

MATH 5: HANDOUT 11

MATH BATTLE – I

1. There are four numbers written on the board: 0, 1, 0, 0. You are allowed to add 1 to any two of them. By repeating this operation, can you make all four numbers equal?

2. A horse eats one bucket of hay in 2 days, a cow — in 3 days, a sheep — in 6 days. In how many days a horse, a cow, and a sheep together will eat 3 buckets of hay?

3. A King of the country heard that one of the three knights killed the Dragon. The King ordered them to come to him and asked them who did it. That's the way they answered:

Sir Lancelot: "Sir Galahad killed the Dragon"

Sir Galahad: "Sir Percival killed the Dragon"

Sir Percival: "I killed the Dragon"

It is known that one of them told the truth and two of them lied. Who killed the Dragon?

4. There are five heads and fourteen legs in a family. How many people and dogs are in the family?

5. The distance between cities A and B is 40km. Two cyclists leave respectively from A and B simultaneously towards one another, one with speed 10km/h and the other with speed 15km/h. A fly flies out with the first cyclist from A with the speed of 100km/h, reaches the second, touches his forehead and flies back to the first, touches his forehead, returns to the second, and so on until the cyclists' foreheads collide and squash the fly. How many kilometres altogether has the fly flown?

6. In an expression a teacher substituted stars for digits: $** + *** = ****$. It is known that each summand and the result won't change if you write them backwards. Can you figure out the original equality?

7. Three boxes contain nuts. The 1st box has 6 nuts less than the 2nd and the 3rd boxes together. The 2nd box has 10 nuts less than the 1st and the 3rd together. How many nuts are there in the 3rd box?

8. Calculate the sum

$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \cdots + \frac{1}{99 \times 100}$$

9. Nine 1×1 cells in a 10×10 square are infected. In one unit time, the cells with at least two infected neighbors (having a common side) also become infected. Can the infection spread to the whole square? (Hint: think about the perimeter of the infected region).