1. **Let p represent**

   Two angles are vertical angles.

   Let q represent

   The angles are congruent.

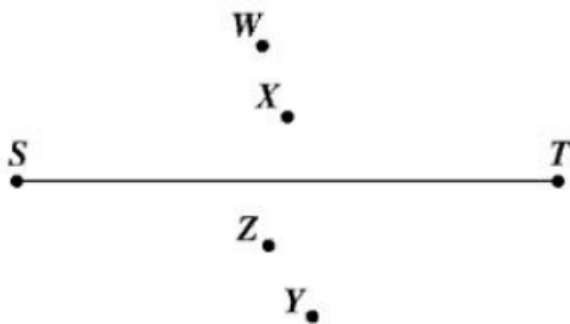   **What is the symbolic representation of the following statement?**

   If two angles are congruent, then the angles are vertical angles.

   - **A** $q \rightarrow p$
   - **B** $p \rightarrow q$
   - **C** $\sim q \rightarrow \sim p$
   - **D** $\sim p \rightarrow \sim q$

2. **Beth is drawing the perpendicular bisector of $\overline{ST}$.**
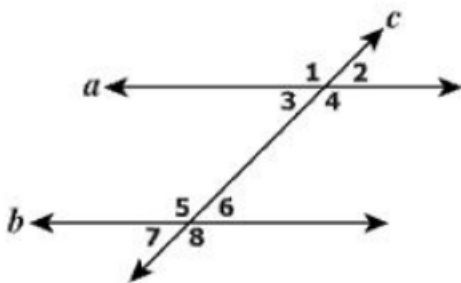   **Which point is on the perpendicular bisector of $\overline{ST}$?**

   - **A** W
   - **B** X
   - **C** Y
   - **D** Z

3. **In this figure, parallel lines a and b are intersected by line c.**
   Which pair of angles is NOT supplementary?
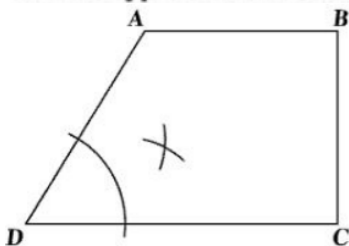

   - **A** $\angle 1$ and $\angle 6$
   - **B** $\angle 3$ and $\angle 8$
   - **C** $\angle 2$ and $\angle 7$
   - **D** $\angle 4$ and $\angle 6$

4. **What type of construction is illustrated in the figure?**

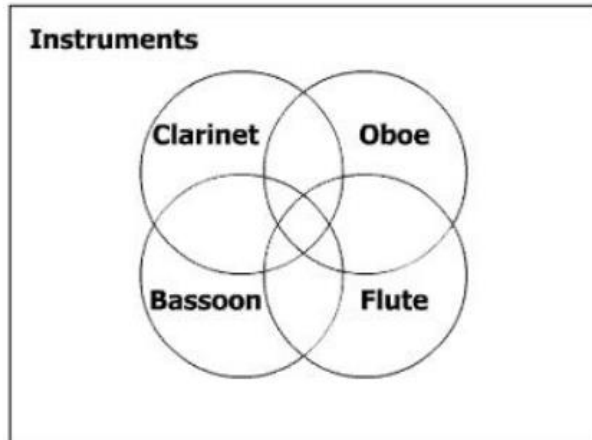

   - **A** The bisection of $\angle D$
   - **B** The bisection of $\overline{BD}$
   - **C** An angle congruent to $\angle D$
   - **D** A line segment congruent to $\overline{AB}$

5. **This Venn diagram represents students who play instruments in the orchestra.**
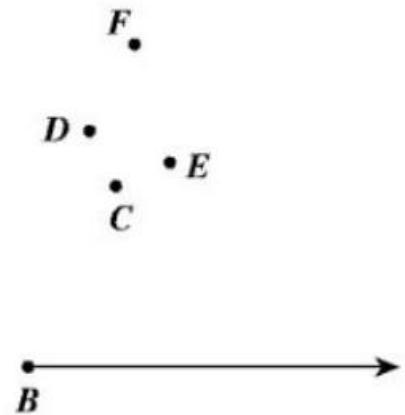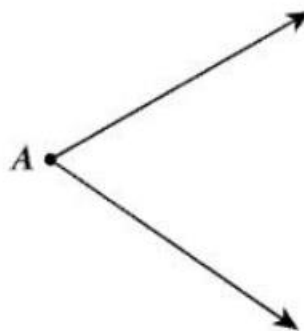
   Identify each region of the Venn diagram that represents students who play only the flute and the oboe.
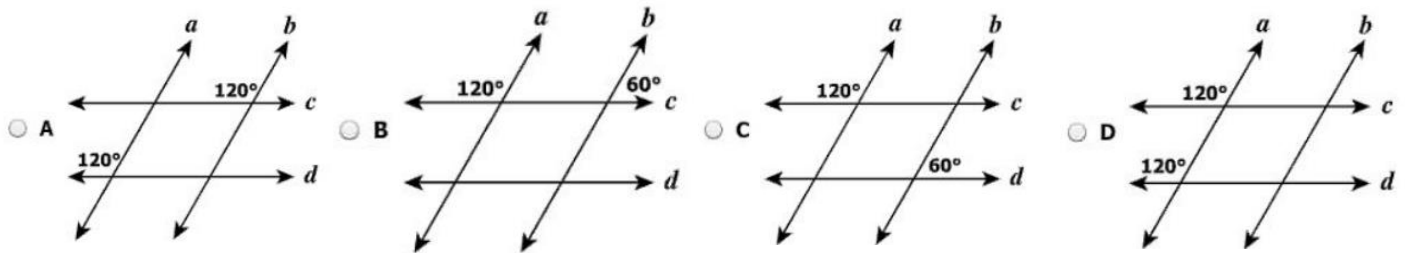
   Instruments

   Clarinet   Oboe

   Bassoon   Flute

6. **An angle congruent to angle A is being constructed.**

   Which ray could be drawn to construct an angle congruent to $\angle A$?

