

# 2004 Washington State Math Championship

Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

## Geometry - Grade 5

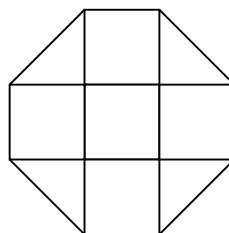
1. Find the surface area of a rectangular solid whose dimensions are 4 by 6 by 7.

2. How many of the following symbols have reflection symmetry?



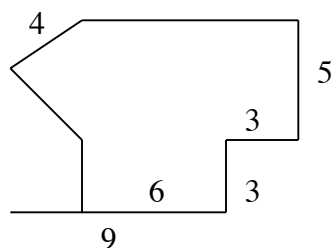
3. How many of the previous symbols have rotation symmetry?

4. The vertices of 5 squares are connected to form an octagon. If the side length of each square is 8, what is the difference between the area and the perimeter of the octagon, to the nearest hundredth?

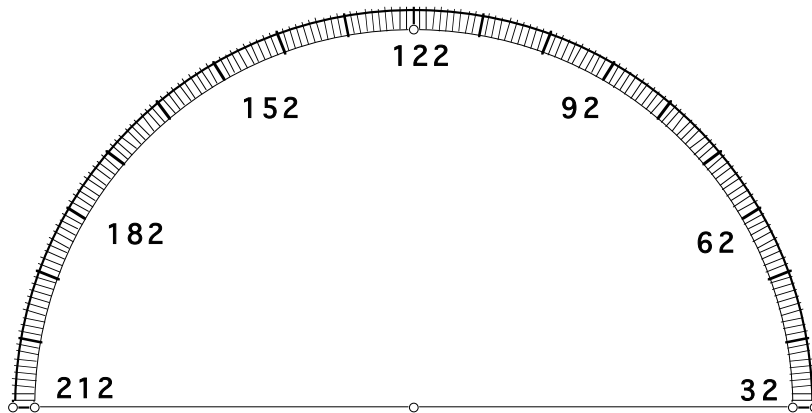


6. The complement of an angle is one-tenth its supplement. What is the measure of the angle in degrees?

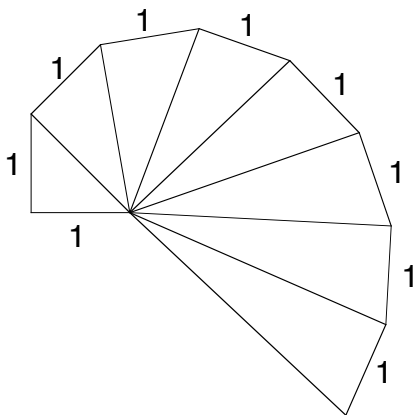
7. What is the area of the figure below?



5. In 1736, the cousin of the famous Gabriel Daniel Fahrenheit, Otto Fahrenheit, invented his angle measuring scale. No rotation was 32 and half a rotation was 212. When Otto Fahrenheit measured the angles of a triangle with his not-so-famous Fahrenheit protractor and added them, what was the sum of the angles?



8. What is the length of the longest segment in the figure? (All triangles are right triangles.)



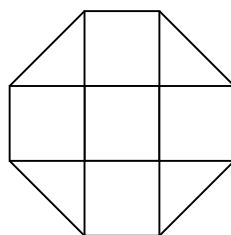
9. What is the length of a side of a cube whose volume and surface area are numerically the same?
10. The length of a rectangle is  $x + 3$  and its area is  $x^2 + 8x + 15$ . What is its width?

