Physics Summer Assignment

1. Neils thinks that a comb carrying a charge of static electricity will be able to dissipate its charge quickly in humid air.

To test this hypothesis, Neils charges a comb by running it through his hair 20 times. He then takes the comb into a room set to 80% humidity and waits 30 seconds. Next, Neils brings the comb in close proximity to 100 small, identical scraps of paper and counts how many scraps are attracted to the comb.

To continue testing his hypothesis, what control experiment should Neils run?

- **A.** He should repeat the experiment with more scraps of paper.
- **B.** He should repeat the experiment using a larger comb.
- C. He should repeat the experiment with an uncharged comb.
- \bigcirc **D.** He should repeat the experiment, but only wait 20 seconds before testing the comb's attractive effects.

2. Gavin doesn't like stepping on the cold stone floor of his room on winter mornings. He is usually careful to walk on the rugs laid over parts of the floor. One day, he wonders why the rugs feel warmer than the stone floor. Since the rugs sit on the bare floor all the time, he thinks they should be at about the same temperature.

Which of the following is a good hypothesis Gavin can use to help satisfy his curiosity?

- **A.** What is the specific heat of carpet?
- **B.** Cold radiates out of the stone floor.
- C. Stone is a better thermal conductor than rugs.
- **D.** The stone floor feels colder than the carpet does.

3. Which of the following phenomena cannot be explained through scientific inquiry?

- A. A ball rolling on the ground eventually comes to a stop.
- **B.** The sky appears blue during the day.
- **C.** Time moves only in one direction.
- O **D.** A hydrogen atom is less massive than a cobalt atom.

4. Which of the following reasons best explains why a scientist would want to examine a possible link between modern women waiting longer to have children and an increase in the number of female babies?

- A. to explain recently observed phenomena
- **B.** to discover new aspects of the natural world
- C. to test the conclusions of prior investigations
- O **D.** to test the predictions of current theories

5. Which of the following is true about scientific inquiries?

Scientific inquiries never require any mathematical knowledge or the application of \bigcirc **A.** mathematics.

 \bigcirc **B.** Scientific inquiries usually do not require accuracy or precision when gathering data.

 \bigcirc C. Scientific inquiries are never based on previous scientific research and data.

• D. Scientific inquiries are usually guided by previous scientific principles and knowledge.

6. Scientific inquiry involves

- A. asking questions.
- **B.** locating relevant and reliable information.
- **C.** interpreting and processing data.

○ **D.** all of these

7. LaTonya is using iron filings to investigate the nature of magnetic fields in her physics laboratory.



Which of the following safety measures should she take?

- I. Make certain her eyes are uncovered, so she can see where every filing goes.
- II. Grind the filings into a fine powder, to minimize the risk of cutting herself on them.
- III. Pour the filings out on her desk, so the magnetic field can exert a more powerful force on them.
- IV. Handle the filings directly with damp hands.
- A. I and IV only
- B. II only
- C. IV only
- **D.** none of these

Ken plays a lot of ping pong, and he wants to find out if there is a relationship between how fast the ball moves and how high it bounces off of a table. To do this, he bounces a ping pong ball off of the table by throwing it straight down at various velocities. Then, Ken measures the bounce height and records his data below:

Initial Velocity	5 m/s	10 m/s	20 m/s
Bounce Height	2.0 m	3.8 m	7.0 m

8. In Ken's experiment, what type of variable is the height of the ping pong ball's bounce?

- A. dependent variable
- O B. constant variable
- C. independent variable
- O **D.** chaotic variable

9. If Rodger wants to determine whether a baseball thrown at 100 m/s or a bowling ball thrown at 100 m/s will have more momentum, what is one measurement device he could use to figure this out, without actually throwing either ball?



- A. a ruler
- **B.** a stopwatch
- C. a balance scale
- O D. an accelerometer

10. There are many different steps to a scientific investigation. Assuming each of the students described below is in the process of one step of an investigation, which of the students is gathering data by observation?

