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Test questions for Chapter 1
Measuring Matter and Energy

1. A person with a T-score of less than −2.5 has a bone mineral density that _____ normal and is said to have _____.
    a. is; normal bone density
    b. is less than; normal bone density
    c. is less than; osteoporosis
    d. is greater than; osteopenia
    e. is; osteopenia

Ans: c Level of difficulty: easy Section: opener

2. Which state of matter has a volume that is constant or fixed?

    a. solid
    b. liquid
    c. gas
    d. solid and liquid
    e. liquid and gas

Ans: d Level of difficulty: easy Section: 1.1

3. This state of matter changes shape depending upon the shape of its container.

    a. solid
    b. liquid
    c. gas
    d. solid and liquid
    e. liquid and gas

Ans: e Level of difficulty: easy Section: 1.1

4. Atoms and molecules in this state of matter are the most highly ordered.

    a. solid
    b. liquid
    c. gas
    d. solid and liquid
    e. liquid and gas

Ans: a Level of difficulty: easy Section: 1.1

5. This state of matter has the highest kinetic energy.

   a. solid
   b. liquid
   c. gas
   d. solid and liquid
   e. liquid and gas

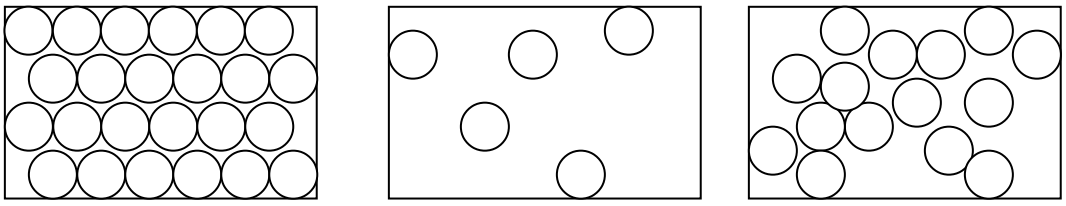
Ans: c Level of difficulty: easy Section: 1.1

6. The speed of molecules and atoms in this state of matter is the slowest.

   a. solid
   b. liquid
   c. gas
   d. solid and liquid
   e. liquid and gas

Ans: a Level of difficulty: easy Section: 1.1

7. Label each box with the appropriate state of matter.



I II III

   a. I: gas II: liquid III: solid
   b. I: liquid II: solid III: gas
   c. I: solid II: liquid III: gas
   d. I: gas II: solid III: liquid
   e. I: solid II: gas III: liquid

Ans: e Level of difficulty: medium Section: 1.1

8. Which of the following describes the kinetic energy of an object or set of objects?
   a. water flowing down hill
   b. water in a reservoir
   c. the forces between two molecules
   d. the chemical bonds in a peanut butter and jelly sandwich

e. a book on top of a shelf

Ans: a Level of difficulty: medium Section: 1.1

9. Which of the following describes the potential energy of an object or set of objects?
   a. water flowing down hill
   b. water is a reservoir
   c. a person running the 50-yard dash
   d. a car speeding up a hill
   e. a student pushing open a door

Ans: b Level of difficulty: medium Section: 1.1

10. Below are five descriptions of the kinetic and potential energy of objects. Which is a description of kinetic energy?

    I. water moving a waterwheel
    II. a skateboarder at the top of a halfpipe
    III. the blades of a fan turning
    IV. hot water molecules moving rapidly in a cup of tea
    V. a parachutist ready to jump out of a plane

    a. I only
    b. II and V
    c. II, III, and V
    d. I, III, and IV
    e. All of the above

Ans: d Level of difficulty: medium Section: 1.1

11. Below are five descriptions of the kinetic and potential energy of objects. Which is a description of potential energy?

    I. water moving a waterwheel
    II. a skateboarder at the top of a halfpipe
    III. the blades of a fan turning
    IV. hot water molecules moving rapidly in a cup of tea
    V. a parachutist ready to jump out of a plane

    a. I only
    b. II and V
    c. II, III, and V
    d. I, III, and IV

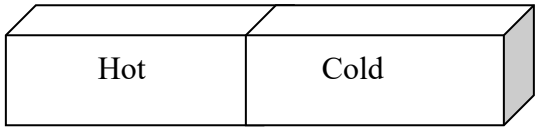
e. All of the above

Ans: b Level of difficulty: medium Section: 1.1

12. Heat is _____ energy, while temperature is a _____.
    a. potential; measure of potential energy
    b. kinetic; measure of kinetic energy
    c. potential; measure of kinetic energy
    d. kinetic; measure of potential energy
    e. Actually, both heat and temperature are forms of kinetic energy.