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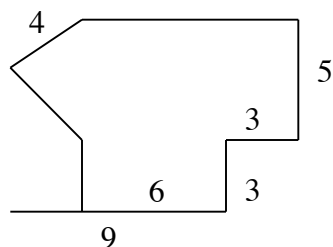
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## Geometry - Grade 6

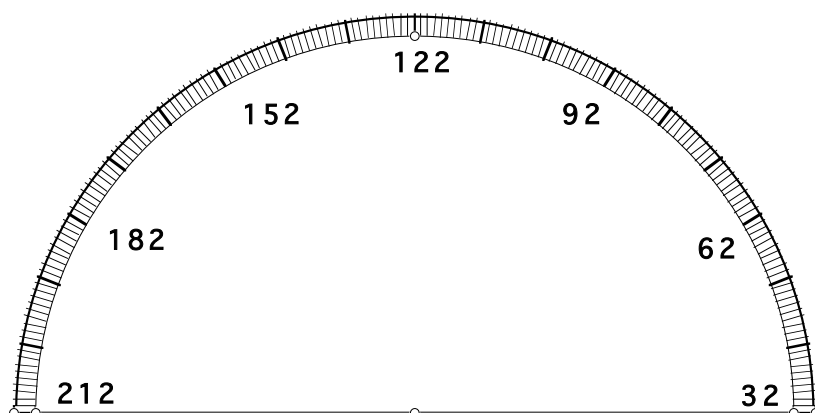
1. The vertices of 5 squares are connected to form an octagon. If the side length of each square is 8, what is the difference between the area and the perimeter of the octagon, to the nearest hundredth?



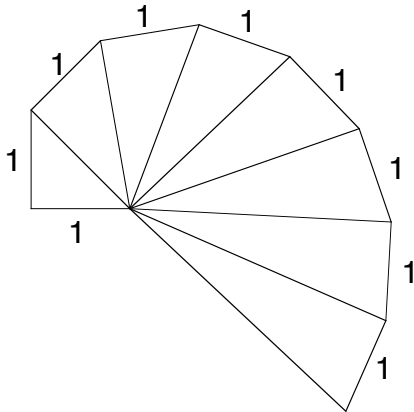
2. The complement of an angle is one-tenth its supplement. What is the measure of the angle in degrees?
3. What is the area of the figure below?



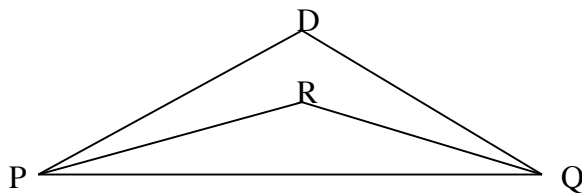
4. In 1736, the cousin of the famous Gabriel Daniel Fahrenheit, Otto Fahrenheit, invented his angle measuring scale. No rotation was 32 and half a rotation was 212. When Otto Fahrenheit measured the angles of a triangle with his not-so-famous Fahrenheit protractor and added them, what was the sum of the angles?



5. What is the length of the longest segment in the figure? (All triangles are right triangles.)



6. What is the length of a side of a cube whose volume and surface area are numerically the same?
7. The length of a rectangle is  $x + 3$  and its area is  $x^2 + 8x + 15$ . What is its width?
8.  $\triangle PDQ$  and  $\triangle PRQ$  are both isosceles triangles.  $\overline{PR}$  and  $\overline{QR}$  are both angle bisectors. If  $\angle D$  is  $122^\circ$ , what is the measure of  $\angle R$ ?



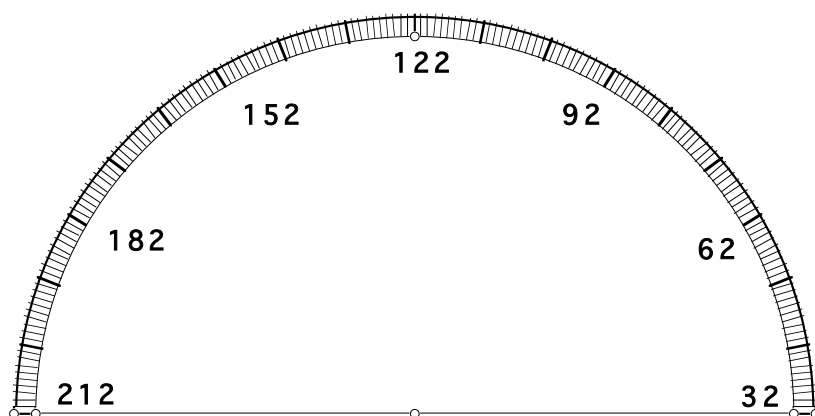
9. Find the surface area-to-volume ratio of a cube with an edge length of 8. (Give your answer as a reduced fraction.)
10. Find the area of triangle ABC if the coordinates of its vertices are A(3,1), B(8,1), and C(12,7).

