

Girls' Adventures in Math 2019

Round 2, Division 6-8

An “**upside-downie number**” is a number that is a valid number when rotated to be upside down.

For example, 8961 is an **upside-downie number** because when we turn it upside down, we get 1968.

$$8961 \rightarrow 1968 \checkmark$$

However, 25 is not an **upside-downie number** because neither 2 nor 5 is a number when turned upside down.

$$25 \rightarrow \cancel{52}$$

180 is also not an **upside-downie number** because a three digit number cannot start with 0.

$$180 \rightarrow \cancel{081}$$

An “**upside-downie expression**” is a mathematical expression written using **upside-downie numbers** that equals itself when turned upside down.

For example, $8+1$ is an **upside-downie expression** because when turned upside down, it is also equal to 9.

$$8+1 = 9 \quad \rightarrow \quad 1+8 = 9 \checkmark$$

However, $8-6$ is not an **upside-downie expression** because it evaluates to a different number upside down.

$$8-6 = 2 \quad \rightarrow \quad 9-8 = 1 \times$$

TEAM CODE:

SCHOOL:

Part 1: Which three of the expressions below are upside-downie expressions?

- A. $55 - 55$
- B. $98 - 86$
- C. $80 + 08$
- D. $101 + 909$

- E. $811 - 188$
- F. $1001 + 1881$
- G. $111 + 8$
- H. 99×11

Answer: The upside-downie expressions listed above are , , and .

Part 2: Find an upside-downie expression using positive integers that evaluates to the following results.

$$1111 = \text{input} \times \text{input}$$

$$15 = \text{input} + \text{input}$$

$$33 = \text{input} - \text{input}$$

Part 3: Find an upside-downie expression using positive integers that evaluates to the following results.

$$104 = \text{input} + \text{input}$$

$$170 = \text{input} + \text{input}$$

$$75 = \text{input} - \text{input}$$

Part 4: Express 2019 as the sum of three upside-downie numbers, not necessarily distinct. The largest of the numbers will be a 4-digit number.

$$2019 = \text{input} + \text{input} + \text{input}$$