

MATH 3/4: ASSIGNMENT 15

MAY 9, 2010

The topic of today's class is odd/even numbers. Most of the problems from the homework are related to whether some number (which students have to find) is odd or even.

Classwork:

1. In each of the following problems, you are shown scales being in balance. Can you determine from this information the weights A , B ? (In each problem, items marked by the same letter have the same weight)

(a) $\overline{AB} \quad \triangle \quad 12 \text{ lbs}$ $\overline{A} \quad \triangle \quad \overline{BB}$

(b) $\overline{AB} \quad \triangle \quad 15 \text{ lbs}$ $\overline{AA} \quad \triangle \quad \overline{B}$

(c) $\overline{AABB} \quad \triangle \quad 12 \text{ lbs}$ $\overline{AA} \quad \triangle \quad \overline{B}$

(d) $\overline{AAAB} \quad \triangle \quad 50 \text{ lbs}$ $\overline{A} \quad \triangle \quad \overline{BBB}$

(e) $\overline{AABB} \quad \triangle \quad 40 \text{ lbs}$ $\overline{AAA} \quad \triangle \quad \overline{B}$

Two following problems are about dominoes: the usual kind, with two numbers on each domino, running all possible combinations from $\boxed{0 \mid 0}$ to $\boxed{6 \mid 6}$. Try to answer these questions without using a real set of dominoes or writing down all possible dominoes — there usually is a better way.

- How many times does the number 1 appears on the dominoes? The number 2?
- How many dominoes are there?
- King Arthur wrote a number 20 on a piece of paper and gave it to his 33 knights. Each of them either subtracts 1 or adds 1. Can they at the end get number 10?
- 7 glasses stand on the table upside down. In each turn you can turn 4 glasses. Is it possible to put all the glasses correctly?
- Is it possible to cut 5×5 square into 1×2 rectangles? What about 6×6 ? 6×5 ? 8×8 ?

Homework:

1. In each of the following problems, you are shown scales being in balance. Can you determine from this information the weights A , B in the same way we did in class? (In each problem, items marked by the same letter have the same weight)

(a) $\frac{A}{\triangle} = \frac{B \text{ 20 lbs}}{\triangle}$ $\frac{A}{\triangle} = \frac{BBB}{\triangle}$

(b) $\frac{AB}{\triangle} = \frac{12 \text{ lbs}}{\triangle}$ $\frac{A}{\triangle} = \frac{B \text{ 4 lbs}}{\triangle}$

(c) $\frac{AAB}{\triangle} = \frac{14 \text{ lbs}}{\triangle}$ $\frac{AA}{\triangle} = \frac{B}{\triangle}$

(d) $\frac{AAB}{\triangle} = \frac{14 \text{ lbs}}{\triangle}$ $\frac{AA}{\triangle} = \frac{B \text{ 2 lbs}}{\triangle}$

2. What is the sum of all the numbers on all dominoes?
3. At a birthday party, each of 17 guests got two balloons, one red and one green. They want to trade so that each guest has two balloons of the same color. Can you help them?
4. There are 7 coins on a table, 2 of them heads up, 5 tails up. You are allowed to turn over any 4 of them. By doing this several times, can you get all coins tails up? Can you get all coins heads up?
5. Numbers 0, 1, 0, 0 are written on the board. During each step it is allowed to add 1 to any two of these numbers. Is it possible to make all of them equal?
6. Is it possible to pay \$1.00 by using only pennies, nickels, and quarters, so that you use exactly 21 coins?
- *7. If we take the usual chessboard and remove two diagonally opposite corner squares, is it possible to cut it into 2×1 rectangles?

