Name Michael Plasmeier Period 3 Date 3/2

Lesson 1: Mixing It Up

Objective: To provide students with an opportunity to explore, observe, and describe a chemical reaction involving common substances.

Starting Substances:	Description:
1. Ex-Lax (1/2 tablet)	off-white shape some words - look like m+ms circular - small - no smell
2. Rubbing Alcohol (20 mL)	clear liquid like water transparent strong odor
3. Water (10 mL)	no odor little dots inside clear transparent liquid boiling point = 100C
4. Alka-Seltzer (1 tablet)	tablet says Alka-Seltzer white smells rough rough surface
5. Window Cleaner (15 mL)	liquid blueish smells like bleach

20

Possible Combinations:

Ex-lax - Achol
Ex-lax - Water
Alca-Water
Alca - Achol
Water - Achol
Window - Achole
Alca - Window
Ex-lax - Window

What we combined:	What happened:
Alca - Water	fizes and disolves clouding water
Achol - Alca	Disolves a bit not as much as in water
Alca - Windey	Bubbles a bit more then Achole but water foaming/at top of windey geting cloudly

Things I mixed earler Windex is a mixture.
Gasoline is a mixed substances.

Did any not Produce a new substance?
There must be something that changed
· All produced bubbles Yes

Mixing it Up

(cont)

Alca-Windex	Did 2nd time when only 15 mL of Windex bubbled + foamed much more
Alca-Water	2nd time = 10 mL water - turned milky white fizzle + bubbled but not as much as Windex
Alca-Achole	2nd time = 20 mL achole fizzed a bit
Windex-Exlax	15 mL windex - 1 tablet turned brownish green - murky
Exlax-Achole	Brownish - not as much as windex

Summary

Sometimes when 2 substances are mixed they just move in + out around each other like mixing tea + lemon juice or sugar + salt

At other times, when 2 substances are combined, a chemical reaction takes place where new substances are made that didn't exist before the mixing took place

Date: 2/7 Name: Michael Plasmeier

CONSERVATION OF MATTER

Introduction: In the last activity we observed a chemical change that used oxygen, and as it did, a balloon over the neck of a flask was sucked into the flask. Today's activity will provided more evidence that gases from the air can be involved in chemical reactions AND will verify the fact that two things (air and water) cannot occupy the same space at the same time. **NOTE: When finished with step 5, ask teacher for Analysis/Conclusion Sheet.**

Procedure:

1. Half fill a 250 mL beaker with water.
2. Lower a funnel, large end down, into the beaker, all the way to the bottom.
   Does the water enter the funnel?

   Yes

   Why or why not?

   Yes the water displaces the air in the funnel and then the water takes the place of the air. The air escapes out of the hole at the top of the funnel
3. Repeat procedure 1, but this time, hold your finger over the small end of the funnel and immerse it into the beaker of water. Lower it gradually all the way to the bottom.
   Does water enter the funnel?

   No

   Why or why not?

   The air in the funnel has no where to go, so it stayes in the funnel. Water + Air can't co-exist in the same place

3. With the funnel at the bottom of the beaker, remove your finger and observe what happens. Try this several more times by placing your finger over the end of the funnel when it is ONLY PARTLY IMMERSED and observe what happens.

The funnel sinks and the water (faster) fills the funnel (faster) than above the water line in the beaker

Observations:

The water slowly pushes air out the top of the hole. It happens slowly because the air can not essape quickly out of the hole. The water fills up the spoace where the air was

4. Place a balloon tightly over the **small end** of the funnel by first squeezing all the air out of the balloon and then pulling it over the end of the funnel. Be careful not to rip the balloon. You may need to insert the funnel through a rubber stopper so that the balloon can fit securely. Place the large end of the funnel in the water. Lower it gradually. Observe what happens.

Observations:

The ballon inflates a bit. You need a bigger funnel or smaller ballon to have the ballon fill up more. No water enters the funnel

5. Squeeze the balloon slowly but firmly, and observe what happens.

Observations:

typical result

The water level rises or air bubbles from the bottem of the beaker.

We observed the typical result. The top water line in the funnel varies a bit

What is causing this to happen?

The air is forced out of the ballon and having no where to go but down either pushs the water down out of the funnel or the air is forced out of the tunnel and escapes upwards

Conclusion in Sci Log

Michael Plasneier

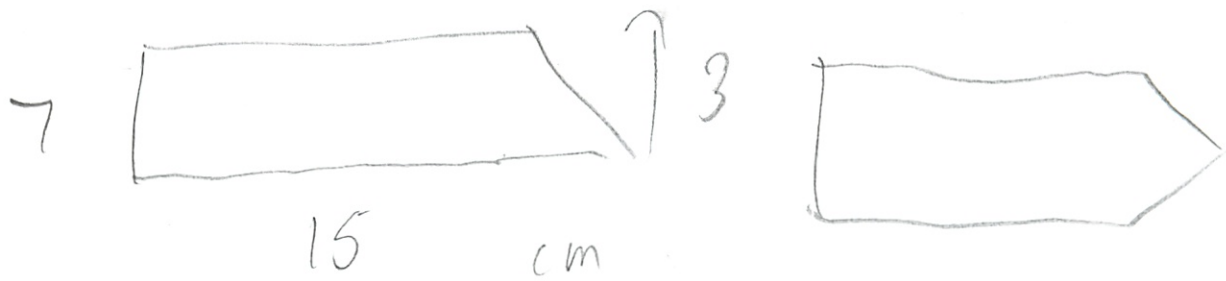
Archimedes' Principle

1. Observe a floating object in an aquarium. Discuss your observations.

What happens if the weight of the vessel changes?

It will sink if it gets heavier

2. Construct a boat from the sheet of aluminum foil supplied to you. Sketch its shape and record its measurements.



3. Calculate the volume of the boat.

$7 \times 15 \times 3 = 315\ cm^3$

$l \times w \times d$

315
7
91
5

4. Set your boat into the aquarium and slowly add weights. Observe the level of the water in the tank and the depth of the boat in the water. Describe your observations.

The water goes up and boat gets deeper

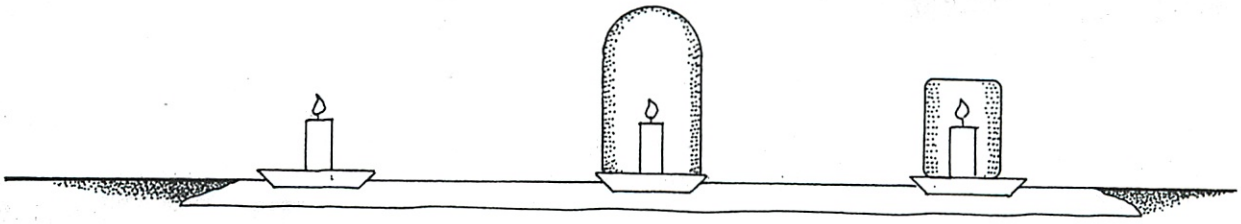
5. Continue to add weights until your boat sinks. How much weight did your boat hold? Compare this to the volume of your boat.

6. Discuss and draw your conclusions.

Student Worksheet

Burning Race

Name _____



Setting Up the Burn Platform

Spread aluminum foil on a table or a counter. Place three candles on it, each about 6 inches (10 cm) apart. Leave one open to the air; cover one using a small jar that is turned upside down; and cover the last one using a large jar turned upside down. Make sure there are no gaps between the mouth of the upside-down jars and the table or counter.

Collecting the Data

Light all the candles at the same time and quickly re-cover the two under the jars. Time the candles to see how long they burn. Fill in the chart below.