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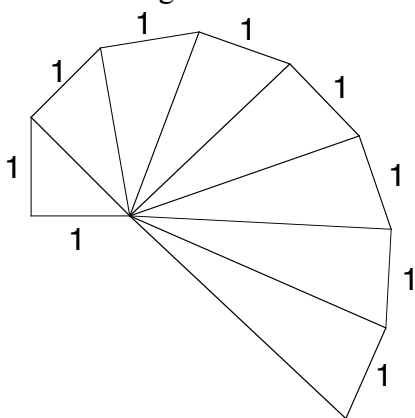
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## Geometry - Grade 7

1. In 1736, the cousin of the famous Gabriel Daniel Fahrenheit, Otto Fahrenheit, invented his angle measuring scale. No rotation was 32 and half a rotation was 212. When Otto Fahrenheit measured the angles of a triangle with his not-so-famous Fahrenheit protractor and added them, what was the sum of the angles?

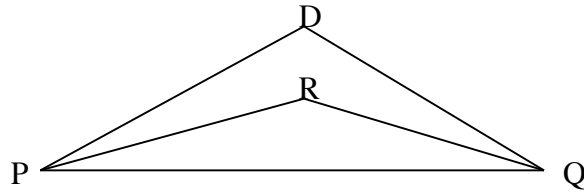


2. What is the length of the longest segment in the figure? (All triangles are right triangles.)

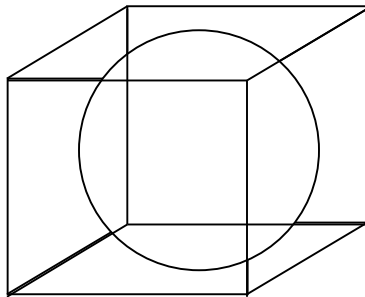


3. What is the length of a side of a cube whose volume and surface area are numerically the same?
4. The length of a rectangle is  $x + 3$  and its area is  $x^2 + 8x + 15$ . What is its width?

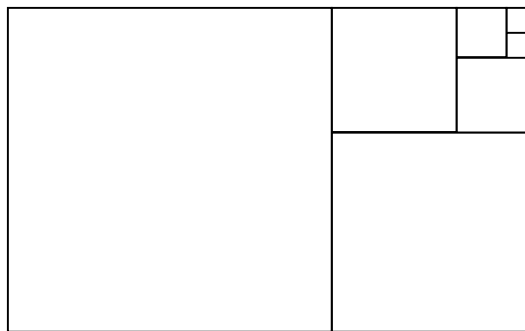
5.  $\triangle PDQ$  and  $\triangle PRQ$  are both isosceles triangles.  $\overline{PR}$  and  $\overline{QR}$  are both angle bisectors. If  $\angle D$  is 122, what is the measure of  $\angle R$ ?



6. Find the surface area-to-volume ratio of a cube with an edge length of 8. (Give your answer as a reduced fraction.)
7. Find the area of triangle ABC if the coordinates of its vertices are A(3,1), B(8,1), and C(12,7).
8. What is the ratio of the volume of the inscribed sphere to the volume of the cube? (Express your answer as a common fraction in terms of  $\pi$ .)



9. The box in which my washing machine was shipped has dimensions of 30 inches by 30 inches by 36 inches. What is the volume of the box, in cubic feet?
10. Each interior is enclosed by a square. The area of the smallest square is four. What is the ratio of the perimeter of the largest square in the figure to the perimeter of the next square to be drawn? (Express your answer as a reduced fraction.)

