

College Physics: A Strategic Approach, 3e (Knight)
Chapter 1 Representing Motion

1.1 Conceptual Questions

1) In the product $A \cdot B \cdot C$, A has 5 significant figures, B has 2 significant figures, and C has 3 significant figures. How many significant figures does the product have?

- A) 2
- B) 3
- C) 4
- D) 5
- E) 10

Answer: A

Var: 1

2) In the quotient $\frac{A}{B \cdot C}$, A has 5 significant figures, B has 2 significant figures, and C has 3 significant figures. How many significant figures does the quotient have?

- A) 2
- B) 3
- C) 4
- D) 0
- E) 1

Answer: A

Var: 1

3) In the sum $A + B + C$, A is accurate to 5 decimal places, B is accurate to 2 decimal places, and C is accurate to 3 decimal places. What is the correct number of decimal places in the sum?

- A) 2
- B) 3
- C) 4
- D) 5
- E) 10

Answer: A

Var: 1

4) In the difference $A - B - C$, A is accurate to 5 decimal places, B is accurate to 2 decimal places, and C is accurate to 3 decimal places. What is the correct number of decimal places in the difference?

- A) 2
- B) 3
- C) 4
- D) 5
- E) 0

Answer: A

Var: 1

5) How many significant figures are in the number 0.0037010?

- A) four
- B) five
- C) six
- D) seven
- E) eight

Answer: B

Var: 1

6) How many significant figures are in the number 0.010?

- A) four
- B) three
- C) two
- D) one

Answer: C

Var: 1

7) How many significant figures are in the number 120.070?

- A) six
- B) five
- C) four
- D) three

Answer: A

Var: 1

8) The number of significant figures in 10001 is

- A) two.
- B) three.
- C) five.
- D) six.

Answer: C

Var: 6

9) The number of significant figures in 0.01500 is

- A) two.
- B) three.
- C) four.
- D) five.

Answer: C

Var: 5

10) The number of significant figures in 0.040 is

- A) one.
- B) two.
- C) three.
- D) four.

Answer: B

Var: 6

11) Which of the following numbers has 4 significant figures; which has 5 significant figures?

- (a) 3001
- (b) 0.00370
- (c) 4774.00
- (d) 29.290

Answer: (a) has 4 significant figures; (d) has 5 significant figures

Var: 1

12) In a parallel universe, the quantity π has the value 3.14049... . Express π in that universe to

- (a) four significant figures
- (b) five significant figures.

Answer: (a) 3.140 (b) 3.1405

Var: 1

13) The metric system is preferred over the British system in science for the following main reason.

- A) The metric system is more precise than the British system.
- B) Metric quantities can be defined more accurately than the quantities in the British system.
- C) Metric quantities are natural whereas British quantities are invented.
- D) Conversions between metric quantities are especially easy because they are all related by factors of ten.

Answer: D

Var: 1

14) A reasonable estimate for the mass of a typical female college student is

- A) 20 kg.
- B) 50 kg.
- C) 150 kg.
- D) 200 kg.

Answer: B

Var: 1

15) A reasonable estimate for the height of an ordinary adult male is

- A) 50 cm.
- B) 70 cm.
- C) 200 cm.
- D) 300 cm.

Answer: C

Var: 1

16) A reasonable estimate for the mass of a typical new-born baby is

- A) 1 kg.
- B) 3 kg.
- C) 10 kg.
- D) 20 kg.

Answer: B

Var: 1

17) A reasonable estimate for the height of the walls in an ordinary American home is

- A) 10 m.
- B) 8 m.
- C) 2.5 m.
- D) 1.5 m.

Answer: C

Var: 1

18) A reasonable estimate for the duration of a typical physics lecture is

- A) 600 s.
- B) 1000 s.
- C) 3500 s.
- D) 10,000 s.

Answer: C

Var: 1

19) A reasonable estimate for the mass of an ordinary passenger car is

- A) 100 kg
- B) 1000 kg
- C) 5000 kg
- D) 10,000 kg

Answer: B

Var: 1

1.2 Problems

1) What is the product of 12.56 and 2.12 expressed to the correct number of significant figures?

