

2005 Washington State Math Championship

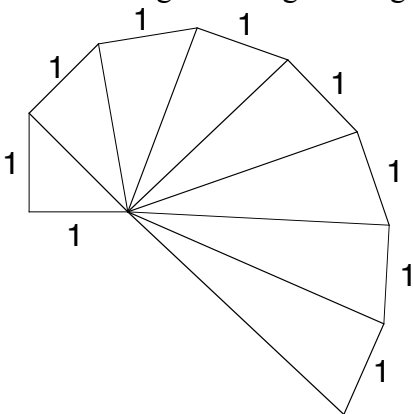
Unless a particular problem directs otherwise, give an exact answer or one rounded to the nearest thousandth.

Geometry - Grade 5

1. If given two rectangular solids, one with the dimensions of 4 by 6 by 8 and the other reduced by half their lengths, write the surface areas as a reduced fraction of small rectangular solid surface area to large rectangular solid surface area.
2. How many of the following symbols have more than one line of reflection symmetry?

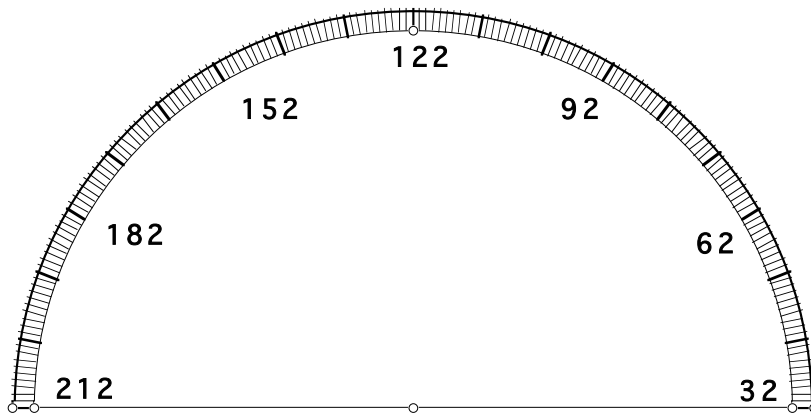


3. How many possible right triangles with integer side-length dimensions for the legs exist (with whole number values) for a triangle with an area of 18 square units?
4. The complement of an angle is 20% its supplement. What is the measure of the angle in degrees?
5. What is the length of the hypotenuse for the longest triangle in the figure? (All triangles are right triangles)



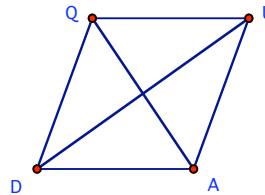
6. If given a square with an area of 16 square feet and you extend all side lengths by a length of 2 feet, how many more times the area results from this expansion? Write your answer as a decimal rounded to the nearest hundredth.

7. 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 Parallelogram with his not-so-famous Fahrenheit protractor and added them, what was the sum of the angles?

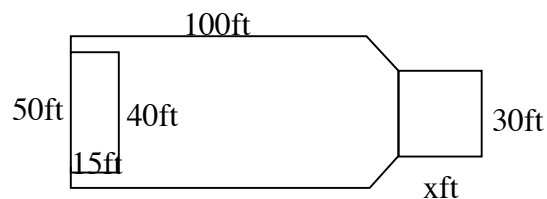


8.

Rhombus QUAD has diagonals QA and DU that bisect $\angle QUA$, and $\angle QDA$. Given $\angle QAD = 55$ degrees, find $\angle QUD$.



9. You have a backyard with the dimensions below. You plan to remove the rectangular section of sod against the house to make a deck 15 x 40 feet. You do not want to waste the sod and you have room to extend the 30-foot section in the back. How long will the back rectangular piece of yard extend?



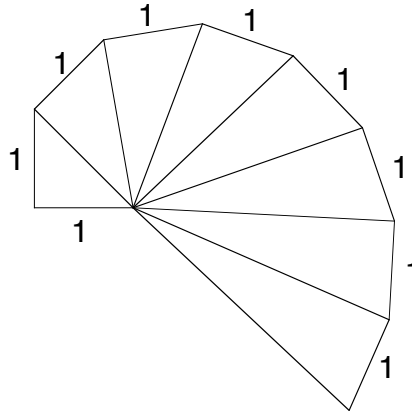
10. What is the length of a side of a square whose perimeter is $\frac{2}{3}$ the value of its area?