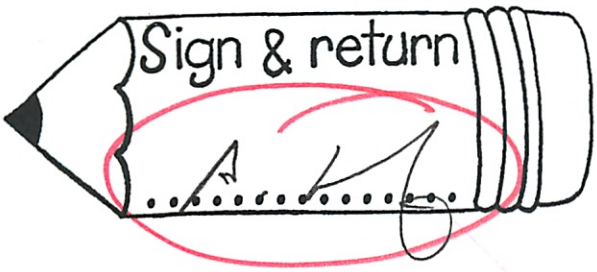
Candle	Time Candle Burned (seconds)			Avg
#1: In open air	–	–	–	–
#2: Under small jar	6	5	5	5.5
#3: Under large jar	17	11	7	12.84

Drawing Conclusions about the Variable

1. What factor varied for all three of the candles? The amount of oxygen
2. What was the variable in this experiment and how did you control it? The amount of air - Controled by not letting more air into area - restricting airflow
3. Which of the candles burned for the shortest time? The small jar because it had the less air.
4. Which burned the longest? Open air
5. What conclusion can you draw about the variable in this experiment? The amount of oxygen available to the candel changes how long it can burn. will not be able to burn very long because they will use up the available oxygen. :)

Conclusion: The candels in the jar

The candles in the smallest jar will burn the least amount of time. A candle burning inside an inverted quart size jar will burn only 15 to 20 seconds



17/20

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1

Name Michael Plasmeier Period 2

Science Portfolio/ScienceLog Quiz

ScienceLog

1. What is the Particle Theory?

   All matter is made of small picres (called particles)

2. A molecule is a substance consisting of two or more elements that are chemically combined. Ex. water

3. John Dalton separated water into hydrogen and oxygen in the early 1800s.

4. An element is a substance that consists of only one kind of atom and that cannot be chemically separated into other substances.

5. Atoms combine to form particles molecules/compounds/matter. (-1)

Portfolio:

1. Describe the model of a typical atom. (how do scientists picture it?)

They picture  with a nucleus with protons and neutrons in the middle and electons spining around 

2. What happens to ice cubes in the freezer over time? Explain using the particle theory.

The ice molecules sobline (turn to gas) the particles in the water are able to turn to gas and flot away.

3. When we mixed 50 mL of sand with 50 mL of water, the volume was less than 100 mL. Explain.

The water particles filled in the space between the sand particles.

4. What distinguishes one atom from another?

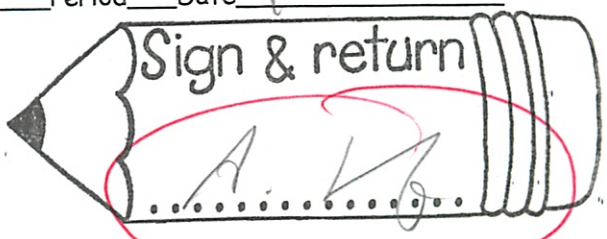
Different properties The number of protons in the nucleus of the atom

5. Atoms are mostly empty space.

Name Michael Plasmeier Period 3 Date 3/1

Science Assessment – A Case for Particles

50/100



Circle your choice for each.

1. When a certain amount of heat is absorbed, the particles that make up butter have enough energy to move around, so the butter melts. The melting of butter is
   a. an exothermic change.
   b. an example of diffusion.
   c. an endothermic change.

2. Mothballs can be smelled across the room from the clothes closet in which they are located. The particles that make up the mothballs go directly from the solid state into the gas state by a process known as
   a. evaporation.
   b. sublimation.
   c. cooling.

3. Once in the air, the mothball particles, described in question two, spread throughout the room by the process of
   a. diffusion.
   b. evaporation.
   c. condensation.

4. You notice a puddle disappears during the day. Heat is absorbed by the water, causing the individual particles making up the liquid to move faster and faster until some of them gain enough energy to break loose and become gas particles. This is an example of
   a. an exothermic change.
   b. condensation.
   c. evaporation.

5. A burning candle warms the air around the candle and beyond. The reaction between the candle wax and oxygen is
   a. an exothermic change.
   b. called condensation.
   c. called regeneration.

6. John Dalton realized that the mass of oxygen atoms is always eight times the mass of hydrogen atoms in any given amount of water. Suppose that a sample of water contains 12 g of hydrogen. How many grams of **oxygen** are in this sample?
   a. 20 g
   b. 96 g
   c. 4 g

12
+8
96

7. Particles are counted in moles that contain a quantity called
   a. scientific notation.
   b. the atomic number.
   c. Avogadro's number.

8. If you watch a thermometer in a beaker of water as the water heats, what happens to the temperature of the water as the water boils?
   a. the temperature rises
   b. the temperature stays the same
   c. the temperture first increases and then decreases.

9. The strength of cohesion between the particles of a substance, determines
   a. surface tension.
   b. the meniscus.
   c. the theory force.

10. In which state does water have the least kinetic energy? (kinetic energy is energy of motion.
   a. steam
   b. out of the faucet
   c. ice

11. Most of an atom's mass is concentrated
   a. in the nucleus.
   b. in the electron cloud.
   c. in the neutrons.

12. What identifies an atom of a particular element?
   a. the number of electrons in the electron cloud
   b. the number of protons in the nucleus
   c. the number of protons and neutrons in the nucleus

13. These two elements combine to form water.
   a. hydrogen and carbon
   b. hydrogen and oxygen
   c. carbon and oxygen

14.. Water is considered a good solvent (can dissolve most things) because its molecules are
   a. cohesive.
   b. small.
   c. polar.

15. An example of a physical change is
   a. burning firewood.
   b. crushing an aluminum can.
   c. mixing baking soda with vinegar.

16. The periodic table is a system which helps to classify the elements. It was devised by
    a. Dmitri Mendeleyev, in 1869
    b. J.J. Thomson, in 1897.
    c. John Dalton, in 1808

17. Each column on the periodic table is referred to as
    a. a period.
    b. a row.
    c. a family or group.

18. What force hold glue to a piece of paper?
    a. fusion
    b. adhesion
    c. gravitational attraction

19. A particle of matter that is made of two or more atoms is called
    a. an element.
    b. a molecule.
    c. a solution.

20. Methane, a compound, consists of one carbon atom and
    a. four hydrogen atoms.
    b. four oxygen atoms.
    c. three hydrogen atoms and one nitrogen atom.

Name Michael Plasmeier Period_____ Class_____

Design Detective

Scenario 1: Compost and Bean Plants

After studying about recycling, members of John's biology class investigated the effect of various recycled products on plant growth. John's lab group compared the effect of different aged grass compost on bean plants. Because decomposition is necessary for release of nutrients, the group hypothesized that older grass compost would produce taller bean plants. Three flats of bean plants (25 plants/flat) were grown for 5 days. The plants were then fertilized as follows: (a) Flat A: 450 g of 3-month-old compost, (b) Flat B: 450 g of 6-month-old compost, and (c) Flat C: 0 g compost. The plants received the same amount of sunlight and water each day. At the end of 30 days the group recorded the height of the plants (cm).

Hypothesis: a prediction about the relationship between the variables that can be tested, for example, The plants with the 6 month-old compost will grow the tallest after 30 days.

Hypothesis Format: If the older compost is applied, the plant hight is increased

Independent Variable (IV): the variable that is purposefully changed by the experimenter, such as, (X) the age of the compost ✓

Dependent Variable (DV): the variable that responds, for example, (Y) The hight of the plants

Constants (C): all factors that remain the same and have a fixed value, for example, amount of water, sunlight, compost size of plants to begin w/ - he forgot this same types of plants amount of compost

Control: the standard for comparing experimental effects, such as, No Compost

Repeated Trials: the number of experimental repetitions, objects, or organisms tested at each level of the independent variable, such as,

25 each - but only 1 fun

Experimental Design Diagram: a diagram that summarizes the independent variable, dependent variables, constants, control, number of repeated trials, experimental title, and hypothesis.

for other experiment

Title: The Effect of Various Amounts of Calcium Chloride on the Temperature of Water
Hypothesis: If more scoops of calcium chloride are added to water, then the temperature of the water will increase.

