Washington State Math Championship 2012

ConocoPhillips Ferndale Refinery

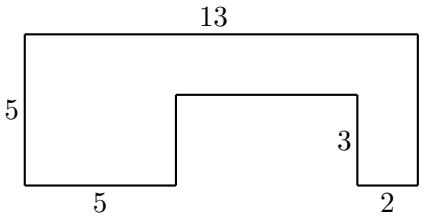
Blaine School District

Geometry – 5th Grade

Bubble in your answers on the answer sheet. Be sure to erase all mistakes completely. You do not need to bubble in leading zeros – the answer of "7" does not need to be answered as "007". If your answer is a fraction like $\frac{3}{16}$, bubble in 316.

1. **2 points:** If a pie with a 4-inch radius costs \$25, and all other pies have the same cost per square inch, how much will a pie with a radius of 8 inches cost? **Express your answer as a number of dollars.**

2. **2 points:** What is the area of the figure below? Assume all corners are right angles.

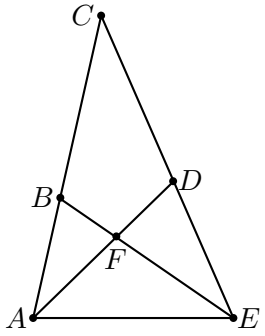


3. **2 points:** On your hike home, you find two straight sticks, measuring 12 inches and 8 inches in length. If you went out the next day to find a third stick such that its length is an integral number of inches, and the three sticks can be put together end-to-end to form a triangle, how many different sized sticks could you find?

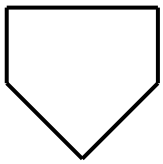
4. **3 points:** What is the sum of the number of reflectional lines of symmetry in a square, non-equilateral rectangle, equilateral triangle, and a non-equilateral isosceles triangle?

5. **3 points:** A stick figure family is building a pentagonal house. The mom stick wants to build the house in the shape of a equilateral pentagon with a side length of six. On the other hand, the dad stick wants to build the house using a square base with an area of 25 and an equilateral triangle attached to the square such that the triangle and square share one side. What is the positive difference between the perimeters of their two designs?

6. **3 points:** In the figure below, $\overline{AD}$ and $\overline{EB}$ bisect $\angle CAE$ and $\angle CEA$, respectively. If $\angle ACE = 40°$, what is the degree measure of $\angle AFE$?



7. **3 points:** A baseball home plate, as seen below, has a pentagonal shape made up of three right angles and two congruent obtuse angles. What is the degree measure of one of the obtuse angles?



8. **4 points:** When the area of a square is increased by 25%, the new square has a side length of 15. What is the length of one of the sides of the original square? **Express your answer to the nearest tenth.**

9. **4 points:** What is the area of the triangle with vertices whose coordinates are $(3, 7)$, $(-4, 25)$, and $(3, 11)$?

10. **4 points:** Gary and Goldie, who were initially standing in the same spot, got in a fight and decided to walk far away from each other. They each walked 50 meters in opposite directions. Then, while still facing the opposite direction, they each turned clockwise 90 degrees and proceeded to walk another 40 meters. At that point, what was the distance between Gary and Goldie? **Express your answer to the nearest meter.**

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Blaine School District

Geometry – 6th Grade

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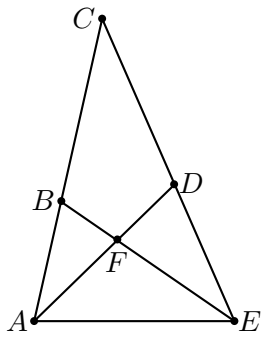
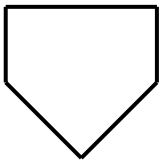
1. **2 points:** What is the sum of the number of reflectional lines of symmetry in a square, non-equilateral rectangle, equilateral triangle, and a non-equilateral isosceles triangle?

2. **2 points:** A stick figure family is building a pentagonal house. The mom stick wants to build the house in the shape of a equilateral pentagon with a side length of six. On the other hand, the dad stick wants to build the house using a square base with an area of 25 and an equilateral triangle attached to the square such that the triangle and square share one side. What is the positive difference between the perimeters of their two designs?

3. **2 points:** In the figure below, $\overline{AD}$ and $\overline{EB}$ bisect $\angle CAE$ and $\angle CEA$, respectively. If $\angle ACE = 40°$, what is the degree measure of $\angle AFE$?



4. **3 points:** A baseball home plate, as seen below, has a pentagonal shape made up of three right angles and two congruent obtuse angles. What is the degree measure of one of the obtuse angles?



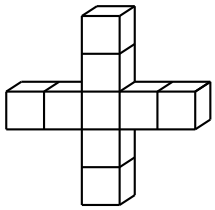
5. **3 points:** When the area of a square is increased by 25%, the new square has a side length of 15. What is the length of one of the sides of the original square? **Express your answer to the nearest tenth.**

6. **3 points:** What is the area of the triangle with vertices whose coordinates are $(3, 7)$, $(-4, 25)$, and $(3, 11)$?