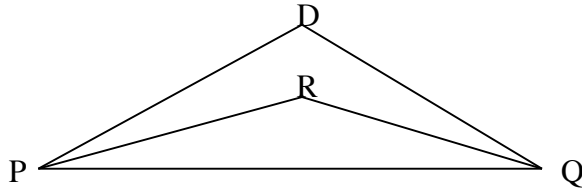


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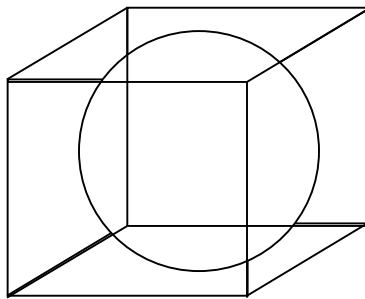
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## Geometry - Grade 8

1. The length of a rectangle is  $x + 3$  and its area is  $x^2 + 8x + 15$ . What is its width?
2.  $\triangle PDQ$  and  $\triangle PRQ$  are both isosceles triangles.  $\overline{PR}$  and  $\overline{QR}$  are both angle bisectors. If  $\angle D$  is 122 , what is the measure of  $\angle R$ ?

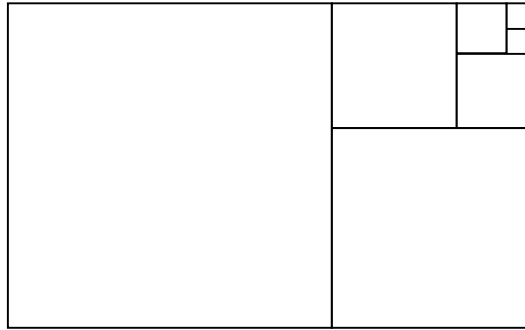


3. Find the surface area-to-volume ratio of a cube with an edge length of 8. (Give your answer as a reduced fraction.)
4. Find the area of triangle ABC if the coordinates of its vertices are A(3,1), B(8,1), and C(12,7).
5. What is the ratio of the volume of the inscribed sphere to the volume of the cube? (Express your answer as a common fraction in terms of  $\pi$ .)

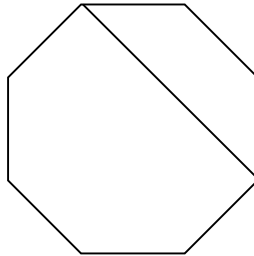


6. The box in which my washing machine was shipped has dimensions of 30 inches by 30 inches by 36 inches. What is the volume of the box, in cubic feet?

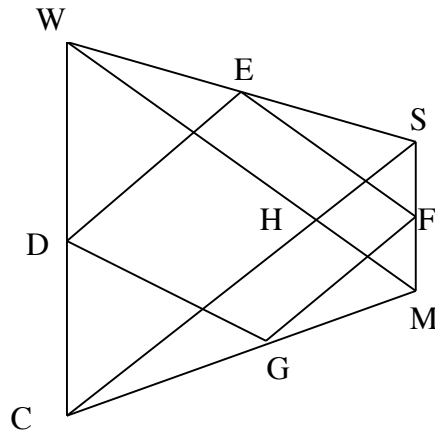
7. Each interior is enclosed by a square. The area of the smallest square is four. What is the ratio of the perimeter of the largest square in the figure to the perimeter of the next square to be drawn? (Express your answer as a reduced fraction.)



8. What is the length of the diagonal shown in the regular octagon if the length of a side of the octagon is 12?



9. Trapezoid WSMC has diagonals that are equal and perpendicular.  $SH = SM = 6$  and  $WH = CH = 12$ . The midpoints of WSMC are connected to form rhombus DEFG. What is the area of WSMC?



10. The Swiss chalet shown has a width of 10 meters, a depth of 20 meters, a first floor that is 3 meters tall, and the peak of its roof is 6 meters above the ceiling of the first floor. If one gallon of paint covers 30 square meters, how many gallons are needed to paint all of its exterior walls, but not the roof (the two angled faces)?

