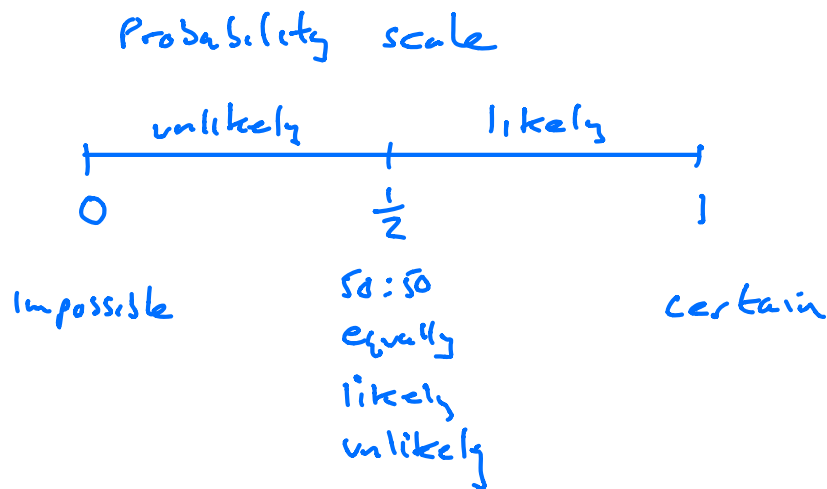


Probability



Roll a Die	Outcome	1	2	3	4	5	6
	Probability	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

These 6 outcomes are mutually exclusive events

$$\text{Consider } \text{Prob}(2 \text{ or } 3) = \frac{2}{6} = \frac{1}{6} + \frac{1}{6}$$

'OR' Rule for mutually exclusive events

$$\text{Prob}(\text{even number}) = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$$

2, 4, 6

We cannot add together the probabilities of events which are not mutually exclusive

Let A be event even number (2, 4, 6)
B be event number > 3 (4, 5, 6)

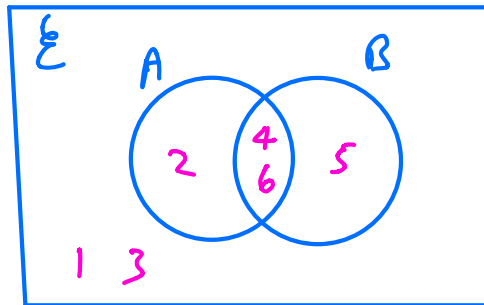
$$\text{Prob}(A \text{ or } B) \neq P(A) + P(B)$$

$$\frac{3}{6} + \frac{3}{6} = 1$$

In fact $P(A \text{ or } B)$ written $A \cup B$
 $= \frac{4}{6}$

The reason this does not work is that
 A and B are not mutually exclusive - they
 overlap $P(A \cap B) = \frac{2}{6}$ as they have 4, 6
 in common

Venn
 Diagram



Monopoly Dice

Roll a blue die and a red die and
 add their scores to find a total

		Blue						
		+	1	2	3	4	5	6
Red	1	2	3	4	5	6	7	
	2	3	4	5	6	7	8	
	3	4	5	6	7	8	9	
	4	5	6	7	8	9	10	
	5	6	7	8	9	10	11	
	6	7	8	9	10	11	12	

$$P(2) = \frac{1}{36}$$

$$P(3) = \frac{2}{36}$$

$$P(4) = \frac{3}{36}$$

$$P(5) = \frac{4}{36}$$

$$P(6) = \frac{5}{36}$$

$$P(7) = \frac{6}{36}$$

$$P(8) = \frac{5}{36}$$

$$P(9) = \frac{4}{36}$$

$$P(10) = \frac{3}{36}$$

$$P(11) = \frac{2}{36}$$

$$P(12) = \frac{1}{36}$$

$$\text{Find } P(\text{Prime total}) = \frac{15}{36}$$

$$P(7) = \frac{6}{36} \text{ or } \frac{1}{6}$$

Draw a sample space diagram for when two dice are rolled and the numbers are multiplied together

		Blue					
Red	X	1	2	3	4	5	6
	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

$$\text{Find } P(\text{Even}) = \frac{27}{36} = \frac{3}{4}$$

$$P(\text{Divisible by 6}) = \frac{15}{36} = \frac{5}{12}$$

Draw a sample space to show rolling two dice and taking the lower score from the higher score. Score 0 if both the same

—	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

$$\text{Find } P(\text{Even}) = \frac{18}{36}$$

$$P(\text{Prime}) = \frac{16}{36}$$