IV: Amount of calcium chloride (scoops)			
0 scoop (control)	1 scoop	2 scoops	3 scoops
3 trials	3 trials	3 trials	3 trials

← Independent Variable

← Levels of Independent Variable Including the Control

← Repeated Trials
Number of times each of the levels of IV was tested

DV: Temperature of water ← Dependent Variable

C: Same amount of water (75 ml) ← Constants
Same time to dissolve (2 min)
Constant stirring

Design Flaws:

didn't mention how tall plant was
Same species of plant
Same strength of sunlight
Same temp?
Same humidity?

? instead of 0g of compost - 450g of dirt

Comon Flaws

- No control group
- Poorly defined constant
- Insufficient num of trials (at least 3)
- Limited # + type of dependent variables
- Insufficent time span + frequency of measurment
- Inappropiate use of animals

Title: The Effect of Different Aged Compost on Bean Plant Growth

Hypothesis: If older compost is applied, then plant growth will be increased.

IV: Age of Compost		
3-month-old compost	6-month-old compost	No compost *(Control)*
25 Plants	25 Plants	25 Plants

DV: Height of plants (cm)

C: Amount of light
Amount of water
Amount of compost

Name Michael Plasmeier Period ____ Class ____

Design Detective

Scenario 2: Metals and Rusting Iron

In chemistry class, Allen determined the effectiveness of various metals in releasing hydrogen gas from hydrochloric acid. Several weeks later, Allen read that a utilities company was burying lead next to iron pipes to prevent rusting. Allen hypothesized that less rusting would occur with the more active metals. He placed the following into 4 separate beakers of water: (a) 1 iron nail, (b) 1 iron nail wrapped with an aluminum strip, (c) 1 iron nail wrapped with a magnesium strip, (d) 1 iron nail wrapped with a lead strip. He used the same amount of water, equal amounts (mass) of the metals, and the same type of iron nails. At the end of 5 days, he rated the amount of rusting as small, moderate, or large. He also recorded the color of the water.

Hypothesis: a prediction about the relationship between the variables that can be tested. What was Allen's hypothesis?

If more active metles are placed near iron ~~the test strip nail will not rust as much~~ rusting will decrease. If I expose more active metals to iron, then less rusting will occre

Independent Variable (IV): the variable that is purposefully changed by the experimenter. What was Allen's IV?

The type ~~of~~ strip metal in active metals (al, mg, pb)

Dependent Variable (DV): the variable that responds. What was Allen's dependent variable?

Amount of rusting on the nail - small - moderate - large

Color of water

Constants (C): all factors that remain the same and have a fixed value. List Allen's constants.

type of nail (iron)
Same amount of time
Amount of water - temp of water
Mass of strip

Control: the standard for comparing experimental effects. What was Allen's control?

nail w/ no strip

Repeated Trials: the number of experimental repetitions, objects, or organisms tested at each level of the independent variable. How many trials did Allen have?

1 - only

Experimental Design: a diagram that summarizes the independent variable, dependent variables, constants, control, number of repeated trials, experimental title, and hypothesis. Draw an experimental design that would fit Allen's investigation.

title: The Effects of Metals on preventing rust
Hyp: If more active metals are placed near iron, then rust will decrease.

Word Word

IV: Strip of Metal			
No Strip (Control)	Aluminum	Magnisum	Lead
1 trial	1 trial	1 trial	1 trial

DV: Color of nail
water
Amt of rusting
C: type of nail
same amount of time
amt of water
mass of strip
mass of strip

Design Flaws: What flaws do you see in Allen's experimental design? Explain.

temp of water amt of oxygen in room
Sun light
only 1 trial
~~having 2 DVs~~
Using just a scale not defined
relative
Should be size of strip, not mass

Scenario 2

Iron nails

An excellent design feature is the presence of a control group, the iron nail without a metallic strip. The number of trials, 1 nail, is insufficient and should be increased to five or more. The number of trials required for sufficiency is determined by the variability in the experimental organisms or materials. With physical phenomena, fewer trials are necessary than for living organisms. The dependent variable, amount of rusting, should be quantified. Possibilities include measuring the residue obtained by scraping the nails or measuring the mass of the nails before and after the experiment. Both the colors of the water and the residue (precipitate) should be recorded. Color observations are critical clues to chemical reactions. In this case, they indicate the kind of iron products formed. Controlling the mass of the metallic wrapper may have introduced an undetected variable, the surface area of the iron nail exposed to the water and oxygen, into the experiment. Because chemical reactions occur at the interfaces of substances, keeping surface area constant would be a critical way to improve the experimental design

their critism

Michael Pleasant

Practice

✓ 3/29

In the "Floor Wax Test" scenario below, identify the following components of an experiment:

1. independent variable
2. dependent variable
3. constants
4. repeated trials
5. control

Use the scenario below to write a title and a hypothesis using the following formats:

6. Title: The Effect of the *(changes in the independent variable)* on the *(dependent variable).*

7. Hypothesis: If the *(independent variable—describe how it will be changed)*, then the *(dependent variable—describe the effect).*

A shopping mall wanted to determine whether the more expensive "Tough Stuff" floor wax was better than the cheaper "Steel Seal" floor wax at protecting its floor tiles against scratches. One liter of each grade of floor wax was applied to each of 5 test sections of the main hall of the mall. The test sections were all the same size and were covered with the same kind of tiles. Five (5) other test sections received no wax. After 3 weeks, the number of scratches in each of the test sections was counted.

1. IV - Type of Floor Wax
2. DV: # of Scratches
3. C - Same place (missed Constants: arrangment of tiles, traffic over tiles, amt - type of shoes, -type)
   Same tiles
   Same time + time period
   amt - floor wax
4. Repeted Trials - 5
5. Control - Floor w/o Wax

6. The Effect of different types of wax on the # of Scratches in floor tile

7. If the type of wax (to Tough Stuff) is changed, the # of Scratches on floor tile is decreased

Her7 If the grade of floor wax is varied, "Tough Stuff" floor wax will result in fewer scratches than "Steel Seal" floor wax.

INVESTIGATION 5.1 • Time and Absorption

Materials

- Paper towel
- Food coloring
- Plastic cup or beaker
- Water
- Clock with second hand
- Scissors
- Metric ruler
- Pencil