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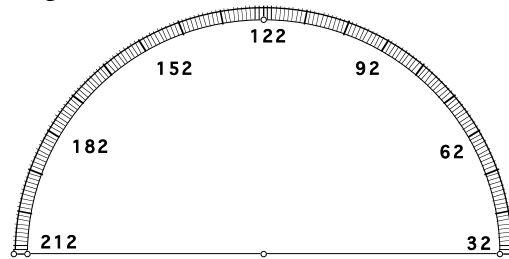
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Geometry - Grade 6

1. The complement of an angle is 20% its supplement. What is the measure of the angle in degrees?
2. What is the length of the hypotenuse for the longest triangle in the figure? (All triangles are right triangles)

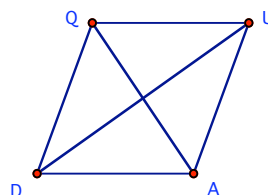


3. If given a square with an area of 16 square feet and you extend all side lengths by a length of 2 feet, how many more times the area results from this expansion? Write your answer as a decimal rounded to the nearest hundredth.
4. In 1736, the cousin of the famous Gabriel Daniel Fahrenheit, Otto Fahrenheit, invented his angle measuring scale. No rotation was 32 and half a rotation was 212. When Otto Fahrenheit measured the angles of a Parallelogram with his not-so-famous Fahrenheit protractor and added them, what was the sum of the angles?

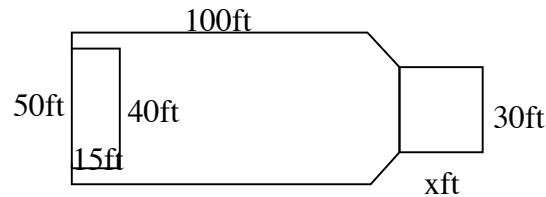


5.

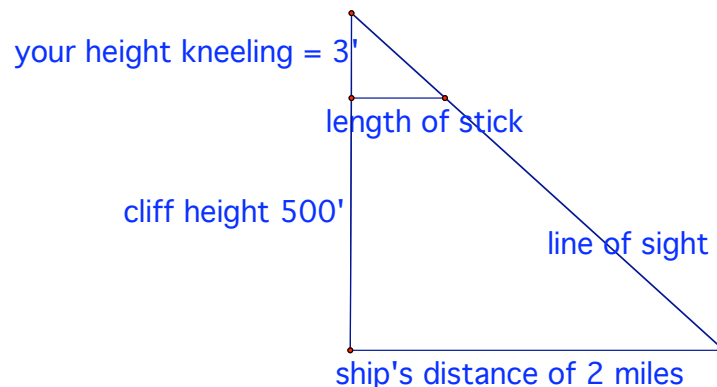
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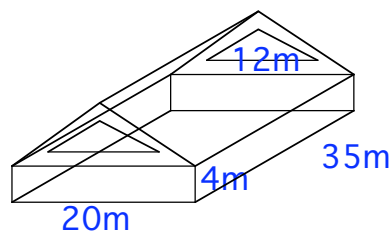
6. You have a backyard with the dimensions below. You plan to remove the rectangular section of sod against the house to make a deck 15 x 40 feet. You do not want to waste the sod and you have room to extend the 30-foot section in the back. How long will the back rectangular piece of yard extend?



7. What is the length of a side of a square whose perimeter is $\frac{2}{3}$ the value of its area?
8. Find the perimeter of the pentagon with the coordinates of P(0,8) E(4,4) N(1,0) T(-1,0) A(-4,4)
9. Creating similar triangles allows the distance of a ship from land to be estimated. This method works well with ships fairly close to land, but has its limitations. Use the diagram below to calculate length of a stick in feet that a person would need to use to find the distance of the ship from the cliff. (Diagram is not to scale)



10. The Swiss chalet shown has a width of 20 meters, a depth of 35 meters, a first floor that is 4 meters tall, and the peak of its roof is 8 meters above the ceiling of the first floor. There are two windows on the ends have a base of 12 meters and are similar to the triangular end walls of the second floor. If one gallon of paint covers 40 square meters, what is the cost of painting all of its exterior walls, but not the windows and roof (the two angled faces) for paint costing \$12.75 per gallon?