   ○ A $\overrightarrow{BC}$

   ○ B $\overrightarrow{BD}$

   ○ C $\overrightarrow{BE}$

   ○ D $\overrightarrow{BF}$

   F.

   D •

   • E

   C

   A •

   B

7. **Which diagram shows a pair of angle measures that prove lines a and b are parallel?**

   ○ A

   a   b
   120°   c
   120°   d

   ○ B

   a   b
   120°   60°   c
   d

   ○ C

   a   b
   120°   c
   60°   d

   ○ D

   a   b
   120°   c
   120°   d

8. **Which is a valid conclusion that can be drawn from these statements?**

   *If a quadrilateral is a rhombus, then it is a parallelogram.*
   If a quadrilateral is a parallelogram, then its opposite angles are congruent.

   ○ **A** Every quadrilateral is a rhombus.   ○ **C** Opposite angles of a rhombus are congruent.

   ○ **B** Every parallelogram is a rhombus.   ○ **D** Opposite angles of a quadrilateral are congruent.

9. **This figure shows parallel stair railings through points M, N, P, and Q.**
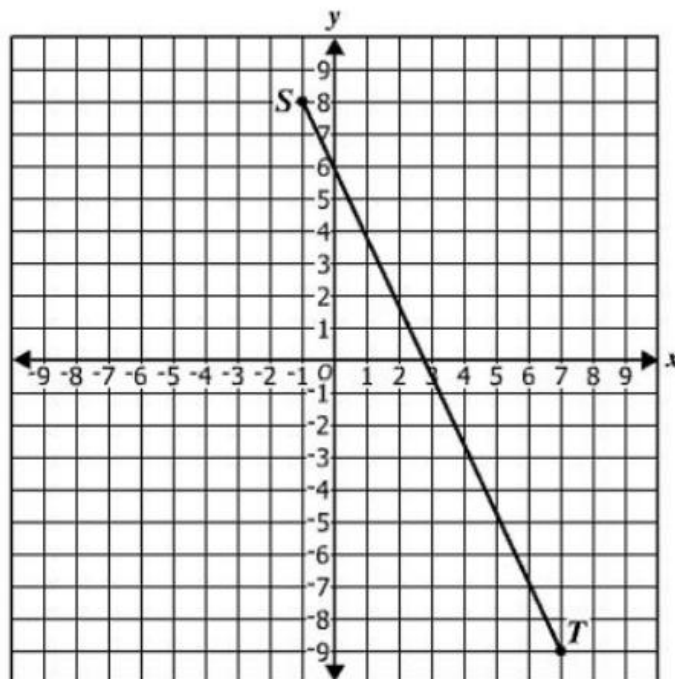
   What is the value of x ?

   ○ **A** 29

   ○ **B** 45

   ○ **C** 61

   ○ **D** 119

   61°

   x°

   M N P Q
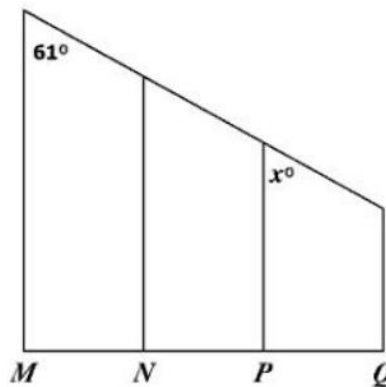
10. **Given: $S(^-1, 8)$ and $T(7, ^-9)$**

    What is the length of $\overline{ST}$?

    ○ **A** $\sqrt{23}$

    ○ **B** 5

   ○ **C** $5\sqrt{13}$

    ○ **D** $\sqrt{353}$

11. Line *t* contains the points (−8, 5) and (8, −3). Plot a point other than point *P* with integral coordinates that is on a line parallel to *t* and passes through point *P*.
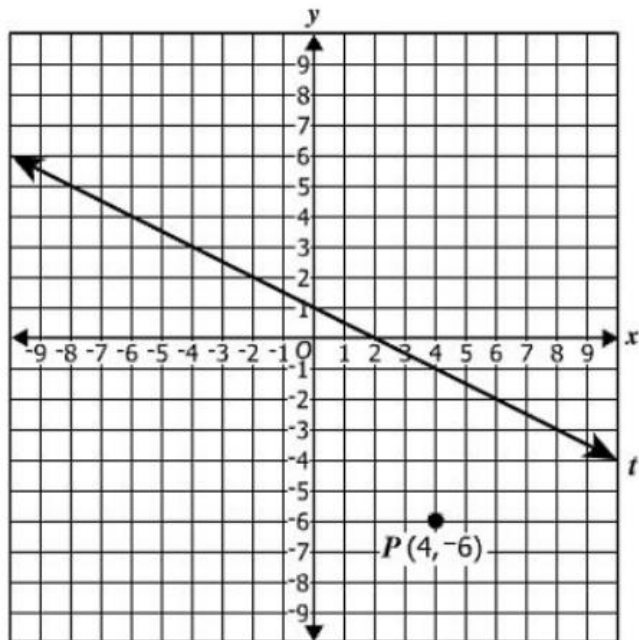
12. Which best describes the construction in the diagram shown?