A) 27

B) 26.6

C) 26.23

D) 26.627

Answer: B

Var: 3

2) What is the quotient of $2.43 \div 4.561$ expressed to the correct number of significant figures?

A) 5.3278×10^{-1}

B) 5.328×10^{-1}

C) 5.33×10^{-1}

D) 5.3×10^{-1}

Answer: C

Var: 3

3) What is $\frac{0.674}{0.74}$ expressed to the correct number of significant figures?

A) 0.91

B) 0.911

C) 0.9108

D) 0.9

Answer: A

Var: 50+

4) What is $0.205^{2/3}$, to the correct number of significant figures?

A) 0.348

B) 0.35

C) 0.3

D) 0.3477

Answer: A

Var: 50+

5) Add 1299 g and 45.1 kg and express your answer in milligrams (mg) to the correct number of significant figures.

A) 4.64×10^7 mg

B) 4.64×10^4 mg

C) 4.64×10^5 mg

D) 4.64×10^6 mg

Answer: A

Var: 50+

6) What is $\sqrt{\frac{4.302(15.6 - 1.2)}{22.1 + 19.4}}$ expressed to the correct number of significant figures?

Answer: 1.22

Var: 1

7) The length and width of a rectangle are 1.125 m and 0.606 m, respectively. Multiplying, your calculator gives the product as 0.68175. Rounding properly to the correct number of significant figures, the area of the rectangle should be written as

A) 0.68 m²

B) 0.682 m²

C) 0.6818 m²

D) 0.68175 m²

Answer: B

Var: 1

8) What is the sum of $2.67 + 1.976 + 2.1$ expressed to the correct number of significant figures?

A) 6.7

B) 6.75

C) 6.746

D) 6.7460

Answer: A

Var: 3

9) Express the sum of 420.77, 13.821, and 2317.8 to the correct number of significant figures.

Answer: 2752.4

Var: 1

10) What is the difference between 103.5 and 102.24 expressed to the correct number of significant figures?

A) 1.3

B) 1.26

C) 1.260

D) 1.2600

Answer: A

Var: 3

11) What is the sum of $1.53 + 2.786 + 3.3$ expressed to the correct number of significant figures?

A) 7

B) 7.6

C) 7.62

D) 7.616

E) 7.6160

Answer: B

Var: 3

12) Express the result of the following calculation to the proper number of significant figures:

$$50.19 - 7966 \times 10^{-3}.$$

Answer: 42.22

Var: 1

13) What is the result, expressed to the proper number of significant figures, of adding 23.4 to 91.237 and then subtracting 23.4?

A) 91.237

B) 91.2

C) 91.3

D) 91.0

E) 91

Answer: B

Var: 1

14) Express the result of the following calculation, in scientific notation, to the proper number of significant figures: $\frac{395600.1}{6.72} + 19$

Answer: 5.9×10^4

Var: 1

15) Add the following lengths, each obtained from a different measuring instrument, and round the answer to the proper number of significant figures: 20.02 m, 5.91 m, 0.0097 m, and 2.467 m.

Answer: 28.41 m

Var: 1

16) The last page of a book is numbered 764. The book is 3.0 cm thick, not including its covers. What is the average thickness (in centimeters) of a page in the book, rounded to the proper number of significant figures?

A) 0.0039 cm

B) 0.072 cm

C) 0.0079 cm

D) 0.00393 cm

E) 0.00785 cm

Answer: C

Var: 1

17) The length and width of a rectangle are 1.125 m and 0.606 m, respectively. You calculate the rectangle's perimeter by adding these numbers and multiplying by two. Your calculator's display reads 3.462. To the correct number of significant figures, the perimeter should be written as

A) 3.5 m.

B) 3.46 m.

C) 3.462 m.

D) 3.4620 m.

Answer: C

Var: 1

18) A rectangular garden measures 15 m long and 13.70 m wide. What is the length of a diagonal from one corner of the garden to the other?