7. **3 points:** Gary and Goldie, who were initially standing in the same spot, got in a fight and decided to walk far away from each other. They each walked 50 meters in opposite directions. Then, while still facing the opposite direction, they each turned clockwise 90 degrees and proceeded to walk another 40 meters. At that point, what was the distance between Gary and Goldie? **Express your answer to the nearest meter.**

8. **4 points:** Suppose that the sum of the two largest exterior angles of an isosceles triangle is 258 degrees. What is the degree measure of the triangle's largest interior angle?

9. **4 points:** With new 3-D technology coming out, the founders of math decided to create a nifty new 3-D addition sign using nine unit cubes attached together as shown below. In order for it to truly pop out, they decided to add some color. How many square units of paint will they need in order to cover the entire surface of the plus sign?



10. **4 points:** What is the slope of a line that is perpendicular to the line whose equation is $2x + 3y = -2$? **Express your answer as a decimal.**

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Geometry – 7th Grade

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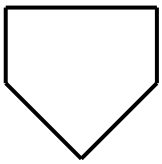


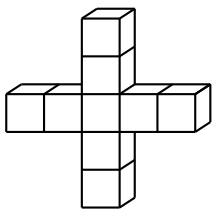
2. **2 points:** When the area of a square is increased by 25%, the new square has a side length of 15. What is the length of one of the sides of the original square? **Express your answer to the nearest tenth.**

3. **2 points:** What is the area of the triangle with vertices whose coordinates are $(3, 7)$, $(-4, 25)$, and $(3, 11)$?

4. **3 points:** Gary and Goldie, who were initially standing in the same spot, got in a fight and decided to walk far away from each other. They each walked 50 meters in opposite directions. Then, while still facing the opposite direction, they each turned clockwise 90 degrees and proceeded to walk another 40 meters. At that point, what was the distance between Gary and Goldie? **Express your answer to the nearest meter.**

5. **3 points:** Suppose that the sum of the two largest exterior angles of an isosceles triangle is 258 degrees. What is the degree measure of the triangle's largest interior angle?

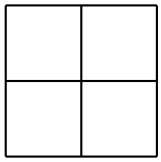
6. **3 points:** With new 3-D technology coming out, the founders of math decided to create a nifty new 3-D addition sign using nine unit cubes attached together as shown below. In order for it to truly pop out, they decided to add some color. How many square units of paint will they need in order to cover the entire surface of the plus sign?



7. **3 points:** What is the slope of a line that is perpendicular to the line whose equation is $2x + 3y = -2$? **Express your answer as a decimal.**

8. **4 points:** Suppose that successive isosceles right triangles are built such that the shorter leg of the next triangle is the same length as the hypotenuse of the previous triangle. If the shorter leg of the first triangle has a length of 4, what is the length of the hypotenuse of the 10^{th} triangle? **Express your answer to the nearest integer.**

9. **4 points:** The square below is made up of four unit squares. How many unique triangles with an area of 1 can be drawn such that each vertex of the triangle is on one of the vertices of the unit squares?



10. **4 points:** How many unique diagonals, from one vertex to another, can be drawn in a hexagonal prism?

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Geometry – 8th Grade

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1. **2 points:** Gary and Goldie, who were initially standing in the same spot, got in a fight and decided to walk far away from each other. They each walked 50 meters in opposite directions. Then, while still facing the opposite direction, they each turned clockwise 90 degrees and proceeded to walk another 40 meters. At that point, what was the distance between Gary and Goldie? **Express your answer to the nearest meter.**

2. **2 points:** Suppose that the sum of the two largest exterior angles of an isosceles triangle is 258 degrees. What is the degree measure of the triangle's largest interior angle?

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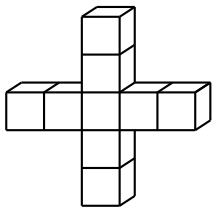

4. **3 points:** What is the slope of a line that is perpendicular to the line whose equation is $2x + 3y = -2$? **Express your answer as a decimal.**

5. **3 points:** Suppose that successive isosceles right triangles are built such that the shorter leg of the next triangle is the same length as the hypotenuse of the previous triangle. If the shorter leg of the first triangle has a length of 4, what is the length of the hypotenuse of the 10^{th} triangle? **Express your answer to the nearest integer.**

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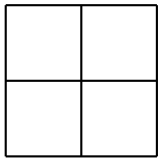
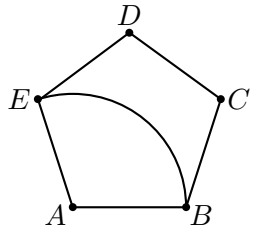


7. **3 points:** How many unique diagonals, from one vertex to another, can be drawn in a hexagonal prism?

8. **4 points:** In the regular pentagon shown below, the line segment $\overline{AB}$ is rotated about point A. If the perimeter of the pentagon is 60 units, what is the length of the arc BE that is formed? **Express your answer to the nearest tenth.**



9. **4 points:** On an analog clock, what is the first time after 1:00 where the minute hand and hour hand form a 90 degree angle? **Express your answer in the form ABC, where A:BC is the time rounded to the nearest minute.**

10. **4 points:** If a sphere is inscribed in a cube, and the cube's surface area is 216 square units, what is the volume of the sphere? **Express your answer to the nearest cubic unit.**