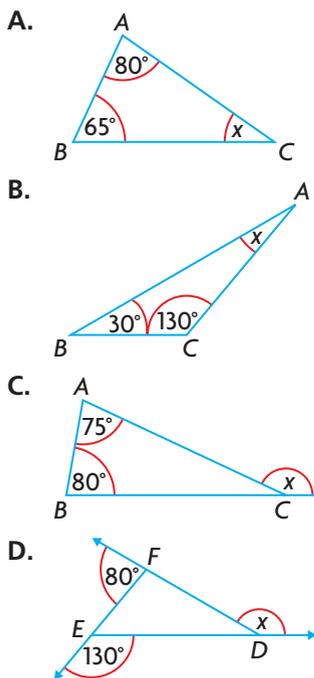


Multiple Choice

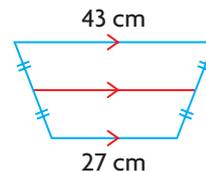
- Melissa cut two vertices off a triangle. What is the maximum amount the sum of the interior angles of the resulting shape will increase by?  
**A.**  $180^\circ$     **C.**  $360^\circ$   
**B.**  $540^\circ$     **D.**  $90^\circ$
- In which diagram is  $x = 150^\circ$ ?



- Which statement is not always true?  
**A.** If the two pairs of opposite sides of a quadrilateral are congruent, the figure must be a parallelogram.  
**B.** The diagonals of a rhombus are perpendicular.  
**C.** The diagonals of a square are perpendicular bisectors.  
**D.** The diagonals of a parallelogram are always congruent.

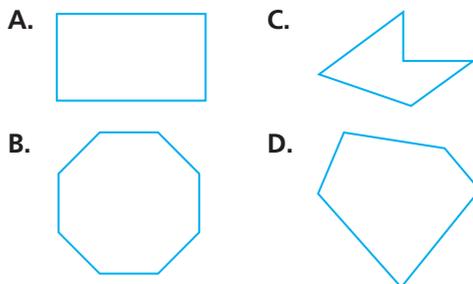
- Which statement is not always true?  
**A.** The midsegments of a rhombus form a rectangle.  
**B.** The midsegments of a square form a square.  
**C.** The midsegments of a parallelogram form a parallelogram.  
**D.** The midsegments of a rectangle form a rectangle.

- Determine the length of the red line segment.  
**A.** 60 cm    **C.** 30 cm  
**B.** 35 cm    **D.** 16 cm



- The police seal off accident scenes with yellow tape. Determine the dimensions of the maximum rectangular area that can be surrounded with 300 m of tape.  
**A.** 100 m by 50 m    **C.** 75 m by 75 m  
**B.** 150 m by 2 m    **D.** 125 m by 25 m
- A stop sign shaped like a regular octagon is 120 cm from side to side and each side is 50 cm long. Estimate the area of the sign.  
**A.**  $24\,000\text{ cm}^2$     **C.**  $6000\text{ cm}^2$   
**B.**  $12\,000\text{ cm}^2$     **D.**  $3000\text{ cm}^2$
- Determine the radius of a sphere with a volume of  $117.00\text{ cm}^3$ .  
**A.** 3.03 cm    **C.** 6.04 cm  
**B.** 1.02 cm    **D.** 58.50 cm
- A sugar sculpture is a triangular pyramid 18.0 cm high. The base is an equilateral triangle with 3.0 cm sides. Determine the volume of the sculpture.  
**A.**  $23.4\text{ cm}^3$     **C.**  $54.0\text{ cm}^3$   
**B.**  $27.0\text{ cm}^3$     **D.**  $70.1\text{ cm}^3$
- The sum of the interior angles in a polygon is  $1800^\circ$ . How many sides does it have?  
**A.** 9    **C.** 11  
**B.** 10    **D.** 12