- A) 18 m
- B) 19 m
- C) 20 m
- D) 4.1×10^2 m

Answer: C

Var: 1

19) If a circle has a radius of 1.109 m, what is its area expressed to the correct number of significant figures?

- A) 3.86 m²
- B) 3.863 m²
- C) 3.864 m²
- D) 3.8638 m²
- E) 3.86379 m²

Answer: C

Var: 1

20) A train travels at a constant speed of 60.4 mi/h for 101.5 min. What distance does the train cover expressed to the correct number of significant figures?

- A) 100 mi
- B) 102 mi
- C) 102.2 mi
- D) 102.18 mi
- E) 102.181 mi

Answer: B

Var: 1

21) A dog has three puppies. Spot weighs 12 ounces. Rascal weighs 9.5 ounces. Socks weighs 10.2 ounces. What is the total weight of the litter expressed to the correct number of significant figures?

- A) 31.7 ounces
- B) 31 ounces
- C) 32 ounces
- D) 30 ounces
- E) 31.70 ounces

Answer: C

Var: 1

22) A traveler has about \$536 in his checking account, about \$2107 in his savings account and exactly \$7.62 in his wallet. To the greatest precision warranted, how much money does this shopper have?

- A) \$2651
- B) \$2,650
- C) \$2,650.6
- D) \$2,650.62
- E) \$2,650.620

Answer: A

Var: 1

23) To get to her physics class, Alice walks 0.25 mi to the bus stop. She takes the bus 1.2 mi to the train station. She takes the train 13 mi and walks the remaining 0.17 mi to her class. How far is her commute expressed to the correct number of significant figures?

- A) 14.6 mi
- B) 10 mi
- C) 15 mi
- D) 14.62 mi
- E) 14.620 mi

Answer: C

Var: 1

24) What is $56 + \frac{32.00}{1.2465 + 3.45}$ written with the correct number of significant figures?

- A) 62.8
- B) 62.812
- C) 62.81
- D) 63
- E) 62.8123846

Answer: D

Var: 1

25) Using a digital balance the mass of a certain piece of wood is read as 12.946 g. Thinking in terms of accuracy and significant figures, what value would you record on your data sheet if the balance is accurate to one-tenth of a gram?

- A) 12.9 g
- B) 12.95 g
- C) 13 g
- D) 13.0 g

Answer: A

Var: 1

26) Which of the following numbers is the *smallest*?

- A) 15×10^{-3}
- B) 0.15×10^0
- C) 0.00015×10^3
- D) 0.00000015×10^6

Answer: A

Var: 1

27) Which one of the following numbers is equivalent to the number 0.0001776?

- A) 1.776×10^{-4}
- B) 17.76×10^{-3}
- C) 1776×10^{-5}
- D) 177.6×10^{-7}

Answer: A

Var: 1

28) Write out the number 8.42×10^{-5} in full with a decimal point and correct number of zeros.

- A) 0.00000842
- B) 0.0000842
- C) 0.000842
- D) 0.00842

Answer: B

Var: 5

29) What is the result of the calculation $(0.410 + 0.021) \times (2.20 \times 10^3)$?

- A) 880
- B) 946
- C) 948
- D) 950

Answer: C

Var: 1

30) Express $(2.2 \times 10^6)^{-1/2}$ in scientific notation.

- A) 6.7×10^{-4}
- B) 1.5×10^3
- C) 1.5×10^{-5}
- D) 1.5×10^4

Answer: A

Var: 40

31) Express the number 13.5 gigameters in meters without using scientific notation.

- A) 135,000 m
- B) 135,000,000 m
- C) 135,000,000,000 m
- D) 13,500,000,000 m

Answer: D

Var: 1

32) A volume of 100 mL is equivalent to which one of the following volumes?

- A) 1 kL
- B) 10^{-6} μ L
- C) 0.1 L
- D) 0.01 ML

Answer: C

Var: 1

33) The volume of a 10-mL test tube is equivalent to which one of the following quantities?