- A The bisector of a line segment
- B A line segment congruent to a given line segment
- C A perpendicular to a given line at a point on the line
- D A perpendicular to a given line from a point not on the line
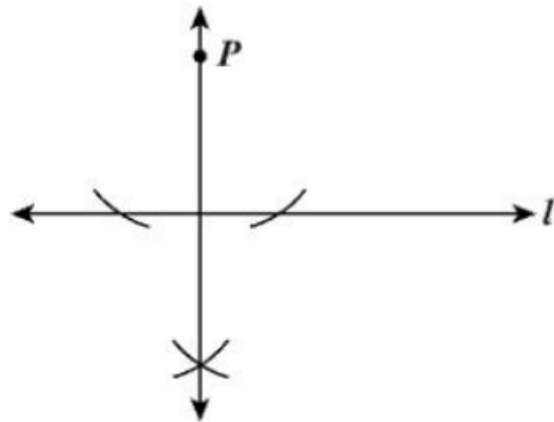
13. Which is the inverse of the following statement?

If the measure of an angle is 90°, then it is a right angle.

- A If the measure of an angle is not 90°, then it is not a right angle.
- B If the measure of an angle is not 90°, then it is a right angle.
- C If an angle is not a right angle, then its measure is not 90°.
- D If an angle is a right angle, then its measure is 90°.

14. **Quadrilateral** $TUVW$ **is shown.**

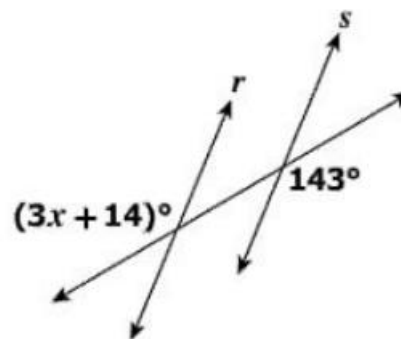If $TUVW$ is reflected across the line $y = x$, what are the coordinates of V' ?

○ A $(8, -3)$

○ B $(3, 8)$

○ C $(-3, -8)$

○ D $(-8, 3)$
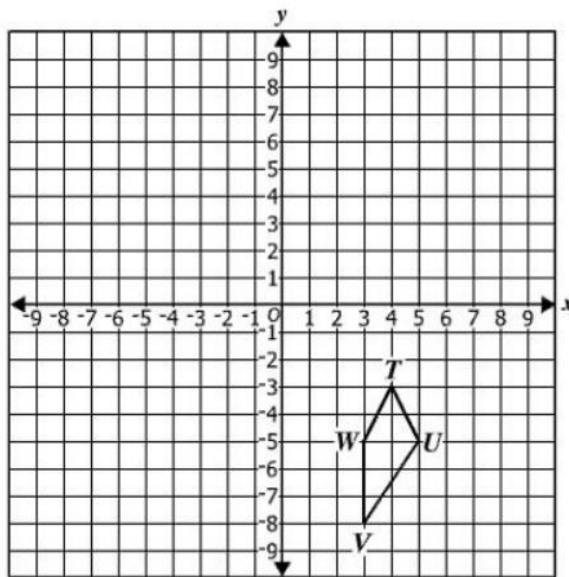
15. **Lines** r **and** s **are cut by a transversal.**

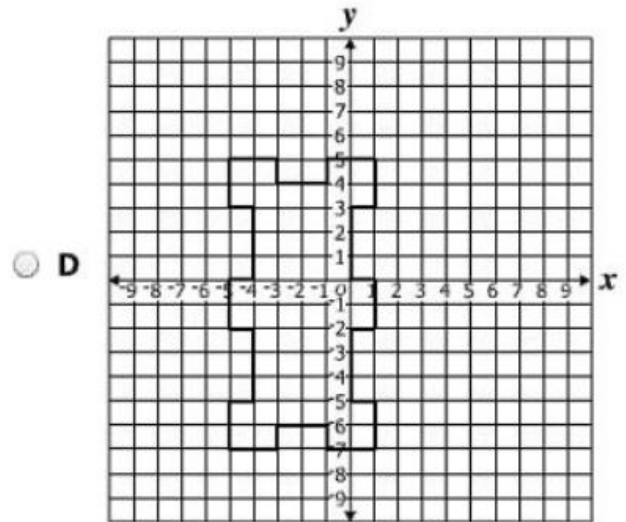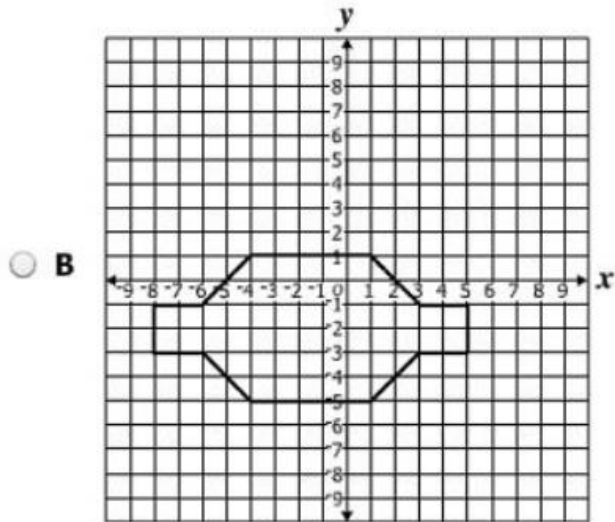What value of x proves that $r \parallel s$?

