Math Awareness Month Competition
University of Kansas, Department of Mathematics
2018 Examination for 3rd-5th Grades

DIRECTIONS: You have 40 minutes for the five problems.
Show all of the necessary work and provide a complete justification for each answer.
Enclose each answer in a box. Solve each problem on a separate sheet of paper.
You are allowed to use a calculator but you are not allowed to borrow or interchange
  calculators during the test.

1. There are 45 shelves in the pantry, and on each shelf there are 12 jars. Jars with jam make up 30% of all jars, and every third jam is a strawberry jam. How many jars of strawberry jam are in the pantry?

2. Insert parentheses such that the following equalities are correct. For example, $6 * 8 - 4 * 2 = 48$ is correct in the form $6 * (8 - 4) * 2 = 48$.
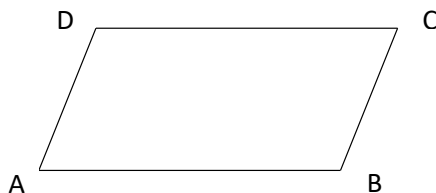
$$2 * 6 + 7 * 9 - 2 * 4 \; = \; 256$$
$$5 + 6 * 7 - 1 * 2 * 3 \; = \; 11$$

3. Calculate the sum

$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \ldots + \frac{1}{18 \cdot 19} + \frac{1}{19 \cdot 20}.$$

4. In the parallelogram ABCD, the sum of the lengths of diagonals AC and BD is equal to 18 inches. The perimeter of the triangle ABC is 2 inches longer than the perimeter of triangle BCD. Calculate the lengths of the diagonals of this parallelogram.

5. If you buy a raffle ticket, you can win a computer or one of 10 tablets. If you buy one ticket, the probability of winning a tablet is $\frac{1}{7}$. How many tickets win no prizes?