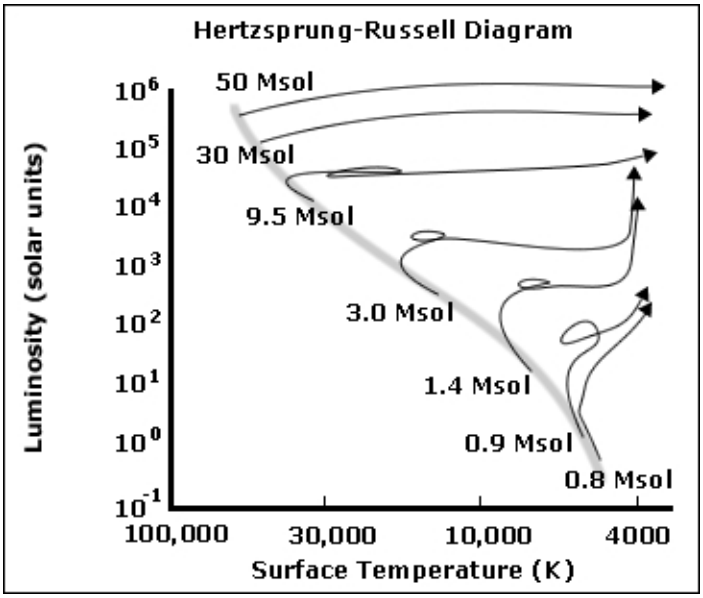
Physics Post-Test Review - General Science Stuff (Demo Version)

Read each item carefully.

"Hertzsprung-Russell Diagram II"

The graph shows a Hertzsprung-Russell diagram. It shows the beginning of the evolutionary paths of stars of various masses as they leave the main sequence. "Msol" stands for solar mass.



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1) from "Hertzsprung-Russell Diagram II"

What question can one ask about this data that will lead to a testable hypothesis?

A) What is the average life span of a star?

B) How many kilograms are in a solar mass unit?

C) Is there a relationship between surface temperature and luminosity?

D) Are high-mass stars hotter and brighter because their composition is different?

"Elizabeth's Experiment: Bacteria Counts in Meats Cooked by Different Methods"

Elizabeth conducted an experiment in which she cooked two kinds of meat using two different cooking methods. She then diluted and incubated small samples of the cooked meats and counted the number of bacterial colonies in each sample. The table below shows her data.

Number of Bacterial Colonies in Meat Samples Cooked by Different Methods

	Trial 1	Trial 2	Trial 3	Average
Beef cooked in microwave	42	68	39	50
Beef cooked in oven	55	83	98	79
Chicken cooked in microwave	50	66	71	62
Chicken cooked in oven	92	59	100	84

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2) from "Elizabeth's Experiment: Bacteria Counts in Meats Cooked by Different Methods"

What is the dependent variable in this experiment?

A) the amount of meat she diluted in each sample tested

B) the method with which she cooked the meat samples

C) the number of bacterial colonies in the meat samples

D) the amount of time for which she cooked the meat samples

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"Marissa's Experiment: Seed Germination"

Marissa read that seed banks help preserve seeds by freezing them. She decided to conduct an experiment to test how storage temperature affects tomato seed germination. She hypothesized that seeds stored at 0 °C would germinate best. She collected 80 tomato seeds and divided them into four groups of 20 seeds. She stored each group at a different temperature for three months. Then she planted all 80 seeds and observed to find out how many of each group germinated. The table below shows her results.

Daily Germination of Seeds

	Tomato Germination			
	0 °C	5 °C	20 °C	25 °C
Day 1	0	0	0	0
Day 2	3	4	1	2
Day 3	8	5	4	3
Day 4	7	5	4	4
Day 5	0	3	3	2
Day 6	0	0	0	1
Day 7	0	0	0	0
Total	18	17	12	12

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3) from "Marissa's Experiment: Seed Germination"

What relationship does the data show between temperature and seed germination?

A) positive relationship

B) negative relationship

C) positive and negative relationship

D) no relationship

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4) from "Marissa's Experiment: Seed Germination"

What is the dependent variable in this investigation?