$x =$ [ ]

$(3x + 14)°$
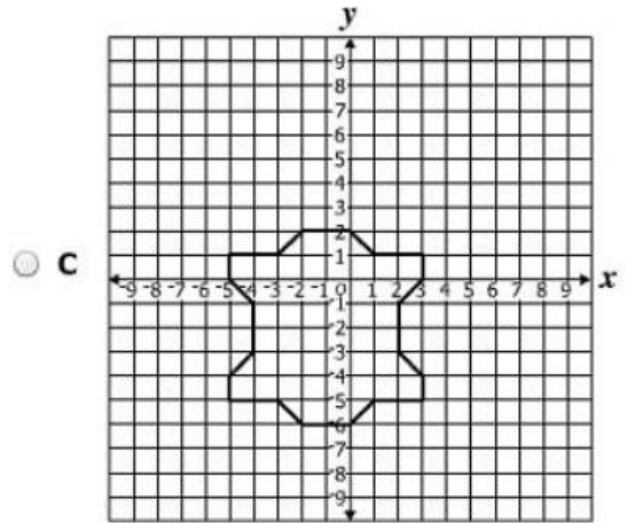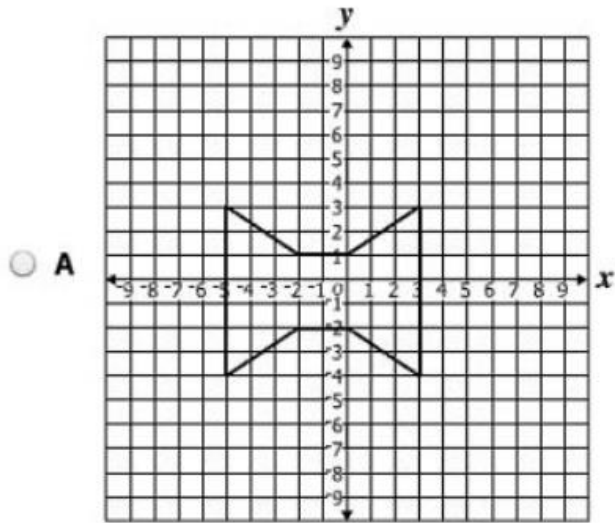
$143°$

16. **Given:** $P(5, 7)$ **and** $T(-3, 3)$

What is the slope of $\overleftrightarrow{PT}$?

○ A -2

○ B $\dfrac{-1}{2}$
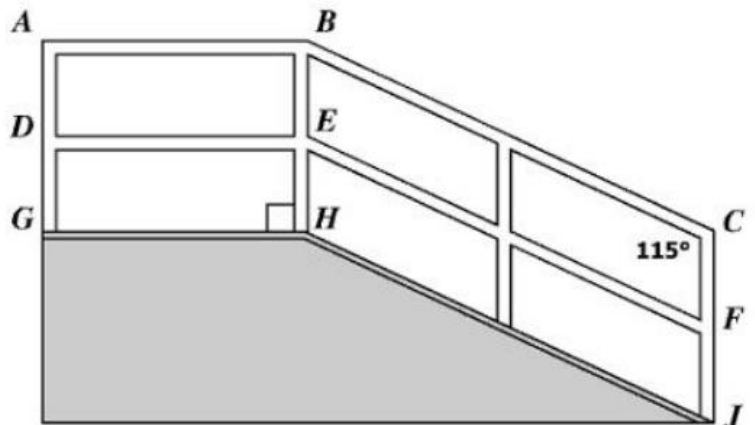
○ C $\dfrac{1}{2}$

○ D 2

17. For which polygon are both $x = {}^-1$ and $y = {}^-2$ lines of symmetry?

○ A

○ C

○ B

○ D

18. The figure represents a ramp with handrails. Segments AB and DE are parallel to $\overline{GH}$. Segments BC and EF are parallel to $\overline{HJ}$. Segments AG and BH are parallel to $\overline{CJ}$.

If $m\angle JCB = 115°$, what is $m\angle CBA$?
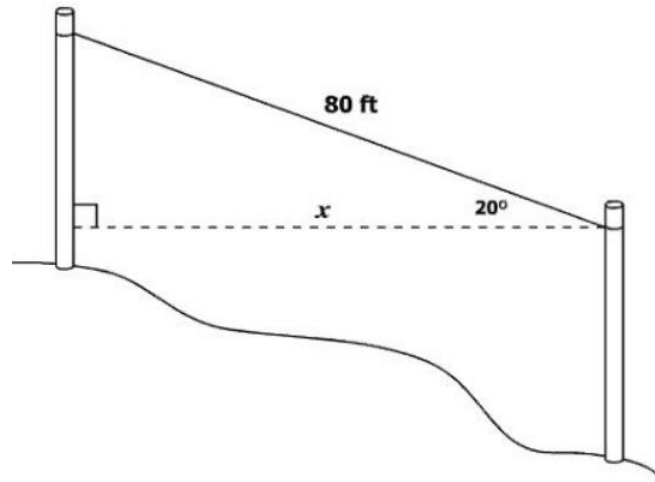
○ A 65°

○ B 90°

○ C 115°

○ D 155°

19. **Reuben attached a wire between two poles on a hill as shown.**

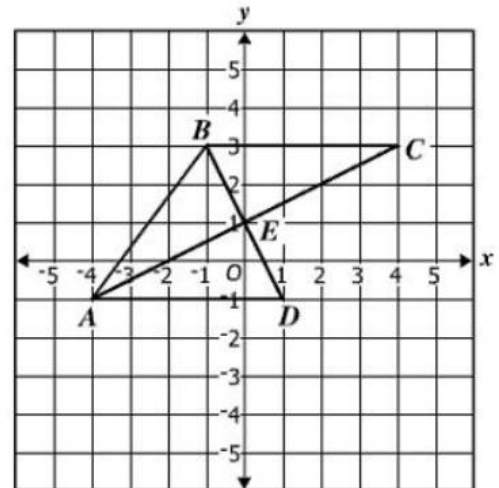   **Which is closest to x, the distance between the two poles?**

   ○ **A** 27 ft

   ○ **B** 29 ft

   ○ **C** 60 ft

   ○ **D** 75 ft

20. **Triangles ABE, ADE, and CBE are shown on the coordinate grid, and all the vertices have coordinates that are integers.**

   Which statement is true?

   ○ **A** No two triangles are congruent.

   ○ **B** Only $\triangle ABE$ and $\triangle CBE$ are congruent.

