

February 2002 Invitational GEOMETRY TEAM QUESTION 1

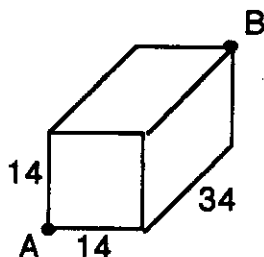
The vertices of triangle $\triangle ABC$ are $A(-2, 2)$, $B(-4, 4)$, and $C(2, 2)$. What is the equation of the line that contains the altitude from B to \overline{AC} ?

GEOMETRY TEAM QUESTION 2

Find the area bounded by the x -axis and the lines $y = 2x + 3$, $x = 2$, and $x = 6$.

GEOMETRY TEAM QUESTION 3

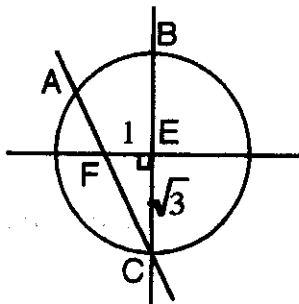
Warren the ant is at point A , which is a vertex of the right prism below. The ant wants to travel to point B , which is the vertex opposite of A . What is the length of the shortest path Warren can take to achieve his goal assuming he must walk on the outside of the box and there are six whole sides of the box?



GEOMETRY TEAM QUESTION 4

Using the circle below, find the arc length of arc AB .

$EF = 1$, $EC = \sqrt{3}$



GEOMETRY TEAM QUESTION 5

What is the sum of the exterior angles of a pentagon using only one exterior angle at each vertex?

GEOMETRY TEAM QUESTION 6

A triangle has one side of length 7 and another side of length 9. What is the sum of the possible integer lengths of the third side?

GEOMETRY TEAM QUESTION 7

An icosahedron is a 3-dimensional figure that has a certain polygon as its faces. What is the sum of the degrees of that polygon?

GEOMETRY TEAM QUESTION 8

Given: A = the circumference of a circle with area of 441π .

B = the perimeter of the square that is circumscribed about a circle, which is circumscribed about another square. A side of the inner square is of length $\pi\sqrt{2}$.

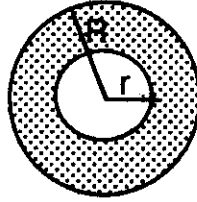
C = the perimeter of an equilateral triangle with area of $\pi^2\sqrt{3}$.

D = the radius times the diameter divided by π , of a hemisphere whose volume is $18\pi^4$.

Find $\frac{D + B + A + C}{29\pi}$ as an exact answer.

GEOMETRY TEAM QUESTION 9

Find the exact area of the shaded region if $r=8$ cm and $R=16$ cm. R is the radius of the larger circle and r is the radius of the smaller circle.



GEOMETRY TEAM QUESTION 10

Given: A = the area of a regular hexagon with a side of 8.

B = the perimeter of a regular octagon with an apothem of length 6 (rounded to the nearest integer).

C = the area of a triangle whose vertices lie on the points $(2,-1)$, $(-2,1)$ and $(0,5)$

D = the volume of a square pyramid with base length of $5\sqrt{2}$ and height of 12.

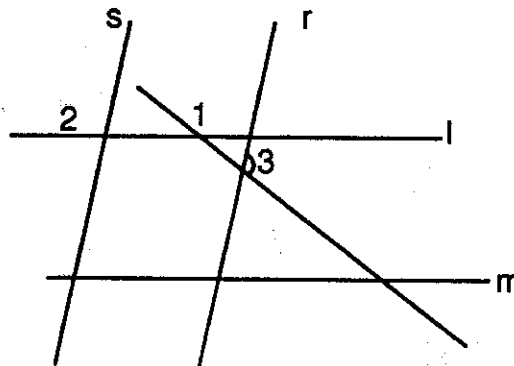
Find $\frac{CD\sqrt{3}}{AB}$ in lowest terms.

GEOMETRY TEAM QUESTION 11

Ogre is the captain of a Carribean Pirate ship. After plundering a village of natives, Ogre and his crew sailed north of the perfectly calm and motionless waters of Crowbean Ocean. After sailing north at 16 miles per hour for 45 minutes, the ship instantly turned and headed west. They then traveled at 60 miles per hour with a much stronger wind for 5 minutes when suddenly they ran into Travish Reef and sank. How far was the ship from the native's shore when it sank? Answer in miles. No natives were injured in the making of this question.

GEOMETRY TEAM QUESTION 12

Lines l and m are parallel and lines r and s are parallel. $\angle 1 = 133^\circ$ and $\angle 2 = 98^\circ$. Find the measure of $\angle 3$. The figure is not drawn to scale.



GEOMETRY TEAM QUESTION 13

You have a sequence of numbers. The first five terms are 1, 3, 6, 10, 15. What is the formula for the n th term of the sequence?

GEOMETRY TEAM QUESTION 14

A polyhedron has 73 edges and 35 faces. How many vertices does it have?

GEOMETRY TEAM QUESTION 15

Find the length of EF in the figure below if $AB=8$, $AC=9$ and $AD=5$. $ABCD$ is a parallelogram and is not drawn to scale.