- A) 0.01 L
- B) 0.001 kL
- C) 0.1 L
- D) 1×10^{-6} L
- E) 0.001 ML

Answer: A

Var: 1

34) The number 0.00325×10^{-8} cm can be expressed in millimeters as

- A) 3.25×10^{-12} mm.
- B) 3.25×10^{-11} mm.
- C) 3.25×10^{-10} mm.
- D) 3.25×10^{-9} mm.

Answer: C

Var: 1

35) An area of 1.00×10^2 cm² is how many square meters?

- A) 1.00 m²
- B) 1.00×10^2 m²
- C) 1.00×10^{-2} m²
- D) 1.00×10^4 m²
- E) 1.00×10^{-3} m²

Answer: C

Var: 1

36) The prefix yotta (Y) signifies a multiple of 10^{24} . How many yottameters are there in a gigameter?

Answer: 10^{-15} ym

Var: 1

37) Express the sum $1.00 \text{ kg} + 1531 \text{ g} + 2.54 \times 10^4 \text{ mg}$ in kilograms with the correct number of significant figures.

A) 2.56 kg

B) 27.9 kg

C) 2.53 kg

D) 2.79 kg

Answer: A

Var: 1

38) The quantity $0.00325 \times 10^{-8} \text{ cm}$ is equivalent to

A) $3.25 \times 10^{-12} \text{ mm}$

B) $3.25 \times 10^{-11} \text{ mm}$

C) $3.25 \times 10^{-10} \text{ mm}$

D) $3.25 \times 10^{-9} \text{ mm}$

E) $3.25 \times 10^{-8} \text{ mm}$

Answer: C

Var: 1

39) A weight lifter can bench press 171 kg . How many milligrams is this?

A) $1.71 \times 10^8 \text{ mg}$

B) $1.71 \times 10^9 \text{ mg}$

C) $1.71 \times 10^7 \text{ mg}$

D) $1.71 \times 10^6 \text{ mg}$

Answer: A

Var: 50+

40) How many nanoseconds does it take for a computer to perform one calculation if it performs 6.7×10^7 calculations per second?

A) 15 ns

B) 67 ns

C) 11 ns

D) 65 ns

Answer: A

Var: 50+

41) A certain CD-ROM disk can store 600 megabytes of information. If an average word requires 9.0 bytes of storage, how many words can be stored on one disk?

A) 6.7×10^7 words

B) 5.4×10^9 words

C) 2.1×10^7 words

D) 2.0×10^9 words

Answer: A

Var: 9

42) The wavelength of the light from a certain laser is 0.66 microns, where 1 micron = 1.0×10^{-6} m. What is this wavelength in nanometers? (1 nm = 10^{-9} m)

A) 6.6×10^2 nm

B) 6.6×10^3 nm

C) 6.6×10^1 nm

D) 6.6×10^4 nm

Answer: A

Var: 50+

43) If you are 5'10" tall, what is your height in meters? (2.54 cm = 1.00 in.)

A) 1.5 m

B) 1.6 m

C) 1.7 m

D) 1.8 m

Answer: D

Var: 1

44) Given that 1.00 in. = 2.54 cm and 1.00 yd = 36.0 in., how many meters are in 7.00 yd?

A) 6.40 m

B) 36.3 m

C) 640 m

D) 1.78×10^3 m

Answer: A

Var: 1

45) Hydraulicists often express rainfall in acre-feet. This is the amount of water required to cover an area of one acre to a depth of one foot. There are 640.0 acres in a square mile, and 5280 feet in one mile. How many cubic feet are there in one acre-foot?

Answer: 43,560 ft³

Var: 1

46) Express 50 mi/h in units of meters per second. (1 mi = 1609 m)

- A) 49 m/s
- B) 2.2 m/s
- C) 22 m/s
- D) 45 m/s

Answer: C

Var: 1

47) Given that 1.00 in. = 2.54 cm, how many square centimeters are in 1.00 square inch?

- A) 1.59
- B) 2.54
- C) 5.08
- D) 6.45

Answer: D

Var: 1

48) A plot of land contains 5.8 acres. How many square meters does it contain? (1.0 acre = 43,560 ft² and 2.54 cm = 1.00 in.)

