

Class 9 9/13/17 Mendelian Genetics

- Announcements: **EXAM 1 9/20 (Classes 1 – 10)**
- Class administration
- Check iLearn for suggested problems
- **REMINDERS:**
 - **If you are not taking a class, drop it by TODAY WED Sep 13**
 - **Class permission numbers expire TODAY WED Sep 13.**
- Office hours HH668C:
 - Mon 2 – 4pm

EXTRA OFFICE HOURS
TUE 9/19, 4:30 - 6pm in HH525

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30th Annual CSUPERB Symposium

- <http://www.csuperb.org/symposium/>
- January 11 – 13, 2018, Santa Clara Marriott
- Poster Abstract due Monday, 9/25, 5pm PST
- Posters, Professional Development, Research Talks
- Poster presenters have lodging/meals/travel “covered”
- Check web site for 2017 symposium program

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CSUPERB Student Travel Grant

- <https://www2.calstate.edu/impact-of-the-csu/research/csUPERB/Documents/2017FallStudentTravelRFP-Final.pdf>
- Maximum \$1500 award
- Support travel between July 1, 2017 and June 30, 2018
- DEADLINE: Oct 19, 2017
- Travel
 - to present original research data and results (presented, accepted, submitted or to be submitted) OR
 - travel for the collection of data OR
 - travel to participate in or organize a workshop/session

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Romberg Tiburon Center Seminar Series

<http://rtc.sfsu.edu/seminar/index.htm>

Wednesday, 9/13/17
Bay Conference Center, 3:30PM

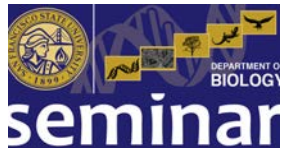


Jenna Judge
California Sea Grant Extension
Fellow

*Natural Shoreline Infrastructure:
Working with Nature to Increase
Coastal Resilience*

<https://caseagrants.ucsd.edu/profile/jenna-judge>

4



Thursday, 9/14/17
SCI 210, 2:10 pm

Biol 871 Colloquium in Microbiology, Cell & Molecular Biology

<http://biology.sfsu.edu/content/MCMB>



Aruna Poduri
Stanford University

*Coronary artery development
and remodeling*

<http://arunapoduri.com/>

<https://redhorselab.stanford.edu/people>

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Tuesday, 9/19/17
HH 543, 2:10pm

Biol 572/872 Ecology, Evolution, & Conservation Biology Colloquium

<http://biology.sfsu.edu/content/EEC>



Robert Skelton
UC Berkeley

*Drought responses in Californian
mixed evergreen and deciduous
oak woodlands*

<https://nature.berkeley.edu/dawsonlab/people/robert-skelton/>

6

Independent Assortment

- A major consequence of independent assortment is the production of genetically dissimilar gametes.
- Extensive genetic variation
 - results from independent assortment
 - is very important to the process of evolution
- Number of possible gametes = 2^n where n is the haploid number
- For humans, $2^{23} > 8$ million
- Each individual represents one of
 $(8 \times 10^6) \times (8 \times 10^6) = 64 \times 10^{12}$ possible genetic combinations from his/her parents

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Laws of Probability

- Genetic ratios are most properly expressed as probabilities:
 - monohybrid F1 cross - expect F2 phenotypic ratio
3/4 long: 1/4 short
- The probability of each zygote having the genetic potential for becoming long-stemmed is 3/4
- Probabilities range from
0 (an event is certain NOT to happen), to
1.0 (an event is certain to happen)
- How do we calculate the probability of 2 or more events happening at the same time?

8



\$50

Product law

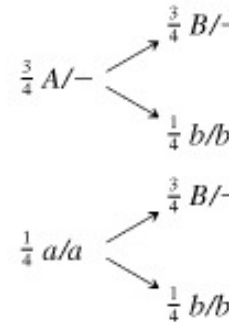
\$0.50



- The probability of two independent events occurring at the same time can be calculated using the product law.
- For simultaneous outcomes (**AND**)
- The probability of both events occurring is the *product* of the probability of each individual event.
- When you flip two coins, there are four possible outcomes. What is the chance that you will get two heads (H **and** H)?
 - Chance of getting Head with first coin (\$50) = ?
 - Chance of getting Head with second coin (\$0.50) = ?
 - Probability of getting H **and** H = $1/2 \times 1/2 = 1/4$
- We used the **product law** when calculating probabilities by the **forked-line method**.

Product Rule of Probabilities

$A/a;B/b \times A/a;B/b$



- The product rule
 - If the events of A and B are independent, the probability that they occur together is denoted
 $P(A \text{ AND } B) = P(A) \times P(B)$

Probability of A AND b phenotype

$$= P(A) \times P(b)$$

$$= 3/4 \times 1/4$$

$$= 3/16$$

Can also use this approach to calculate probability of each genotype...

Suggestion: Review fractions

10



\$0.50

Sum law

\$1.00



- The sum law is used to calculate the probability of a generalized outcome that can be accomplished *in more than one way*.
- For outcomes that can occur more than one way (**OR**)
- The sum law states that the probability of obtaining any single outcome, where that outcome can be achieved in two or more events, is equal to the *sum* of the individual probabilities of all such events.

Flip a half-dollar and a dollar: what are the odds of 1 head and 1 tail?

Sum law

- The sum law is used to calculate the probability of a generalized outcome that can be accomplished *in more than one way*.

Flip a half-dollar and a dollar: what are the odds of getting 1 head and 1 tail?

There are 4 possible outcomes from this flip.

1 head, 1 tail can be from the **half-dollar being heads** (odds 1/4), but also from the **dollar being heads** (1/4)

| | | |
|--|----|----|
| | | |
| | HH | HT |
| | TH | TT |

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

11

12



\$.50

Clicker question 1

\$1.00



Flip a half-dollar and a dollar: what are the odds of **showing 2 tails?**

Please select the BEST answer to complete this statement:

To solve this problem, I would use the

- A. Product rule
- B. Sum rule
- C. Both A and B
- D. Not enough information to select method

13



\$.50

Clicker question 2

\$1.00



Flip a half-dollar and a dollar: what are the odds of **showing 2 of the same side?**

Please select the BEST answer to complete this statement:

To solve this problem, I would use the

- A. Product rule
- B. Sum rule
- C. Both A and B
- D. Not enough information to select method

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\$.50

Clicker question 3

\$1.00



- Flip a half-dollar and a dollar: what are the odds of **showing 2 of the same side?**

- The probability of obtaining 2 of the same side is

- A. 1/16
- B. 1/4
- C. 1/2

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