   ○ **C** Only $\triangle ABE$ and $\triangle ADE$ are congruent.

   ○ **D** Triangle ABE, $\triangle ADE$, and $\triangle CBE$ are all congruent.

21. Directions: Click and drag each selected number to the correct box.

   The lengths of two sides of a triangle are 24 inches and 43 inches. What is the range of possible lengths, in inches, for the third side, x, of this triangle?
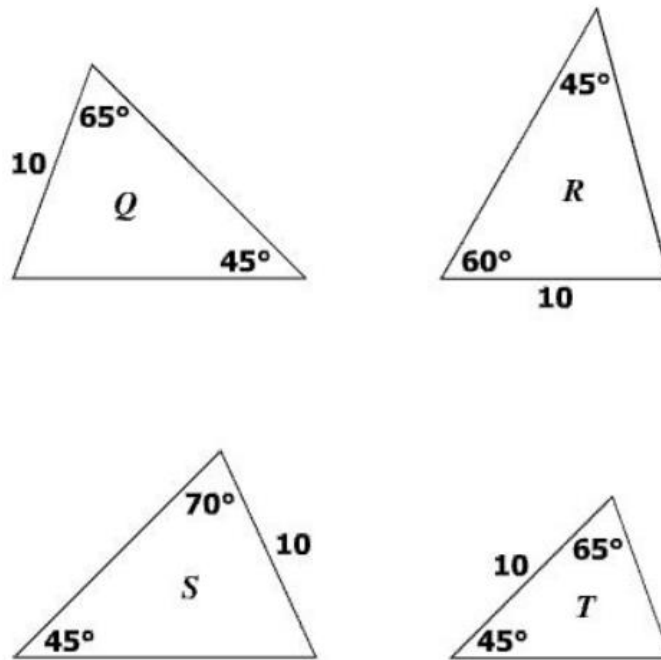
   $\boxed{} < x < \boxed{}$

   | 9 | 19 | 20 | 24 | 30 | 33.5 | 67 | 101.5 |

22. **Which of the following sets of lengths can represent the measures of the sides of a right triangle?**

   A 4, 5, 6

   B 5, 12, 15

   C 8, 10, 17

   D 20, 21, 29

23. **Given the measures shown in the diagram, which two triangles are congruent?**

   A Q and S

   B R and T

   C R and S

   D Q and T

24. **Part of a marching band formed a triangle made with trumpet players on one side, clarinet players on one side, and flute players on the third side.**

   - The angle formed by the trumpet and flute players measured 45°.
   - The angle formed by the flute and clarinet players measured 68°.

   Which orders the sides of this triangle from least to greatest using the instrument names?

   A Clarinet, trumpet, flute

   B Clarinet, flute, trumpet

   C Trumpet, flute, clarinet

   D Flute, trumpet, clarinet
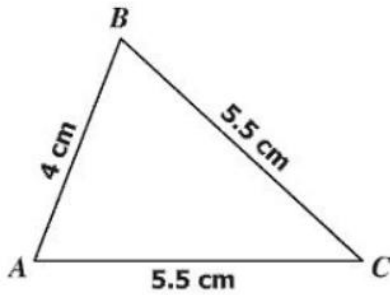
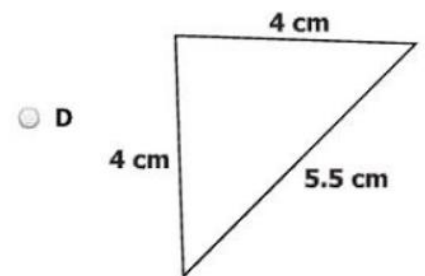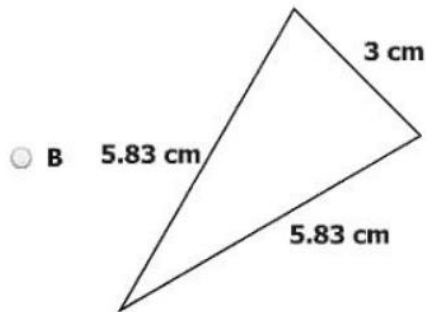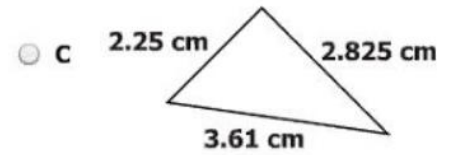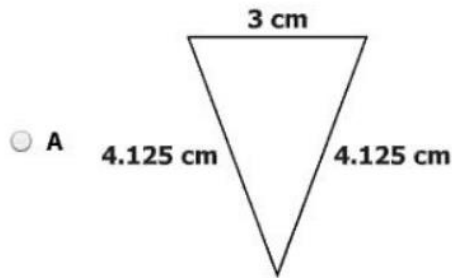**25.** **An equilateral triangle is folded in half.**

What is x, the height of the equilateral triangle?
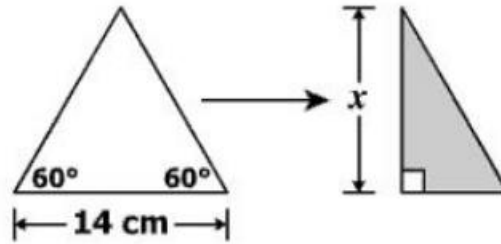
- **A** $14\sqrt{3}$ cm
- **B** 14 cm
- **C** $7\sqrt{3}$ cm
- **D** 7 cm

26. **Look at this triangle.**   **Which triangle is similar to the given triangle?**

- **A** 4.125 cm 3 cm 4.125 cm
- **B** 5.83 cm 3 cm 5.83 cm
- **C** 2.25 cm 2.825 cm 3.61 cm
- **D** 4 cm 4 cm 5.5 cm

27. Directions: Click and drag each selected reason to the correct box.

Given: Figure $ABCD$ with diagonal $\overline{AC}$

$\overline{AB} \cong \overline{DC}; \overline{BC} \cong \overline{AD}$
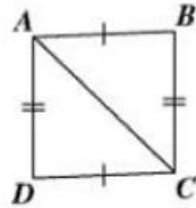
Complete the proof of $\triangle ABC \cong \triangle CDA$ by selecting the reasons for the last two statements.