- A) $2.3 \times 10^4 \text{ m}^2$
- B) $7.1 \times 10^3 \text{ m}^2$
- C) $7.0 \times 10^4 \text{ m}^2$
- D) $5.0 \times 10^4 \text{ m}^2$

Answer: A

Var: 50+

49) The density of water is 1.00 g/cm³. What is its density in kg/m³?

Answer: $1.00 \times 10^3 \text{ kg/m}^3$

Var: 1

50) A light-year (ly) is the distance that light travels in one year. The speed of light is $3.00 \times 10^8 \text{ m/s}$. How many miles are there in 1.00 ly? (1.00 mi = 1.609 km and one year is 365.25 days.)

- A) $2.87 \times 10^{13} \text{ mi}$
- B) $9.46 \times 10^{15} \text{ mi}$
- C) $5.88 \times 10^{15} \text{ mi}$
- D) $9.46 \times 10^{12} \text{ mi}$
- E) $5.88 \times 10^{12} \text{ mi}$

Answer: E

Var: 1

51) A speed of 60 mi/h is closest to which of the following? (2.54 cm = 1.00 in.)

- A) 60 m/s
- B) 20 m/s
- C) 30 km/h
- D) 120 m/s
- E) 30 m/s

Answer: E

Var: 1

52) Which of the following speeds is *greatest*? (2.54 cm = 1.00 in.)

- A) 10 km/h
- B) 10 m/s
- C) 10 ft/s
- D) 10 mi/h
- E) 10 yd/s

Answer: B

Var: 1

53) A person on a diet loses 1.6 kg in a week. How many micrograms per second ($\mu\text{g/s}$) are lost?

- A) $2.6 \times 10^3 \mu\text{g/s}$
- B) $1.6 \times 10^5 \mu\text{g/s}$
- C) $44 \mu\text{g/s}$
- D) $6.4 \times 10^4 \mu\text{g/s}$

Answer: A

Var: 11

54) There are 640 acres in a square mile, 5280 ft in one mile, and 3.28 ft in one meter. How many acres are there in a hectare, which is a square one hundred meters on each side?

Answer: 2.47 acres

Var: 1

55) There are 2.00 dry pints to 1.00 dry quart, 8.00 dry quarts to 1.00 peck, 4.00 pecks to 1.00 bushel. An organic farmer wants to pick enough berries to fill 40,000 pint containers. How many bushels of berries does the farmer need?

Answer: 625 bushels

Var: 1

56) A typical ruby-throated hummingbird is 8 cm long. Express its length in millimeters and micrometers (μm).

- A) 80 mm; 800 μm
- B) 80 mm; 80,000 μm
- C) 800 mm; 0.008 μm
- D) 800 mm; 0.8 μm
- E) 0.8 mm; 8000 μm

Answer: B

Var: 1

57) A jogger has a mass of 50 kg. Express her mass in grams and micrograms (μg).

- A) 50,000 g; $5 \times 10^6 \mu\text{g}$
- B) 500,000 g; $500 \times 10^6 \mu\text{g}$
- C) 500,000 g; 5000 μg
- D) 50,000 g; $5 \times 10^{10} \mu\text{g}$
- E) 50,000 g; 50,000 μg

Answer: D

Var: 1

58) A jar of peanut butter costs \$3.29. Express its price in dekadollars and decidollars.

- A) 0.329 dekadollars; 0.329 decidollars
- B) 32.9 dekadollars; 0.329 decidollars
- C) 329 dekadollars; 32.9 decidollars
- D) 0.329 dekadollars; 32.9 decidollars
- E) 32.9 dekadollars; 329 decidollars

Answer: D

Var: 1

59) The following conversion equivalents are given:

$$1.00 \text{ gal} = 231 \text{ in}^3 \quad 1.0 \text{ ft} = 12 \text{ in} \quad 1.0 \text{ min} = 60 \text{ s}$$

If a pipe delivers water at the rate of 95 gal/min, its rate of flow in ft^3/s is closest to

- A) 0.21 ft^3/s .
- B) 0.19 ft^3/s .
- C) 0.17 ft^3/s .
- D) 0.15 ft^3/s .
- E) 0.14 ft^3/s .