Safety

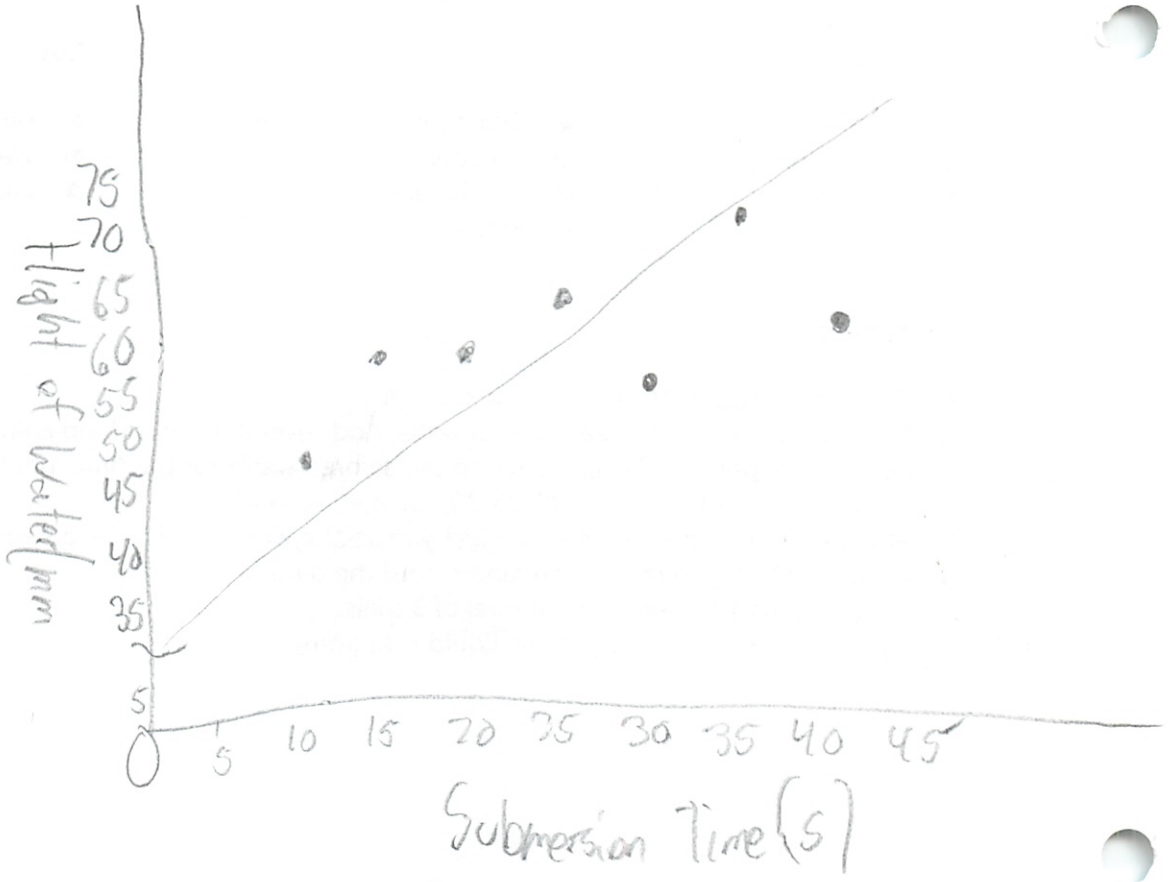
- Handle sharp objects safely.
- Wash hands.
- Wear goggles.

Procedure

1. Cut a paper towel into strips, 2 cm x 22 cm.
2. Fill a container (cup or beaker) with water. Add several drops of food coloring.
3. Place the paper towel strip 1 cm into the colored water for the time interval designated by your teacher, for example, 10, 15, 20, 25, 30, 35, or 40 seconds.
4. At the end of each time interval, *quickly* mark the water levels with a pencil. Then, measure the height in the liquid rose in mm and record the data.
5. Repeat Steps 1 through 4 for a total of 3 trials.
6. Calculate the average height the liquid rose (mm).

Time Strips in water in sec	Hight water rose in mm			
	T 1	T 2	T 3	Average
10	50	45	50	48 1/3
15	66	65	55	60
20	65	55	60	60
25	60	70	65	65
30	60	50	60	55
35	70	73	71	71 1/3
40	65	65	62	63

(10, 48)
(15, 60)
(20, 60)
(25, 65)
(30, 55)
(35, 71)
(40, 63)

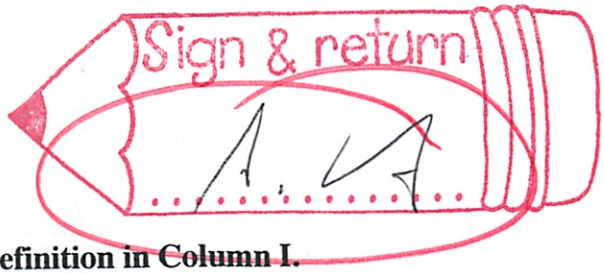


Generally,
Summary Statement: As the length of time the paper towel was submerged increased, the hight the liquid rose also increased

Name Michael Plasmeier Period 2 Date 4/1

Science Quiz – Experimental Design

35/40
+5 extra Credit



Match each term in Column II with its definition in Column I.

Column I	Column II
g 1. A statement of possible relationship between the independent and dependent variables.	a. control
d 2. Any factor that is not allowed to change.	b. independent variable
a 3. A group or sample that is used as a standard for comparison.	c. repeated trials
c 4. Used to reduce the effects of chance errors.	d. constant
b 5. The factor in an experiment that is changed on purpose.	e. dependent variable
e 6. The factor in an experiment that responds to the purposefully changed factor.	f. variable
f 7. Any factor in an experiment that changes.	g. hypothesis

Used 2x

Identify the independent and dependent variables in an experiment with the following title: **The Effect of Placing Used Tea Bags Under Rose Plants on the Growth of the Rose Plants.**

8. Independent variable Placing Used Tea Bags under rose plants

9. Dependent variable Growth of rose plants

Identify the independent and dependent variables in the following hypothesis: **If the kind of dry cell put into a toy car is changed, then the total distance the car will travel changes.**

10. Independent variable kind of dry cell in a car

11. Dependent variable total distance car travels

Review Sam's Experimental Design below, then answer each question that follows.

Sam predicted that Ace gasoline was best.

Brand of gasoline		
Speedy	**Ace**	**Roll-on**
3 round trips (Attica, NY to Downtown Whigham, GA)	3 round trips (Attica, NY to Downtown Whigham, GA)	3 round trips (Attica, NY to Downtown Whigham, GA)

DV: Miles per gallon

Constants:
Same make, model, and horsepower autos
3 cars traveled together
- same route
- same traffic
- same speed, starts, and stops

What was Sam's IV?

Brand of gasoline

What was Sam's DV?

Which gas was best (should: distance traveled - miles per gallon -1.5)

Did he have a Control? If so, what was it?

No

very bad

How many repeated trials did he use?

3

What were his Constants?

same route (traffic, stops, starts)
same types, ages of cars
horsepower

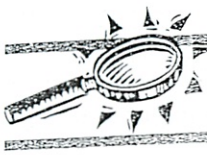
What was his hypothesis?

If Ace gasoline is used, the car would travel better (should go the car travels farther)?

very bad

more miles to the gallon

-1.5



INVESTIGATION 6.1 Super Fizzers

Directions

Read the list of materials and the procedure for conducting the investigation. Before you begin the experiment: (1) write a title, (2) draw an experimental design diagram, and (3) construct a data table. After completing the experiment, construct an appropriate graph.

Materials

- Plastic cups
- Water at three different temperatures (ice cold, room temperature, hot)
- Brand X effervescent tablets
- Watch with second hand
- Graduated cylinder
- Goggles

Safety

- Wear goggles.
- Handle hot objects carefully.

Procedure

1. From the central supply area, obtain 75 ml of ice water.
2. Add one effervescent tablet.
3. Record the time (sec) for the tablet to completely dissolve. Discard the solution as directed by your teacher.
4. From central supply, obtain 75 ml of room temperature water. Repeat Steps 2–3.
5. From central supply, obtain 75 ml of hot water. Repeat Steps 2–3.
6. To create repeated trials, record your group's data on the class data table.
7. Compute the average time for dissolving at each temperature using the values from the class data table.
8. Construct an appropriate graph of the data.

Writing a Simple Report

Follow the sequence described by your teacher to write a simple report for this investigation.

1. Title
2. Introduction
3. Experimental Design Diagram
4. Procedure
5. Results
6. Conclusion

TABLE 6.1 How to Write a Simple Report

Part	Purpose
1. Title	Write a sentence that relates the independent and dependent variables that were investigated.
2. Introduction	Describe the rationale, purpose, and hypothesis for the investigation. Use three questions to guide your writing of the introduction. • Why did you conduct the experiment? (Rationale) • What did you hope to learn? (Purpose) • What did you think would happen? (Hypothesis)
3. Experimental Design Diagram	Format the experimental process. • Begin the diagram by drawing a rectangle. • Write the independent variable (IV) across the top of the rectangle. • Divide the rectangle into labeled columns to represent the different levels of the independent variable. • Indicate the number of trials in each column. • Write the dependent variables (DV) and constants (C) beneath the rectangle.
4. Procedure	List the steps followed to complete the investigation. Check the list carefully for accuracy, completeness, and precision.
5. Results	Complete a data table and an appropriate graph for the data using the following guidelines.
Data Table	• Make a table containing vertical columns for the independent variable, dependent variable, and derived quantity. • Subdivide the column for the dependent variable to reflect the number of trials. • Order the values of the independent variable—preferably from the smallest to the largest. • Record values of the dependent variable. • Compute the derived quantity.
Graph	• Draw and label the X and Y axes of the graph. • Write data pairs for the independent and dependent variables. • Determine an appropriate scale for the X and Y axes; subdivide the axes. • Plot the data pairs on the graph. • Summarize the data trends on the graph.
6. Conclusion	Describe the purpose, major findings, an explanation for the findings, and recommendations for further study. Use six questions to guide your writing of the conclusion. • What was the purpose of the experiment? • What were the major findings? • Was the hypothesis supported by the data? • How did your findings compare with other researchers or with information in the textbook? • What possible explanation can you offer for the findings? • What recommendations do you have for further study and for improving the experiment?

