2017
Leap Frog Relay Grades 6-8
Part I

No calculators allowed
Correct Answer $= 4$ **points**
Incorrect Answer $= -1$ **point**
Blank = 0 points

1. Jaime went to the Big 5 store to buy running shoes. To his pleasant surprise, all running shoes were on a 20% discount sale that day. Jaime also knew that he had to pay a 7.5% sales tax on the discounted price. He had \$60. What is the original (before discount) price of the most expensive shoes he could afford to buy out of the list of prices below?

   a. \$67.42

   b. \$69.50

   c. \$69.76

   d. \$79.78

   e. \$87.50

2. What is the ratio of the number of even divisors to the number of odd divisors for the number 792?

   a. 3 : 1

   b. 2 : 1

   c. 1 : 1

   d. 1 : 2

   e. 1 : 3

3. How many different teams of 4 representatives can be selected from a group of 7 people?

   a. 24

   b. 28

   c. 35

   d. 840

   e. None of the above

4. I gave a value to every vertex of a cube. The value of an edge is the sum of the values of the vertices at its ends. The value of a side is the sum of the values of the edges surrounding it. The value of a cube is the sum of the values of its sides. What is the value of the cube if the sum of the values of its vertices is 256?

   a. 768

   b. 1024

   c. 1280

   d. 1536

   e. 2048

5. A very thin wire is going upwards in a spiral from the bottom of a cylinder to the top, rising by the same rate all along, making 9 complete rotations around the cylinder. The radius of the cylinder is 12 centimeter, and its height is 2 meter. Which of the following quantities is the closest to the length of the wire?

   a. $3.8m$

   b. $4.5m$

   c. $5.4m$

   d. $6.3m$

   e. $7.1m$

6. If you roll two fair dice, what is the probability that the product of the two numbers showing up on the top faces is more than 6?

   a. $\frac{7}{12}$
   b. $\frac{11}{12}$
   c. $\frac{7}{18}$
   d. $\frac{11}{18}$
   e. $\frac{11}{36}$

7. The gas consumption of Peter's is car 28 miles per gallon. Juanita's car uses 7 liters of gas on 100 kilometers. Carla's car used 7 gallons of gas on a 300 kilometer trip. (Hint: 1 gallon is 3.6 liter, and 1 mile is 1.6 kilometer.) Which of the following statements is true?

   a. Peter's car uses less gas on 100 miles than Carla's, but more than Juanita's.
   b. Peter's car uses less gas on 100 miles than both Carla's and Juanita's.
   c. Carla's car uses less gas on 100 miles than both Juanita's and Peter's.
   d. Juanita's car uses less gas on 100 miles than Carla's, but more than Peter's.
   e. Juanita's car and Carla's car uses the same amount of gas on 100 miles.

8. For any positive integer n, define $S(n)$ to be the sum of the positive factors of n. For example, $S(10) = 1 + 2 + 5 + 10 = 18$. Find $S(S(14))$.

   a. 15
   b. 24
   c. 60
   d. 196
   e. 210

9. The base of an isosceles triangle is 24 inches and its area is 60 square inches. What is the length of one of the congruent sides?

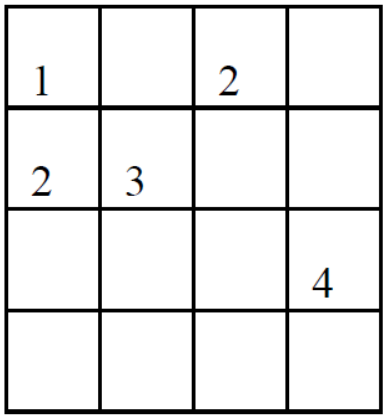
   a. 5 inches

   b. 13 inches

   c. 15 inches

   d. 20 inches

   e. 36 inches



10. To complete the grid seen above, each of the digits 1 through 4 must occur once in each row and once in each column. What number will occupy the lower right-hand cell?

    a. 1

    b. 2

    c. 3

    d. 4

    e. Cannot be determined

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Part II

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Blank = 0 points

11. Esperanza is dropping a ball and watching it bounce. If she drops the ball from the top of an 18 foot playground, and every time it rebounds to half the height it was at before, how far does the ball travel by the time it hits the ground for the third time? (The ball bounces straight up and straight down.)

    a. 54 feet

    b. 9 feet

    c. 31.5 feet

    d. 27 feet

    e. 45 feet

12. Sabrina runs at 7 miles per hour for 1 minute, then walks at 3 miles per hour for 1 minute, then runs at 5 miles per hour for 2 minutes, then walks at 3 miles per hour for 1 minute. She repeats this 5 times. What was the total distance she ran and walked?

    a. 15 miles

    b. 15/6 miles

    c. 23/12 miles

    d. 18 miles

    e. 2 miles

13. Suppose Addi, Manit, and Gaby are making lemonade. They want to choose from the following recipes to make the recipe that tastes the most strongly of lemon. Which one should they choose?

    a. 3 cups of water to 2 scoops of lemonade mix

    b. 1 cup of water to $\frac{3}{4}$ scoops of lemonade mix

    c. 10 cups of water to 7 scoops of lemonade mix

    d. 6 cups of water to 5 scoops of lemonade mix

    e. 13 cups of water to 9 scoops of lemonade mix

14. Suppose we have a square with side length S, and a circle with diameter S. If we take the area of the circle divided by the area of the square, what should the result be?

    a. π

    b. There is not enough information to get a result.

    c. $1/\pi$

    d. $\pi/4$

    e. $1/3$

15. A perfect number is one where if you add up the factors of the number, except the number itself, then the sum is the number again. For example the factors of 6 are 1, 2, and 3, and $1 + 2 + 3 = 6$. Which of the numbers below is perfect?

    a. 28

    b. 29

    c. 30

    d. 31

    e. 32

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16. A particular kind of plant triples in height over the course of one week. Shaina buys one of these plants. If at the end of the third week that she had the plant, Shaina measured that it was 54 cm tall, then how tall was the plant when she first bought it?

    a. 1 cm

    b. 2 cm

    c. 4 cm

    d. 6 cm

    e. 8 cm

17. Six college students volunteered to clean up trash in a particular abandoned lot. They told the coordinator that they could clean it up in 4 days. The coordinator said he wanted the lot cleaned up in three days. How many more students would have to join to accomplish this?

    a. 1

    b. 2

    c. 3

    d. 4

    e. 5

18. Lillian has a ribbon that is 2 and $\frac{3}{4}$ feet long. She wants to cut pieces that are $\frac{1}{2}$ of a foot long to give to her friends. How many pieces can she cut?

    a. 2 pieces

    b. 4 $\frac{3}{4}$ pieces

    c. 4 $\frac{1}{2}$ pieces

    d. 5 $\frac{1}{4}$ pieces

    e. 5 $\frac{1}{2}$ pieces

19. How many steps are required to break a 6×8 sized bar of chocolate into 1×1 pieces? You can break an existing piece of chocolate horizontally or vertically. You cannot break two or more pieces at once (so no cutting through stacks).

    a. 14

    b. 16

    c. 47

    d. 48

    e. 49

20. Suppose that Daya has a $4 \times 4 \times 4$ inch solid wood cube. Daya puts the cube on a worktable and paints all of the sides except the bottom purple. A day later, she cuts the cube into $1 \times 1 \times 1$ inch cubes. How many of the small cubes have exactly two sides painted?

    a. 12 small cubes

    b. 16 small cubes

    c. 18 small cubes

    d. 20 small cubes

    e. 24 small cubes