S&P #1: Asking Questions and Defining Problems

1. A student thinks that birds eat the same food as squirrels. Which of the following would give her data to answer the question?

    a. She counts the number of birds and squirrels in a park
    b. She feeds sugar water to each and records how they drink
    c. She observes squirrels and birds and writes down everything they eat
    d. She puts a squirrel and a bird together in a cage for a week and observes them

2. Conducting a lab experiment would be the best way to investigate....

    a. Why bears hibernate
    b. How a housing development affected a population of squirrels
    c. How a tornado forms
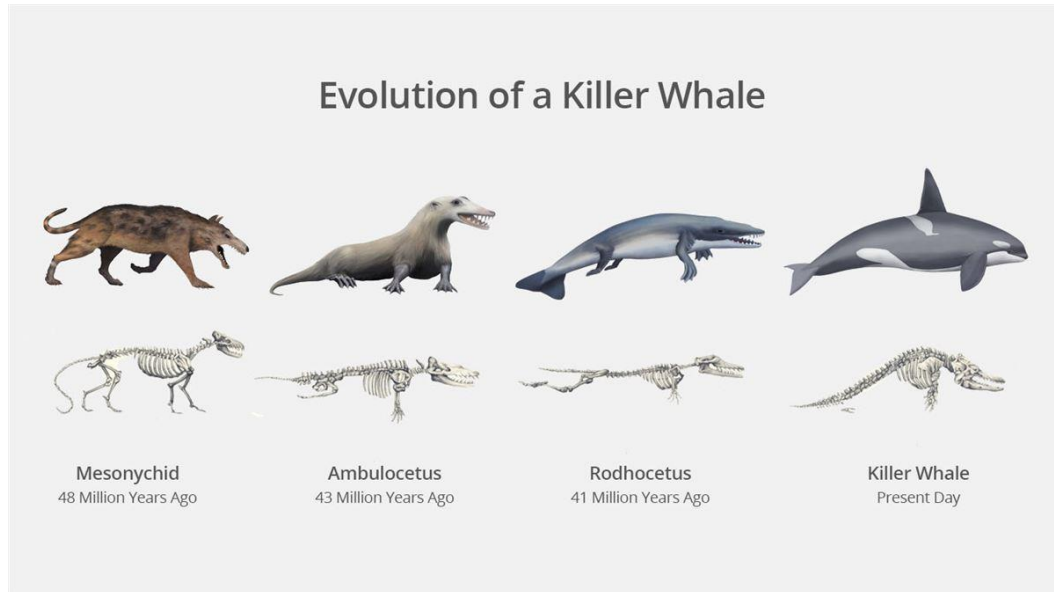   d. How temperature affects the growth of bread mold

3. While observing birds in the neighborhood, Tim noticed that the birds pecking in the grassy areas had different beaks than the birds feeding at the bird feeder. Which of the following is a question he can investigate with an experiment?

    a. Why do birds fly south in the winter?
    b. What beak type do most seed-eating birds have?
    c. How do birds learn to eat?
    d. What material are bird beaks made of?

4. Below is a student's data table. Which problem are they likely investigating?

Plant Species	Height of Plant (cm) after 30 days at 30º F
Flamengo Lilly	6.7
Evening Primose	8.2
Alpine Avens	9.7

    a. How the amount of light affects how much a plant will grow?
    b. How the height of a plant affects the plant species?
    c. Which species of plant is better adapted for colder temperatures?
    d. How the amount of fertilizer affects how much a plant will grow?

5. Which of the following does the model below **NOT show**?

Evolution of a Killer Whale

| Mesonychid | Ambulocetus | Rodhocetus | Killer Whale |
| 48 Million Years Ago | 43 Million Years Ago | 41 Million Years Ago | Present Day |

a. Transitional species that eventually led to the present-day Killer Whale
b. How long ago each of the species existed
c. How the Killer Whale will evolve in the future
d. How the bone structure changed during the evolution of the Killer Whale

6. A group of evolution scientists stated that the data below supported their original hypothesis. What could their hypothesis have been?

Year	% of Deer Population that has Spots
1959	33.9
1979	30.5
1999	15.2
2019	4.5

a. The percentage of the spotted fur trait in deer has decreased over the last 60 years.
b. The percentage of the spotted fur trait in deer has increased over the last 60 years.
c. The percentage of the spotted fur trait in deer has fluctuated (gone up and down) over the last 60 years.
d. There is no relationship that can be determined from this data table.