A) the number of seeds that germinate

B) the storage temperature for the seeds

C) the length of time the seeds are stored

D) the type of seeds used in the experiment

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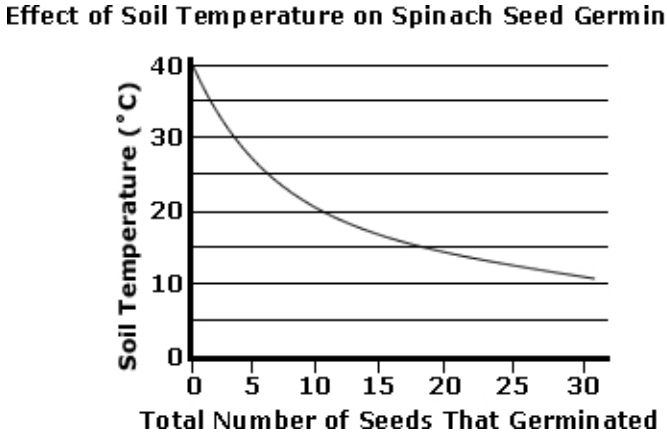
5) The graph below shows the results of an experiment testing the effect of soil temperature on spinach seed germination.

What relationship does the data show between soil temperature and spinach seed germination?



A) a positive relationship

B) a negative relationship

C) a negative relationship, then a positive relationship

D) no relationship

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"Danny's Experiment: Tree Fertilizer"

Danny was curious about the three hyphenated numbers he saw on bags of fertilizer. He conducted some research and learned that this series of numbers is called a fertilizer's "analysis." The first number refers to the percentage of nitrogen in the fertilizer, the second number to the percentage of phosphorus, and the third number to the percentage of potassium. He read that what's most important in choosing a fertilizer is the ratio of these three nutrients. The actual percentage of each nutrient is less important because fertilizers with higher percentages can be used more sparingly, fertilizers with low percentages used more generously.

Danny conducted an experiment to find out what ratio of nutrients would work best in fertilizing the orange trees in his yard. He hypothesized that since all three nutrients must be important if they are all accounted for in a fertilizer's analysis, then a fertilizer with an equal percentage of each nutrient would make orange trees healthiest. He tested four different fertilizers on four different orange trees. The written log below shows his results.

Fertilizer Experiment Notes

	2 weeks	4 weeks	6 weeks	8 weeks
Tree Receiving 5-10-10	looks healthy	some leaves wilted	looking more wilted	looking more wilted
Tree Receiving 5-10-5	looks healthy	some leaves wilted	some leaves wilted	looking more wilted
Tree Receiving 10-5-5	looks healthy	very green; producing new fruit	very green; producing new fruit	very green; producing new fruit
Tree Receiving 10-10-10	looks healthy	looks healthy	looks healthy	some leaves wilted

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6) from "Danny's Experiment: Tree Fertilizer"

What is the independent variable in this investigation?

A) the growth rate of orange trees

B) the amount of nitrogen in fertilizers

C) the amount of fruit produced by orange trees

D) the ratio of nutrients in fertilizers

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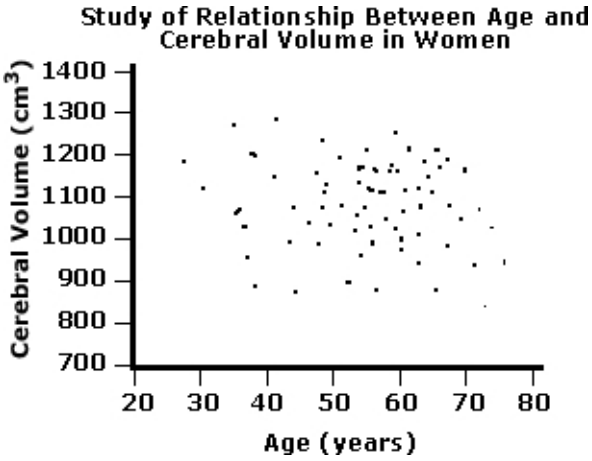
7) The scatterplot below shows the results of a study of the relationship between age and brain size in women.

What relationship does the data show between age and cerebral volume?



A) positive relationship

B) negative relationship

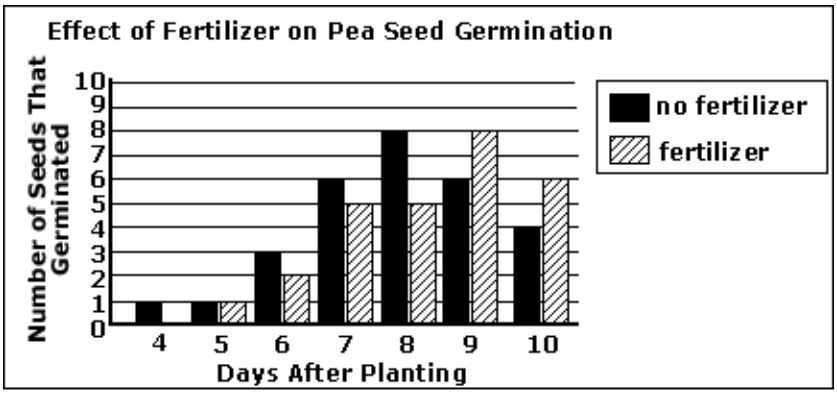
C) positive and negative relationship

D) no relationship

Physics Post-Test Review - General Science Stuff (Demo Version)