Name Michael Plasmeier Period 3 Date 4/11

4-18

Science Homework: Experimental Design

Directions: Construct an experimental design diagram, including a title and a hypothesis; identify the control (if present); and list at least two ways to improve the experiment.

June wished to determine whether the concentration of salt in water affected how long it takes water to cool. She put 4 identical plastic glasses, each of which contained 225 mL of a different concentration of salt solution into a freezer, for example, 0%, 10%, 20%, 30% salt. She recorded the amount of time it took for each solution to cool to a temperature of 3°C. cool to 3°C not by 3°C

Hyp If the concentration of salt in water is increased, the amount of time it takes the water to cool 3°C ~~is~~ will increase

switch

Title The effect of the concentration of salt in time water takes to cool 3°C.

IV: Concentration of salt in water			
0%	10%	20%	30%
1 trial	1 trial	1 trial	1 trial

Percent not Degrees!!!

DV: Time to cool 3°C

C: same cup
same water
Same freezer at temp
starting point
amt of solution
same type of salt
distilled water
specify temp

Improve
call 0% control
starting point
# of trials
I do amt salt not % of total

Investigation 54: Investigating Human Traits

Objective: To investigate traits for six human characteristics as the beginning of an ongoing discussion of human variation and heredity.

Key Concepts and Process Skills:

1. Graphing data can reveal patterns that are not apparent from data tables.
2. Every person has unique characteristics, including physical characteristics and personality, that distinguish him or her from other people.
3. Related individuals often (but not always) display similar characteristics
4. An organism's traits can be caused by a number of factors, including hereditary and environmental factors, that affect growth and development.
5. Genes are the units of information for inherited traits that parents transmit to their offspring.

Key Vocabulary

1. Inherited traits: characteristics that we acquire from our parents or grandparents.
2. Heredity: the study of inherited traits.
3. Genetics: the study of variation and heredity.

Reminders for Procedures 1-7:

1. For tongue rolling classify as positive only those in your group who can easily and fairly completely roll the tongue into a tube-like shape.
2. For PTC testing, one student from the group will get a piece of control paper for everyone, and then return for PTC paper when everyone in the group is ready. Discard both papers in the wastepaper basket.
3. For height and arm span measurements, round to the nearest 5 cm.

BACKGROUND INFORMATION

Eye Color

Eye and hair color are the product of the action of several genes, interacting in a way that is not completely understood. Although brown eye color usually behaves as if dominant to blue eye color, it is possible for two blue-eyed parents to have brown-eyed children.

Tongue Rolling

For many years, textbooks have suggested that the ability to roll the tongue easily into a tube was a simple dominant Mendelian trait. However, studies of identical twins have provided convincing evidence against this type of inheritance pattern. Identical twins are no more likely than other siblings to display the same tongue-rolling behavior. The geneticist who originally published the report that this was a dominant trait has since published material indicating his concern that his incorrect results of many years ago still persist in textbooks. (Similarly, free earlobes were once considered to be a simple dominant trait, but analysis of identical twins indicates that the determination of free vs. attached earlobes is more complex than originally thought.)

Double-Jointed Fingers

This is also not a simple trait. However, as students will learn later in the course, it can be associated with a dominant trait, called the Marfan syndrome.

? Vocab = ___

PTC Tasting

The only known human trait that is relatively easy to determine and based on simple, one-gene Mendelian inheritance patterns is the ability to taste PTC. PTC is a chemical called phenylthiocarbamide. The PTC papers have a very small amount of this chemical. Tasting is dominant over non-tasting. However, this dominance may be incomplete; individuals with two alleles for PTC tasting may tend to have a stronger tasting reaction than individuals with only one allele for PTC tasting. This difference is more easily detected with another chemical, called PROP, which is not available for classroom use. Recent investigations of the genetics and physiological basis of PTC and PROP tasting suggest that food preferences are correlated to the ability to taste these chemicals. Non-tasters tend to like spicy, flavorful foods, while strong tasters (especially when young) are less likely to like strong flavors. Even this trait, which has a strong genetic basis, can vary with age or environmental factors (such as what a person has recently eaten).

Height and Arm Span

Height and arm span are continuously variable characteristics determined by more than one gene and by environmental factors. For example, genetic factors determine the upper height an individual may reach, but environmental factors such as diet affect whether this potential height is actually reached.

Scoring Guide: Group Interaction (GI) Variable

Score	Task Management **What to look for:** Group stayed on task, managing time efficiently.	Group Participation **What to look for:** Group members work together as a team and the ideas of all members were valued and weighed in working toward the common goal.
4	Accomplishes Level 3 AND goes beyond in some significant way, e.g. group defines own approach to more effectively managing activity, group members actively help each other accomplish the task, group uses extra time productively.	Accomplishes Level 3 AND goes beyond in some significant way, e.g. group members actively ask questions about each others' ideas, group members compromise if there are disagreements, group members actively help each other accomplish the task.
3	Group managed time well and stayed on task throughout the activity.	All group members participated and respectfully considered each others' ideas.
2	Group stayed on task most of the time.	Unequal group participation OR group respectively considered some, but not all, ideas.
1	Group was off-task majority of the time, but task completed.	Significantly unequal group participation OR group totally disregraded some members' comments and ideas.
0	Group did not stay on task which caused task not to be completed.	Single individual does entire task.
X	Group was not present.	

Name _____ Date _____

Human Traits: Group Results

Trait	Name: Michael	Name: Eric	Name: Andrew	Name: Kathy	Group Totals
Eye Color:					
blue	✓				1
brown				✓	1
gray					0
green		✓			1
hazel			✓		1
Tongue Rolling:					
yes	✓	✓		✓	3
no			✓		1
Finger Crossing:					
yes	✓	✓	✓	✓	4
no					0
Height (in cm)	174	156	163	155	
Armspan (in cm)	166	152	122	142	
PTC Tasting:					
yes	mild ✓	strong ✓		✓	3
no			✓		1

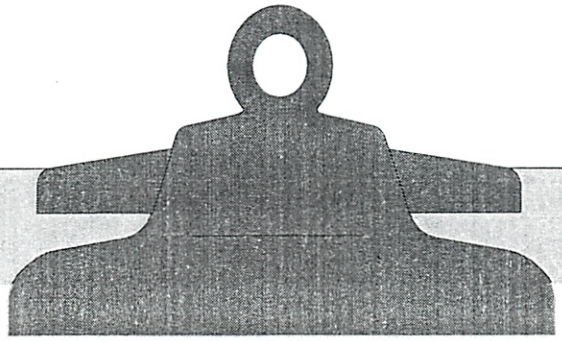
Michael Plasencia

Class Results

Student Group	Germinating Plants Results		
	No. of Green Seedlings	No. of Yellow Seedlings	No - sprout
1	7	1	2
2	8	3	—
3	14	4	—
4	7	1	2
5	25	14	38
Totals	61	23	42

Name _____ Date 8/11

Alternative Hypotheses



After a lengthy discussion, the scientists decide that they have three different ideas for what happened when the blue- and orange-tailed critters were bred.