11. Which of the following is not a convex polygon?



12. What is the measure of each exterior angle in a regular 12-gon?

A.  $30^\circ$  C.  $20^\circ$   
 B.  $45^\circ$  D.  $35^\circ$

13. In any polygon what is the sum of any interior angle and its corresponding exterior angle?

A.  $360^\circ$  C.  $90^\circ$   
 B.  $180^\circ$  D.  $270^\circ$

14. If the diagonals of a quadrilateral are perpendicular, equal in length, and bisect each other, then the shape is a:

A. rectangle C. kite  
 B. rhombus D. square

15. How many counterexamples are needed to disprove a conjecture?

A. 1 C. 5  
 B. 2 D. 10

16. In which of the following quadrilaterals do the midsegments form a parallelogram?

A. rhombus C. rectangle  
 B. trapezoid D. all of the above

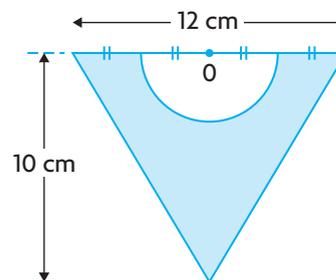
17. What lines can be used to locate the centroid of any quadrilateral?

A. diagonals C. midsegments  
 B. bimedians D. medians

18. What is the greatest rectangular area that can be enclosed with a 100 m roll of fencing?

A.  $100 \text{ m}^2$  C.  $625 \text{ m}^2$   
 B.  $250 \text{ m}^2$  D.  $825 \text{ m}^2$

19. Determine the area of the shaded region.



A.  $60 \text{ cm}^2$  C.  $106 \text{ cm}^2$   
 B.  $46 \text{ cm}^2$  D.  $75 \text{ cm}^2$

20. A sphere has a diameter of 10 cm. Both the diameter and the height of a cone are 10 cm. A cube has a side length of 10 cm. Both the side length and the height of a square-based pyramid are 10 cm. Which shape has the least volume?

A. sphere C. cone  
 B. cube D. pyramid

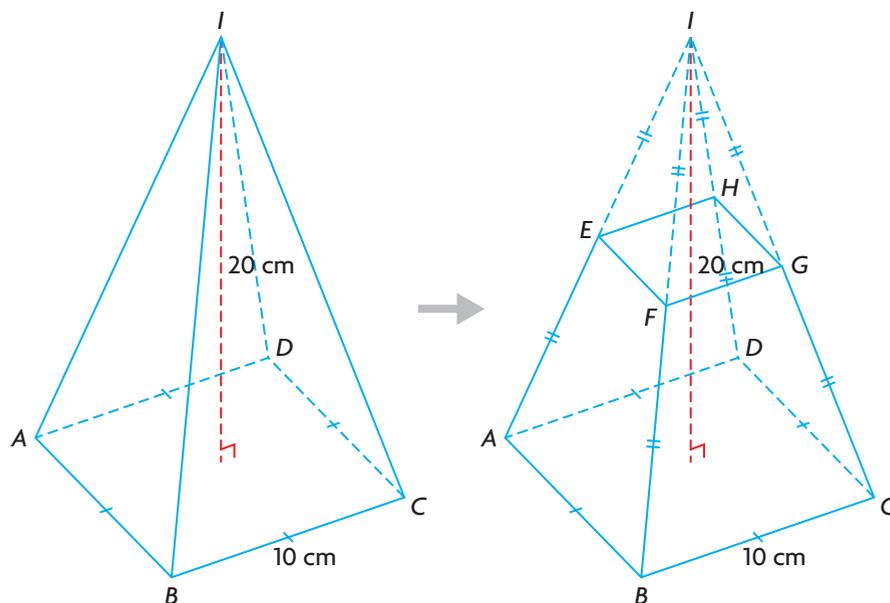
21. For a given volume, the cylinder with the least surface area occurs when:

A. radius = height  
 B. radius = height  $\div$  2  
 C. diameter = height  
 D.  $2(\text{diameter}) = \text{height}$

## Investigation

### Mystery of the Pyramids

22. Jeremy is creating a piece of art for an exhibit. He starts with a square-based right pyramid, as shown. He makes a cut parallel to the base through the midpoints of the lateral edges. Then, he removes the top of the pyramid.



- Determine the volume of the original pyramid.
- Determine what volume of the pyramid was removed.
- In terms of volume, what fraction of the original pyramid was removed?
- Investigate whether this fraction would be the same if the original pyramid had a rectangular base.