Answer: A

Var: 50+

60) The following conversion equivalents are given:

$$1.0 \text{ m} = 100 \text{ cm} \quad 1.0 \text{ in} = 2.54 \text{ cm} \quad 1.0 \text{ ft} = 12 \text{ in}$$

If a bin has a volume of 1.5 m^3 , the volume of the bin, in ft^3 , is closest to

- A) 35 ft^3
- B) 41 ft^3
- C) 47 ft^3
- D) 53 ft^3
- E) 59 ft^3

Answer: D

Var: 1

61) The following conversion equivalents are given:

1.0 mile = 5280 ft 1.0 ft = 12 in 1 m = 39.37 in

1.0 hour = 60 min 1.0 min = 60 s

If a deer runs at 4.7 mi/h, its speed, in meters per second, is closest to

A) 2.1 m/s.

B) 1.7 m/s.

C) 1.9 m/s.

D) 2.3 m/s.

E) 2.5 m/s.

Answer: A

Var: 50+

62) A speed of 65 miles per hour is the same as which of the following? (1.00 ft = 30.48 cm)

A) 24 m/s

B) 29 m/s

C) 32 m/s

D) 37 m/s

E) 42 m/s

Answer: B

Var: 1

63) The following conversion equivalents are given:

1.0 kg = 1000 g 1.0 l = 1000 cm³ 1.0 l = 0.0353 ft³

The density of a certain liquid is 0.83 g/cm³. The density of this liquid, expressed in kg/ft³, is closest to

A) 24 kg/ft³.

B) 19 kg/ft³.

C) 21 kg/ft³.

D) 26 kg/ft³.

E) 28 kg/ft³.

Answer: A

Var: 50+

64) Your car gets 34.7 mi/gal on a vacation trip in the U.S. If you were figuring your mileage in Europe, how many km/L did it get? (3.79 L = 1.00 gal; 1.00 mi = 1.61 km)

A) 14.7 km/L

B) 9.16 km/L

C) 55.9 km/L

D) 32.4 km/L

Answer: A

Var: 50+

65) An oak tree was planted 22 years ago. How many seconds does this correspond to? (Do not take leap days into account.)

- A) 6.9×10^8
- B) 1.2×10^7
- C) 2.9×10^7
- D) 2.8×10^8

Answer: A

Var: 12

66) At a certain time, the average size of a transistor in a microprocessor was 250 nanometers. A human hair has a diameter of 70 microns (micrometers). How many transistors fit across a human hair?

- A) 280
- B) 28
- C) 2800
- D) 2.8
- E) 0.28

Answer: A

Var: 1

67) The king's chamber of the great pyramid in Egypt is 10.43 m long, 5.21 m wide, and 5.82 m high. What is the volume of the chamber in cubic feet, expressed to the correct number of significant figures? (1.00 in. = 2.54 cm)

- A) 316 ft³
- B) 3,720 ft³
- C) 6,530 ft³
- D) 11,200 ft³
- E) 13,200 ft³

Answer: D

Var: 1

68) Rover eats 0.50 pound of dry dog food per day. How many 5.0-kg sacks of dog food does his owner need to buy in a year? (1.0 kg weighs 2.2 lb)

- A) 17
- B) 25
- C) 52
- D) 80
- E) 81

Answer: A

Var: 1

69) The peak of Mt. Everest, at 10,900 m, is the highest point above sea level in the world. What is its elevation in miles? (1.00 m = 3.281 ft)

- A) 17.6 mi
- B) 0.630 mi
- C) 6.77 mi
- D) 6.20 mi
- E) 67.1 mi

Answer: C

Var: 1

70) The Hope Diamond weighs 44.5 carats, and there are 200 mg per carat. What is the mass of the Hope Diamond in kilograms?

