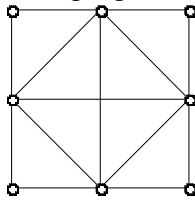


**Illinois Mathematics and Science Academy**  
**Mu Alpha Theta's**  
**2001 Junior High Math Contest**  
**Eighth Grade Team**

1. Seven days from Monday, it will be Monday again. What day will it be 10,000 days from Monday?

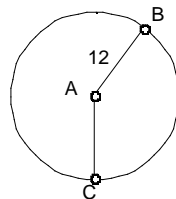
2. What is the measure of the acute angle formed by the minute and hour hands of a clock at 3:30?

3. How many triangles are in the following figure?



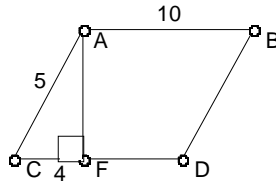
4. Within triangle ABC, the measure of angle A is 3 times that of angle B. The measure of angle C is half the measure of angle B. What is the degree measure of angle A?

5. Given that circle A has a radius of 12 and angle BAC is  $135^\circ$ , calculate the length of the arc BC.



6. Using 125 small cubes a bigger  $5 \times 5 \times 5$  cube is formed. How many of these small cubes can a person see from the outside, without taking the cube apart? (Hint: the person is allowed to move around and look at the cube from different sides)

7. Find the area of parallelogram  $ABDC$  given  $\angle AFC$  is a right angle,  $CF=4$ ,  $CA=5$ , and  $AB=10$ .

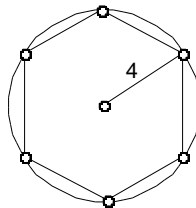


8. In triangle  $ABC$ , vertex  $A$  is at point  $(1,2)$  and vertex  $B$  is at point  $(3,0)$ , find all possible ordered pairs for vertex  $C$  so that  $\angle C$  is a right angle and  $AC=BC$ .

9. The outside of a box measures 10 inches in length, 8 inches in width, and 5 inches in height. If the board from which it was made is 1 inch thick, what is the capacity of the box? (The box has 6 faces.)

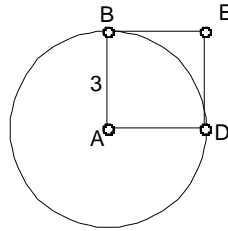
10. Class A and class B have a total of 83 students, class B and class C have a total of 86, while class C and class D have 88 students altogether. How many students are there in total in classes A and D?

11. A regular hexagon is inscribed in a circle of radius 4. Find the area of the hexagon.



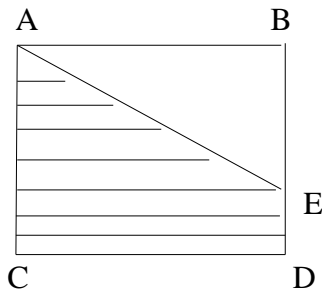
12. A squirrel is collecting nuts. He collects 20 every day when it's sunny and 12 on every rainy day. Over a few days he collected 112 nuts, with an average of 14 nuts per day. How many days were rainy?

13. Square ABED is tangent to circle A of radius 3 at points B and D. What is the area inside of the square but outside of the circle?



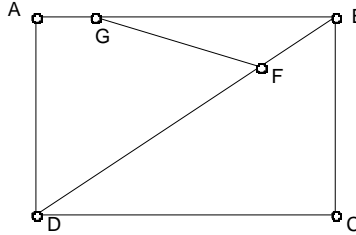
14. Given any three digits from  $\{1, 2, 3, \dots, 9\}$ , a set of 6 three-digit numbers can be formed by rearranging the digits. If the sum of a set of six such numbers is 1332, what are the digits?

15. Rectangle ABCD is separated into two portions by AE. It is given that  $AD = 10$  cm and  $AB = 8$  cm. If you know the area of the shaded portion is  $20\text{cm}^2$  greater than that of the white portion, then what is the area of the shaded portion?



16. Bob is reading a book. He reads a certain number of pages every day, starting with 40 on the first day. From the second day, the number of pages he reads increases by 5 each day, until the last day when he reads 85 pages and finishes his book. How many pages are there in this book?

17. ABCD is a rectangle with area 60. If  $BF = (1/3)DF$  and  $AG = (1/2)BG$ , what is the area of triangle GFB?



18. If  $x = a/(b+c) = b/(c+a) = c/(a+b)$ , and  $a+b+c$  does not equal to 0. Find the value of  $x$ .

19. A rectangle and a square have the same areas. The longer side of the rectangle is  $5/4$  the length of a side of the square and the shorter side is 2cm shorter than the side of the square. What is the length of a side of the square?

20. A student asks her math teacher what his age is and gets the following reply, “When I was your age, you were only 3. By the time you are my current age, I will be 39.” How old is the teacher now?