Statements	Reasons
$\overline{AB} \cong \overline{DC}; \overline{BC} \cong \overline{AD}$	Given
$\overline{AC} \cong \overline{AC}$	
$\triangle ABC \cong \triangle CDA$	

Definition of congruent triangles

Reflexive property

Side-Angle-Side (SAS) Theorem

Side-Side-Side (SSS) Theorem

Hypotenuse-Leg (HL) Theorem

Given

---

28. A spectator is viewing the six cars of a roller coaster as it travels down a hill at an amusement park.

- ○ A 12.3 ft
- ○ B 15.8 ft
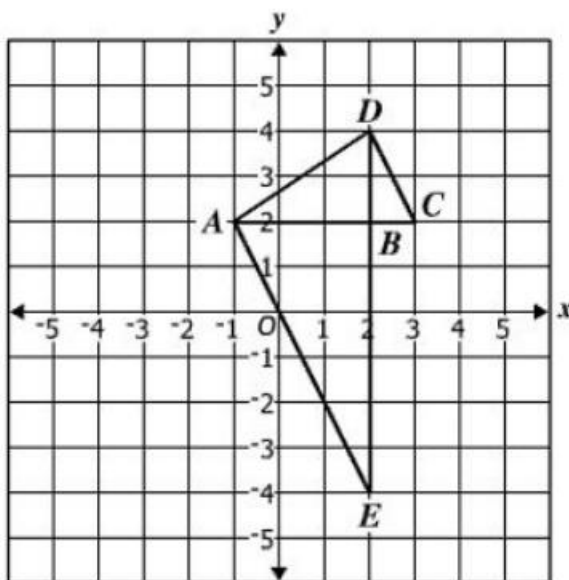- ○ C 25.6 ft
- ○ D 32.5 ft

38°

20 ft
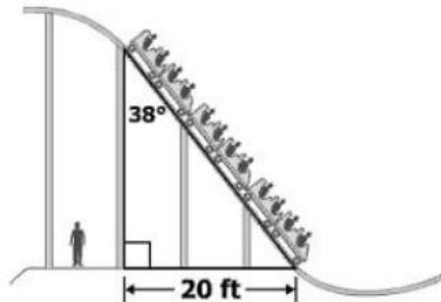
Which is closest to the total length of the six cars?

29. Three triangles that do not overlap are shown on the coordinate grid. The coordinates of all vertices are integers.
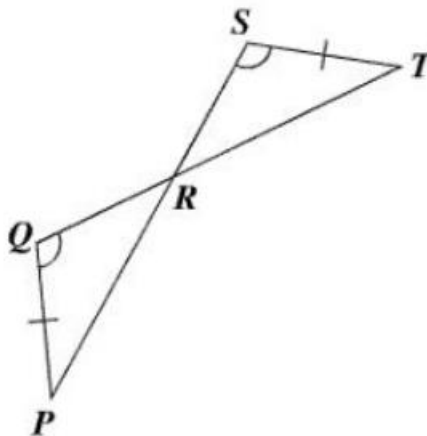
Which statement is true?

A $\triangle ABD \sim \triangle EBA$

B $\triangle ABD \sim \triangle DBC$

C $\triangle CBD \sim \triangle ABE$

D $\triangle CBD \sim \triangle EBA$

30. Using the information given, which congruence postulate or theorem can be used to prove that $\triangle PQR \cong \triangle TSR$?

A Side-Side-Side Postulate

B Side-Angle-Side Postulate
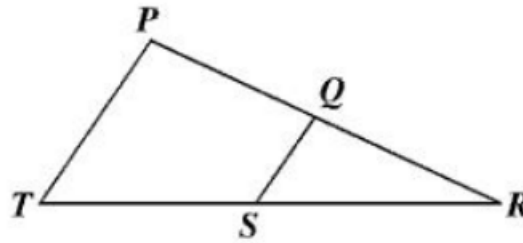
C Hypotenuse-Leg Theorem

D Angle-Angle-Side Theorem

31. Which could be the lengths of three sides of a triangle?

A 6 cm, 14 cm, 8 cm

B 9 cm, 11 cm, 21 cm

C 8.5 cm, 17 cm, 10.6 cm

D 14 cm, 4.7 cm, 4.7 cm
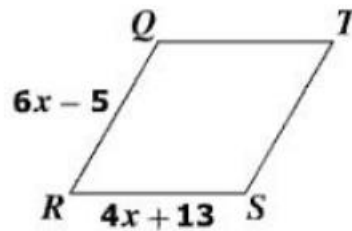
32. **Given:** Q lies on $\overline{PR}$ and S lies on $\overline{RT}$

   Which condition proves $\triangle PRT \sim \triangle QRS$?

