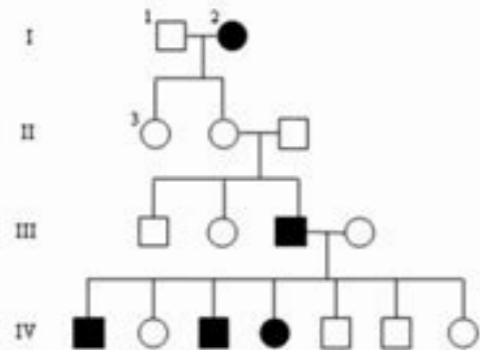


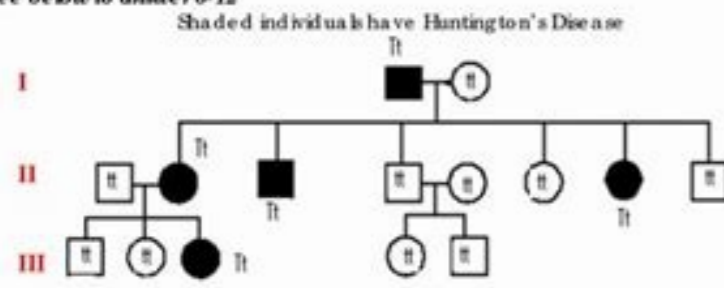
Continue

Interpreting a Human Pedigree
Use the pedigree below to answer 1-5



- In a pedigree, a square represents a male. If it is shaded, he has hemophilia; if not, he has normal blood clotting.
 - How many males are there? **8**
 - How many males have hemophilia? **3**
- A circle represents a female. If it is shaded, she has hemophilia; if not, she is normal.
 - How many females are there? **8**
 - How many females have hemophilia? **2**
- A marriage is indicated by a horizontal line connecting a circle to a square.
 - How many marriages are there? **3**
- A line perpendicular to a marriage line indicates the offspring. If the line ends with either a circle or a square, the couple had only one child. However, if the line is connected to another horizontal line, then several children were produced, each indicated by a short vertical line connected to the horizontal line. The first child born appears to the left and the last born to the right.
 - How many children did the first couple (couple in row I) have? **2**
 - How many children did the third couple (couple in row III) have? **7**
- Level I represents the first generation, level II represents the second generation.
 - How many generations are there? **4**
 - How many members are there in the fourth generation? **7**

Use the pedigree below to answer 6-12



Individuals are numbered for each generation right to left...they are denoted with the generation and the number. See #7 for example.

- Write the generation on the pedigree number (roman numeral).
- Which members of the family above are affected with Huntington's Disease? **I-1, II-2, II-3, II-6, III-3**
- There are no carriers for Huntington's Disease; you either have it or you don't. With this in mind, is Huntington's disease caused by a dominant or recessive trait? **dominant**
- How many children did individuals I-1 and I-2 have? **6**

Density Practice Problem Worksheet

- A block of aluminum occupies a volume of 15.0 mL and weighs 40.5 g. What is its density?

$$D = \frac{M}{V} \Rightarrow \frac{40.5 \text{ g}}{15.0 \text{ mL}} = 2.70 \frac{\text{g}}{\text{mL}}$$
- Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 g. From this information, calculate the density of mercury.

$$D = \frac{M}{V} \Rightarrow \frac{306.0 \text{ g}}{22.5 \text{ mL}} = 13.6 \frac{\text{g}}{\text{mL}}$$
- What is the weight of the steel alcohol that exactly fills a 200 mL container? The density of steel alcohol is 1.78 g/mL.

$$M = D \times V = 1.78 \frac{\text{g}}{\text{mL}} \times 200 \text{ mL} = 356 \text{ g}$$
- A rectangular block of copper metal weighs 189 g. The dimensions of the block are 4.0 cm by 5.5 cm by 6.6 cm. From this data, what is the density of copper?

$$D = \frac{M}{V} \Rightarrow \frac{189 \text{ g}}{148.5 \text{ cm}^3} = 1.27 \frac{\text{g}}{\text{cm}^3}$$

Name _____ Period _____

Advanced Genetics Practice Problems – Beyond Mendel

Part 1: Incomplete Dominance

- What is incomplete dominance? How does this affect the phenotype of the heterozygotes?
 In traits with incomplete dominance, neither allele is completely dominant over the other. In heterozygotes, the phenotype appears as a blend of the two alleles.
- Japanese Four O'clock Flowers show an incomplete dominance for Color. When an offspring has both the Red and the White allele, it appears Pink (Rr).

RR = Red Rr = pink rr = white

 - Show a cross between a Purebred Red (RR) and a Purebred White (rr) flower. What is the Genotype and Phenotype ratio?
 Cross: RR x rr

R	R
r	Rr
r	Rr

Genotypic Ratio: 100% Rr
Phenotypic Ratio: 100% pink
 - Show a cross between two Pink Japanese Four O'clock Flowers. What is the Genotype and Phenotype Ratio?
 Cross: Rr x Rr

R	r
R	RR
r	Rr
r	Rr
r	rr

Genotypic Ratio: 25% RR, 50% Rr, 25% rr
Phenotypic Ratio: 25% red, 50% pink, 25% white
- In Horses the valuable Palomino (Gold) color is the result of a cross between a purebred Chestnut (brown) and a purebred Cremello (off-white).

