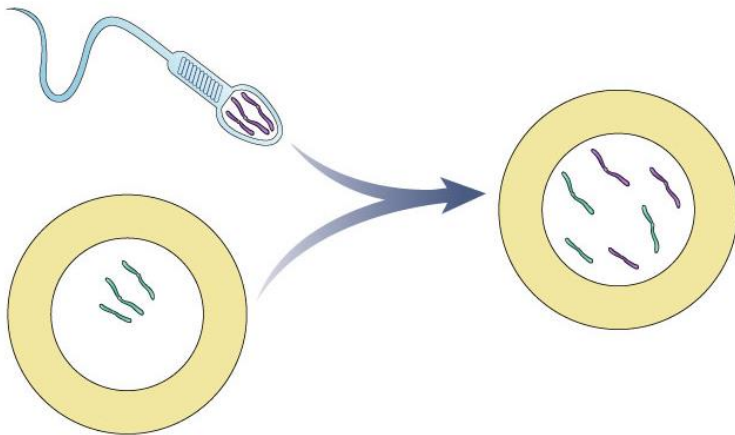




Probability & Genetics



Genetics & Probability

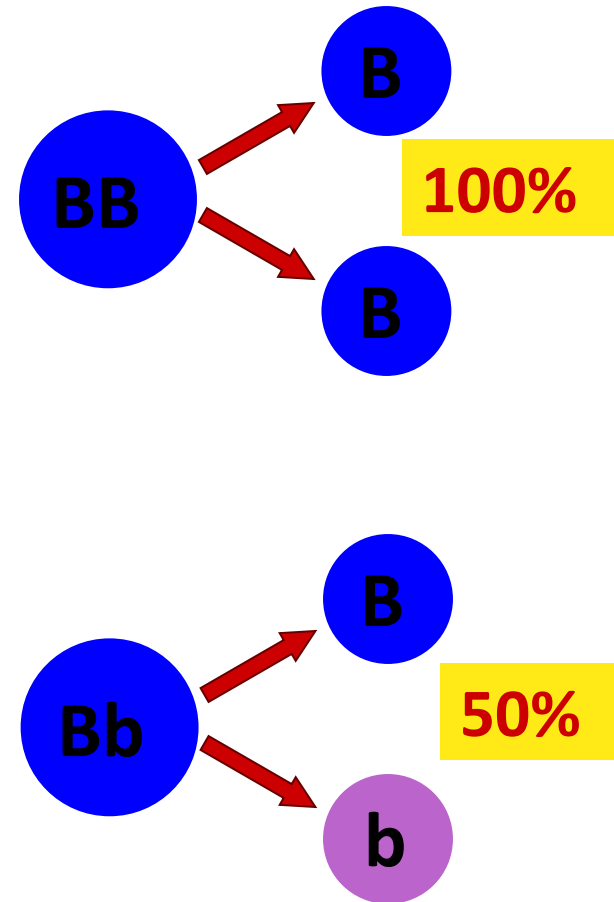
- **Mendel's laws:**
 - segregation
 - independent assortment

reflect same laws of probability
that apply to tossing coins or
rolling dice



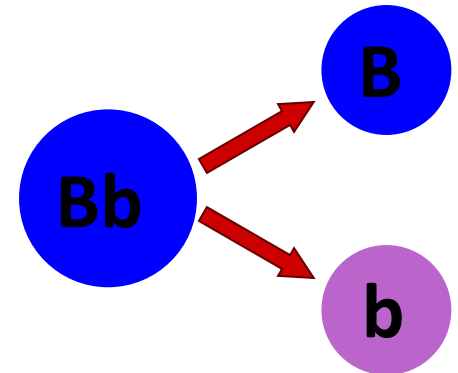
Probability & genetics

- Calculating probability of making a specific gamete is just like calculating the probability in flipping a coin
 - probability of tossing heads?
 - probability making a B gamete?



Probability & genetics

- Outcome of 1 toss has no impact on the outcome of the next toss
 - probability of tossing heads each time? **50%**
 - probability making a B gamete each time? **50%**



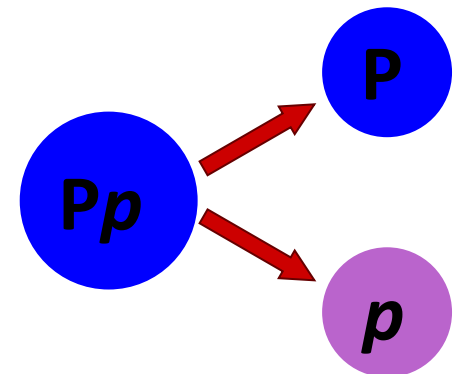
Rule of multiplication

- Chance that 2 or more independent events will occur together
 - probability that 2 coins tossed at the same time will land heads up

