the tangents to the fountain. If Rob estimates that this angle is 30° , what is the measure x of the arc of the fountain that will be in the photograph?



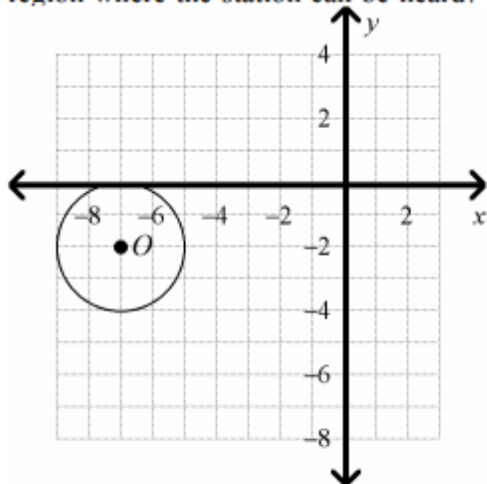
- a. 150°
- b. 140°
- c. 120°
- d. 100°

___ 36. How many two inch cubes will fit inside the four inch cubic box?



- a. 4 b. 6 c. 8 d. 16

___ 37. A low-wattage radio station can be heard only within a certain distance from the station. On the graph below, the circular region represents that part of the city where the station can be heard, and the center of the circle represents the location of the station. Which equation represents the boundary for the region where the station can be heard?

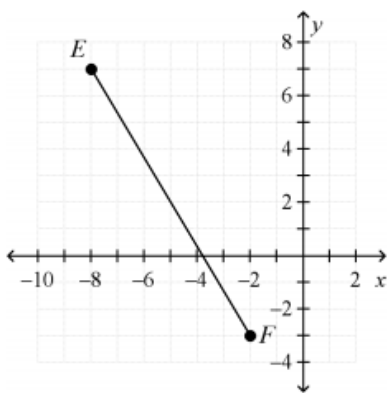


- a. $(x - 7)^2 + (y - 2)^2 = 4$ c. $(x + 7)^2 + (y + 2)^2 = 4$
b. $(x - 7)^2 + (y - 2)^2 = 2$ d. $(x + 7)^2 + (y + 2)^2 = 2$

___ 38. Two sides of a triangle are 11 centimeters and 14 centimeters. What are all possible values for the length x of the third side?

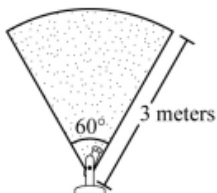
- a. $x = 3$ or $x = 25$
b. $3 < x < 25$
c. $x < 3$ or $x > 25$
d. $x = 14$

___ 39. To the nearest tenth, what is the length, in units, of \overline{EF} ?



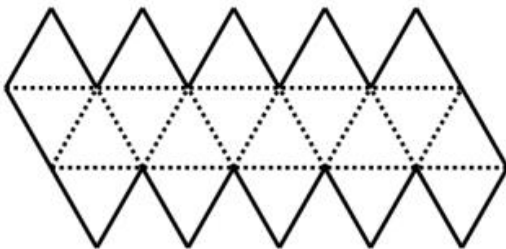
- a. 10.9 b. 11.2 c. 11.7 d. 16.0

___ 40. A sprinkler rotates through 60° , watering a section of a field. The distance from the sprinkler to the farthest point reached is 3 meters. Approximately how many square meters of the field is watered?



- a. 0.6 square meter
b. 0.8 square meter
c. 3.1 square meters
d. 4.7 square meters

___ 41. The net below represents an icosahedron. How many faces does an icosahedron have?

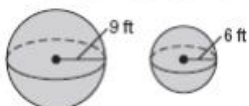


- a. 10
b. 12
c. 15
d. 20

___ 42. What are the center and radius of the circle with equation $(x - 2)^2 + (y + 5)^2 = 180$?

- a. center $(2, -5)$; radius 90 c. center $(-2, 5)$; radius $36\sqrt{5}$
b. center $(2, -5)$; radius $6\sqrt{5}$ d. center $(-2, 5)$; radius 180

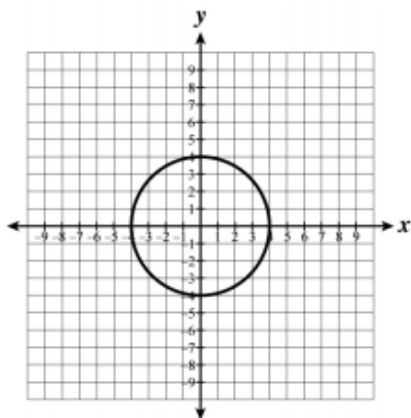
___ 43. Find the difference in the volume of the two spheres below.