- I. After researching flight speeds, Jaron concludes that small birds fly faster than large birds.
- II. Shawna counts how many birds fly into the tree in her front yard each hour.
- III. Oliver sits at the lunchroom door and keeps track of the number of students he sees buying pizza for lunch at his school for one month.
- IV. Raymond hypothesizes that tall students are more likely to buy pizza for lunch than are short students.

- V. Allison mixes water and sodium chloride over the stove until the salt dissolves, then sets the saltwater outside until the water has all evaporated.
- A. I, II, and III only
- **B.** III only
- C. II, IV, and V only

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II D. and III only

11. Mary and her brothers are planning an anniversary party for their parents. The location they are planning to use has a base cost of \$800, and food for each guest will cost \$20. Which of the following graphs best represents the cost of the party?



O A. W

B. X **C.** Y **D.** Z

12. A movie theater collected data on the ages of patrons and discovered that the pattern was a normal distribution, as shown below.



If they collected more data, but only for patrons who were in a younger age group, which of the following would be true about the distribution?

- \bigcirc **A.** skewed to the left; mean > median
- **B.** skewed to the right; mean < median
- \bigcirc **C.** skewed to the right; mean > median
- **D.** skewed to the left; mean < median

13. A chemist performs an experiment in which she compresses an air sample and then measures its pressure. She records her results in the following table:

Volume (cm) ³	Pressure (kPa)
100.0	33.3
50.0	66.7
25.0	133.2

If the chemist continues to compress the air to a volume of 12.5 cm³, what will its pressure most likely be?

- 🔾 **A.** 266.4 kPa
- **B.** 366.4 kPa
- C. 212.2 kPa
- **D.** 12.5 kPa

14. Use dimensional analysis to determine how many centimeters are in 15 kilometers.

○ **A.** 15,000 cm

○ B. 1,500 cm

- **C.** 1,500,000 cm
- **D.** 150 cm

15. Susie has a part-time job. The table below shows her earnings based on the number of hours worked.

Hours Worked, x	1	2	3	4	5
Earnings, E	\$5.71	\$11.57	\$18.43	\$24.29	\$29.15

Which equation best models this set of data?

• **A.** $E = -5.86x^2 + 1.15$ • **B.** E = -5.86x + 1.15• **C.** E = 5.86x - 1.15• **D.** $E = 5.86x^2 - 1.15$

16. A research scientist recorded the height of a certain tree over a period of time. Which equation best models this set of data?

Age of $Tree(x)$	Height in feet (y)	
1	6 <u>5</u> 12	
3	$12\frac{11}{12}$	
5	$15 \frac{3}{16}$	
7	19 5	

• **A.**
$$y = 7x^{0.5}$$

• **B.** $y = 3x + 6$

17.



Picture is not drawn to scale.

Mr. Jameson is walking toward his nine-story hotel and stops to look up to the top of the building. The angle of elevation to the top of the hotel is 55°. If the height of the hotel is 108 feet, about how far away is Mr. Jameson from the hotel?

- A. 76 feet
- **B.** 154 feet
- **C.** 188 feet
- **D.** 132 feet

18. There are 115 tenth-grade students at Courtney's school. Courtney asked 35 randomly selected tenth-grade students the name of their favorite local band. The survey results are shown in the table below. Students will be voting on a local band to play at the upcoming dance. Based on the survey results, how many votes should Rockzilla expect to receive?

Band	Number of Votes	
Slick Sounds	10	
Basstastic	12	
Jam Plan	7	
Rockzilla	6	

A. 20
B. 33
C. 23
D. 39

19. Which of the following describes a way in which mathematics can be used in a scientific investigation?

Jake graphs the results of his science experiment and determines the slope of the \bigcirc **A.** trend line.

Kayla calculates the molarity of the substance that she is using in her \bigcirc **B.** experiment.

Sarah determines the correct number of significant figures to report the mass of \bigcirc C. her sample.

○ **D.** all of these

20. Ron conducted an experiment which measured the pressure exerted by different volumes of air. His results are shown in the graph below.



Based upon the results, what type of relationship exists between the volume and pressure of a gas?

- A. no relationship
- **B.** a linear relationship
- C. an inverse relationship
- O D. a direct relationship