$$1/2 \times 1/2 = 1/4$$

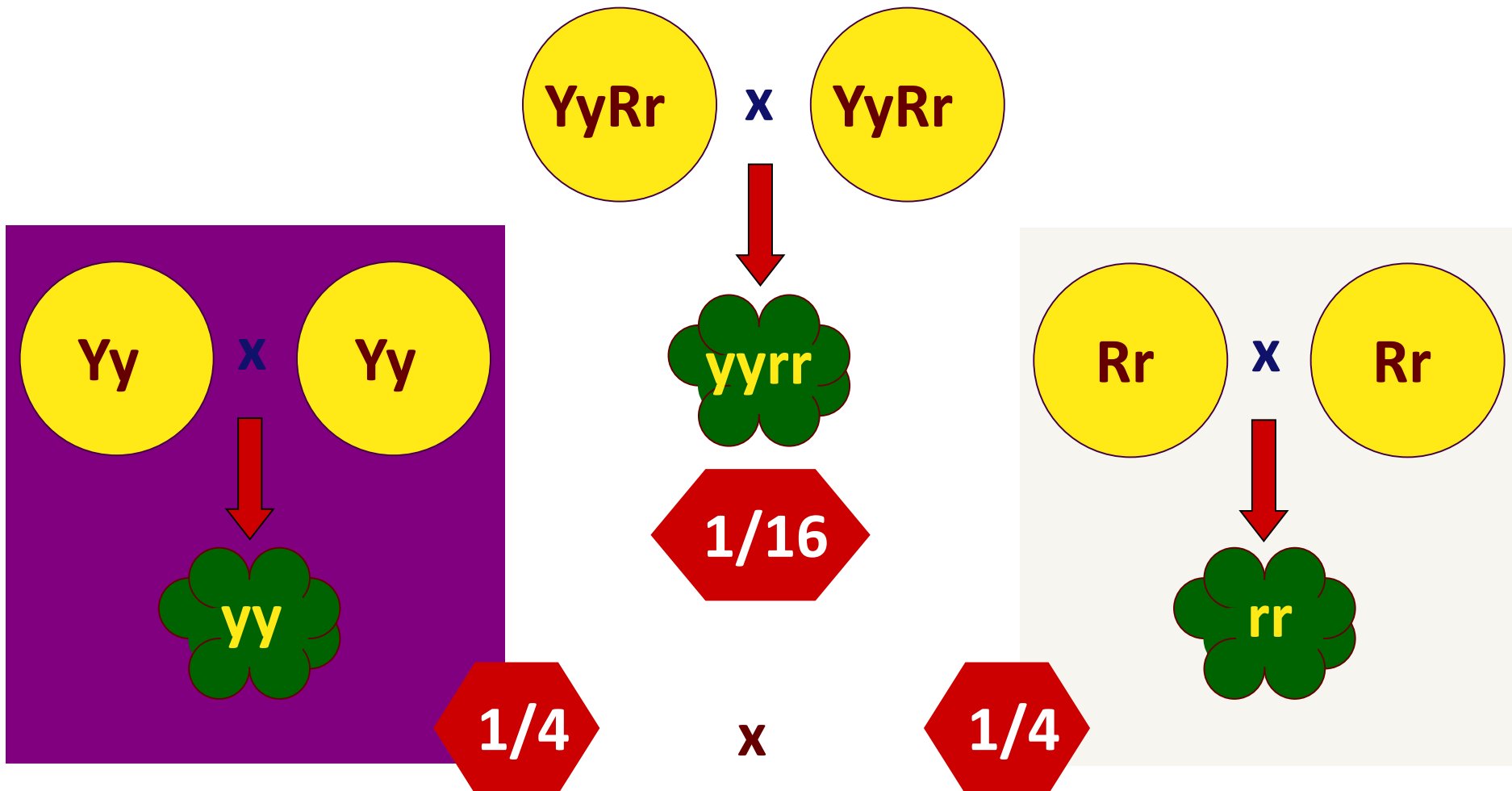
- probability of $Pp \times Pp \rightarrow pp$

$$1/2 \times 1/2 = 1/4$$



Calculating probability in crosses

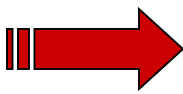
Use rule of multiplication to predict crosses



Rule of addition

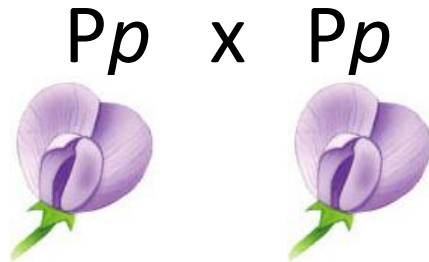
- Chance that an event can occur 2 or more different ways
 - sum of the separate probabilities
 - probability of **Bb** x **Bb** → **Bb**

sperm		egg		offspring	
B		b		Bb	
1/2	x	1/2	=	1/4	
b		B		Bb	
1/2	x	1/2	=	1/4	



1/4
+ 1/4
<hr/>
1/2





Calculating probability



male / sperm

P p

female / eggs
 P
 p

 PP	 Pp
 Pp	 pp

sperm	egg	offspring
P $1/2$	P $1/2$	PP $1/4$
P $1/2$	p $1/2$	Pp $1/4$
p $1/2$	P $1/2$	+ $1/4$
p $1/2$	p $1/2$	pp $1/4$

$$P \times P = PP$$

$$1/2 \times 1/2 = 1/4$$

$$P \times p = Pp$$

$$1/2 \times 1/2 = 1/4$$

$$p \times P = Pp$$

$$1/2 \times 1/2 = 1/4$$

+

$$1/4 + 1/4 = 1/2$$

$$p \times p = pp$$

$$1/2 \times 1/2 = 1/4$$

Apply the Rule of Multiplication

AABbccDdEEff

x

AaBbccDdeeFf



AabbccDdEeFF

AA x Aa → **Aa** **1/2**

Bb x Bb → **bb** **1/4**

cc x cc → **cc** **1**

Dd x Dd → **Dd** **1/2**

EE x ee → **Ee** **1**

Ff x Ff → **FF** **1/4**

1/64

Got it?
Try this!

