Washington State Math Championship

$\sqrt{2014}$

Ferndale Refinery

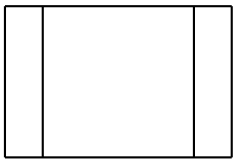
Blaine School District

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:** The ratio of the three angles in a triangle is $3 : 11 : 6$. What is the degree measure of the largest angle?

2. **2 points:** Two identical rectangles are drawn such that they overlap, as seen below, to form a square. If the area of the square is 36 and the perimeter of the newly formed rectangle is 30, what is the area of one of the original rectangles?



3. **2 points:** The supplement of an angle is three times the complement of the same angle. What is the degree measure of the original angle?

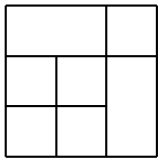
4. **3 points:** Suppose that a star shape is formed by attaching an equilateral triangle onto the outside of each side of a regular pentagon, such that each triangle shares one side with the pentagon. If the perimeter of the pentagon is 20, what is the perimeter of the star?

5. **3 points:** Marshawn and his younger brother Russ decided to race each other from one side of a circular race track to the other. Since Marshawn was faster, he ran around the outside of the track, while Russ ran straight across the diameter of the track. Assuming they began the race from the same spot at the same time and made it to the other side at the exact same time, how many times faster did Marshawn run than Russ? **Express your answer to the nearest tenth.**

6. **3 points:** A square with an area of 36 is centered at each corner of a square with an area of 16. What is the area of the region where all four of the larger squares overlap?

7. **3 points:** What is the area of a circle whose diameter begins at the point with coordinates $(2, 7)$ and ends at the point with coordinates $(6, 11)$? **Express your answer to the nearest square unit.**

8. **4 points:** How many rectangles are in the figure below?



9. **4 points:** A circular dartboard with a radius of 8 is divided into 20 congruent sectors, with each sector labeled with a unique number from 1 to 20, inclusively. Two other circles of radii 2 and 3 are drawn and are centered at the center of the dartboard. The "triple 20" region is the region that is bound by the two smaller circles in the sector labeled with the number 20. What is the area of that region? **Express your answer to the nearest tenth.**

10. **4 points:** On a rectangular prism, two of the faces have a surface area of 8, two faces have a surface area of 12, and two faces have a surface area of 24. What is the volume of the prism?

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Ferndale Refinery

Blaine School District

Geometry – 6th 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.

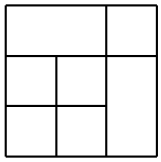
1. **2 points:** Suppose that a star shape is formed by attaching an equilateral triangle onto the outside of each side of a regular pentagon, such that each triangle shares one side with the pentagon. If the perimeter of the pentagon is 20, what is the perimeter of the star?

2. **2 points:** Marshawn and his younger brother Russ decided to race each other from one side of a circular race track to the other. Since Marshawn was faster, he ran around the outside of the track, while Russ ran straight across the diameter of the track. Assuming they began the race from the same spot at the same time and made it to the other side at the exact same time, how many times faster did Marshawn run than Russ? **Express your answer to the nearest tenth.**

3. **2 points:** A square with an area of 36 is centered at each corner of a square with an area of 16. What is the area of the region where all four of the larger squares overlap?

4. **3 points:** What is the area of a circle whose diameter begins at the point with coordinates $(2, 7)$ and ends at the point with coordinates $(6, 11)$? **Express your answer to the nearest square unit.**

5. **3 points:** How many rectangles are in the figure below?



6. **3 points:** A circular dartboard with a radius of 8 is divided into 20 congruent sectors, with each sector labeled with a unique number from 1 to 20, inclusively. Two other circles of radii 2 and 3 are drawn and are centered at the center of the dartboard. The "triple 20" region is the region that is bound by the two smaller circles in the sector labeled with the number 20. What is the area of that region? **Express your answer to the nearest tenth.**

7. **3 points:** On a rectangular prism, two of the faces have a surface area of 8, two faces have a surface area of 12, and two faces have a surface area of 24. What is the volume of the prism?

8. **4 points:** Cylindrical cans of soda that come out of the fridge can be tough to hold. So, Dawn decided to buy enough waterproof material that will cover a soda can that has a radius of 3 and height of 8. The radius of the covered can is 4. How much material was used? **Express your answer to the nearest cubic unit.**

9. **4 points:** An isosceles triangle is created such that the angle between the two congruent sides measures 120 degrees. If the area of the triangle is 12, what is the length of one of those two sides? **Express your answer to the nearest tenth.**

10. **4 points:** If each interior angle in a regular polygon is 162 degrees and each side has a length of 13, what is the perimeter of the polygon?