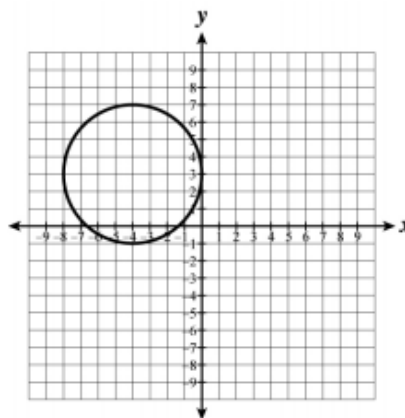
- a. 972π c. 180π
b. 684π d. 324π

44. Which of the following graphs correctly displays the equation $(x-4)^2 + (y+3)^2 = 16$?

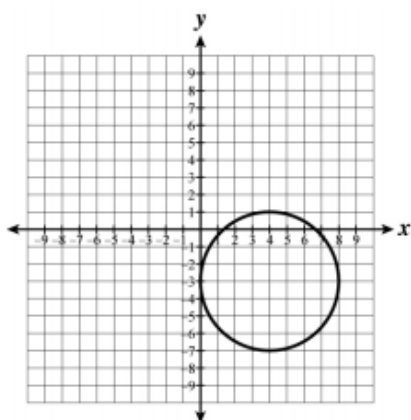
a.



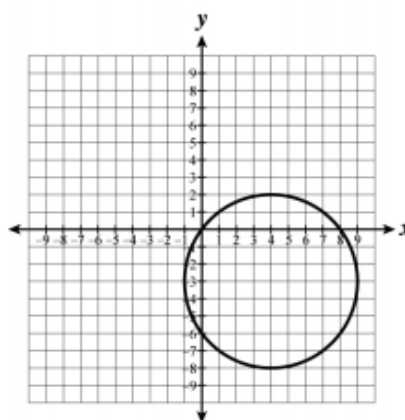
c.



b.



d.



45. When writing a coordinate proof, which of the following would you use to prove that the diagonals of a quadrilateral are congruent?

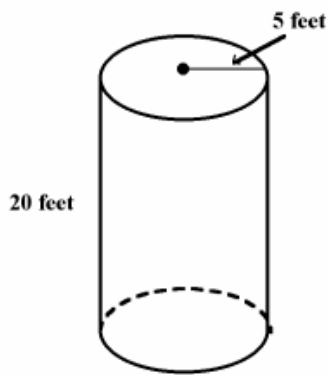
a. the slope formula

c. the point-slope formula

b. the distance formula

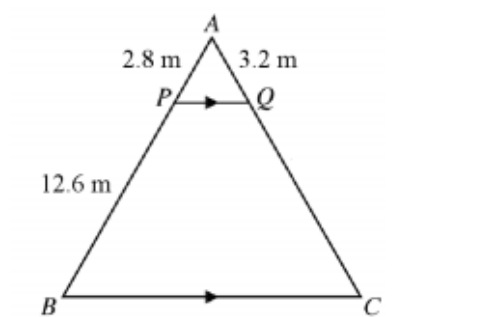
d. the midpoint formula

46. If you double the dimensions of the right cylinder below, what is the approximate surface area of the new cylinder?



- a. 1,335 square feet
- b. 1,570 square feet
- c. 2,826 square feet
- d. 3,140 square feet

___ 47. In triangle ABC , \overline{PQ} is parallel to \overline{BC} . What is the length of \overline{CQ} , in meters?



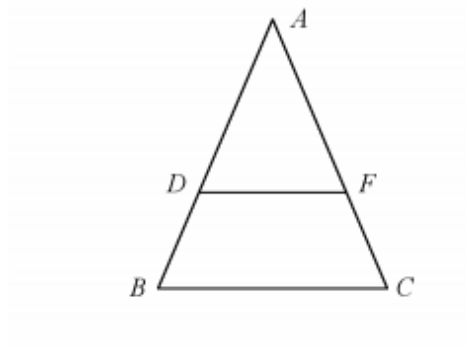
- a. 4.5 meters
- b. 9.6 meters
- c. 12.8 meters
- d. 14.4 meters

___ 48. Which of the following is logically equivalent to the conditional statement below?

“If there are no clouds in the sky, then it is not raining.”

- a. If it is raining, then there are clouds in the sky.
- b. If it is not raining, then there are not clouds in the sky.
- c. If there are clouds in the sky, then it is raining.
- d. If it is raining, then there are no clouds in the sky.