Ans: b Level of difficulty: medium Section: 1.1

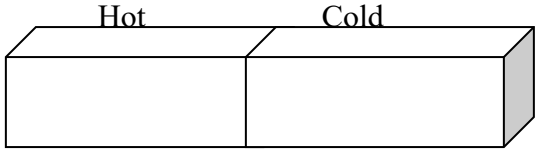
13. The illustration below shows two metal blocks, one hot and one cold, placed together so their sides are touching. What do you expect to happen to the temperature of the blocks as time passes?



    a. Nothing
    b. The temperature of the hot block will decrease and the temperature of the cold block will increase a little bit, but the hot block will always stay a bit warmer than the cold one.
    c. The temperature of the cold block will decrease, and the temperature of the hot block will increase.
    d. The hot block will cool down, but the temperature of the cold block will not change.
    e. The temperature of the cold block will increase, and the temperature of the hot block will decrease until the temperature of the two blocks is the same.

Ans: e Level of difficulty: medium Section: 1.1

14. The illustration below shows two metal blocks, one hot and one cold, placed together so their sides are touching. How does atomic motion change as time passes

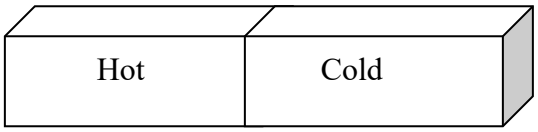


    a. Atomic motion does not change as time passes.

b. Atomic motion does change, but it is not predictable how it will change.
c. Atoms in the hot block slow down, and atoms in the cold block speed up.
d. Atoms in the cold block slow down, and atoms in the hot block speed up.
e. Atoms in both the cold and hot block speed up.

Ans: c Level of difficulty: medium Section: 1.1

15. How does the kinetic energy of the hot and cold bricks below change as time passes?



a. The kinetic energy of the bricks does not change as time passes.
b. Kinetic energy increases in both blocks.
c. Kinetic energy in the hot block decreases and kinetic energy in the cold block increases.
d. Kinetic energy in the hot block increases and kinetic energy in the cold block decreases.
e. Kinetic energy decreases in both blocks.

Ans: c Level of difficulty: medium Section: 1.1

16. How are physical changes different than chemical changes?
a. They aren't different at all.
b. Chemical changes are much more common than physical changes.
c. Chemical changes are much faster than physical changes.
d. Chemical changes involve making and breaking bonds and physical changes do not.
e. Chemical changes involve changes of state and physical changes do not.

Ans: d Level of difficulty: easy Section: 1.1

17. Which of the following is NOT an example of a physical change?
a. freezing water to make ice
b. ice cream melting in a bowl
c. boiling water
d. water condensing on the surface of a glass of ice tea
e. onions browning as they are cooked

Ans: e Level of difficulty: easy Section: 1.1

18. Chemistry attempts to explain the behavior of matter on the _____ so that we can better understand the properties of matter that we observe on the _____.
a. microscopic scale; macroscopic scale

b. microscopic scale; atomic scale
c. atomic scale; microscopic scale
d. macroscopic scale; atomic scale
e. atomic scale; macroscopic scale

Ans: e Level of difficulty: easy Section: 1.2

19. A molecule of hemoglobin is described as being on the _____ scale.
a. macroscopic
b. microscopic
c. atomic
d. both macro- and microscopic
e. both microscopic and atomic

Ans: c Level of difficulty: easy Section: 1.2

20. Identify whether the following represent the microscopic, macroscopic, or atomic scale.

i. Hemoglobin ii. Person iii. Red blood cell

a.	i. atomic	ii. microscopic	iii. macroscopic
b.	i. atomic	ii. macroscopic	iii. microscopic
c.	i. microscopic	ii. atomic	iii. macroscopic
d.	i. microscopic	ii. macroscopic	iii. atomic
e.	i. macroscopic	ii. atomic	iii. microscopic

Ans: b Level of difficulty: easy Section: 1.2

21. Every measurement consists of
a. a number followed by a unit.
b. only whole numbers.
c. a fraction.
d. a number followed by a description of the device used to take the measurement.
e. There are no characteristics that all measurements share.

Ans: a Level of difficulty: easy Section: 1.2

22. Which of the following measurements includes a base unit?
a. 298 mg
b. 2.981 g
c. 5×10^3 kg
d. 3.6 mL

e. 168 mm

Ans: b Level of difficulty: easy Section: 1.2

23. Which of the following statements best describes the unit "milliliter"?
    a. It is a prefix followed by a base unit.
    b. It is a base unit.
    c. It is a prefix followed by a derived unit.
    d. It is a derived unit.
    e. It is a base unit followed by a suffix.

Ans: c Level of difficulty: easy Section: 1.2

24. There are five different objects with the diameters shown below. Which of these objects cannot be seen with the naked eye?
    a. 1.0 nm
    b. 1.0 mm
    c. 1.0 μm
    d. 1.0 dm
    e. 1.0 cm

Ans: c Level of difficulty: medium Section: 1.2

25. How many nanometers are in a meter?
    a. 1×10^{-9}
    b. 1×10^{9}
    c. 1×10^{-12}
    d. 1×10^{3}
    e. 1×10^{-6}

Ans: b Level of difficulty: medium Section: 1.2

26. Which of the following equalities is NOT correct?
    a. $1 \text{ cm} = 10^{-2} \text{ m}$
    b. $10^{3} \text{ g} = 1 \text{ kg}$
    c. $10^{-3} \text{ mL} = 1 \text{ L}$
    d. $10^{9} \text{ nm} = 1 \text{ m}$
    e. $1 \text{ L} = 10 \text{ dL}$

