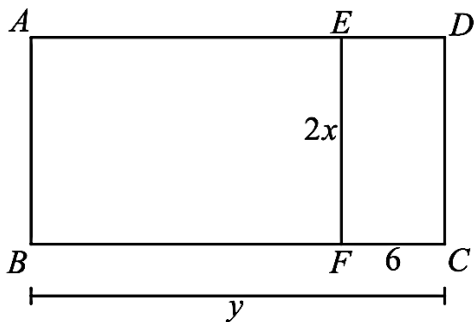# Properties of Shapes

Non-Calculator: Multiple Choice

1. What is the degree measure of each exterior angle of an octagon?
   A) 27.5°
   B) 45°
   C) 67.5°
   D) 80°

2. Square B has 4 times the perimeter of square A. If the area of square A is 8, what is the area of square B?
   A) 32
   B) $32\sqrt{2}$
   C) 64
   D) 128

3. In the figure below, rectangle $ABCD$ is similar to rectangle $DEFC$. How would you express length y in terms of x?

   A) $\frac{1}{2}x^2$

   B) $\frac{2}{3}x$

   C) $\frac{2}{3}x^2$

   D) $6x$

4. A cone has a height of 8, radius of 6, and a slant height l of 10. What is the ratio of the cone's volume to surface area? (Surface Area $= \pi r^2 + \pi r l$)
   A) 1 : 2
   B) 3 : 4
   C) 1 : 1
   D) 2 : 1

5. Cindy is buying a rectangular box of candy. If the box has a height of 4 centimeters, a length of 8 centimeters and a width of 6 centimeters, what is the approximate distance rounded to the nearest cm from the front bottom right corner to the back left top corner?
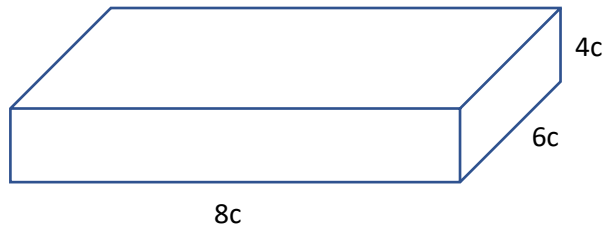
A) 9
B) 10
C) 11
D) 12

6. Vanessa has just been on a discounted holiday to Egypt. She buys a replica of the Pyramid of Giza. It is a squared-based pyramid, and each side measures 6 centimeters. If the height of the pyramid is two-thirds the length of each side of the base, what is the total surface area of the pyramid replica in square centimeters?
A) 36
B) 84
C) 96
D) 144

Non-Calculator: Grid In

7. A trapezoid has base lengths of 12 and n, and a height of 2. A square has a side length of n. If the area of the square and trapezoid are the same, what is the value of n?

8. Caroline is using ribbon to create patterns. She has two pieces of ribbon, both of equal length, and makes a square with one ribbon and a rectangle with the other. She then wants to fill the area made by each shape using fabric, but she notices she needs an extra 9 square centimeters of fabric to fill the area made by the square. What is the difference in length of the two sides in the rectangle?

Calculator: Multiple Choice

9. You buy an oversized cube dice with a volume of 216cm^3. What is the surface area of the cube?
   A) 36 cm^2
   B) 72 cm^2
   C) 144 cm^2
   D) 216 cm^2

10. What is the length of the diagonal of the dice in question 9?
   A) $6\sqrt{3}$ cm
   B) 6 cm
   C) 12 cm
   D) $3\sqrt{2}$ cm

Questions 11 and 12 refer to the parallelogram below:
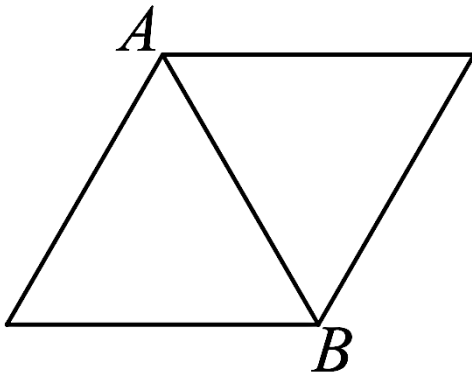
11. The above parallelogram is made of two equilateral triangles. If AB is $2\sqrt{3}$, what is the area of the parallelogram?
    A) 8
    B) $6\sqrt{3}$
    C) $12\sqrt{3}$
    D) 12

12. What is difference between the perimeter and area of the parallelogram?
    A) $\sqrt{3}$
    B) $2\sqrt{3}$
    C) $4\sqrt{3}$
    D) 4

13. A nine-sided polygon has sides of length 8 centimeters. What is the measure of each interior angle in the polygon?
    A) 40°
    B) 70°
    C) 100°
    D) 140°

14. Amanda is dabbling in the occult and buys a spherical crystal ball. The crystal ball has a cube of moonstone perfectly inscribed into it, such that each corner of the moonstone touches the crystal ball. If the moonstone has a volume of 8 cubic inches, what is the radius of the sphere?

A) 2

B) $\sqrt{3}$

C) $\sqrt{2}$

D) 3

Calculator: Grid In

15. Emmerson Mnangagwa is re-tiling the kitchen floor of his new presidential mansion. If the floor is 6 feet by 9 feet and each square tile has a length of 3 inches, how many tiles does he need?

16. Cassandra is craving lemonade on a hot summer day. She gets a square-based glass with base measurements of 6 centimeters and a height of 9 centimeters. She bought an ice-cube tray that makes spherical ice cubes, each with a radius of 1 centimeter. If she adds in 6 ice cubes and 200 milliliters of lemonade into the glass, how much volume is left in the glass? Round the answer to the nearest mL and use 3.14 for π. (Note that $1mL = 1cm^3$).