___ 49. Which of the following would allow you to prove that $\triangle ABC \sim \triangle ADF$?



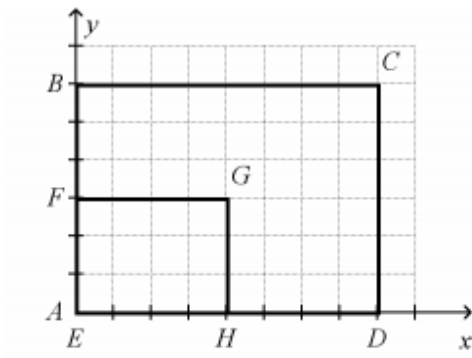
a. $\angle B \cong \angle C$

b. $\overline{AD} \cong \overline{DB}$

c. $\overrightarrow{BC} \parallel \overrightarrow{DF}$

d. $\overline{AB} \cong \overline{AC}$

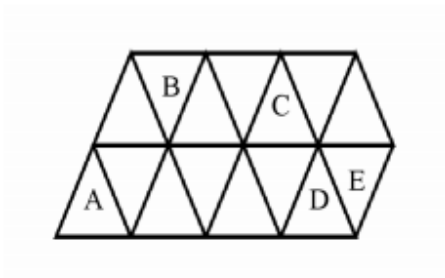
____ 50. Rectangles $ABCD$ and $EFGH$ lie in the coordinate plane as shown below.



Which of the following best explains why the rectangles are or are not similar?

- a. Yes, all rectangles are similar.
- b. Yes, both figures have four right angles and the corresponding sides are proportional.
- c. No, the corresponding sides are not proportional.
- d. No, the corresponding angles of the figures are not congruent.

____ 51. A uniform tessellation is created using isosceles triangles as shown below.



Which transformation could have been used to create triangle C from triangle A?

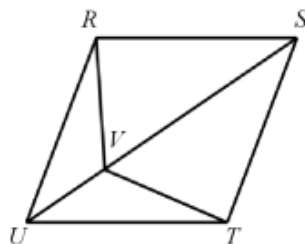
- a. dilation
- b. reflection
- c. rotation
- d. translation

_____ 52. In the proof below, what is the missing reason in step 2?

Given: $RSTU$ is a rhombus with diagonal \overline{SU} ;

Point V lies on \overline{SU}

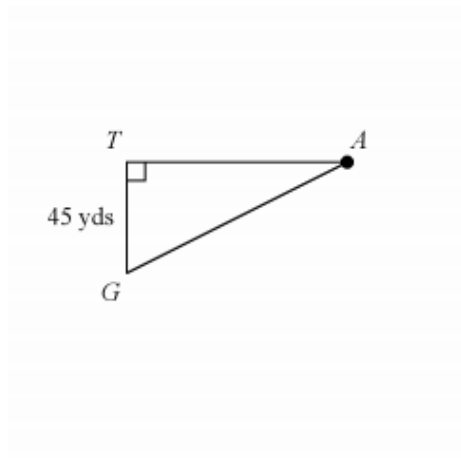
Prove: $\overline{RV} \cong \overline{TV}$



Statement	Reason
1. $RSTU$ is a rhombus with diagonal \overline{SU} ; Point V lies on \overline{SU}	1. Given
2. $\angle RUV \cong \angle TUV$	2. ?
3. $\overline{RU} \cong \overline{TU}$	3. Definition of a rhombus
4. $\overline{UV} \cong \overline{UV}$	4. Reflexive Property
5. $\triangle RUV \cong \triangle TVU$	5. SAS
6. $\overline{RV} \cong \overline{TV}$	6. CPCTC

- a. Diagonals of a rhombus are congruent. c. Diagonals of a rhombus are perpendicular.
- b. Diagonals of a rhombus bisect each other. d. Diagonals of a rhombus bisect opposite angles.

- _____ 53. \overline{GT} is an air traffic control tower and point A is an airplane taking off. If angle A is 8.5° , what is the distance between the plane at point A and the top of the tower at point T ?



- a. 45 yards
b. 100 yards
c. 301 yards
d. 304 yards
- _____ 54. The dimensions of a rectangle are multiplied by a factor of 2 to form a new rectangle. Which of the following best describes the relationship between the perimeter of the old rectangle and the perimeter of the new rectangle?
- a. The perimeter of the new rectangle is half the original rectangle.
b. The perimeter of the new rectangle is twice the original rectangle.
c. The perimeter of the new rectangle is four times the original rectangle.
d. The perimeter of the new rectangle is one-fourth the original rectangle.
- _____ 55. Kurt has a rectangular garden in his backyard with an area of 40 square feet. He wants to increase the size of the garden by doubling each dimension. What will the area of the garden be after he doubles the length and width?
- a. 180 square feet
b. 160 square feet
c. 120 square feet
d. 80 square feet