Hypothesis A:

Each critter pup got most of its tail-color genes from the parent with a blue tail and only a little genetic information from the parent with an orange tail.

Hypothesis B:

Each critter pup got all of its tail-color genes from the parent with the blue tail. (None came from the parent with the orange tail.)

Hypothesis C: C I agree w/

Each critter pup got half of its tail-color information from each parent, but the information from the blue-tailed parent overwhelms the information from the orange-tailed parent.

ANALYSIS

Discuss with your group: Which hypothesis is most like your original hypothesis? Explain.

C

20/25

Sign & return

Name Michael Plasencia Period 3 Date 1/28

Science Quiz – Investigation 55: Investigating Human Traits

1. What were the dominant traits for your class? (Hint: Look at Class Results Data Table)

Blue and Brown eyes
tongue rolling
Finger Crossing
Can't taste PTC Pape

160-170 cm hight
160-170 cm armspan

2. What accounts for the variation in human traits?

Everyone has different genes from different parents, this genes change through evelotion and natural selection over hundreds of years,

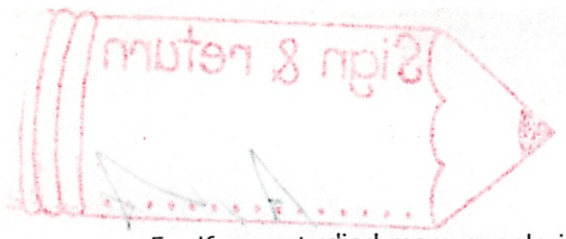
Environmental Factors? -2.5

3. Of the six traits we looked at, which one is relatively easy to determine and based on a simple one-gene inheritance pattern?

PTC tasting is the one gene pattern that is easy to determine and we looked at it,

4. What is meant by nature vs. nurture?

Heredity vs. enviroment is meant by nature vs. nuture. This means that some traits are determined by genes, but can be affected by enviromental conditions like what you eat, or your sunlight exposure.



5. If you studied more people in your community, would you expect to find more traits for each characteristic? Explain your answer.

Hight, arm span and eye color would have the possibility for more alleles, O.R. Tounge Rolling, Fingar Crossing and PTC tasting you can either do it or you can't, there are no more possibity for allels, But the ratio of something like Fingar Crossing to Not being able to cross their fingers would be about the same in the community, because of Dominate + Ressive traits,

Community provides a larger sample size and wider age range -2.5

Name _____ Date _____

Modeling Genes

Scientists often construct simple models that help them test hypotheses. In this activity, you will use colored disks to represent genes for tail color. You can think of the genes as bits of information that carry directions for the traits of the organism.

CHALLENGE

How are simple inherited traits passed from parents to their offspring and then to the next generation?

MATERIALS

For each group of four students

- 1 copy of Transparency 58.4, "Critter Template"
- 20 orange plastic disks
- 30 blue plastic disks

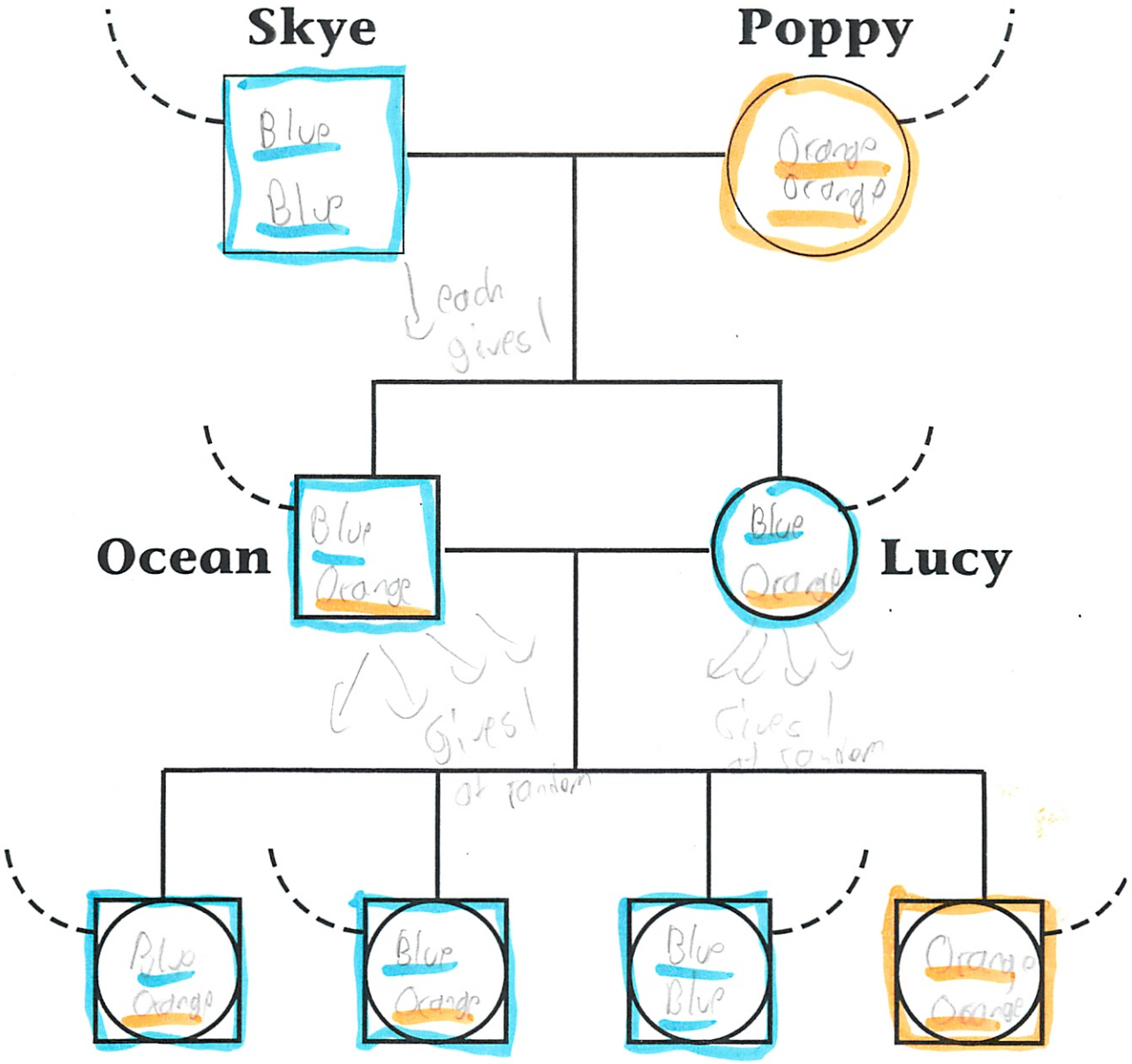
PROCEDURE

1. Decide which hypothesis you will model first.
2. Assume that each critter has the same total number of tail-color genes. To keep your simulation simple, decide with your partner whether to try the simulation with 2, 3, or 4 tail-color genes in each critter.
3. Place the number of orange tail-color genes (orange disks) you have chosen into Poppy's outline on your critter-breeding template.
4. Place the number of blue tail-color genes (blue disks) you have chosen into Skye's outline on your critter-breeding template.
5. Decide how many genes you think each parent (Skye and Poppy) gives to each offspring. Don't take the genes away from Skye and Poppy. Skye and Poppy give copies to their offspring. Take the copies you need from your pile of disks. Place the appropriate number of orange and blue disks in the outline for each offspring. *Remember, each offspring has to have the same total number of tail-color genes as Skye and Poppy.*
6. Review what you did in Steps 4 and 5. Be sure it fits the hypothesis you are modeling.