"Robert's Experiment: Effect of Fertilizer on Pea Plants"

Robert was curious how fertilizer would affect pea seed germination and growth. He hypothesized that peas planted in soil mixed with fertilizer would grow faster than peas planted in plain soil because fertilizer supplies plants with nutrients that help them grow. He prepared two containers of soil. In one he mixed in the recommended amount of fertilizer. He planted 30 peas in each container. He gave each set of peas the same amount of water and sunlight each day. He recorded how many seeds germinated each day, and he averaged how long it took for the plants to begin producing pea pods. His results are shown below.



Effect of Fertilizer on Pea Plant Maturation

	Average Number of Days Until Plants Produced Pods
No Fertilizer	63
Fertilizer	41

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8) from "Robert's Experiment: Effect of Fertilizer on Pea Plants"

Which method would best communicate the relationship between the use of fertilizer and plant maturation?

A) line graph

B) bar graph

C) pie chart

D) stem-and-leaf plot

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9) from "Robert's Experiment: Effect of Fertilizer on Pea Plants"

What is the independent variable in this investigation?

A) the amount of soil in each container

B) the presence of fertilizer

C) the number of pea pods produced

D) the percentage of pea seeds that germinate

---

10) from "Robert's Experiment: Effect of Fertilizer on Pea Plants"

What is the dependent variable in this investigation?

A) the rate of pea plant growth

B) the number of pea seeds planted

C) the amount of fertilizer used

D) the temperature during germination

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11) Which of the following scientists developed a scale for measuring the magnitude of earthquakes?

A) Archimedes

B) Galileo Galilei

C) Jacques Cousteau

D) Charles Richter

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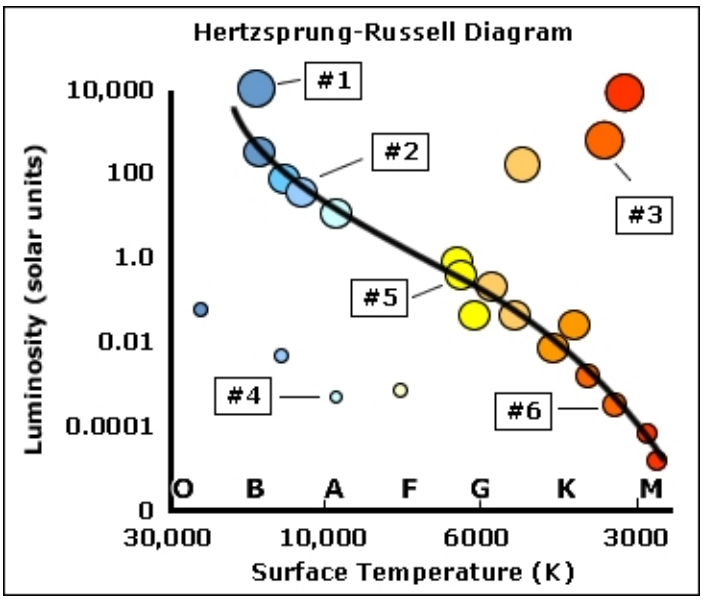
"Hertzsprung-Russell Diagram I"

The graph shows a Hertzsprung-Russell diagram. It shows the relationship between the luminosity and surface temperature of some well-known stars.



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12) from "Hertzsprung-Russell Diagram I"

What general relationship does the data show between a star's surface temperature and luminosity?

A) positive relationship

B) negative relationship

C) positive and negative relationship

D) no relationship

"Frequency of Earthquakes of Various Magnitudes"

Frequency of Earthquakes of Various Magnitudes
According to U.S. Geological Survey

Magnitude	Yearly Average
8 +	1
7.0 - 7.9	17
6.0 - 6.9	134
5.0 - 5.9	1319
4.0 - 4.9	13,000 (estimated)
3.0 - 3.9	130,000 (estimated)
2.0 - 2.9	1,300,000 (estimated)

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13) from "Frequency of Earthquakes of Various Magnitudes"

What relationship does the data show between earthquake magnitude and frequency?