Ans: c Level of difficulty: medium Section: 1.2

27. Which of the following measurements represents the least mass?
    a. 0.1 mg
    b. 1000 μg
    c. 0.001 g
    d. 1 cg
    e. 0.010 kg

Ans: a Level of difficulty: hard Section: 1.2

28. Which of the following measurements is larger than 1.0 meters?
    a. 10 cm
    b. 0.0001 km
    c. 0.01 km
    d. 100 mm
    e. 1000 μm

Ans: c Level of difficulty: hard Section: 1.2

29. Which of the following is most likely to weigh 90 kg?
    a. a computer
    b. a zebra
    c. a man
    d. a baby girl
    e. All four are equally likely to weigh 90 kg.

Ans: c Level of difficulty: medium Section: 1.2

30. Which of the following is most likely to be 1.1 m tall?
    a. a giraffe
    b. a 5-year-old girl
    c. a man
    d. an infant
    e. All four are equally likely to be 1.1 m tall.

Ans: b Level of difficulty: medium Section: 1.2

31. Which of the following is likely to be shorter than 1 m?
    a. the length of a car
    b. the height of an average adult
    c. the width of a computer screen
    d. the height of a one-story building
    e. the length of an adult giraffe's neck

Ans: c Level of difficulty: easy Section: 1.2

32. Which of the following equalities is correct?
    a. 1 mL = 1 cm^3
    b. 1 L = 1 cm^3
    c. 1 mL = 1 cm^2
    d. 1 L = 1 cm^2
    e. 1 mL = 1 cm

Ans: a Level of difficulty: easy Section: 1.2

33. A juice box is 10.0 cm × 5.5 cm × 4.0 cm. What is the maximum amount of juice that the box can contain?
    a. 220 cm^3
    b. 110 cm^3
    c. 220 cm^2
    d. 110 cm^2
    e. 220 cm

Ans: a Level of difficulty: medium Section: 1.2

34. The cubic centimeter (cm^3 or cc) is the same volume as a
    a. centimeter.
    b. milliliter.
    c. centiliter.
    d. deciliter.
    e. liter.

Ans: b Level of difficulty: easy Section: 1.2

35. A graduated cylinder contains water with some food coloring in it. What is being measured?
    a. volume
    b. weight
    c. distance
    d. length
    e. temperature

Ans: a Level of difficulty: easy Section: 1.2

36. An aluminum ball is dropped into the graduated cylinder and the water level increases. If the ball has a volume of 6.8 mL, what is the new volume reading in the graduated cylinder?
    a. 6.8 mL
    b. 83 mL

c. 90.7 mL
d. 96.8 mL
e. It is not possible to predict the volume without the density of aluminum.

Ans: d Level of difficulty: medium Section: 1.2

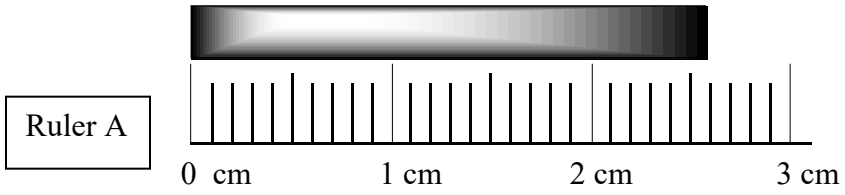
37. Which of the following units for measuring energy is typically used in nutritional applications?
a. calorie
b. Calorie
c. Joule
d. joule
e. All of the above

Ans: b Level of difficulty: easy Section: 1.2

38. Which of the following units of energy is equal to one thousand calories?
a. 1 Calorie only
b. 1 kcal only
c. 1 joule only
d. 1 kcal and 1 Calorie
e. 1 kcal and 1 kJ

Ans: d Level of difficulty: medium Section: 1.2

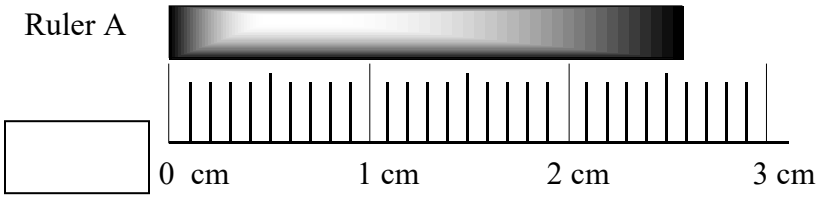
39. What is being measured by the ruler (ruler A)?