BB = chestnut (brown) Bb = palomino (gold) bb = cremello (off-white)

 - Use a Punnett Square to show a cross between 2 Palomino Horses. What is the Genotype and Phenotype Ratios of this cross?
 Cross: Bb x Bb

B	b
B	BB
b	Bb
b	Bb
b	bb

Genotypic Ratio: ¼ RR, ½ Rr, ¼ rr
Phenotypic Ratio: ¼ Chestnut: ½ Palomino: ¼ Cremello
 - What are the Genotype and Phenotype Ratios for a cross between a Cremello horse and a Palomino horse.
 Cross: bb x Bb

b	b
B	Bb
b	bb
b	bb

Genotypic Ratio: ½ Bb: ½ bb
Phenotypic Ratio: ½ Palomino: ½ Cremello
 - If you were a horse breeder that wanted only Palomino offspring, what parent cross would ensure this result? Use a Punnett Square to justify your answer.
 To produce only palomino horses, I would cross a chestnut horse with a cremello horse.
 Cross: BB x bb

B	B
b	Bb
b	Bb
b	Bb

Part 2: Co-Dominance

- What is co-dominance? How does this affect the phenotype of the heterozygotes?
 In co-dominance traits, both alleles are dominant. Both versions of the trait are seen in the phenotype of the heterozygotes.
- Roan (RW) is a color of cattle in which both Red (R) and White (W) hairs are present due to Co dominance.

RR = Red RW = Roan WW = White

 - What are the phenotype and genotype ratios of offspring produced by a Roan bull and a Red cow?
 Cross: RW x RR

R	R
R	RR
W	RW

- 1) How many moles of Na^+ ions are there in 22.0 mL of 0.150 M Na_2CO_3 solution?

$$M = \text{moles/Liter} \quad \text{mol} = \text{ML} = (.150\text{M})(.0220\text{ L}) = .0033 \text{ mol Na}_2\text{CO}_3$$

$$.0033 \text{ mol Na}_2\text{CO}_3 \times (2 \text{ mol Na}^+ / \text{mol Na}_2\text{CO}_3) = .0066 \text{ mol Na}^+ \text{ ions}$$

- 2) What is the molar concentration of potassium permanganate in a solution prepared by dissolving 47.4 g of KMnO_4 in water and then making up the solution to 2.50 L?

$$47.4 \text{ g KMnO}_4 \times (\text{mol} / 157.58\text{g}) = .301 \text{ mol KMnO}_4$$

$$.301 \text{ mol} / 2.50 \text{ L} = .120 \text{ M}$$

- 3) How many grams of KMnO_4 would be required to prepare 200mL of a 0.178M solution?

$$\text{mol} = \text{ML} \rightarrow \text{mol} = .2 \times .178 = (.0356 \text{ mol KMnO}_4 \times 157.58\text{g/mol}) = 5.61 \text{ g KMnO}_4$$

- 4) How many mL of a 0.130 M solution of CaCl_2 contains 2.00g of CaCl_2 ?

$$2.00\text{g CaCl}_2 \times (\text{mol} / 110.97\text{g}) = .018 \text{ mol CaCl}_2$$

$$L = \text{mol} / M = .018 / .130 = .138\text{L} = 138 \text{ mL}$$

- 5) How many grams of sodium chloride should be put into a 50.0 mL volumetric flask to give 0.15 M solution when the flask is filled to the score mark with water?

$$M = \text{mol/L} \rightarrow \text{mol} = \text{ML} = (.05) (.15) = .0075 \text{ mol NaCl}$$

$$.0075 \text{ mol NaCl} \times 58.43\text{g/mol} = .438 \text{ g NaCl}$$

- 6) What is the maximum weight of 2.00 L of 1.00 M of CaCl_2 with 3.00 L of 0.500 M Na_3PO_4 ?



$$\text{Mole} = 1.00 \text{ M} \times 2.00 \text{ L} = 2.00 \text{ mol}$$

$$1.0 \text{ mol/L} \times 200\text{L} \times (1 \text{ Ca}_3(\text{PO}_4)_2 / 3 \text{ CaCl}_2) = .6667 \text{ mol Ca}_3(\text{PO}_4)_2 \text{ limiting reagent}$$

$$.500 \text{ mol/L} \times 3.00 \text{ L Na}_3\text{PO}_4 \times (1 \text{ Ca}_3(\text{PO}_4)_2 / 2 \text{ Na}_3\text{PO}_4) = .75 \text{ mol Ca}_3(\text{PO}_4)_2$$

$$.6667 \text{ mol Ca}_3(\text{PO}_4)_2 \times 310.07\text{g/mol} = 206.71\text{g Ca}_3(\text{PO}_4)_2$$

Problem-Solving Worksheet: SAMPLE

1. Define the Problem Narrowly

How to cope with stress right after school.

2. Brainstorm Possible Solutions

listen to music	Jason's house	watch TV
call a friend	skateboard	pick-on-sister
computer	homework	play music
shoot hoops at the Y	lift weights	punch speed bag
mall	chores	dollar-movie

3. Eliminate Undesired Suggestions [cross out from the list above]

4. Select One Potential Solution

Lift weights (at Jason's house).

Use guitar-teaching program on the computer [added later]

5. Generate Possible Obstacles

Lift weights:

- Get bored with old weights
- Can't go to Jason's to lift weights if nobody is there

Use guitar-teaching program on the computer:

- Fingers too sore to play
- Tempted to go to Perry's house

6. Address Each Obstacle

Obstacle: Get bored with old weights

- Lift weights at Jason's house; get advance on allowance & buy new weights

Obstacle: Can't go to Jason's if nobody is there

- Clear with Jason's sister & mom; call in advance to be sure someone will be there

Obstacle: Fingers too sore to play

- Study the notes without playing

Obstacle: Tempted to go to Perry's house

- Avoid Perry after school; walk out of school with Jason; use drug-refusal skills

7. Assign Task

Lift weights at Jason's house 3 days/wk (usually Mon., Wed., Fri.).

Use guitar-teaching program on the computer the remaining days.

8. Evaluate Outcome [next session]

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