A) positive relationship

B) negative relationship

C) positive and negative relationship

D) no relationship

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14) Which of the following scientists is credited with inventing the first light bulb?

A) Thomas Edison

B) Wilhelm Röntgen

C) John Joseph Thomson

D) Francis Crick

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15) The table below shows the results of an experiment testing how the amount of sugar added to water affects how long the frozen water takes to melt.

What relationship does the data show between sugar content and melting time for frozen water?

Effect of Sugar Content on Melting Time for Water

Amount of Sugar (mg)	Melting Time (min)
0	115
20	108
40	108
60	114
80	102

A) positive relationship

B) negative relationship

C) positive and negative relationship

D) no relationship

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16) Alfonso observed that cleaning a shower with bleach gets rid of mold that grows along the sealant around the shower door.

What question can he ask about this observation that will lead to a testable hypothesis?

A) Is bleach toxic to other organisms?

B) What household cleaning products contain bleach?

C) How often do showers need to be cleaned with bleach?

D) What kind of mold typically grows in showers?

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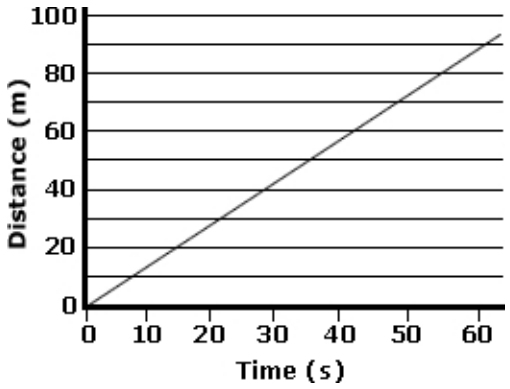
17) What relationship does the data show between time and distance?



A) positive relationship

B) negative relationship

C) positive and negative relationship

D) no relationship

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18) Randy planted a poinsettia in a pot without drainage holes. He observed that over the course of a month, many of the plant's leaves turned yellow.

What question can he ask about this observation that will lead to a testable hypothesis?

A) What material was the pot made from?

B) How does the amount of sunlight a plant receives affect the color of its leaves?

C) How often do poinsettias need water?

D) Does excess water around a plant's roots prevent it from taking in adequate nutrients?

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19) Josephine observed that she woke up in the middle of the night with a leg cramp on a day during which she did not consume any milk or yogurt. She normally consumes both milk and yogurt every day.

What question can she ask about this observation that will lead to a testable hypothesis?

A) What is the best way to relieve a leg cramp?

B) Are leg cramps caused by insufficient calcium intake?

C) Which food contains more calcium per calorie, milk or yogurt?

D) How much calcium is recommended daily by the United States Department of Agriculture?

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20) Carmen observed that after she accidentally spilled some water onto a paper towel holding tomato seeds, some of the seeds germinated.

What question can she ask about this observation that will lead to a testable hypothesis?

A) What percentage of the seeds germinated?

B) On what other surfaces will moistened seeds germinate?

C) How much water did she spill onto the paper towel?

D) What is the average number of days tomato seeds take to germinate?

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21) Which is a requirement of all scientific hypotheses?

A) They must be testable.

B) They must be proven true.

C) They must be based on accepted theories.

D) They must be accepted by the general public.

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22) Which instrument measures the intensity of light on an object's surface?

A) photometer

B) oscilloscope

C) autoclave

D) electron microscope

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23) Which is a requirement of all scientific hypotheses?

A) They must be published.

B) They must be falsifiable.

C) They must be accepted by experts.

D) They must be based on previous research.

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24) Which instrument measures the wavelengths of light absorbed by a substance?

A) ammeter

B) spectrometer

C) centrifuge

D) thermal cycler

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25) Which instrument will measure 45 mm most accurately?

A) micrometer

B) spectrometer

C) manometer

D) tribometer

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26) What contribution did James Joule make to science?

A) He developed an atomic model.

B) He invented the first cathode ray tube.

C) He discovered the mechanical equivalent of heat.

D) He described the properties of electromagnetic waves.

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27) Which is a requirement of all scientific hypotheses?

A) that they be testable

B) that they be factual statements

C) that they support an accepted theory

D) that they be accepted by the scientific community

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28) Which is a requirement of all scientific hypotheses?

A) that they be original

B) that they be complex

C) that they be falsifiable

D) that they be proven true