a. volume
b. weight
c. grams
d. length
e. temperature

Ans: d Level of difficulty: easy Section: 1.3

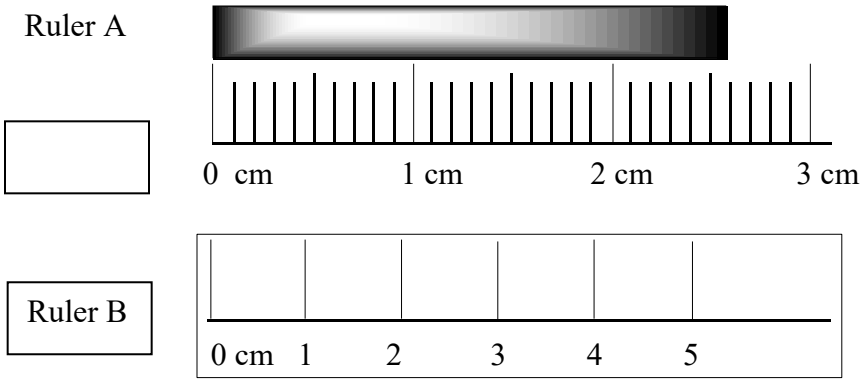
40. How long is the bar above the ruler?



a. 2.5 cm
b. 2.6 cm
c. 2.59 cm
d. 3 cm
e. 2 cm

Ans: c Level of difficulty: medium Section: 1.3

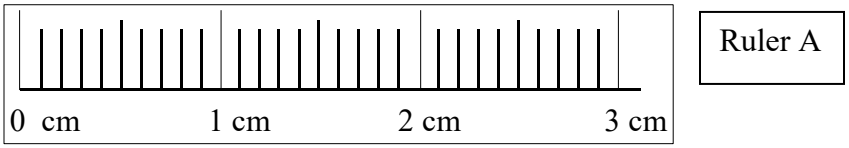
41. Measurements taken with ruler A and ruler B differ slightly. In what way do the measurements differ?

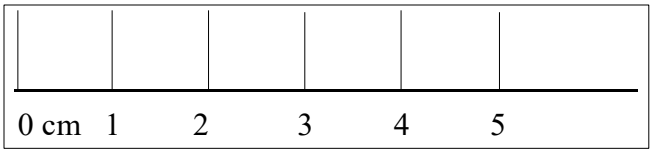


a. A measurement taken with ruler A has two more significant digits than ruler B.
b. A measurement taken with ruler B has two more significant digits than ruler A.
c. A measurement taken with ruler A has one more significant digit than ruler B.
d. A measurement taken with ruler B has one more significant digit than ruler A.
e. Measurements taken with ruler A and B are the same.

Ans: c Level of difficulty: hard Section: 1.3

42. Which statement comparing the accuracies and precisions of ruler A and ruler B is correct?





Ruler B

a. Ruler A is more precise and more accurate than ruler B.
b. Ruler B is more accurate than ruler A, but less precise.
c. Ruler A is more accurate than ruler B, but less precise.
d. Ruler B is more precise and more accurate than ruler A.
e. Ruler A is more precise than ruler B, but it is not possible to compare accuracy based on the information given.

Ans: e Level of difficulty: medium Section: 1.3

43. The following illustrates the digital readout of two different balances. Which of the following balances is more precise? Which is more accurate?

0.024 g

Balance A

0.0180 g

Balance B

a. Balance A is more precise and more accurate than balance B.
b. Balance B is more accurate than balance A, but less precise.
c. Balance A is more accurate than balance B, but less precise.
d. Balance B is more precise and more accurate than balance A.
e. Balance B is more precise than balance A, but it is not possible to compare accuracy based on the information given.

Ans: e Level of difficulty: medium Section: 1.3

44. To make this table, four different people took three measurements each of the distance between the chemistry building and the cafeteria on campus. Each person used a different measuring device and therefore arrived at a different set of measurements. The true distance is 152 meters. Which person is most accurate and precise?

Person A – counted steps	Person B – measured with a tape measure	Person C – used a radar measuring device	Person D – walked with a measuring wheel
155 m	157 m	163 m	153 m
160 m	152 m	164 m	151 m
180 m	155 m	163 m	153 m

a. person A
b. person B
c. person C
d. person D
e. All are equally accurate and precise.

Ans: d Level of difficulty: medium Section: 1.3

45. To make this table, four different people took three measurements each of the distance between the chemistry building and the cafeteria on campus. Each person used a different measuring device and therefore arrived at a different set of measurements. The true distance is 152 meters. Which person is precise, but not very accurate?

Person A – counted steps	Person B – measured with a tape measure	Person C – used a radar measuring device	Person D – walked with a measuring wheel
155 m	157 m	163 m	153 m
160 m	152 m	164 m	151 m
180 m	155 m	163 m	153 m

a. person A
b. person B
c. person C
d. person D
e. All are equally precise.

Ans: c Level of difficulty: medium Section: 1.3

46. To make this table, four different people took three measurements each of the distance between the chemistry building and the cafeteria on campus. Each person used a different measuring device and therefore arrived at a different set of measurements. The true distance is 152 meters. Which person is the least precise and the least accurate?

Person A – counted steps	Person B – measured with a tape measure	Person C – used a radar measuring device	Person D – walked with a measuring wheel
155 m	157 m	163 m	153 m
160 m	152 m	164 m	151 m
180 m	155 m	163 m	153 m

a. person A
b. person B
c. person C
d. person D
e. All are equally inaccurate and imprecise.