- A) 0.000890 kg
- B) 0.00890 kg
- C) 0.0890 kg
- D) 0.890 kg
- E) 8.90 kg

Answer: B

Var: 1

71) The column of Trajan, erected in Rome in 106-113 A.D., is 125 feet tall. What is its height in centimeters? (2.54 cm = 1.00 in.)

- A) 1,510 cm
- B) 591 cm
- C) 2,520 cm
- D) 3,810 cm
- E) 38,100 cm

Answer: D

Var: 1

72) There are 640 acres in a square mile, and 5280 feet in 1.00 mile. What is the length in feet (to the nearest foot) of the side of a square having an area of 1.00 acre?

- A) 660 feet
- B) 209 feet
- C) 165 feet
- D) 412 feet
- E) 435 feet

Answer: B

Var: 1

73) An American football field, including end zones, is 360 feet long and 160 feet wide. If you needed to describe it for someone in Europe using the metric system, which one of the following quantities would be closest to its area in square meters? (2.54 cm = 1.00 in.)

- A) 4,920 m²
- B) 5,350 m²
- C) 88.0 m²
- D) 12,100 m²
- E) 13,200 m²

Answer: B

Var: 1

74) Leonardo da Vinci's *Mona Lisa* is 21 in. wide and 30.25 in. tall. What is the area of the painting in square centimeters? (1.00 m = 39.37 in.)

- A) 4,100 cm²
- B) 1,600 cm²
- C) 660 cm²
- D) 3,300 cm²
- E) 2,400 cm²

Answer: A

Var: 1

75) A cylindrical drinking glass has a diameter of 2.5 in. and is 5.5 in. tall. What is the volume of the drinking glass in cubic centimeters? (2.54 cm = 1.00 in.)

- A) 170 cubic cm
- B) 440 cubic cm
- C) 350 cubic cm
- D) 710 cubic cm
- E) 530 cubic cm

Answer: B

Var: 1

76) A football field is 120 yd long and 50 yd wide. What is the area of the football field, in square meters, given that 1.0 yd = 91.44 cm?

- A) 2.4×10^3 m²
- B) 3.7×10^3 m²
- C) 4.2×10^3 m²
- D) 5.0×10^3 m²

Answer: D

Var: 1

77) Wall posters are usually sold curled up in cylindrical cardboard tubes. If the length of the tube is 84.5 cm, and the inside diameter of the tube is 2.40 cm, what is the area of the poster expressed to the correct number of significant figures? (Assume the poster is just as long as the tube and does not overlap itself.)

A) 202.8 cm²

B) 637.1 cm²

C) 203 cm²

D) 319 cm²

E) 637 cm²

Answer: E

Var: 1

78) A spherical fruit has a radius of 3.23 cm. What is the volume of the fruit in cubic meters?

A) 1.41×10^{-4} m³

B) 1.41 m³

C) 4.23×10^{-4} m³

D) 4.23 m³

Answer: A

Var: 1

79) A thick-walled metal pipe of length 20.0 cm has an inside diameter of 2.00 cm and an outside diameter of 2.40 cm. What is the *total* surface area of the pipe, counting the ends, in square centimeters?

A) 276 cm²

B) 277 cm²

C) 278 cm²

D) 279 cm²

Answer: D

Var: 1

80) The radius of the earth is 3963 mi. Which one of the following numbers is closest to the surface area of the earth? (1.0 mi = 1609 m)

A) 4.9×10^7 m²

B) 1.3×10^{14} m²

C) 2.6×10^{14} m²

D) 5.1×10^{14} m²

Answer: D

Var: 1

81) A large school district has 300 school buses. If each school bus is used 3.0 hours each day, the average speed of the school buses is 15 mi/h, and the fuel economy of the buses is 10 mi/gal. How much does it cost to run these buses for 22 school days if gasoline costs \$4.10 a gallon?

