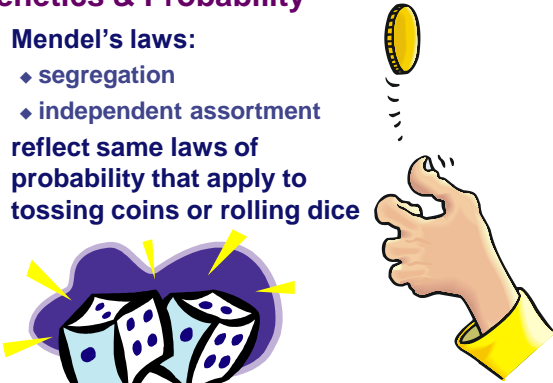


Genetics & Probability

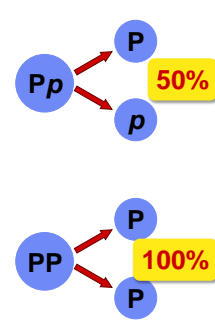
- Mendel's laws:**
 - segregation
 - independent assortment

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



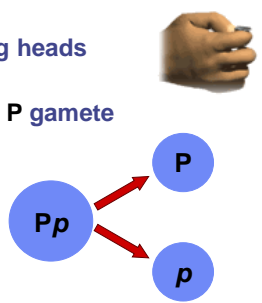
Genetics & Probability

- Calculating probability of making a specific gamete is just like calculating the probability in flipping a coin**
 - probability of getting a P gamete?
 - probability making a P gamete?



Genetics & Probability

- Outcome of 1 toss has no impact on the outcome of the next toss**
 - probability of tossing heads each time? 50%
 - probability making a P 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 x Pp → pp

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

Calculating Dihybrid Probability

- Rule of multiplication also applies to dihybrid crosses (if you don't have linked genes on the same chromosome)
 - ◆ heterozygous parents — $YyRr$
 - ◆ probability of producing $yyrr$?
 - probability of producing y gamete = $1/2$
 - probability of producing r gamete = $1/2$
 - probability of producing yr gamete = $1/2 \times 1/2 = 1/4$
 - probability of producing a $yyrr$ offspring = $1/4 \times 1/4 = 1/16$

Rule of Addition

- Chance that an event can occur 2 or more different ways
 - ◆ sum of the separate probabilities
 - think of all the ways you can roll a 7!
 - ◆ probability of $Pp \times Pp \rightarrow Pp$


sperm	egg	offspring
P $1/2$	p $1/2$	Pp $1/4$
p $1/2$	P $1/2$	Pp $1/4$

\Rightarrow

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

Calculating Probability

$Pp \times Pp$



male / sperm

P p

	sperm	egg	offspring
female / eggs	P	P	PP $1/2 \times 1/2 = 1/4$
	p	p	pp $1/2 \times 1/2 = 1/4$
	P	P	Pp $1/2 \times 1/2 = 1/4$
	p	P	Pp $1/2 \times 1/2 = 1/4$

P	P	PP
P	p	Pp
p	P	Pp
p	p	pp

Chi-square Test (Analysis)

- Test to see if your data supports your hypothesis
- Compare "observed" vs. "expected" data
 - ◆ is variance from expected due to "random chance"?
 - ◆ is there another factor influencing data?
 - null hypothesis
 - degrees of freedom
 - statistical significance

Lab #10