

palette of problems

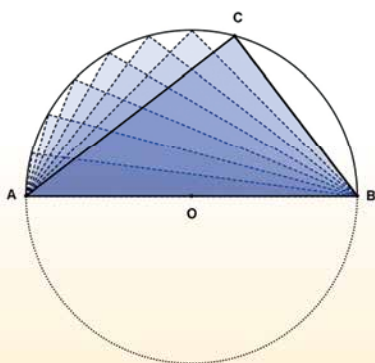
Matt B. Roscoe and Steve Pelikan

1. Once the water in 1 cubic foot of seawater has evaporated, 2.2 pounds of salt remain. How many cubic inches of seawater would be required to meet the recommended daily allowance of 6 grams of salt per person per day? (Note: 1 kg \approx 2.2 lbs.)

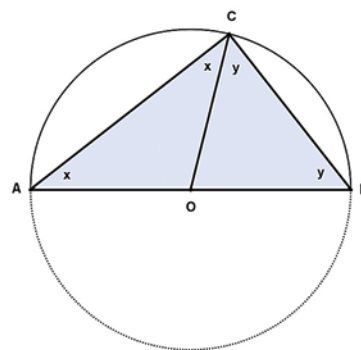
2. Use the information from problem 1. How many cubic feet of sea water would have to evaporate to meet the recommended daily allowance of salt for 10,000 people for 365 days?

3. A turtle fell to the bottom of a deep well. The turtle climbed up 2 meters on the first day, but slipped back 1 meter as he rested. The second day, the turtle climbed double the distance of the previous day but slipped and lost $\frac{1}{2}$ of the day's climbed distance as he rested. This pattern continued until the end of the fourth day, when the turtle realized he was halfway to the top of the well. How deep was the well?

4. The image below shows a series of triangles. Points A , B , and C are on the circle, line segment AB is a diameter of the circle, and O is the center of the circle. Make a conjecture about the type of triangle that results from this construction.



5. Line segment OC is added to problem 4's figure. Explain why $m\angle CAO = m\angle OCA = x$ and $m\angle OCB = m\angle OBC = y$.



6. Use the diagram in problem 5 to prove the conjecture that you made in problem 5. (Hint: What is the sum of the measures of the 3 interior angles of a triangle?)

7. At A Carousel for Missoula, you can ride a mechanical pony in a circle. If the ride lasts 4 minutes and completes 25 revolutions, determine the average speed, in miles per hour, of a person who is sitting on a pony 18 feet from the center of the circular carousel.

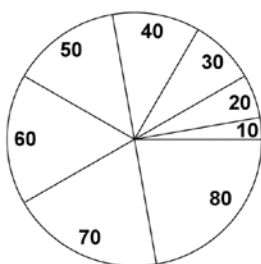


8. What is the first month following September that will always begin on the same day of the week as September?

9. A survey of cell phone usage was conducted. University students were observed walking between classes at 12:00 noon, and their cell phone usage was tallied. On the same day, city workers were observed walking on the sidewalk at 12:00 noon. Their cell phone usage was also tallied. Is there evidence that one group used its cell phones at 12:00 noon at a higher rate than the other? Explain.

Group	Using a Cell Phone	Not Using a Cell Phone	Total
University students	56	87	143
City workers	78	121	199
Total	134	208	342

10. A circular spinner is constructed such that each sector of the spinner corresponds to a central angle of 10, 20, 30, 40, 50, 60, 70, and 80 degrees. The sectors are labeled with the values 10, 20, 30, 40, 50, 60, 70, and 80, respectively. Suppose that the spinner is spun twice and the resulting values are summed. What is the probability that the resulting sum is equal to 100?



11. A length of 52-inch wire is cut into 2 pieces. Each piece is then formed into a square. The combined area of the two squares is 97 square inches. What is the positive difference in the lengths of the sides of the squares?

12. Four new students were placed in Mr. Smith's home-room. After looking around the room, Mr. Smith, a math teacher, said, "There are just 1680 ways you can sit in the empty seats in this room." How many empty seats were in the classroom?

13. The arithmetic mean of 5 numbers is 100. The mean of 2 of these numbers is 85. What is the mean of the other 3 numbers?

14. If Q is a convex quadrilateral, which is larger: the sum of the lengths of the diagonals of Q or the sum of the side lengths of Q ?

15. I can walk at 2 miles per hour (mph) and jog at 5 mph. I get home from the bus stop 4 minutes quicker if I jog instead of walk. How far is it from my home to the bus stop?

16. Bill is \$23 short of having enough money to buy a gold coin. Charlie is \$28 short of the money needed to buy the same gold coin. Together, they have just enough money to buy the coin. How much does the coin cost?

(Answers on page 127)

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The solutions to the Palette of Problems are online at www.nctm.org. Online solutions are available to NCTM members only.