- A) \$60,000
- B) \$120,000
- C) \$180,000
- D) \$240,000

Answer: B

Var: 1

82) A 2.00-qt bottle of soda is on sale for \$1.29. What should be the price of a 2.00-L bottle of the same soda to yield the same value? (1.00 qt = 0.947 L)

Answer: \$1.36

Var: 1

83) In a country where the unit of currency is the Passi, kerosene costs 130 Passi per liter, and one dollar buys 227 Passi. What is the cost of kerosene in *dollars per gallon*? (1.00 gal = 3.79 L)

Answer: \$2.17 per gallon

Var: 1

84) The tank of a certain car holds 16 gallons of gasoline. (1.00 gal = 3.785 L)

(a) How many liters of gasoline does this tank hold?

(b) How many kilometers can the car travel on one tank if it gets 25 miles per gallon?

Answer: (a) 61 L (b) 640 km

Var: 1

85) The mass of Mars, 6.40×10^{23} kg, is about one-tenth that of Earth, and its radius, 3395 km, is about half that of Earth. What is the mean density (mass divided by volume) of Mars in kilograms per cubic meter?

- A) 9.76×10^2 kg/m³
- B) 1.95×10^3 kg/m³
- C) 3.90×10^3 kg/m³
- D) 7.81×10^3 kg/m³

Answer: C

Var: 1

86) The average density of blood is 1.06×10^3 kg/m³. If you donate a pint of blood to the Red Cross, how many grams of blood have you donated? (2.00 pt = 1.00 qt, 1.00 L = 1000 cm³, 1.00 qt = 0.947 L, and density is mass per unit volume.)

- A) 502 g
- B) 0.502 g
- C) 5020 g
- D) 5.02×10^5 g
- E) 5.02 g

Answer: A

Var: 1

87) Concrete is sold by the cubic yard. What is the mass, in kilograms, of 1.00 cubic yard of concrete that is 5.00 times as dense as water? (1.00 m = 1.094 yd, a cubic meter of water has a mass of 1,000 kg, and density is mass per unit volume.)

- A) 764 kg
- B) 6550 kg
- C) 2420 kg
- D) 8730 kg
- E) 3820 kg

Answer: E

Var: 1

88) A porch roof that slopes upward at 45° measures $3.0 \text{ m} \times 5.0 \text{ m}$. It is covered with a slab of insulating material that is 2.0 cm thick. If the density of the insulation is 15 kg/m^3 , what is the weight of the insulation, in pounds, on the roof? (1.00 kg weighs 2.2 lb and density is mass per unit volume.)

- A) 4.5 lb
- B) 9.0 lb
- C) 20 lb
- D) 990 lb
- E) 9.9 lb

Answer: E

Var: 1

89) Estimate how many pennies would you have to stack to reach from the floor to an average 8-ft ceiling.

- A) 2×10^3
- B) 2×10^2
- C) 2×10^4
- D) 2×10^5
- E) 2×10^6

Answer: A

Var: 1

90) Estimate the number of times the earth will rotate on its axis during a human's lifetime.

- A) 3×10^4
- B) 3×10^5
- C) 3×10^6
- D) 3×10^7
- E) 3×10^8

Answer: A

Var: 1

91) Estimate the thickness, in meters, of an ordinary sheet of paper.

- A) 10^{-4} m
- B) 10^{-5} m
- C) 10^{-6} m
- D) 10^{-7} m
- E) 10^{-8} m

Answer: A

Var: 1

92) Which of the following is the most reasonable estimate of the number of characters (typed letters or numbers) in a 609-page book? Assume an average of 194 words per page and a reasonable average number of letters per word.

- A) 5×10^5 char
- B) 5×10^7 char
- C) 5×10^6 char
- D) 5×10^4 char

Answer: A

Var: 50+

93) A marathon race is 26 mi and 385 yd long. Estimate how many strides would be required to run a marathon. Assume a reasonable value for the average number of feet/stride.

- A) 4.5×10^4 strides
- B) 4.5×10^3 strides
- C) 4.5×10^5 strides
- D) 4.5×10^6 strides

Answer: A

Var: 1

94) Estimate the number of times an average person's heart beats in a lifetime. Assume the average heart rate is 69 beats/min and a life span of 75 years.

- A) 3×10^9 beats
- B) 3×10^8 beats
- C) 3×10^{10} beats
- D) 3×10^7 beats

Answer: A

Var: 50+