1. At the Orange Julius store, the prices for Premium Fruit Smoothies for 12, 21, 24, and 32 ounce servings are $3.75, $4.50, $5.50, and $6.00, respectively. Is price a linear function of serving size?

2. A saltwater pool manufacturer suggests that 427 pounds of salt be added to a pool with a volume of 16,000 gallons to achieve the proper concentration. How many pounds of salt should be added to a pool that is 22,000 gallons to achieve the same level of concentration?

3. Is this assertion true: A semicircle constructed on the hypotenuse of a right triangle is equal in area to the sum of the areas of the two semicircles constructed on the legs? Explain how you know. (Hint: Don’t forget Pythagoras.)

4. What is the least positive integer that has only 1’s and 0’s as digits and is a multiple of 75?

5. A student in seventh grade claims to be able to predict the outcome of a coin toss. To test the claim, the student is asked to predict the next 4 outcomes of a flip of a fair coin. The student correctly guesses 3 out of 4 flips of the coin. What is the probability that the student achieved the outcome just by guessing?

6. What fraction is located 3/4 of the distance between 1 2/3 and 4 1/2?

7. Amanda has purchased a new aquarium that is built in the shape of a cylinder. The diameter of the cylinder is 2 feet, and its fill height is 15 inches. What is the whole number of gallons of water Amanda should purchase to have enough to fill her aquarium? (Hint: There are 231 cubic inches in a gallon.)

8. Jenny has a bag of chocolates. If she divides the individual pieces equally among 6 friends, there will be 2 pieces leftover. If she divides the chocolates among the 5 members of the debate club, there will be 1 piece leftover. What is the smallest possible number of chocolates that Jenny has? Could she have some other numbers of chocolates?
9. Sally is making 24 Valentine’s Day cards that look exactly the same. She folds a rectangular piece of paper that measures 3 in. × 5 in. when closed. The fold can be along the 5 inch edge or along the 3 inch edge of the card. The construction paper that Sally uses comes in 10 in. × 15 in. sheets. Which card shape uses the smallest number of sheets of paper? How many sheets of construction paper will Sally need?

10. What is the smallest positive integer $n$ so that $n + 125$ and $n + 201$ are both perfect squares?

11. There are 20 students in the cast and crew of the school play. Any group of 7 or more of these students must contain at least 1 boy. What’s more, any group of size 15 must contain at least 1 girl. How many boys are working on the play?

12. While catering a party, Lori spent 1/4 of the time shopping, 1/3 of the time cooking, and 2 hours cleaning up. How long did she work?

13. Allan, Barbara, and Cathy can each eat a whole pizza by themselves in 20 minutes, 1 hour, and 1/2 hour, respectively. How long will they take if eating a pizza together?

14. Ken works part time after school at the food mart. Last month, Ken’s boss cut his pay by 20%. When Ken complained that this was not fair and promised to quit if his pay was cut, his boss relented and gave him a 20% raise. Ken quit anyway. Why?

15. A rectangular box has faces with areas of 12, 15, and 20 square units. What is the volume of the box?

16. If you pick three vertices of a regular hexagon at random and connect them, what is the probability that you will get an isosceles triangle? The diagrams below show a nonexample (at left) and an example (at right).

(Answers on page 63)