# palette of problems

Joel Amidon and Matt Roscoe

**1.** The Green Bay Packers football team has retired uniform numbers 3, 4, 14, 15, 66, and 92. What is the smallest positive integer that is divisible by each of the retired uniform numbers?

**2.** Given 3 quarters and 7 dimes, how many different amounts of money can be created using one or more coins?

**3.** What is the smallest integer greater than 1 that is both a perfect square and a perfect cube?

**4.** Each letter in the words "APRIL FOOLS" is written on a card and put into a box. Cards are pulled from the box, one at a time. Each card is returned to the box after it is drawn. Which word has less chance of being pulled: SAP or FOOL?

**5.** A rectangular plot of land is divided into 4 parcels with integer dimensions (see the diagram, which is not to scale). Parcels A and D are square plots with a combined area of 898 ft.$^2$. Parcel B has an area of 351 ft.$^2$. How wide is the rectangular plot of land?

| | |
|---|---|
| A | B |
| C | D |

**6.** Ducks for Bucks is sending 4620 rubber ducks to The Squeaky Clean Toy Store. There are 12 rubber ducks packed in a box, $c$ boxes packed in each crate, and 7 crates in a container. If $c$ is less than the number of ducks in a box and greater than the number of crates in a container, then how many containers is Ducks for Bucks shipping to the Squeaky Clean Toy Store?

**7.** An equilateral triangle has an altitude that is equal to the distance between parallel sides of a regular hexagon. What is the ratio of the perimeter of the hexagon to the perimeter of the triangle?

**8.** An equilateral triangle has an altitude that is equal to the distance between parallel sides of a regular hexagon. What is the ratio of the area of the hexagon to the area of the triangle?

**9.** Robby is tiling a rectangular wall and needs exactly 1320 square tiles for his project. When he goes to the store, he notices that the tiles are twice as wide as he thought they were. He decides to buy only half as many tiles. As he nears the end of his project, he notices a problem. What is the problem?

**10.** A driver in a car on the Going-to-the-Sun Road in Glacier National Park climbs 3050 feet while traveling 10.5 miles. On average, how many feet will the car climb for every 100 feet traveled?

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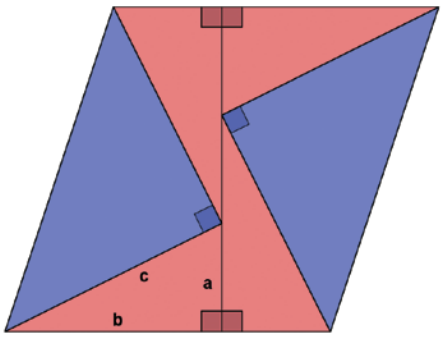
**11.** A recent sale on Cheerios® cereal offered two pricing options: Two 14 oz. boxes for $5.00 or one 8.9 oz. box for $2.99. Which option offers the better deal to the buyer? Explain.

**12.** The figure below shows 4 congruent right triangles in pink and 2 congruent right triangles in blue. Find an expression for the area of the figure by adding the area of the 6 right triangles.




**13.** The figure above is a parallelogram because it is a quadrilateral with two pairs of parallel sides. Find an algebraic expression for the area of the figure using the area formula for a parallelogram.

**14.** What well-known theorem is demonstrated by equating the area expressions found in problems 12 and 13?

**15.** In an experiment, 100 thumbtacks were spilled randomly on the floor and the number of tacks pointing up was recorded. The experiment was repeated 5 times. From the results below, estimate the probability that a tack dropped on the floor will point up.

| Trials | 100 | 100 | 100 | 100 | 100 |
|---|---|---|---|---|---|
| Point up | 39 | 45 | 52 | 40 | 47 |

GABY KOOIJMAN/THINKSTOCK

**16.** A set of 7 distinct positive integers has a mean of 40 and a median of 40. What is the largest possible integer that this set can contain?

(Answers on page 510)

(*Ed. note*. Online solutions are available to NCTM members only.)