Insta-Review: Genetics Problems

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Instagram Live Session Thursday (11/12) at 8:30pm

Genetic Practice Problem #1

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What is the probability that each of the following pairs of parents will produce the indicated offspring? (Assume independent assortment of all gene pairs)

AABbCc x AaBbCc → AAbbCC

Genetic Practice Problem #1: What is the probability that each of the following pairs of parents will produce the indicated offspring? (Assume independent assortment of all gene pairs)

AABbCc x AaBbCc → AAbbCC

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Step 1: Complete the cross for the AA x Aa

	A	A
A	AA	AA
a	Aa	Aa

$P(AA) = ½$

Genetic Practice Problem #1: What is the probability that each of the following pairs of parents will produce the indicated offspring? (Assume independent assortment of all gene pairs)

AABbCc x AaBbCc → AAbbCC

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Step 2: Complete the cross for the Bb x Bb

	B	b
B	BB	Bb
b	Bb	bb

$P(bb) = \frac{1}{4}$

Genetic Practice Problem #1: What is the probability that each of the following pairs of parents will produce the indicated offspring? (Assume independent assortment of all gene pairs)

AABbCc x AaBbCc → AAbbCC

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Step 3: Complete the cross for the Cc x Cc

	C	c
C	CC	Cc
c	Cc	cc

P(CC) = ¼

Genetic Practice Problem #1: What is the probability that each of the following pairs of parents will produce the indicated offspring? (Assume independent assortment of all gene pairs)

AABbCc x AaBbCc → AAbbCC

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Step 4: Multiply each probability

P(AA) = ½ P(bb) = ¼ P(CC) = ¼

P(AA) x P(bb) x P(CC) =

½ x ¼ x ¼ = 1/32

Genetic Practice Problem #2

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Incomplete dominance: C^RC^R (red) x C^WC^W (white) → C^RC^W (pink)

Complete dominance: axial (dominant) vs. terminal (recessive)

What will be the phenotypic ratio of F_2 generation resulting from the cross:

axial-red (true-breeding) x terminal-white?

Genetic Practice Problem #2: Incomplete dominance: C^RC^R (red) x C^WC^W (white)→ C^RC^W (pink)
Complete dominance: axial (dominant) vs. terminal (recessive)
What will be the phenotypic ratio of F_2 generation resulting from the cross:
axial-red (true-breeding) x terminal-white?

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Step 1: Solve for the F_1 generation

	C^R	C^R
C^W	C^RC^W	C^RC^W
C^W	C^RC^W	C^RC^W

	A	A
a	Aa	Aa
a	Aa	Aa

Genetic Practice Problem #2: Incomplete dominance: C^RC^R (red) x C^WC^W (white)→ C^RC^W (pink)
Complete dominance: axial (dominant) vs. terminal (recessive)
What will be the phenotypic ratio of F_2 generation resulting from the cross:
axial-red (true-breeding) x terminal-white?

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Step 2: Solve for the F_2 generation

	C^R	C^W
C^R	C^RC^R	C^RC^W
C^W	C^RC^W	C^WC^W

	A	a
A	AA	Aa
a	Aa	aa

Genetic Practice Problem #2: Incomplete dominance: C^RC^R (red) x C^WC^W (white)→ C^RC^W (pink)
Complete dominance: axial (dominant) vs. terminal (recessive)
What will be the phenotypic ratio of F_2 generation resulting from the cross:
axial-red (true-breeding) x terminal-white?

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Step 3: Calculate for each phenotype

Red, Axial =	P(red) x P (axial) =	¼ x ¾ =	3/16
Pink, Axial =	P(pink) x P (axial) =	½ x ¾ =	6/16
White, Axial =	P(white) x P (axial) =	¼ x ¾ =	3/16
Red, Terminal =	P(red) x P (terminal) =	¼ x ¼ =	1/16
Pink, Terminal =	P(pink) x P (terminal) =	½ x ¼ =	2/16
White, Terminal =	P(white) x P (terminal) =	¼ x ¼ =	1/16

Genetic Practice Problem #3

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In mice, black color (B) is dominant to white (b). At a different locus, a dominant allele (A) produces a band of yellow just below the top of each hair in mice with black fur. This gives a frosted appearance known as agouti. Expression of the recessive allele (a) results in a solid coat color. If mice that are heterozygous at both loci are crossed, what is the expected phenotypic ratio of their offspring?

Genetic Practice Problem #3: In mice, black color (B) is dominant to white (b). At a different locus, a dominant allele (A) produces a band of yellow just below the top of each hair in mice with black fur. This gives a frosted appearance known as agouti. Expression of the recessive allele (a) results in a solid coat color. If mice that are heterozygous at both loci are crossed, what is the expected phenotypic ratio of their offspring?

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Step 1: Solve the Crosses

	B	b
B	BB	Bb
b	Bb	bb

	A	a
A	AA	Aa
a	Aa	aa

Genetic Practice Problem #3: In mice, black color (B) is dominant to white (b). At a different locus, a dominant allele (A) produces a band of yellow just below the top of each hair in mice with black fur. This gives a frosted appearance known as agouti. Expression of the recessive allele (a) results in a solid coat color. If mice that are heterozygous at both loci are crossed, what is the expected phenotypic ratio of their offspring?

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Step 2: Calculate for each phenotype

Black, Yellow = P(black) x P (yellow) = ¾ x ¾ = 9/16 — agouti

White, Yellow = P(white) x P (yellow) = ¼ x ¾ = 3/16 — white

Black, No Y = P(black) x P (no Y) = ¾ x ¼ = 3/16 — black

White, No Y = P(white) x P (no Y) = ¼ x ¼ = 1/16 — white