Name _____ Date _____

7. Decide how many blue and orange genes you think each parent in the second generation gives to each of the offspring in the third generation. Try to develop a logical model that will result in approximately 3 blue-tailed creatures for every 1 orange-tailed creature. Place the number of blue and orange disks that each offspring must receive into the outlines for the third-generation offspring.
8. Keep a record of your group's model. Be prepared to explain your ideas to the class.
9. Next try simulating the transfer of genes from Poppy and Skye to their offspring according to each of the other hypotheses developed in class. Follow Steps 1–7.
10. Answer the Analysis Questions on page D-29 in your Student Book.

Critters Template



Scoring Guide: Group Interaction (GI) Variable

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Group 1

Mike

Andrew

Cathy

Eric

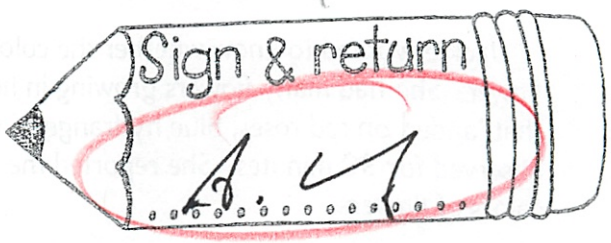
Investigation #54

Investigating Human Traits

Name Michael Plasencia Period 3 Date 9/20

Science Quiz – Experimental Design

25/22



Directions: Circle your choice for each.

1. Which of the following is NOT part of a well-designed experiment.
   a. a control
   b. multiple trials
   c. a reproducible procedure
   d. small sample size

2. Ali wants to find out how long it takes her baby sister to fall asleep. Variables in her experiment include:
   a. time of day
   b. noise levels
   c. both a and b
   d. none of the above

3. A scientist is interested in comparing the circulatory systems of different types of worms. What is the scientist most likely to do first?
   a. develop a procedure
   b. analyze data
   c. make a conclusion
   d. collect evidence

4. A student wonders which of her friends can run the fastest. She decides that a race, starting at the maple tree and ending at the oak tree, will answer her question. Which variable(s) is she planning to control?
   a. time
   b. distance
   c. both a and b
   d. none of the above

5. Andrew isn't sure how much sugar to add to his powdered drink mix. He decides to test how much sugar will make his drink too sweet., Which of the following could NOT be a hypothesis for his experiment?
   a. If lemon is added to a drink mix, then it will taste less sweet.
   b. If more than two (2) spoonfuls of sugar is added a drink mix, then it will be too sweet.
   c. If sugar is not added to a drink mix, then it will taste just right.
   d. If sugar is added to a drink mix, then it will taste sweet.

Read the following scenario, then complete the matching exercise.

Jackie wanted to know whether the color of a flower affected the attraction of bees to the flower. She had many flowers growing in her backyard. She observed the number of the bees that landed on red roses, blue hydrangeas, yellow marigolds, and pink carnations. She observed for 30 minutes. She reported the number of bees that landed on each of the four colors of flowers.

a. Title
b. Hypothesis
c. Independent Variable
d. Dependent Variable
e. Constants
f. Way to improve

e 6. Temperature; Observations for 30 minutes; Location in backyard

f 7. Add a control

a 8. The Effect of the Color of a Flower on Its Attractiveness to Bees

d 9. Number of bees

c 10. Color of Flowers

b 11. If different colored flowers are present, then bees will be attracted to the flowers in the order of red, pink, yellow and blue.

Bonus +3pts. How many trials did Jackie have? 1 days work

Scoring Guide: Group Interaction (GI) Variable

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Mike

Melissa

Meredith

Creature Features Model Presentation 5-16-05

25/22
5-10-05

Name Michael Plasmeier Period 3 Date 5/10/05
Science Quiz – Activities 55, 56, and 57 – Our Genes, Our Selves

Directions: Choose from the word bank to complete each statement below.

~~avoid some physical activities~~	~~connective tissue~~
~~artificial clones~~	~~genes~~
~~asexual~~	~~green and pale yellow~~
~~both parents~~	~~monitor his/her health~~
~~clones~~	~~reproduce rapidly~~
	~~sexual~~

Plants Have Genes, Too!

1. Genes are the units of information for inherited traits that parents transmit to their offspring.

2. Organisms that reproduce rapidly are useful in studying genetics.

3. In class, we are germinating seeds that are the offspring of plants bred from true breeding green & pale yellow strains of flowering tobacco.

Bonus +1 pt.
What is the advantage of studying heredity in plants and simple organisms such as bacteria and yeast rather than in humans or large animals?

Plants reproduce rapidly and have simpler traits
Simple organisms

Joe's Dilemma

1. The Marfan syndrome is an inherited disease that affects a person's Connective tissue and is characterized by a pattern of symptoms, some or all of which may be displayed by an individual with the syndrome.

2. A person with Marfan syndrome can live a full productive life, but may have to monitor higher health and avoid some physical activities.

Bonus +1
What are three signs that suggest a person may have the Marfan syndrome?

loose joints
tall
long arms + legs

Copycat

1. Asexual reproduction produces individuals who are genetically identical to the parent. These individuals are called clones of the parent. Artificial Cloning can now be made of some animals that normally reproduce only sexually.

2. Sexual reproduction involves the union of two sex cells and produces unique individuals that show a combination of traits inherited from both parents.

Bonus +1pt.
While most of your traits can be influenced by the environment, what in your cells causes traits to be inherited?

Genes / DNA

Name Michael Plasmeier Period 3 Date 4/17

4.21-05

Science Homework: Experimental Procedures

Procedures for a science experiment need to be written with explicit detail and in proper sequence. Procedures must be written so that anyone can conduct the experiment exactly as it was intended. There should be no need to infer any details in an experimental plan, because in doing so, they may vary from what the original experimenter did.

Directions: In the space below, write the directions for making a peanut butter and jelly cracker-sandwich. Then write directions for another familiar activity of your own choosing.

1. Take 1 Ritz brand snack cracker, normal size (3g) and lay it on a flat surface.
2. Using a knife, spread about 10g of Brand X peanut butter onto the flat side of a ritz cracker.
3. Lay this aside and take another cracker.
4. Using a different knife, spread about 10g of Brandy jelly on the flat side of the other cracker.
5. Place the jelly side of the cracker on top of the peanut-butter side of the first cracker and squeeze till the peanut butter oozes out .5 cm
6. Place in your mouth and enjoy!

Over →

How to get nutrients information of USDA website

1. Mass the edibal part of food.
2. Go to : USDA website
3. Click on: "Search database"
4. type in food in "keyword" box
5. Hit search
6. Pick food by checking radio box near it,
7. type in mass of food from #1
8. Hit search
9. Get nutrients from table and note units

Activity 59: Gene Combo

We will investigate a model for the behavior of genes that assumes that each parent has two versions of the gene for tail color and only one version from each parent is transferred to each offspring.

An allele is a version of a gene. In this activity, tail color is determined by two different alleles; one provides information resulting in a blue tail and the other provides information resulting in an orange tail. A coin-tossing simulation will be used to model a random process for determining which of the two alleles a parent gives an offspring.

Question?
What are the chances that a coin toss will result in heads (vs. tails)?

$P(\text{Heads}) = \frac{1}{2}$

We will use the outcomes of coin tosses (heads or tails) to simulate the random transfer of genes from parents to offspring. You will compare results of the random simulation to the results of the critter breeding to see if this random model fits the results. Assume that Ocean and Lucy are one breeding pair chosen from Generation Two; i.e., they are offspring of Skye and Poppy and both have blue tails.