   A $\angle PQS \cong \angle TSQ$

   B $\angle PTR \cong \angle TPR$

   C $\dfrac{QS}{PT} = \dfrac{QR}{SR}$

   D $\dfrac{QR}{PR} = \dfrac{SR}{TR}$

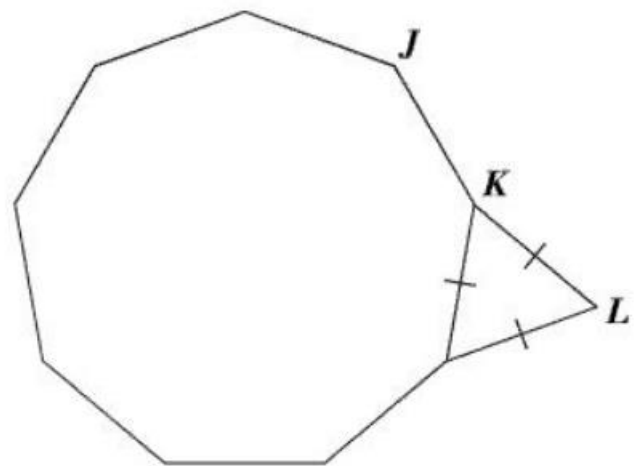33. **Given:** Parallelogram $QRST$ where $QR = 6x - 5$ and $RS = 4x + 13$

   What value of x proves this parallelogram is a rhombus? $x = $ [ ]

34. The floor plan for a modern home is modeled by the composite of the regular nonagon and triangle shown.

   What is the measure of $\angle JKL$?

   A 150°

   B 160°

   C 165°
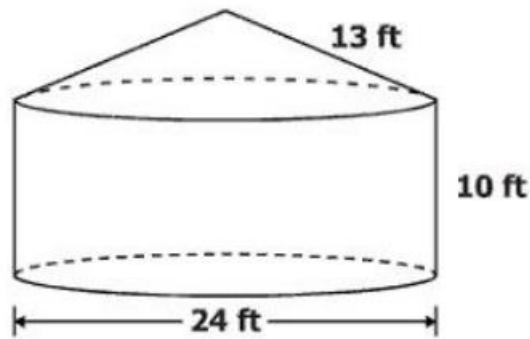
   D 175°

35. **Given: Circle P with center at $(^-4, 1)$**

   Which equation could represent circle P ?

   ○ A $(x - 4)^2 + (y - 1)^2 = 41$

   ○ B $(x - 4)^2 + (y + 1)^2 = 41$

   ○ C $(x + 4)^2 + (y - 1)^2 = 41$

   ○ D $(x + 4)^2 + (y + 1)^2 = 41$

36. **This container is composed of a right circular cylinder and a right circular cone.**

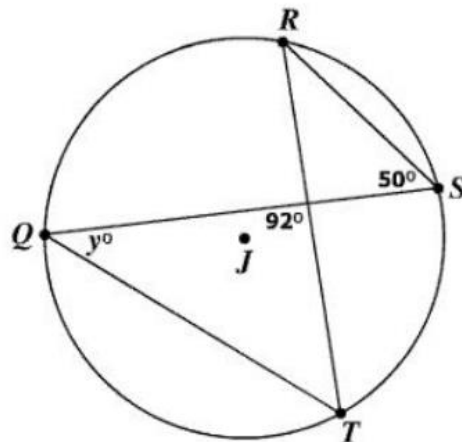   **Which is closest to the surface area of the container?**

   ○ A 490 ft²

   ○ B 754 ft²

   ○ C 1,243 ft²

   ○ D 1,696 ft²

   13 ft

   10 ft

   24 ft

37. **Given: Circle J**

   What is the value of y ?

   ○ A 38

   ○ B 50

   ○ C 88

   ○ D 92

   R

   50° S

   Q $y°$ 92° J

   T

38. A cell phone box in the shape of a rectangular prism is shown. The height of the box is 4 cm.

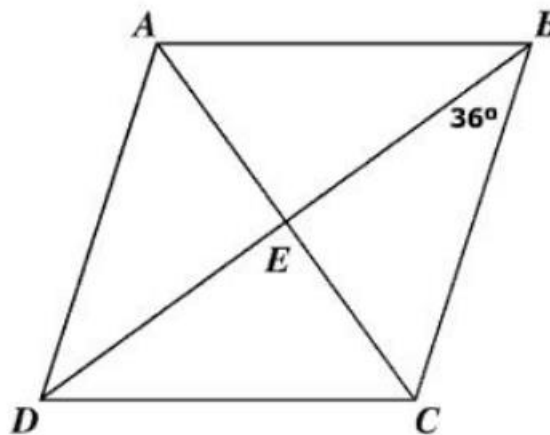**Original Box**

4 cm | 13.5 cm | ←18 cm→
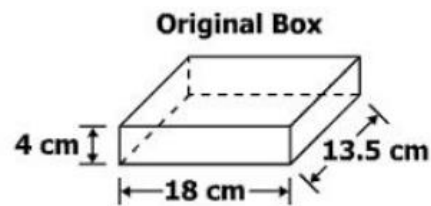
The height of the original box will be increased by 3.5 centimeters so a new instruction manual and an extra battery can be included. Which is closest to the total surface area of the new box?

- A 479 cm²
- B 707 cm²
- C 738 cm²
- D 959 cm²

39. Parallelogram $ABCD$ is a rhombus with $m\angle EBC = 36°$.

What is the $m\angle DAE$?

- A 36°
- B 54°
- C 108°
- D 144°

40. Circle O has a center at $(^-2, \,^-2)$ and a diameter of 10 units.

Which point lies on circle O ?

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

41. An architect used this diagram to design a curved balcony. She drew a circle with a radius of 40 feet and a central angle of 70° to determine the length of railing needed for the balcony.

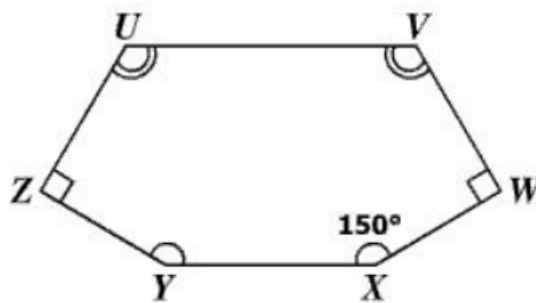Which is closest to the length of railing needed for the curved section of the balcony?