Washington State Math Championship

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Ferndale Refinery

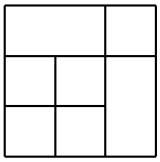
Blaine School District

Geometry – 7th 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:** What is the area of a circle whose diameter begins at the point with coordinates $(2, 7)$ and ends at the point with coordinates $(6, 11)$? **Express your answer to the nearest square unit.**

2. **2 points:** How many rectangles are in the figure below?



3. **2 points:** A circular dartboard with a radius of 8 is divided into 20 congruent sectors, with each sector labeled with a unique number from 1 to 20, inclusively. Two other circles of radii 2 and 3 are drawn and are centered at the center of the dartboard. The "triple 20" region is the region that is bound by the two smaller circles in the sector labeled with the number 20. What is the area of that region? **Express your answer to the nearest tenth.**

4. **3 points:** On a rectangular prism, two of the faces have a surface area of 8, two faces have a surface area of 12, and two faces have a surface area of 24. What is the volume of the prism?

5. **3 points:** Cylindrical cans of soda that come out of the fridge can be tough to hold. So, Dawn decided to buy enough waterproof material that will cover a soda can that has a radius of 3 and height of 8. The radius of the covered can is 4. How much material was used? **Express your answer to the nearest cubic unit.**

6. **3 points:** An isosceles triangle is created such that the angle between the two congruent sides measures 120 degrees. If the area of the triangle is 12, what is the length of one of those two sides? **Express your answer to the nearest tenth.**

7. **3 points:** If each interior angle in a regular polygon is 162 degrees and each side has a length of 13, what is the perimeter of the polygon?

8. **4 points:** Suppose that two line segments are drawn: the first from the point $(-2, 4)$ to the point $(-4, -2)$, and the second from the point $(5, 6)$ to the point $(7, -28)$. What is the shortest distance between the midpoints of each line segment?

9. **4 points:** What is the area of a pentagon whose vertices are the points with coordinates: $(0, 0)$, $(0, 3)$, $(4, 5)$, $(5, 3)$, $(5, 0)$?

10. **4 points:** If the center of a circle of radius 2 is placed at random in a circle of radius 4, what is the probability that the smaller circle will be fully contained either on or in the larger circle? **Express your answer as a percent.**

Washington State Math Championship

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Ferndale Refinery

Blaine School District

Geometry – 8th 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:** On a rectangular prism, two of the faces have a surface area of 8, two faces have a surface area of 12, and two faces have a surface area of 24. What is the volume of the prism?

2. **2 points:** Cylindrical cans of soda that come out of the fridge can be tough to hold. So, Dawn decided to buy enough waterproof material that will cover a soda can that has a radius of 3 and height of 8. The radius of the covered can is 4. How much material was used? **Express your answer to the nearest cubic unit.**

3. **2 points:** An isosceles triangle is created such that the angle between the two congruent sides measures 120 degrees. If the area of the triangle is 12, what is the length of one of those two sides? **Express your answer to the nearest tenth.**

4. **3 points:** If each interior angle in a regular polygon is 162 degrees and each side has a length of 13, what is the perimeter of the polygon?

5. **3 points:** Suppose that two line segments are drawn: the first from the point $(-2, 4)$ to the point $(-4, -2)$, and the second from the point $(5, 6)$ to the point $(7, -28)$. What is the shortest distance between the midpoints of each line segment?

6. **3 points:** What is the area of a pentagon whose vertices are the points with coordinates: $(0, 0)$, $(0, 3)$, $(4, 5)$, $(5, 3)$, $(5, 0)$?

7. **3 points:** If the center of a circle of radius 2 is placed at random in a circle of radius 4, what is the probability that the smaller circle will be fully contained either on or in the larger circle? **Express your answer as a percent.**

8. **4 points:** A regular hexagon is inscribed in a larger regular hexagon such that the vertices of the smaller hexagon are at the midpoints of each side of the larger hexagon. If the perimeter of the smaller hexagon is 72, what is the perimeter of the larger hexagon? **Express your answer to the nearest tenth.**

9. **4 points:** For an abstract art project, your teacher allows you to draw two circles and one triangle. What is the greatest possible number of intersection points?

10. **4 points:** A right circular cone-shaped cup with a radius of 3 inches and height of 7 inches is filled completely with water, but then starts to leak out of the bottom. Thankfully, there is a cylindrical-shaped cup with a radius of 4 inches and height of 1 inch beneath it specifically for that reason. When the cylindrical-shaped cup is full, what is the smallest distance between the vertex of the cone-shaped cup and the surface of the water? **Express your answer to the nearest hundredth of an inch.**