

Amador Valley Geometry Bee

May 28th, 2008

Rules and Format

- Contestants will have a time limit to solve each of the problems presented.
- Students remain in the competition until they are eliminated by a wrong answer.
- Once the number of contestants drops to five or less, we move on to the Championship Round to determine the Geometry Bee Champion.

Round I

45 seconds per problem

Box final answer

Calculators acceptable

Good Luck!

1

Find the next *THREE* terms in this sequence.

1, 1, 2, 3, 5, 8...

13, 21, 34

2

What is the perimeter of a square that has an area of 36?

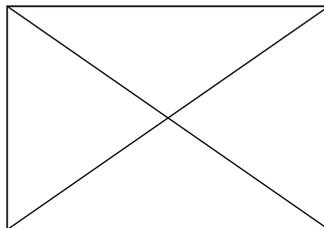
24

A=36

3

What is the sum of the lengths of the two diagonals in a 12 by 9 rectangle?

30



4

A bird flies 20 miles west, 5 miles north, then 8 miles east. How far is the bird from its starting location?

13 Miles

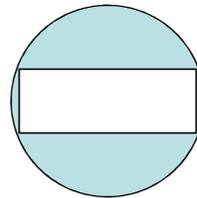
5

The lengths of two sides of an isosceles triangle are 9 and 20. What is the perimeter?

49

6

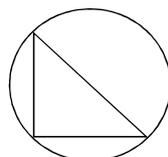
What is the circumference of a circle in which a 5 by 12 rectangle is inscribed?
Express your answer in terms of π .

 13π 

7

Find the radius of a circle, circumscribed around a triangle with side lengths 6-8-10.

5



8

Point $X(9,12)$ is translated to $X'(-6,-1)$. If the same translation rule is applied to point $Y(2, 15)$, what are the coordinates of Y' ?

$(-13,2)$

9

What are the next TWO terms in this pattern?

7, 8, 10, 14, 22, 38...

70, 134

10

The measures of the angles of a quadrilateral are $3x$, $8x$, $9x$, and $10x$. What is the measure of the greatest angle?

 120°

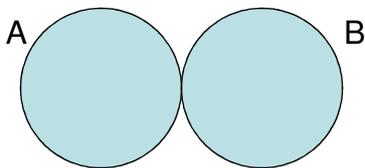
11

Point $P(4,5)$ is reflected across the y -axis to point P' , and then reflected across the x -axis to point P'' . What are the coordinates of point P'' ?

 $(-4, -5)$

12

Two congruent circles of radius 7 share one point of *common tangency*. If A is a point on one circle and B is a point on the other circle, what is the maximum possible length for the line segment AB ?



28

13

A goat is tied to a pole by a piece of rope. The length of the rope is increased from 5 meters to 10 meters. *How many more square meters* will the goat be able to graze? Express your answer in terms of π , and assume that the goat can move everywhere within reach of its rope with equal ease.

75 π

Round II

60 Seconds per question

Box final answer

Calculators acceptable

14

A regular polygon has interior angles measuring 168 degrees. How many sides does the polygon have?

30 sides

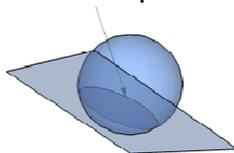
15

A triangle has side lengths 52, 52 and 40.
What is the area?

960 units²

16

A plane passes through a sphere forming an circular intersection with area 64π square centimeters. The perpendicular distance from the center of the sphere to the plane is 15 centimeters. How long is the radius of the sphere?



17 cm

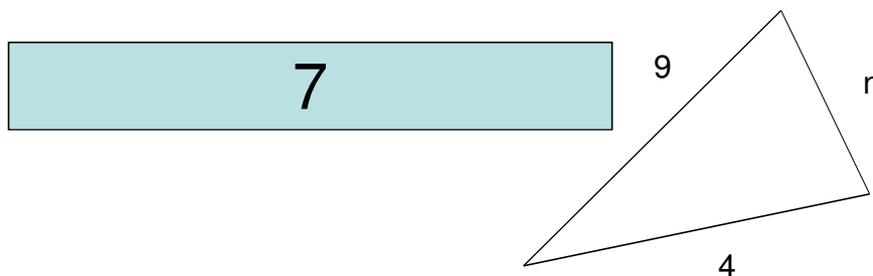
17

Point B(-6,-13) is reflected across point (-2,2). What are the coordinates of the image of B' under this reflection?

(2,17)

18

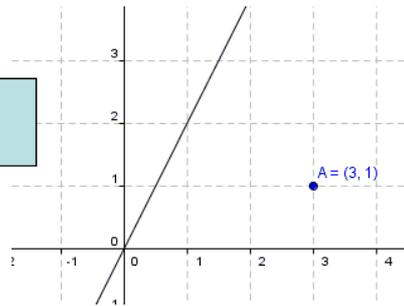
There exists a triangle ABC with side lengths 4, n, and 9. How many different integer values can n represent?



19

Point A(3,1) is reflected along the line $y = 2x$. What are the coordinates of the reflection?

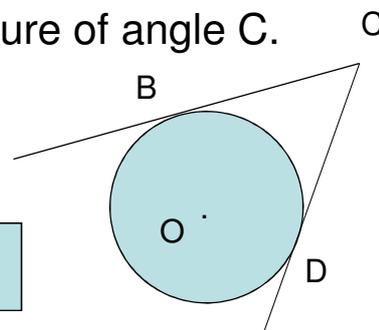
(-1,3)



20

Tangents BC and DC are drawn to circle O. If the measure of minor arc BD is 112 degrees, find the measure of angle C.