Name _____ Date _____

Gene Combo Results

Offspring	Ocean's contribution (T or t?)	Lucy's contribution (T or t?)	Offspring's genes (TT, Tt, tT, or tt?)	Offspring's tail color (blue or orange?)
1	t	t	tt	Orange
2	T	t	Tt	Blue
3	t	t	tT	B
4	T	t	Tt	B
5	T	t	Tt	B
6	t	t	tT	B
7	t	t	tt	O
8	T	t	Tt	B
9	T	t	Tt	B
10	t	t	tt	O
11	T	t	Tt	B
12	T	T	TT	B
13	T	T	TT	B
14	T	T	TT	B
15	t	T	Tt	B
16	t	t	tt	O
17	T	t	Tt	B
18	T	T	TT	B
19	t	T	tT	B
20	t	t	tt	O

5 Orange
15 Blue

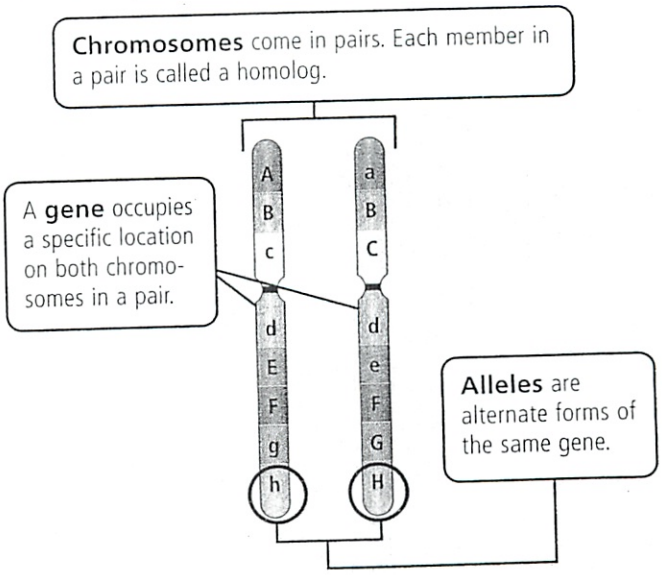
Class Results

Gene Combo Totals

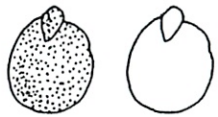
Student Group	Coin Tossing Model Results	
	No. of Blue Tails	No. of Orange Tails
1	15	5
2	16	4
3	15	5
4	15	5
5	15	5
6	13	7
	↓	↓
	↓	↓
Totals	89	31

Chromosomes and Genes

The letters on the pair of chromosomes below represent alleles.



Mendel's Results

	Flower Color 	Seed Color 	Seed Surface 	Pod Color 
Original Cross (Generation One)	purple x white	green x yellow	wrinkled x smooth	green x yellow
Generation Two Offspring / Dominate	all purple	all yellow	all smooth	all green
Generation Three Offspring	705 : 224 (purple:white)	6,022 : 2,001 (yellow:green)	5,474 : 1,850 (smooth:wrinkled)	428 : 152 (green:yellow)

2a, 3.15:1 3.00:1 2.96:1 2.82:1

↑ round Correctly!

He also did other observations

Name Michael Plasmeier Date _____ Class _____

Don't Pass the Salt, Please!

You are cofounder of Flav-R-Gro Inc., a company that specializes in creating genetically engineered foods. You and your partner, Maisie Mantequilla, have recently been concentrating your efforts on developing new types of corn. Together, you have developed a type of corn that, fresh from the stalk, tastes like it has been roasted with just the perfect amounts of butter and salt! Your new creation, which you and Maisie call WonderCorn, is bringing you the admiration of your peers and the loyalty of customers. Hungry corn consumers are eager to try your tasty creation, because they can eat it without worrying about the health risks caused by adding butter and salt to food. And to think that you and Maisie did it all through determination, hard work, and an understanding of *codominance*.

Background

In some cases of genetic inheritance, two dominant traits are expressed together instead of one trait being dominant and one trait being recessive. This phenomenon is known as **codominance**. When codominance occurs, both traits are evident in the phenotype instead of one trait being hidden. For example, a cross between a homozygous red horse and a homozygous white horse results in offspring with a roan coat, which consists of red hairs and white hairs. Human blood types are also determined by codominant traits.

You and Maisie suspected that the taste trait in corn is codominant. To find out, you crossed two other types of corn that you created: a homozygous salty corn *(SS)* and a homozygous buttery corn *(BB)*. The offspring were all WonderCorn. Complete the Punnett square below for this cross:

	B	B
S	BS	BS
S	BS	BS

1. What is the genotype of WonderCorn?

   BS

2. What percentage of the offspring have this genotype?

   100%

Your hunch about the codominant taste traits was right. You and Maisie then did another Punnett square to predict the offspring that would be produced by a second-generation (heterozygous) cross. Show the cross below.

	S	B
S	SS Salty	SB WC
B	SB WC	BB Bitter

3. What percentage of these offspring will be WonderCorn?

50%

4. What percentage of these offspring could you and Maisie use for another homozygous cross?

look!
50%

5. If the heterozygous cross produced 736 offspring, how many would you predict would be WonderCorn? Show your work.

368
2 | 736

50% of 368

6. How many of the offspring from the heterozygous cross would you predict would taste salty but not buttery? Show your work.

189
2 | 378

25% or 184

7. Demand for WonderCorn has been high! Grover's Grocery alone has ordered 50 bushels for delivery as soon as possible. Flav-R-Gro Inc. is fresh out of WonderCorn, but you and Maisie are beginning another growing cycle. Assuming that your total crop yield will be 75 bushels, would you be better off using a homozygous cross or a heterozygous cross to fill the order for Grover's Grocery?

Homozygous because then all will be WonderCorn not half of it

Making Punnett Squares

1. Punnett squares is a simple way to determine the various combinations of genes, or factors, that can result from a particular cross.

2. The letters **across the top** of a Punnett square represent the **female's genes** and the letters **on the left** represent the **male's genes** for the trait.

3. The pair of genes in each box represent one from the male and one from the female.

4. You fill in each box by combining the factor to the left of the box with the factor above the box.

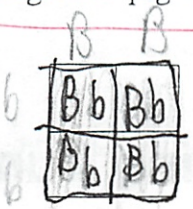
5. When there is both a dominant and a recessive factor for a trait, the dominant one is always written first.

Using Punnett Squares

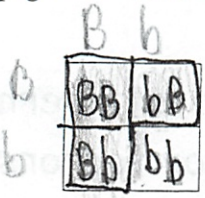
Punnett squares are used to show possible combinations of traits. Complete the Punnett squares and use them to solve the following problems.

What color will the offspring be if a pure black guinea pig is crossed with a pure white?

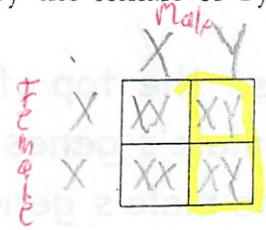
Black Black is dominant in guinea pigs.
Use B for black and b for white.



If two hybrid guinea pigs are crossed, what color will the offspring be? $\frac{3}{4}$ Black $\frac{1}{4}$ White

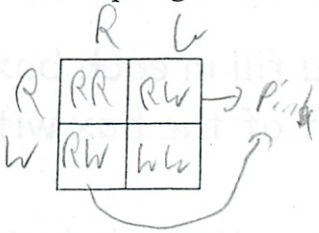


Is the sex of an offspring determined by the female or by the male? Male



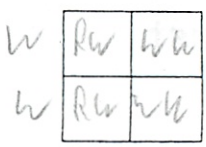
If a red four o'clock flower is crossed with a white one, the resulting flowers are pink. If two pink four o'clocks are crossed, what percent of the offspring will be red? $\frac{1}{4}$

pink? $\frac{1}{2}$ white? $\frac{1}{4}$

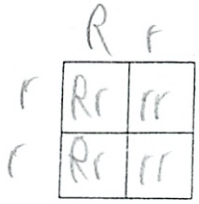


If a pink four o'clock is crossed with a white one, what percent of their offspring will be red?

0 pink? $\frac{1}{2}$ white? $\frac{1}{2}$



According to Mendel, round pea seeds are dominant over wrinkled pea seeds. What offspring would be produced by a cross between a hybrid round seed plant and a wrinkled seed pl



$\frac{1}{2}$ = hybrid round
$\frac{1}{2}$ = wrinkled