- A 24 ft
- B 49 ft
- C 251 ft
- D 977 ft

Railing

Balcony

70°

40 ft
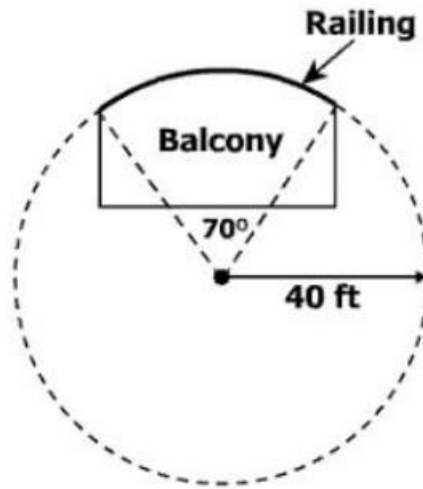
42. A polygon is shown.

What is the measure of ∠U ?

- A 60°
- B 90°
- C 120°
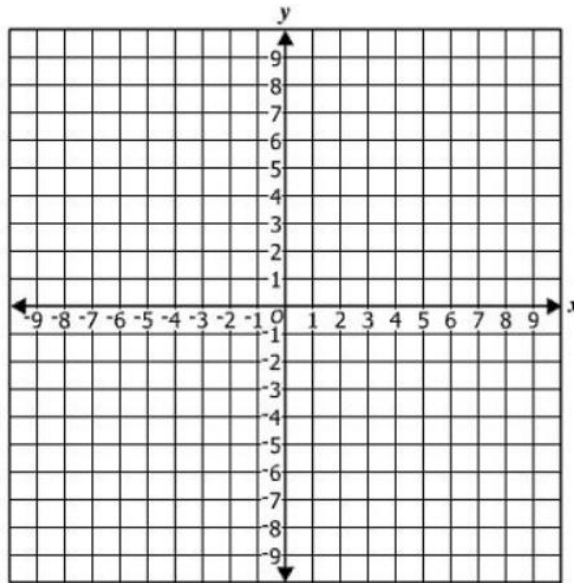- D 240°

U   V

Z   W

150°

Y   X

43. The volume of a cube is 64 cubic centimeters. What is the surface area of the cube?

- A 16 cm²
- B 96 cm²
- C 256 cm²
- D 384 cm²

44. The diagonals of rectangle $KLMN$ intersect at the point $(2, 1)$. One of the vertices of rectangle $KLMN$ is located at $(-4, 5)$.

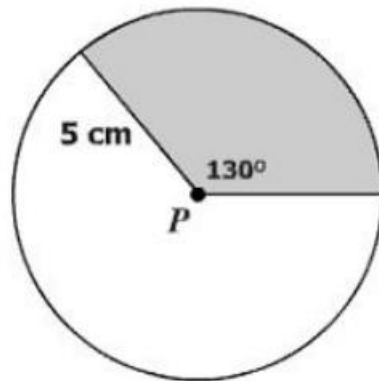Which of the following could be the location of another vertex of this rectangle?

○ A $(8, -3)$

○ B $(3, -1)$

○ C $(-2, 3)$

○ D $(-10, 9)$

45. Given: Circle P

Which is closest to the area of the shaded sector of circle P ?

○ A 11 cm²

○ B 28 cm²

○ C 50 cm²

○ D 78 cm²

5 cm

130°

P

46. Directions: Click and drag each selected number to the correct box.

The ratio of the lengths of the radii of two spheres is 3:5. What is the ratio of the volumes of these two spheres?
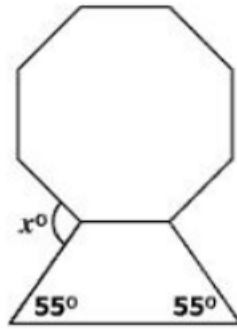
☐ : ☐

| 1 | 3 | 5 | 9 | 15 | 25 | 27 | 125 |

47. This figure is composed of an isosceles trapezoid and a regular octagon.

What is the value of x ?

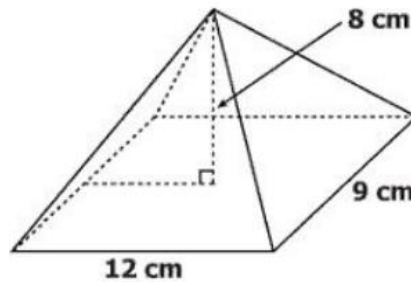- A 100
- B 125
- C 135
- D 190

$x°$

$55°$ $55°$

48. Directions: Click on the grid for the point you want to select.

Plot the center of the circle defined by the equation $(x+4)^2 + (y-5)^2 = 3^2$.
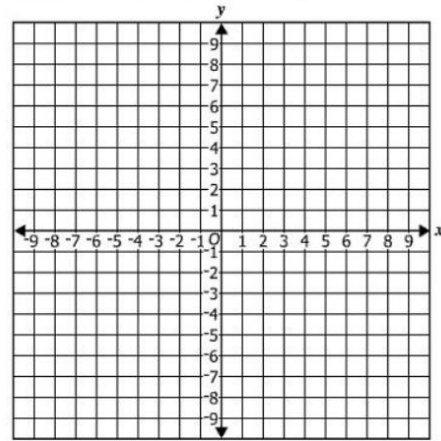
49. A rectangular pyramid is shown. What is the volume of the pyramid?

- A 864 cm^3
- B 432 cm^3
- C 288 cm^3
- D 108 cm^3

8 cm

9 cm

12 cm

50. A company is creating a new cylindrical container to replace its original cylindrical container.

- The new container will have 4 times the volume of the original container.
- The height of the new container will remain the same as the height of the original container.

The length of the radius of the new container will be —

- A 2 times the length of the radius of the original container
- B 4 times the length of the radius of the original container
- C 8 times the length of the radius of the original container
- D 16 times the length of the radius of the original container