Ans: a Level of difficulty: medium Section: 1.3

47. You are asked to administer 3.50 mL of a liquid medication. Which measuring device would be the best choice for measuring 3.50 mL?

a. A medicine cup
b. A syringe
c. A medicine cup and a syringe are equally good choices.
d. It would depend on the composition of the medication.
e. It is not possible to determine the answer with the given information.

Ans: b Level of difficulty: medium Section: 1.3

48. The number of significant digits in a measurement is
a. all of the digits that are known exactly.
b. all of the digits that are known exactly plus one uncertain digit.
c. a way to communicate the precision of a measurement.
d. Both a and c above
e. Both b and c above

Ans: e Level of difficulty: medium Section: 1.3

49. Which of the following measurements has three significant figures?
a. 0.0058 m
b. 580.0 m
c. 5800 m
d. 0.058 m
e. 0.0580 m

Ans: e Level of difficulty: medium Section: 1.3

50. The number of significant figures in the measurement of 0.004500 cm^3 is
a. two
b. four
c. five
d. six

e. seven

Ans: b Level of difficulty: medium Section: 1.3

51. The number of significant figures in the measurement 5.40×10^5 kg is
a. one.
b. two.
c. three.
d. five.
e. eight.

Ans: c Level of difficulty: easy Section: 1.3

52. Which of the following is a measured number?
a. the number of eggs in a dozen
b. the number of people in this room
c. the number of milligrams in a gram
d. the number of years in a century
e. the number of grams in one ounce

Ans: e Level of difficulty: medium Section: 1.3

53. Which of the following is an exact number?
a. the number of milligrams in a gram
b. the number of meters in a kilometer
c. the number of micrometers in a centimeter
d. the number of cubic centimeters in a liter
e. All of the above

Ans: e Level of difficulty: easy Section: 1.3

54. Using significant figures, what is the product of $0.021 \times 0.118 \times 1020$?
a. 2.52756
b. 2.528
c. 2.53
d. 2.5
e. 3

Ans: d Level of difficulty: medium Section: 1.3

55. Using significant figures, what is the sum of $12.01 + 1011 + 0.113$?
a. 1023.123
b. 1023.12
c. 1023
d. 1020

e. 1000

Ans: c Level of difficulty: medium Section: 1.3

56. A patient's fluid intake is monitored over a six-hour period. If the patient drinks 232.0 mL, 300. mL, and 41 mL of water, what is the total volume of the fluid intake?

a. 573.0 mL
b. 573 mL
c. 570 mL
d. 600 mL
e. 57 mL

Ans: b Level of difficulty: hard Section: 1.3

57. A patient is given 5.00 mL of a medication that contains 0.0012 g of active ingredient per mL. To determine the amount of active ingredient administered, the product of the two numbers is calculated (5.00 mL × 0.0012 g/mL). Using significant figures, what is this product?

a. 0.006 g
b. 0.0060 g
c. 0.00600 g
d. 6.00 g
e. 0 g

Ans: b Level of difficulty: medium Section: 1.3

58. How many micrometers are there in 52.6 km?

a. 5.26×10^{-8} μm
b. 0.0526 μm
c. 5260 μm
d. 5.26×10^{9} μm
e. 5.26×10^{10} μm

Ans: e Level of difficulty: hard Section: 1.4

59. Convert 0.038 L to milliliters.

a. 3.8 mL
b. 38 mL
c. 380 mL
d. 3.8×10^{-2} mL
e. 3.8×10^{-5} mL

Ans: b Level of difficulty: easy Section: 1.4

60. Which of the following unit conversions are useful when converting 312 mg to kilograms?

1 mg = 1000 g	1000 mg = 1 g	1 kg = 1000 g	1000 kg = 1 g
I	**II**	**III**	**IV**

a. I and III
b. II and IV
c. I and IV
d. II and III
e. All of them are useful.

Ans: d Level of difficulty: medium Section: 1.4

61. Which of the following conversion factors are useful when converting 312 mg to kilograms?

$\frac{1\text{ g}}{1000\text{ mg}}$	$\frac{1\text{ mg}}{1000\text{ g}}$	$\frac{1\text{ kg}}{1000\text{ g}}$	$\frac{1000\text{ kg}}{1\text{ g}}$
I	**II**	**III**	**IV**

a. II and III
b. II and IV
c. I and IV
d. I and III
e. All of them are useful.

Ans: d Level of difficulty: medium Section: 1.4

62. Which of the following equations is set up to convert 312 mg to kilograms?

a. $312\text{ mg}\times\frac{1\text{ mg}}{1000\text{ g}}\times\frac{1\text{ kg}}{1000\text{ g}}$
b. $312\text{ mg}\times\frac{1000\text{ mg}}{1\text{ g}}\times\frac{1000\text{ kg}}{1\text{ g}}$
c. $312\text{ mg}\times\frac{1\text{ g}}{1000\text{ mg}}\times\frac{1\text{ g}}{1000\text{ kg}}$
d. $312\text{ mg}\times\frac{1\text{ g}}{1000\text{ mg}}\times\frac{1\text{ kg}}{1000\text{ g}}$
e. $312\text{ mg}\times\frac{1\text{ mg}}{1000\text{ g}}\times\frac{1000\text{ kg}}{1\text{ g}}$

