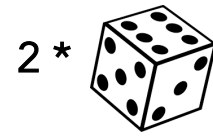


Does  $X + X = 2X$ ?



1. Write out all 36 possible outcomes for two die rolls.

$(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)$        $(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)$   
 $(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)$        $(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)$   
 $(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)$        $(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)$

Let  $X$  = value of a single die roll. Let  $X + X$  = sum of two die rolls.

2. Create a probability distribution for the sum of  $X + X$ .

Value	2	3	4	5	6	7	8	9	10	11	12
Probability	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{3}{36}$	$\frac{4}{36}$	$\frac{5}{36}$	$\frac{6}{36}$	$\frac{5}{36}$	$\frac{4}{36}$	$\frac{3}{36}$	$\frac{2}{36}$	$\frac{1}{36}$

3. Use the Discrete Random Variables applet at [www.stapplet.com](http://www.stapplet.com) or your calculator.

Mean  $(X + X) = 7$

Interpret: After many, many rolls of two dice, the average sum is about 7.

SD  $(X + X) = 2.42$

Interpret: The sum of the two dice will typically vary by about 2.42 from the mean of 7.

Let  $X$  = value of a single die roll. Let  $2X$  = doubling a single die roll.

4. Create a probability distribution for  $2X$ .

Value	2	4	6	8	10	12
Probability	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Mean  $(2X) = 7$

Interpret: After many, many times doubling a single die roll, the average is about 7.

SD  $(2X) = 3.42$

Interpret: The doubling of a single die will typically vary by about 3.42 from the mean of 7.

5. Does  $X + X = 2X$ ? Explain. **No!**

$\text{Mean}(X+X) = \text{Mean}(2X)$   
 $\text{SD}(X+X) \neq \text{SD}(2X)$

No, this distribution of  $X+X$  is less variable than the distribution of  $2X$ . **less likely to get 2 or 12**

6. If you were told you would win the number of dollars of your score, would you rather get the sum of rolling two dice or doubling a single die roll? Explain.

Same expected value (mean) for each, so choose the one that is less variable.

**students who are big risk takers might choose option 2.**