# Seventh Annual Upper Peninsula High School Math Challenge

Northern Michigan University (Marquette Co, MI)

Saturday 12 March 2016

NAME: SOLUTION

TEAM: _____

SCHOOL: _____

**SUDDEN DEATH**

$\frac{35}{216}$

**answer**

**Put no work on this side of the paper. Write the answer and only the answer in the space above. Put all work on the other side of the sheet.**

Four standard dice are rolled simultaneously. What is the probability that exactly two distinct numbers (i.e. not counting repeats) will be showing? For example, 1, 4, 4, 1 has two distinct numbers: 1 and 4.

For 2 distinct numbers to show, there must be two pairs OR three of a kind and a single

3 of a kind and a singleton

6 choices for singleton

5 choices for triple

singleton can be any of 4 dice

$6 \cdot 5 \cdot 4$

Two pair

6 choices for first pair

5 choices for second pair

$4C_2 = 6$ ways to arrange dice

counted each pair twice so $\div$ by 2

$6 \cdot 5 \cdot 3$

$$\frac{6 \cdot 5 \cdot 4 + 6 \cdot 5 \cdot 3}{6^4} = \frac{5(4+3)}{6^3} = \frac{35}{216}$$