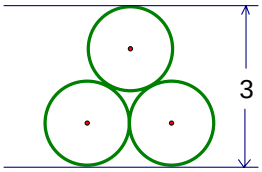
ROUND I

1. If 5 elephants can eat 200 peanuts in 8 minutes, how many elephants are needed to eat 350 peanuts in 10 minutes?

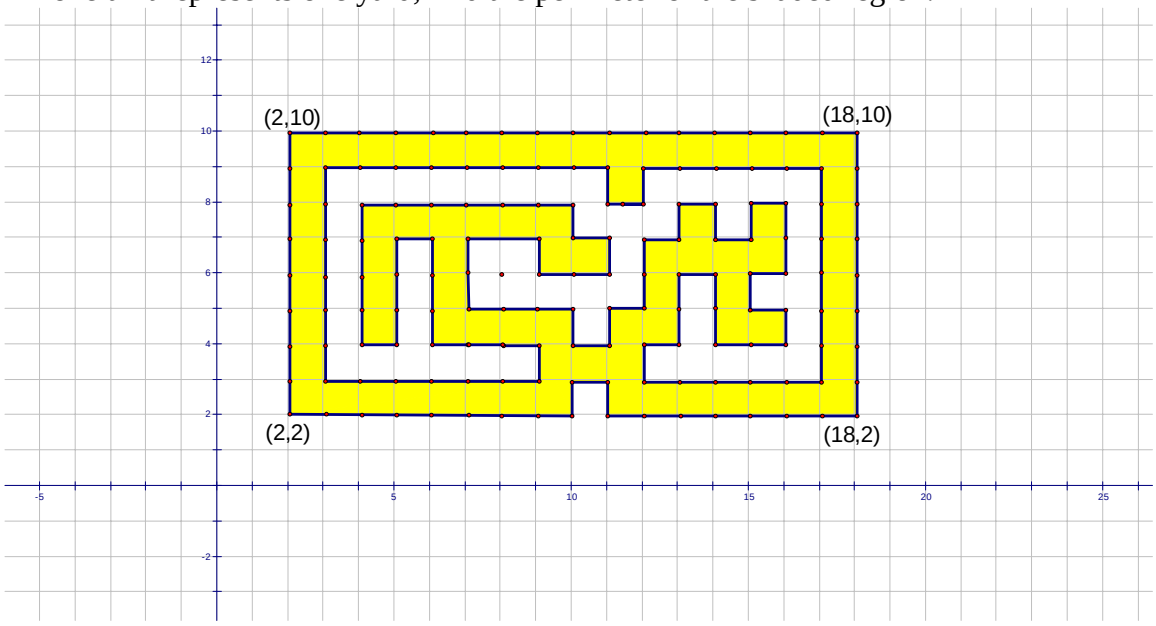
2. Three circles with the same radius are tangent to each other as shown below. If the height of the shape is 3, then what is the radius of each circle?



3. Three iron cubes with side lengths 3, 4, and 5 respectively were melted down to cast a bigger cube. What is the ratio of the surface area of the new cube to the sum of the surface areas of the original three cubes?

4. Let $y = (x-1)^2 + (x-2)^2 + (x-3)^2$. For what value of x, does y reach a minimum?

5. If all corners of the following shaded region have integer coordinates and in the scale drawing one unit represents one yard, find the perimeter of the shaded region.



6. A group of 200 tourists arrived in Paris. Of those tourists, 78 knew neither French nor English, 75 knew French, and 97 knew English. How many tourists knew both French and English?

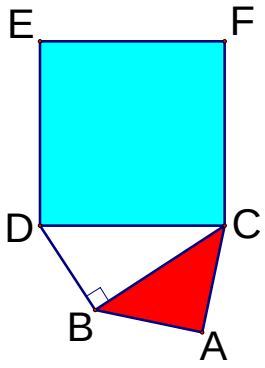
7. Write the expression $\sqrt{3+2\sqrt{2}}-\sqrt{27+10\sqrt{2}}$ as an integer without using radicals and exponents.

8. Find the radius of the circle $4x^2+12x+4y^2-20y-15=0$.

ROUND II

1. How many terms are there in the simplified expansion of $(x+y+z)^3$?

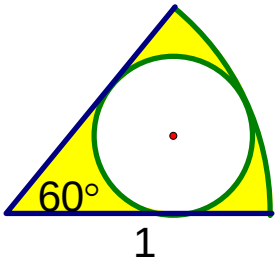
2. In the accompanying figure ΔABC is an isosceles right triangle with the right angle at A and each leg's length equals to 28 cm. The triangle ΔDBC is a right triangle in which the leg BD is 21 cm. What is the area of the square DEFC?



3. Base b of a triangle is doubled. How much must be **Taken** from the corresponding altitude h so that the area of the new triangle is one-half of the original triangle?

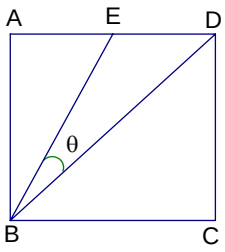
4. The first two terms of a geometric sequence are $\sqrt[9]{3^7}$ and $\sqrt[3]{9}$. What is the fourth term of the sequence?

5. A circle is inscribed in a 60° sector of a circle with radius 1. Find the area of the shaded region.



6. In a group of 200 rabbits, 85 have some black on them and 150 have some white. There could be rabbits with no black or no white. At least how many rabbits have both black and white on them?

7. In this figure, point E is the midpoint of AD of square ABCD. Find the value of $\sin\theta$.



8. Solve the equation $\sqrt{2x-1}=x-2$.