Physics G12-Q1-W1-H.W

Ch1- 1 - The Science of Physics

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Which of the following is an area of physics that studies motion and its causes?
a. thermodynamics
b. mechanics
c. quantum mechanics
d. optics

____ 2. A hiker uses a compass to navigate through the woods. Identify the area of physics that this involves.
a. thermodynamics
b. relativity
c. electromagnetism
d. quantum mechanics

____ 3. According to the scientific method, why does a physicist make observations and collect data?
a. to decide which parts of a problem are important
b. to ask a question
c. to make an interpretation
d. to solve all problems

____ 4. In the steps of the scientific method, what is the next step after formulating and objectively testing hypotheses?
a. interpreting results
b. stating conclusions
c. conducting experiments
d. making observations and collecting data

____ 5. Diagrams are *not* designed to
a. show relationships between concepts.
b. show setups of experiments.
c. measure an event or a situation.
d. label parts of a model.

____ 6. What two dimensions, in addition to mass, are commonly used by physicists to derive additional measurements?
a. length and width
b. area and mass
c. length and time
d. velocity and time

____ 7. The SI base unit used to measure mass is the
a. meter.
b. second.
c. kilogram.
d. liter.

____ 8. The most appropriate SI unit for measuring the length of an automobile is the
a. micron.
b. kilometer.
c. meter.
d. nanometer.

____ 9. The radius of Earth is 6 370 000 m. Express this measurement in km in scientific notation with the correct number of significant digits.
a. 6.37×10^{6} km
b. 6.37×10^{3} km
c. 637×10^{3} km
d. 63.7×10^{4} km

____ 10. How does a scientist reduce the frequency of human error and minimize a lack of accuracy?
a. Take repeated measurements.
b. Use the same method of measurement.
c. Maintain instruments in good working order.
d. all of the above

____ 11. Three values were obtained for the mass of a metal bar: 8.83 g; 8.84 g; 8.82 g. The known mass is 10.68 g. The values are
a. accurate.
b. precise.
c. both accurate and precise.
d. neither accurate nor precise.

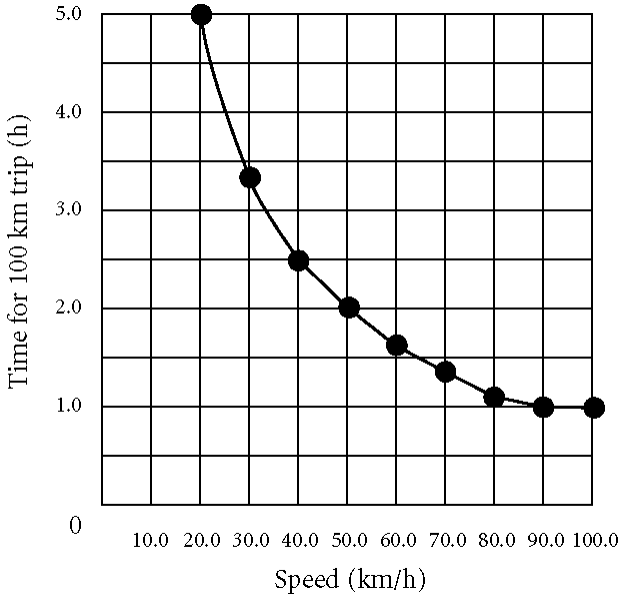
____ 12. Calculate the following, and express the answer in scientific notation with the correct number of significant figures: $(0.82 + 0.042)(4.4 \times 10^3)$

a. 3.8×10^3
c. 3.784×10^3
b. 3.78×10^3
d. 3784

Hour	Temperature (°C)
1:00	30.0
2:00	29.0
3:00	28.0
4:00	27.5
5:00	27.0
6:00	25.0

____ 13. A weather balloon records the temperature every hour. From the table above, the temperature

a. increases.
c. remains constant.
b. decreases.
d. decreases and then increases.



____ 14. The time required to make a trip of 100.0 km is measured at various speeds. From the graph above, what speed will allow the trip to be made in 2 hours?

a. 20.0 km/h
c. 50.0 km/h
b. 40.0 km/h
d. 90.0 km/h

____ 15. Which expression has the same dimensions as an expression yielding a value for acceleration (m/s^2)? (Δv has units of m/s.)

a. $\Delta v/(\Delta t)^2$
c. $(\Delta v)^2/\Delta t$
b. $\Delta v/(\Delta x)^2$
d. $(\Delta v)^2/\Delta x$

____ 16. Estimate the order of magnitude of the length of a football field.

a. 10^{-1} m
c. 10^4 m
b. 10^2 m
d. 10^6 m

Choose the best answer from the options that follow each question.