Ans: d Level of difficulty: medium Section: 1.4

63. Convert 312 mg to kilograms.
    a. 3.12×10^{-4} kg
    b. 3.12 kg
    c. 0.312 kg
    d. 3.12×10^{5} kg
    e. 3.12×10^{8} kg

Ans: a Level of difficulty: medium Section: 1.4

64. A patient weighs 78 kg. What is his weight in pounds?
    a. 35 lb
    b. 78 lb
    c. 80 lb
    d. 170 lb
    e. 1.7×10^{5} lb

Ans: d Level of difficulty: easy Section: 1.4

65. The smallest bone on the body, the stirrup-shaped stapes found in the middle ear, has a typical length of less than 0.33 cm. How long is typical maximum length of the stapes in inches?
    a. 7.7 in
    b. 1 in
    c. 0.84 in
    d. 0.8 in
    e. 0.13 in

Ans: e Level of difficulty: easy Section: 1.4

66. Which of the following conversions are needed to convert 36.2 inches to centimeters?

1 inch = 2.54 cm 100 cm = 1 m 2.54 inches = 1 cm 1 cm = 100 m

I **II** **III** **IV**

    a. I
    b. II
    c. III
    d. IV
    e. I and II

Ans: a Level of difficulty: easy Section: 1.4

67. Which of the following conversion factors are required to convert 36.2 inches to centimeters?

I	II	III	IV
$\frac{1\text{ inch}}{2.54\text{ cm}}$	$\frac{2.54\text{ cm}}{1\text{ inch}}$	$\frac{2.54\text{ inches}}{1\text{ cm}}$	$\frac{1\text{ cm}}{2.54\text{ inches}}$

a. I
b. II
c. III
d. IV
e. None of them are required.

Ans: b Level of difficulty: easy Section: 1.4

68. A child's height is 36.2 inches and she wants to know her height in centimeters. In this problem, _____ is the supplied unit and _____ is the requested unit.
a. centimeters; inches
b. meters; inches
c. inches; centimeters
d. inches; meters
e. meters; centimeters

Ans: c Level of difficulty: medium Section: 1.4

69. A child's height is 36.2 inches. What is her height in centimeters?
a. 91.95 cm
b. 92 cm
c. 91.9 cm
d. 14.25 cm
e. 14.3 cm

Ans: c Level of difficulty: easy Section: 1.4

70. A medium apple provides about 80 Calories. How many calories are provided by the apple?
a. 0.0008 calories
b. 0.008 calories
c. 80 calories
d. 8000 calories
e. 8×10^4 calories

Ans: e Level of difficulty: easy Section: 1.4

71. A 1.0×10^2 Watt light bulb uses 6.0×10^3 J of energy per minute. How many Calories of energy does a 1.0×10^2 W light bulb use in one minute?
    a. 1.4 Calories
    b. 250 Calories
    c. 1400 Calories
    d. 6×10^3 Calories
    e. 2.5×10^4 Calories

Ans: a Level of difficulty: medium Section: 1.4

72. Tylenol is ordered for a child weighing 42 pounds at a dosage of 15 mg per kilogram of body weight. You need to determine how many mg of Tylenol should be administered to this child in a single dose. Which of the following units will be in the answer to this question (i.e., is requested)?
    a. pounds of body weight
    b. kilograms of body weight
    c. milligrams of Tylenol
    d. ounces of Tylenol
    e. tablets of Tylenol

Ans: c Level of difficulty: easy Section: 1.4

73. Tylenol is ordered for a child weighing 42 pounds at a dosage of 15 mg per kilogram of body weight. You need to determine how many mg of Tylenol should be administered to this child in a single dose. In order to answer this question, a conversion is used that is actually written within the body of the question. Which factor is this?
    a. 42 pounds = 15 mg of Tylenol
    b. 42 pounds = 1 kilogram of body weight
    c. 15 mg of Tylenol = 1 kilogram of body weight
    d. 15 mg of Tylenol = 1 pound of body weight
    e. 1 pound = 1 kilogram of body weight

Ans: c Level of difficulty: easy Section: 1.4

74. Tylenol is ordered for a child weighing 42 pounds at a dosage of 15 mg per kilogram of body weight. You need to determine how many mg of Tylenol should be administered to this child in a single dose. In order to answer this question, it is also necessary to use a conversion factor that must be looked up in a table (or have memorized). Which conversion factor is this?