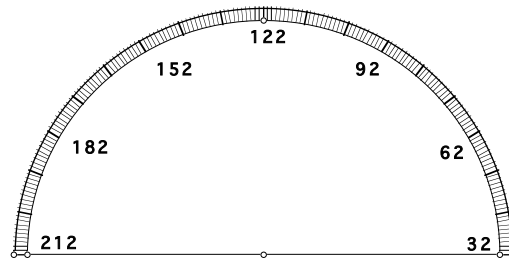


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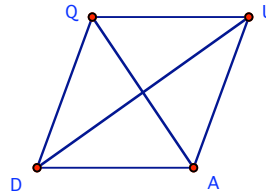
Geometry - Grade 7

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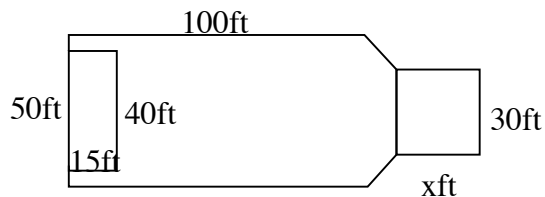


2.

Rhombus QUAD has diagonals QA and DU that bisect $\angle QUA$, and $\angle QDA$. Given $\angle QAD = 55$ degrees, find $\angle QUD$.

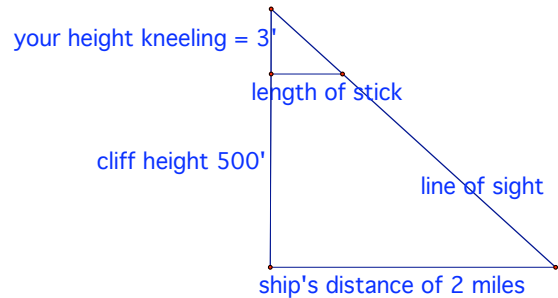


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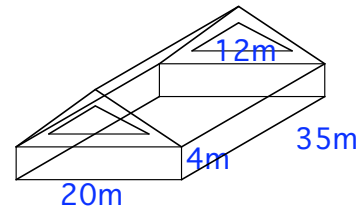


4. What is the length of a side of a square whose perimeter is $\frac{2}{3}$ the value of its area?
5. Find the perimeter of the pentagon with the coordinates of P(0,8) E(4,4) N(1,0) T(-1,0) A(-4,4)

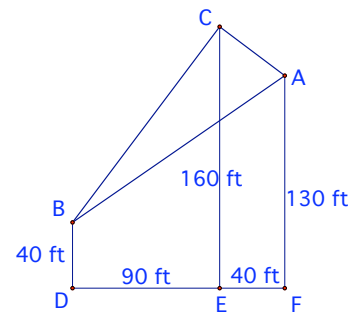
6. Creating similar triangles allows the distance of a ship from land to be estimated. This method works well with ships fairly close to land, but has its limitations. Use the diagram below to calculate length of a stick in feet that a person would need to use to find the distance of the ship from the cliff. (Diagram is not to scale)



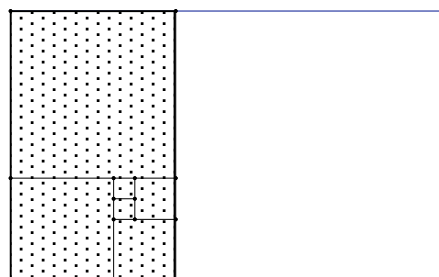
7. The Swiss chalet shown has a width of 20 meters, a depth of 35 meters, a first floor that is 4 meters tall, and the peak of its roof is 8 meters above the ceiling of the first floor. There are two windows on the ends have a base of 12 meters and are similar to the triangular end walls of the second floor. If one gallon of paint covers 40 square meters, what is the cost of painting all of its exterior walls, but not the windows and roof (the two angled faces) for paint costing \$12.75 per gallon?



8. A Diving tank with dimensions of 20m x 40m x 5m needs a new pump to filter the water. You are considering a pump that filters 15 liters per second. How many hours will it take to filter a volume equivalent to the entire pool?
9. A biologist is interested in the lengths of a triangular shaped island for estimation of a particular bird population. In order to not disrupt wildlife, the biologist decides to use surveyor equipment to get the dimensions with indirect measurements. The figure below shows the measurements obtained (angles C,D,E,F are all right angles) with equipment. What is the perimeter of the island?