68 °



21

The length, width, and height of a rectangular prism are in the ratio 4:2:1. The volume of this box is 64. What is the total surface area?

112 units²

22

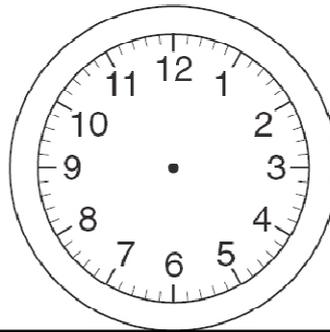
What is the area of a triangle whose vertices are (-3,-2), (3,6), and (5, -2)?

32

23

Through how many degrees does the minute hand of a clock move from 1:24PM to 1:50PM of the same day?

156°

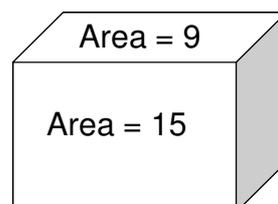


24

The dimensions of a rectangular box are positive integers. If the area of one side is 9 and the area of another side is 15, what is a possible volume of this box?

$V = 135$ or

$V = 45$



Round III

90 seconds per problem

Box final answer

Calculators acceptable

25

You have a cylindrical barrel with a radius of 1 meter and a height of 2 meters. How many complete barrels of water are required to fill an empty cylindrical fish tank with a height of 4 meters and a radius of 2 meters?

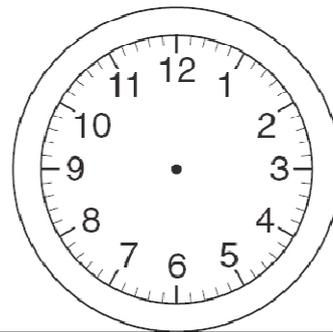
w
a
t
e
r

8 barrels

26

What is the degree measure between the hour and minute hand at 3:30?

75°



27

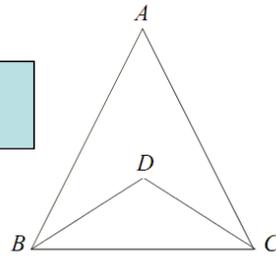
A rectangular prism has the volume of 80 cubic centimeters. If each side length of the prism is an integer, find the minimum surface area.

112 units²

28

AB and AC are equal in length. BD and CD are both angle bisectors. If Angle A has a measure of 50 degrees, what is the measure of angle BDC?

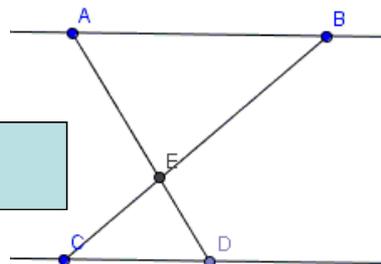
115°



29

Lines AB and CD are parallel. If the length of AE is 12, the length of ED is 8, and the length of BC is 30, then what is the length of segment BE?

18



30

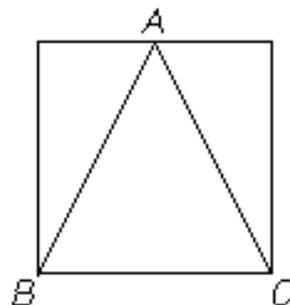
A point is randomly chosen inside of the triangle $A(0, 5)$ $B(6, 0)$ $C(0, -3)$. What is the probability that both coordinates will be positive?

$5/7$ or 71.4%

31

AB and AC both measure 5 and are inscribed in a square. Find the area of the square.

20



32

The points A, B, and C lie on a circle that has a radius of length 4. If the length of arc ABC is $4\pi/3$, what is the length of line segment AC?

4

33

Four sheep are tethered at 4 corners of a square field of side length 60. Their grazing areas will never overlap. What is the smallest area of the field that will never get grazed? Express your answer in terms of π .

 $3600 - 900\pi$

34

The diameter of circle X is equal in length to a side of a square, while the diameter of circle Y is equal in length to a diagonal of the same square. The area of circle Y is how many times the area of circle X?

2

Championship Round

120 seconds per problem

Box final answers

Calculators acceptable

All students will attempt all six questions

Scores will determine final rankings

Ties will be decided by tie-breakers

Championship Round Question 1

A sphere is inscribed inside a cube with edge length 20. What is the shortest possible distance from a vertice of the cube to the surface of the sphere?
Express your answer in radical form

$$20\sqrt{3} - 10$$

Championship Round Question 2

A 3x4x5 box is placed on top of a 6x7x8 box. Calculate the minimum exposed surface area of the two-box figure.

$$329$$

Championship Round Question 3

Triangle ABC exists such that C is a right angle. $AC = 8$ and $CB = 9$. There lies a point X on AC and a point Y on CB such that $AX = XY = YB$. Find the length of XY.

10

Championship Round Question 4

Three vertices of a unit cube are connected to form a triangle. What is the maximum perimeter of this triangle? Express your answer in radical form.

$3\sqrt{2}$

Championship Round Question 5

How many rectangles with area 8 can be formed on an 8x8 grid, if all sides of the rectangle must be horizontal or vertical and all vertices of the rectangle must be a point on the 8x8 grid?

86

Championship Round Question 6

Three faces of a rectangular prism with integer side lengths have areas 143, 221, and 187. What is the radius of the largest sphere that can fit into this prism?

5.5

Tiebreakers

- This round is based on speed
- When you get your answer, box it and raise it.
- The judges will check it.
- First person to answer the question correctly wins the tiebreaker

41 (Tiebreaker)

In parallelogram $ABCD$, EC is an extension of line BC . If the area of triangle ADF is 16 and the area of triangle FEC is 4, then what is the area of the parallelogram?