$\boxed{\frac{1\text{ g}}{1000\text{ mg}}}$ $\boxed{\frac{1\text{ lb}}{16\text{ oz}}}$ $\boxed{\frac{1\text{ kg}}{2.205\text{ lbs}}}$ $\boxed{\frac{1\text{ kg}}{1000\text{ g}}}$

I **II** **III** **IV**

a. I
b. II
c. III
d. IV
e. Both III and IV

Ans: c Level of difficulty: medium Section: 1.4

75. Tylenol is ordered for a child weighing 42 pounds at a dosage of 15 mg per kilogram of body weight. You need to determine how many mg of Tylenol should be administered to this child in a single dose. Which of the following equations is set up to find the answer to this problem?

a. $42\text{ lbs} \times \frac{1\text{ kg}}{2.205\text{ lbs}} \times \frac{15\text{ mg Tylenol}}{1\text{ kg of body weight}}$

b. $15\text{ mg Tylenol} \times \frac{1\text{ g}}{1000\text{ mg}} \times \frac{1\text{ kg}}{1000\text{ g}}$

c. $42\text{ lbs} \times \frac{1\text{ kg}}{2.205\text{ lbs}} \times \frac{1\text{ lb}}{16\text{ oz}}$

d. $15\text{ mg Tylenol} \times \frac{1\text{ g}}{1000\text{ mg}} \times \frac{1\text{ kg}}{1000\text{ g}} \times \frac{2.205}{1\text{ kg}}$

e. $42\text{ lbs} \times \frac{15\text{ mg Tylenol}}{1\text{ kg body weight}}$

Ans: a Level of difficulty: easy Section: 1.4

76. How many mg of Tylenol should be administered to this child in a single dose?

a. 14 mg
b. 19 mg
c. 300 mg
d. 290 mg
e. 630 mg

Ans: d Level of difficulty: easy Section: 1.4

77. Tetracycline is a short acting antibiotic. It discolors developing teeth and so is not normally prescribed for children under 8 or pregnant women. An 11-year-old, 84-lb child is prescribed 35 mg/kg tetracycline per day for 10 days. What is the daily dose of tetracycline that should be administered to the child?

a. 5.3 mg
b. 53 mg
c. 1.3 g
d. 1.3 mg

e. 2.9 g

Ans: c Level of difficulty: hard Section: 1.4

78. The pediatric dosage of diphenhydramine, an over-the-counter antihistamine, is 1.23 mg/kg of body weight b.i.d. How many milligrams of diphenhydramine should be given to a 66-lb child in one day?
    a. 19 mg
    b. 1.3 g
    c. 37 mg
    d. 2.5 g
    e. 74 mg

Ans: e Level of difficulty: hard Section: 1.4

79. Water has a density of 1.0 g/mL. What is the mass of 25 mL of water?
    a. 0.25 g
    b. 2.5 g
    c. 25 g
    d. 250 g
    e. 25 kg

Ans: c Level of difficulty: easy Section: 1.4

80. Oil floats on water because oil is _____ than water.
    a. heavier
    b. less dense
    c. lighter
    d. denser
    e. lower in volume

Ans: b Level of difficulty: easy Section: 1.4

81. What is the density of substance with a mass of 10.6 g and a volume of 12.0 mL?
    a. 0.883 g/mL
    b. 1.4 g/mL
    c. 22.6 g/mL
    d. 1.13 mL/g
    e. 127 gmL

Ans: a Level of difficulty: medium Section: 1.4

82. If you dropped a 6.0 g piece of aluminum (density = 2.70 g/mL) into a graduated cylinder containing 93.8 mL of water, what measurement would you read on the graduated cylinder?
    a. 92.2 mL

b. 92 mL
c. 96.0 mL
d. 92 µL
e. 96.0 µL

Ans: c Level of difficulty: hard Section: 1.4

83. A patient's urine has a density of 1.010 g/mL. What is the specific gravity of the patient's urine?
a. 0.9901
b. 1.000
c. 0.1010
d. 1.010
e. 0.99

Ans: d Level of difficulty: easy Section: 1.4

84. A patient has a kidney infection. Which of the following is most likely to be the specific gravity of the patient's urine?
a. 0.9900
b. 1.000
c. 1.002
d. 1.025
e. 1.040

Ans: e Level of difficulty: medium Section: 1.4

85. Which temperature scale(s) is/are relative (i.e., based on the freezing and boiling point of water)?
a. Kelvin
b. Celsius
c. Fahrenheit
d. Kelvin and Celsius
e. Celsius and Fahrenheit

Ans: e Level of difficulty: easy Section: 1.4

86. In which temperature scale(s) does zero mean that all molecular motion has stopped?
a. Kelvin
b. Celsius
c. Fahrenheit
d. Kelvin and Celsius
e. Celsius and Fahrenheit

Ans: a Level of difficulty: easy Section: 1.4

87. A child comes into the doctor's office with a temperature of 39.2°C. What is the child's temperature in Fahrenheit?
    a. 103°F
    b. 98.6°F
    c. 277°F
    d. 312°F
    e. 96.8°F

Ans: c Level of difficulty: medium Section: 1.4

88. Normal body temperature in Celsius is
    a. 37.
    b. 50.
    c. 98.6.
    d. 212.
    e. 288.

Ans: a Level of difficulty: easy Section: 1.4

89. Room temperature is about 70°F. What is this temperature in Celsius?
    a. 340°C
    b. 294°C
    c. 21°C
    d. 38°C
    e. 6.9°C

Ans: c Level of difficulty: medium Section: 1.4

90. When measuring the temperature of gases, Kelvin is often used because it is a function of the kinetic energy of a gas. If a gas is 121°C, what is its temperature in Kelvin?
    a. 322 K
    b. –152 K
    c. –242 K
    d. 394 K
    e. 250 K

Ans: c Level of difficulty: medium Section: 1.4

91. If a gas is 251°F, what is its temperature in Kelvin?
    a. 484 K
    b. 122 K
    c. –22 K
    d. 395 K

e. 524 K

Ans: d Level of difficulty: hard Section: 1.4

92. Which of the following statements best describes specific heat?
    a. It is the specific amount of heat that a substance has at any one time.
    b. It is the amount of heat energy required to boil water.
    c. It is the amount of heat energy actually transferred during heating.
    d. It is the amount of heat energy required to melt a substance.
    e. It is the amount of heat energy required to raise the temperature of one gram of a substance by one degree.