10. The two smallest squares have a combined area of 18 square units. What is the area of the shaded rectangle?

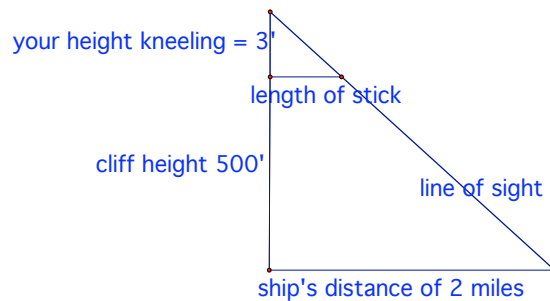


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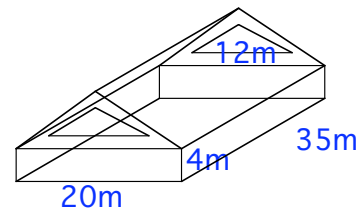
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Geometry - Grade 8

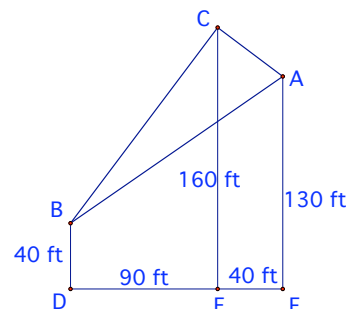
1. What is the length of a side of a square whose perimeter is $\frac{2}{3}$ the value of its area?
2. Find the perimeter of the pentagon with the coordinates of P(0,8) E(4,4) N(1,0) T(-1,0) A(-4,4)
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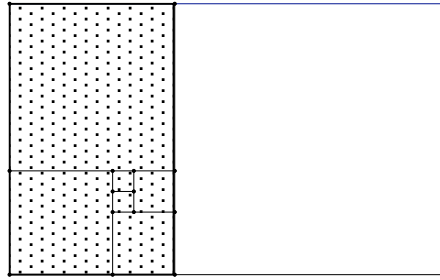
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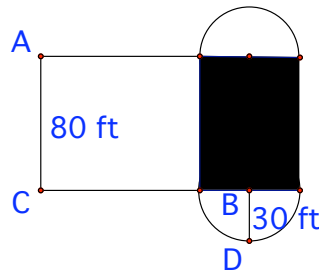
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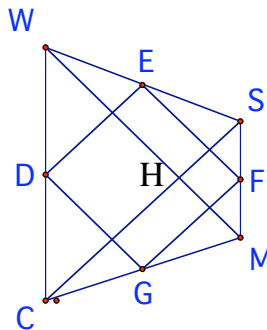
11. The two smallest squares have a combined area of 18 square units. What is the area of the shaded rectangle?



8. Thomas Greenthumb wants to expand his nursery operations by adding more greenhouses. He needs to calculate the surface area above ground and volume for heating and cooling purposes for the following greenhouse that is shaped like half a cylinder laid on its side. What is the ratio of surface area to volume? (The ends of the greenhouse are semicircles with radius BD) The picture below is what it looks like unfolded (A Net diagram)? Write your answer as a reduced fraction.



9. Trapezoid WSMC has diagonals that are equal and perpendicular. $SH = SM = 8$ and $WH = CH = 16$. The midpoints of WSMC are connected to form rhombus DEFG. What is the area of trapezoid?



10. The length of a rectangle is $x + 3$ and its area is $x^2 + 8x + 15$. If the length and width are both increased by four, what is its new width?

Geometry Answers 2005

- 1) $\frac{1}{4}$
- 2) 2
- 3) 9
- 4) 67.5
- 5) 3
- 6) 2.25
- 7) 488
- 8) 35
- 9) 20ft
- 10) 6
- 11) $12 + 8\sqrt{2}$ OR 23.314
- 12) 62.982 ft
- 13) \$178.50 (This cost is FULL gallons)
- 14) 74.074 hours
- 15) 358.114ft
- 16) 936
- 17) $\frac{11}{120}$
- 18) 288
- 19) $x + 9$