

palette of problems

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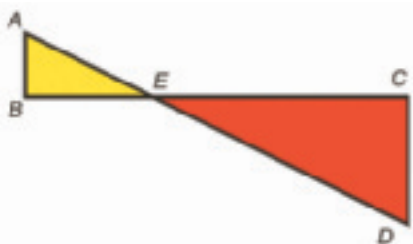
1. Here are the rules for the double-or-half game: An amount of money is put in a pot; at the beginning of each round, \$1 comes out of the pot; then a coin is tossed.

- If it lands heads, the pot is doubled.
- If it lands tails, only one-half of the money is left in the pot.

a. You put \$4 in the pot and play three rounds. In the first round, heads is tossed; second round, tails; third round, tails. How much money is in the pot?

b. You play three rounds and all three coin tosses are tails. If \$3 is in the pot, how much was in the pot originally?

2. In the figure below, the length of AB is 61 units, the length of BC is 240 units, and the length of CD is 100 units. If $\angle B$ and $\angle C$ are right angles, what is the length of AD ? (Note: The figure may not be drawn to scale).



3. Ashwin draws a circle. If he increases the length of its radius by 4 cm, the area is quadrupled. What is the radius of his original circle?

4. Maya and Pilar each choose a number. Maya's number is the sum of the 4th and 5th Fibonacci numbers. Pilar's number is the difference between the 7th and 5th Fibonacci numbers. Whose number is larger, and by how much? (Assume that the first two Fibonacci numbers are 1 and 1.)

5. Suppose that Maya and Pilar each choose another number. Maya's number is the sum of the 24th and 25th Fibonacci numbers. Pilar's number is the difference between the 27th and the 25th Fibonacci numbers. Whose number is greater?

6. A regular hexagon is inscribed in a circle. The circle is inscribed in a square. If the side length of the square is 25 cm, what is the length of each side of the hexagon?

7. Find the degree measure of an angle whose complement is 40% of its supplement.

8. Each face of an octahedron in Mr. Jaffe's class is a unique color. If you toss the octahedron twice, what is the probability that it lands on the same colored face both times?



9. Two sides of a triangle measure 13 meters and 8 meters. How many integer lengths of the third side are possible?

10. Rose has made 10 cups of punch by using three times as much lemonade as grape juice. Amanda drinks 1 cup, then realizes that Rose needs a full 10 cups of the punch. She tries to help by adding 1 cup grape juice to the pitcher. What is the ratio of lemonade to grape juice in the punch, using whole numbers in both parts of the ratio?

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For questions 11 and 12: A circular disk with an 8-inch radius is painted to resemble a target. The inner circle is red, the middle ring is yellow, and the outer ring is blue. The red circle in the middle covers 10% of the target's total area. The blue outer ring covers all points on the target that are farther than 6 inches from the center. The yellow ring contains all the points between these red and blue regions. Round your answer to the nearest hundredth of an inch.

11. What is the radius of the red inner circle?

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12. What is the area of the middle yellow ring?

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13. Find my number using these clues:

- It is 1 less than a prime number.
- It is more than 5 but less than 45.
- The sum of its digits is a prime number.
- It is the largest number that satisfies the three clues above.

14. Karina has a piece of wire that is 16 inches long. Use this fact to answer the following questions. Round your answers to the nearest tenth.

- a. What are the dimensions of a rectangle with the largest area using this wire?
- b. What will be the area inside a semicircle made from this wire?
- c. Suppose that Karina cuts the wire into 2 pieces to make 2 squares such that the area of 1 square is twice the area of the other. What is the side length of the larger square?

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15. Dan baked at least two dozen cookies but fewer than 60 cookies. If he divides the cookies evenly among 7 plates, 4 cookies are left over. If he divides the cookies evenly among 6 plates, 5 cookies are left over. How many cookies did Dan bake?

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16. The rectangular base of a box has a perimeter of 2 feet. The base is twice as long as it is wide. Victoria plans to cover the top and bottom with colored paper, which costs 5 cents per square inch. She then plans to cover the other 4 faces with white paper, which costs 1.5 cents per square inch. How much money will Victoria spend to cover the box with paper? Assume that there is no waste.