Ans: e Level of difficulty: easy Section: 1.4

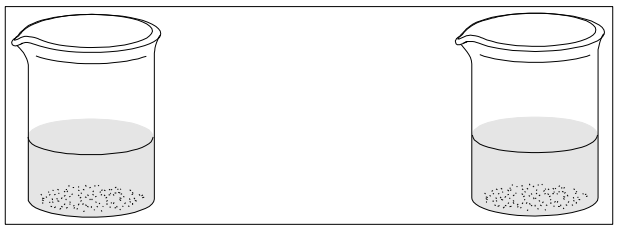
93. In general, which is the best interpretation of specific heat?
    a. The higher the specific heat, the less heat energy is required to increase a substance's temperature.
    b. The higher the specific heat, the less heat energy is required to boil or melt a substance.
    c. The higher the specific heat, the more heat energy is required to boil or melt a substance.
    d. The higher the specific heat, the more heat energy is required to increase a substance's temperature.
    e. The higher the specific heat, the higher the temperature of a substance.

Ans: d Level of difficulty: easy Section: 1.4

94. Consider a warm summer's day at the beach. While the sand feels warm on your feet, the water feels cool. Which statement is the best explanation for this phenomenon?
    a. Surface water molecules protect deeper water molecules from the Sun's rays.
    b. The specific heat of water is higher than that of the sand.
    c. Water is denser than sand, so it feels cooler on the skin.
    d. The specific heat of sand is higher than that of water.
    e. Sand is denser than water.

Ans: b Level of difficulty: medium Section: 1.4

95. The two beakers below each have added to them the same amount of heat energy. Which statement best describes what would happen to the temperatures of the two beakers?



Beaker 1
200 mL ethanol
Specific heat: 0.58 cal/g°C

Beaker 2
200 mL water
Specific heat: 1.00 cal/g°C

a. The temperature of the two beakers will remain the same.
b. The temperatures of the two beakers will increase by the same amount.
c. The temperature of beaker 1 will increase more than that of beaker 2.
d. The temperature of beaker 2 will increase more than that of beaker 1.
e. It is not possible to predict how the temperature of the beakers will change.

Ans: c Level of difficulty: hard Section: 1.4

96. Water has a specific heat of 1.00 cal/g°C and wood has a specific heat of 0.10 cal/g°C. Which substance requires more heat to be warmed from room temperature to 50°?
    a. They both require the same amount of heat.
    b. Water requires more heat because it has a higher specific heat.
    c. Wood requires more heat because it has a lower specific heat.
    d. Water requires more heat because it is a liquid at room temperature.
    e. Wood requires more heat because it is a solid at room temperature.

Ans: b Level of difficulty: medium Section: 1.4

97. A copper pipe with a mass of 1200 g and a specific heat of 0.093 cal/g°C absorbs 252 calories of heat. By how many degrees does the temperature of the pipe change?
    a. 2.3°C
    b. 2.8×10^{4}°C
    c. 0.020°C
    d. 0.44°C
    e. 3.6×10^{-5}°C

Ans: a Level of difficulty: medium Section: 1.4

98. How many calories of heat are required to raise the temperature of 15 g water (specific heat = 1.00 cal/g°C) from 25°C and 42°C?

a. 380 cal
b. 630 cal
c. 260 cal
d. 2.8 cal
e. 0.88 cal

Ans: c Level of difficulty: medium Section: 1.4

99. You have a 25-g sample of a metal and you would like to identify it. You are certain that the metal is either copper (specific heat = 0.093 cal/g°C), lead (specific heat = 0.031 cal/g°C), or aluminum (specific heat = 0.22 cal/g°C). You run an experiment in which you find that the metal absorbs 6.2 calories of heat when it increases in temperature from 25°C to 33°C. Which metal is it?
a. copper
b. lead
c. iron
d. a mixture of copper and lead
e. It's not any of these metals.

Ans: b Level of difficulty: hard Section: 1.4

100. Which of the following biological molecules are the major nutrients that make up the food that we eat?
I. proteins
II. nucleic acids
III. steroids
IV. fats
V. carbohydrates

a. All of these are major nutrients.
b. I, II, IV, and V
c. I and V
d. III, IV, and V
e. I, IV, and V

Ans: e Level of difficulty: easy Section: chemistry in medicine

101. Which of the following activities require energy?
a. breathing
b. walking
c. studying
d. cell repair
e. All of the above

Ans: e Level of difficulty: easy Section: chemistry in medicine