____ 17. After making observations and collecting data that leads to a question, a physicist will then

a. formulate and test hypotheses by experimentation.
b. state conclusions.
c. interpret the results.
d. revise the initial hypotheses.

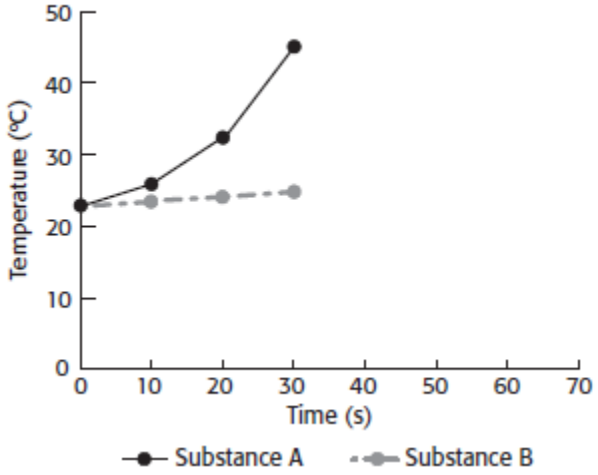
____ 18. Why do physicists use models?
a. They are usually easy to build.
b. They are helpful when explaining fundamental features.
c. They are usually inexpensive.
d. none of the above

____ 19. Which of the following represents a system?
a. flag blowing in the wind
b. ball rolling on the ground
c. picture hanging on the wall
d. all of the above

Choose the best answer from the options that follow each question.

____ 20.

GRAPH 1 DATA FROM HEATING EXPERIMENT



What does Graph 1 show about the heating rate of substance A versus substance B?
a. Compared to substance B, substance A has a faster heating rate.
b. Compared to substance A, substance B has a slower heating rate.
c. Substance A and B heat at different rates.
d. all of the above

____ 21. Which of the following equations best shows the average relationship between temperature and time for substance B as given in Table 1 and Graph 1 above?
   a. $\Delta T = 0.07(\Delta t)$
   b. $\Delta T = 0.07(\Delta t)^2$
   c. $(\Delta T)^2 = 0.7(\Delta t)$
   d. $\Delta T = 7.4(\Delta t)$

____ 22. Using the order-of-magnitude method of calculation, estimate how long it would take a car moving at 109 km/h to travel 10450 km.
   a. 100 000 h
   b. 10 000 h
   c. 1000 h
   d. 100 h

Choose the best answer from the options that follow each question.

____ 23. Which of the following is an area of physics that studies motion and its causes?
   a. thermodynamics
   b. mechanics
   c. quantum mechanics
   d. optics

____ 24. A baker makes a loaf of bread. Identify the area of physics that this involves.
   a. optics
   b. thermodynamics
   c. mechanics
   d. relativity

____ 25. Which statement about models is *not* correct?
   a. Models describe only part of reality.
   b. Models help build hypotheses.
   c. Models help guide experimental design.
   d. Models manipulate a single variable or factor in an experiment.

____ 26. What two dimensions, in addition to mass, are commonly used by physicists to derive additional measurements?
   a. length and width
   b. area and mass
   c. length and time
   d. velocity and time

____ 27. How does a scientist reduce the frequency of human error and minimize a lack of accuracy?
   a. Take repeated measurements.
   b. Use the same method of measurement.
   c. Maintain instruments in good working order.
   d. all of the above

____ 28. Five darts strike near the center of a target. The dart thrower is
   a. accurate.
   b. precise.
   c. both accurate and precise.
   d. neither accurate nor precise.

____ 29. Calculate the following, and express the answer in scientific notation with the correct number of significant figures: 21.4 + 15 + 17.17 + 4.003
   a. 5.7573×10^1
   b. 5.757×10^1
   c. 5.75×10^1
   d. 5.8×10^1

____ 30.

Hour	Temperature (°C)
1:00	30.0
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6:00	25.0

A weather balloon records the temperature every hour. From the table above, the temperature
a. increases.
b. decreases.
c. remains constant.
d. decreases and then increases.