7. A group of geneticists were studying the inheritance of a disease that an affected person must have <u>two recessive copies</u> for. In the family pedigree below, people who are affected by the disease are shaded. Which statement below **best explains** why these geneticists will revise the third generation of their initial pedigree model below?
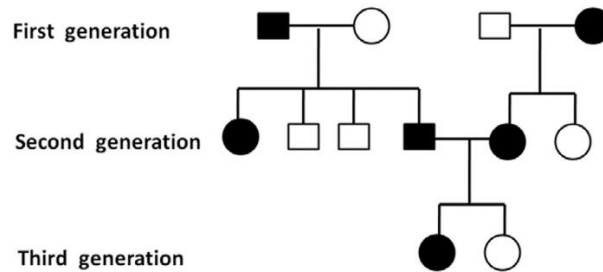
    a. The parents in the second generation can only have children that are affected with the disease
    b. The disease skips a generation
    c. The parents in the second generation can only have children that are not affected by the disease
    d. The parents in the second generation can only have children that are females

8. Which of the following would be <u>the best</u> hypothesis for estimating the relative ages of fossils found in the Earth?

    a. The closer the fossil was found to the surface, the older it is
    b. Fossils found at a depth between 5 and 10 meters are the oldest fossils
    c. The deeper a fossil is found, the older it is
    d. There has been so much construction that it makes it impossible to estimate the relative age of fossils

<u>S&P #3: Planning and Carrying Out Investigations</u>

9. A class is trying to determine which of three laundry detergents is most effective at getting rid of stains. What would be the control of their experiment?

    a. Washing the stained clothes with one detergent after another
    b. Washing the stained clothes with only 1 laundry detergent
    c. Washing the stained clothes with a mix of all three detergents
    d. Washing the stained clothes with water only (no detergent)

10. An experiment is done to test how color affects the speed of a toy car. What is the independent variable in this experiment?
    a. Speed
    b. Distance
    c. Time
    d. Color

11. A student wants to find out how salt affects the melting of ice. She puts four identical ice cubes in plastic cups at room temperature. She pours 5, 10, 15 mL of salt on three ice cubes and leaves one ice cube with no salt. Then she measures how long each ice cube takes to melt completely. What is the dependent variable in this investigation?

   a. Time to melt completely
   b. Amount of salt
   c. Size of plastic cup
   d. Temperature of the room

12. A group of students want to test how the height in which a tennis ball is dropped affects its' return bounce height. Which of the following should they keep constant?

   a. They should keep the drop height the same.
   b. They should use the same tennis ball each time.
   c. They should keep the return bounce height the same.
   d. None of the above.

S&P #4: Analyzing and Interpreting Data

13. A student wants to know which battery brand lasts the longest. He performs an experiment that tests how long four different brands of battery last in a flashlight. He runs one test on each battery. What is the MOST LIKELY source of error in his experiment?

   a. He tests the batteries in only one product.
   b. He does not test enough brands of batteries.
   c. He uses too many brands of batteries.
   d. He does not conduct repeated trials.

14. A group of students conducted 5 trials on the amount of water that filters through sand. Below are their results:

Trial #	1	2	3	4	5
Amount of Water Filtered (mL)	14.5	29.0	3.5	1.0	18.5

Which statement below about the reliability of their results is correct?

   a. Their results are reliable because they conducted 5 trials.
   b. Their results are not reliable because their results per trial were not consistent.
   c. Their results are reliable because at least 1.0 mL of water filtered down in each trial.
   d. Their results are not reliable because they used clean water instead of dirty water.

S&P #5: Using Mathematics and Computational Thinking

15. Use the data per trial below to calculate the average number of students with the recessive trait Widow's Peak per grade.

Grade	6th	7th	8th
# of Students with Widow's Peak	42	64	44

   a. 46   b. 55   c. 44   d. 50

16. A team of ecologists were keeping track of the number of sightings of the endangered snow leopard over the summer months below:

Month	May	June	July	August
Number of Sightings	19	10	11	10

Which month's number of sightings is likely an outlier?

    a. May   b. June   c. July   d. August

17. Based on the graph below, about how many wild tigers would you expect to be living in 2020?

Wild Tiger Population of the World (Last 100 Years)
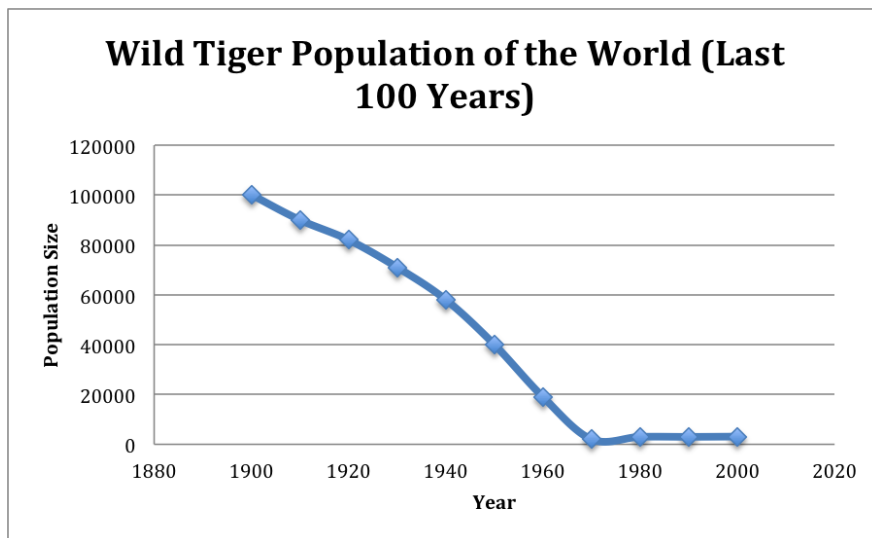
    a. More than 20,000   c. Less than 10,000

    b. Exactly 15,0000   d. Between 10,000 and 20,000

<u>**S&P #7: Engaging in Argument from Evidence**</u>

18. Stephanie hypothesized that the percentage of squirrels with a brown coat would increase over time due to natural selection. Her data is below:

Squirrel Trait Coat Color	Percentage of Squirrel Population with Trait Year 1995 (%)	Percentage of Squirrel Population with Trait Year 2005 (%)	Percentage of Squirrel Population with Trait Year 2015 (%)
Grey	60.0	50.0	40.0
Black	25.0	30.0	35.0
Brown	15.0	20.0	25.0

Which of the following based off Stephanie's hypothesis is MOST TRUE?

   a. Her hypothesis was incorrect because the percentage of grey coat squirrels remained the highest over time.
   b. Her hypothesis was correct because the percentage of brown coat squirrels increased each decade.
   c. Her hypothesis was incorrect because the percentage of brown coat squirrels remained the lowest over time.
   d. There is not enough information in the data table to make a claim.

19. Which is the best explanation for the phenomena observed in Stephanie's data above?

   a. A changing environment is causing the black and brown varieties of squirrel to be more "fit" than the grey-coated type.
   b. Foxes are targeting grey squirrels more because they taste better.
   c. Genetic mutations have given the brown and black color squirrels unusual defense mechanisms.
   d. A new virus is attacking the squirrel population.

20. Kim and Heather both think their paper airplane design will allow it to travel the furthest. They conduct 3 trials each. After evaluating the data, which statement is true?

Trial #	Distance from Kim's Airplane (m)	Distance from Heather's Airplane (m)
1	7.5	6.0
2	6.5	5.5
3	8.0	5.5

   a. Their airplane designs are equally as effective.
   b. Heather's airplane design is better because it travels further.
   c. Kim's airplane design is better because it travel's further.
   d. There is not enough data to support any conclusion.

S&P #8: Obtaining, Evaluating, and Communicating Information

21. Suppose a consumer reads the following news release regarding the safety of a genetically modified (GM) food:

> **GM Grains Pose No Health Risk**
>
> Researchers report that genetically modified (GM) grains fed to test mice have no negative impact on health. In two trials, the offspring of mice fed GM grain for three weeks showed a similar survival rate as the offspring of mice that were fed non-GM grain. The trials have been called as a victory for GM food producers. A spokesperson for the research group stated that "it is highly unlikely for any unintended side effects to occur as a result of human consumption of GM grains."

Why should a consumer question the conclusions presented in this news release?

    a. The researchers only tested on mice and not humans.
    b. They only conducted two trials and should have conducted several more to make sure they are safe.
    c. They only tested for three weeks; not long enough to see if there were any long-term health effects.
    d. All the above.

22. A group of students carried out the following procedure to determine which variety of pea plant height is most common (tall or small).

    1) Go to the Enfield Green House Conservatory in May
    2) Go the location where they store all their pea plants
    3) Count the number of pea plants that are small and tall
    4) Calculate the percentage of pea plants that are small and tall

Why would it be difficult for other students to replicate this experiment?

    a. They did not share which month to test and the number of each variety could change monthly
    b. They did not provide an exact location to perform the experiment
    c. They did not share the criteria for determining whether a pea plant is tall or small
    d. They did not tell us how to calculate a percentage

23. Jerome wants to do a presentation on evolution. When in the library, he finds the following quote online.

> "Species have no way to change over time. The ones that currently exist on the planet, have always existed and have been able to avoid going extinct."
>
> -Archibald Dawson III
> *Current Theories on Speciation*
> 1801

Why shouldn't Jerome use this quote in his project?

   a. Because it is a quote and quotes are never accurate
   b. Because it is too short and doesn't give enough information
   c. Because it only presents facts and doesn't show the bias of the author
   d. Because it is from long ago and findings have likely occurred since then

24. Which conclusion statement below about a study on which worldwide human eye color is most abundant is BEST?

   a. Blue eye colors are the prettiest and therefore are the most abundant
   b. From counting the eye colors of those around me, I conclude that brown eye color is the most abundant
   c. Based on global data, there are more people with brown eyes than any other color
   d. There are so many different eye colors that it is impossible to determine which is most abundant

25. A naturalist studying the color of a specific bird species on an island finds that 37% are blue, 2.2% are green, 18.5% are yellow, and 42.3% are red. What would be the BEST way to communicate this information visually?

   a. Line graph
   b. Drawing a model
   c. Circle/ Pie Graph
   d. Bar Graph