____ 31. The Greek letter Δ indicates a(n)
a. difference or change.
b. sum or total.
c. direct proportion.
d. inverse proportion.

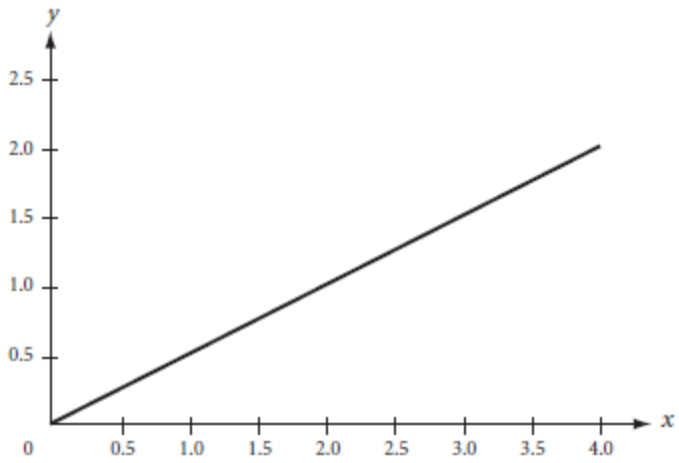
Choose the best answer from the options that follow each question.

____ 32. A hiker uses a compass to navigate through the woods. Identify the area of physics that this involves.
a. thermodynamics
b. relativity
c. electromagnetism
d. quantum mechanics

____ 33. Calculate the following, and express the answer in scientific notation with the correct number of significant figures: $10.5 \times 8.8 \times 3.14$
a. 2.9×10^2
b. 290.136
c. 2.90×10^2

d. 290

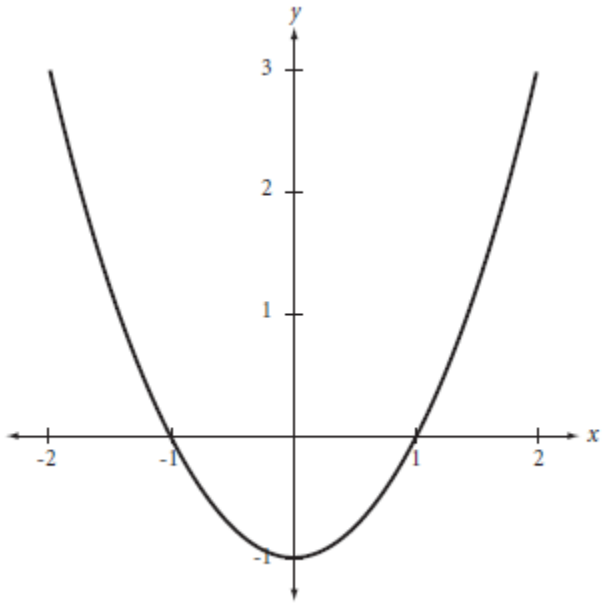
____ 34.



Which of the following equations best describes the graph above?

a. $y = 2x$
b. $y = x$
c. $y = x^2$
d. $y = \frac{1}{2}x$

____ 35.



Which of the following equations best describes the graph above?

a. $y = x^2 + 1$
b. $y = x^2 - 1$
c. $y = -x^2 + 1$
d. $y = -x^2 - 1$

____ 36. The sun is composed mostly of hydrogen. The mass of the sun is 2.0×10^{30} kg, and the mass of a hydrogen atom is 1.67×10^{-27} kg. Estimate the number of atoms in the sun.
a. 10^{3}
b. 10^{57}
c. 10^{30}
d. 10^{75}

Choose the best answer from the options that follow each question.

____ 37. In scientific notation, 0.000 005 823 µg equals
a. 5.823×10^{-6} µg.
b. 5.823×10^{-12} g.
c. 5.823×10^{-9} mg.
d. all of the above

____ 38. The average mass of a proton is 1.673×10^{-27} kg. What is this mass in grams?
a. 1.673×10^{-30} g
b. 1.673×10^{-24} g
c. 1.673×10^{-27} g
d. 1.673×10^{-81} g

____ 39. Precision describes
a. human error.
b. the relationship of a measurement to an accepted standard.
c. the limitations of the measuring instrument.
d. the lack of instrument calibration.

____ 40. How many significant figures does 50.003 00 have?
a. five
b. seven
c. two
d. Three

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