

***Principles & Practice of Physics, Global Edition (Mazur)***

**Chapter 1 Foundations**

**1.1 Conceptual Questions**

1) The current definition of the standard meter of length is based on

- A) the distance between the earth's equator and north pole.
- B) the distance between the earth and the sun.
- C) the distance traveled by light in a vacuum.
- D) the length of a particular object kept in France.

Answer: C

Var: 1

2) The current definition of the standard second of time is based on

- A) the frequency of radiation emitted by cesium atoms.
- B) the earth's rotation rate.
- C) the duration of one year.
- D) the oscillation of a particular pendulum kept in France.

Answer: A

Var: 1

3) If a woman weighs 125 lb, her mass expressed in kilograms is  $x$  kg, where  $x$  is

- A) less than 125.
- B) greater than 125.

Answer: A

Var: 1

4) If a tree is 15 m tall, its height expressed in feet is  $x$  ft, where  $x$  is

- A) less than 15.
- B) greater than 15.

Answer: B

Var: 1

5) If a flower is 6.5 cm wide, its width expressed in millimeters is  $x$  mm, where  $x$  is

- A) less than 6.5.
- B) greater than 6.5.

Answer: B

Var: 1

6) If an operatic aria lasts for 5.75 min, its length expressed in seconds is  $x$  s, where  $x$  is

- A) less than 5.75.
- B) greater than 5.75.

Answer: B

Var: 1

7) Scientists use the metric system chiefly because it is more accurate than the English system.

A) True

B) False

Answer: B

Var: 1

8) When adding two numbers, the number of significant figures in the sum is equal to the number of significant figures in the least accurate of the numbers being added.

A) True

B) False

Answer: B

Var: 1

9) When determining the number of significant figures in a number, zeroes to the left of the decimal point are never counted.

A) True

B) False

Answer: B

Var: 1

## 1.2 Problems

1) Convert  $1.2 \times 10^{-3}$  to decimal notation.

A) 1.200

B) 0.1200

C) 0.0120

D) 0.0012

E) 0.00012

Answer: D

Var: 5

2) Write out the number  $7.35 \times 10^{-5}$  in full with a decimal point and correct number of zeros.

A) 0.00000735

B) 0.0000735

C) 0.000735

D) 0.00735

E) 0.0735

Answer: B

Var: 5

3) 0.0001776 can also be expressed as

A)  $1.776 \times 10^{-3}$ .

B)  $1.776 \times 10^{-4}$ .

C)  $17.72 \times 10^4$ .

D)  $1772 \times 10^5$ .

E)  $177.2 \times 10^7$ .

Answer: B

Var: 5

4)  $0.00325 \times 10^{-8}$  cm can also be expressed in mm as

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

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

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

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

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

Answer: C

Var: 1

5) If, in a parallel universe,  $\pi$  has the value 3.14149, express  $\pi$  in that universe to four significant figures.

A) 3.141

B) 3.142

C) 3.1415

D) 3.1414

Answer: A

Var: 1

6) The number 0.003010 has

A) 7 significant figures.

B) 6 significant figures.

C) 4 significant figures.

D) 2 significant figures.

Answer: C

Var: 1

7) What is  $\frac{0.674}{0.74}$  to the proper number of significant figures?

A) 0.91

B) 0.911

C) 0.9108

D) 0.9

Answer: A

Var: 50+

8) What is the value of  $\pi(8.104)^2$ , written with the correct number of significant figures?

A) 206.324

B) 206.323

C) 206.3

D) 206

E) 200

Answer: C

Var: 1

9) What is the sum of 1123 and 10.3 written with the correct number of significant figures?

A)  $1.13 \times 10^3$

B) 1133.3000

C)  $1.1 \times 10^3$

D) 1133.3

E) 1133

Answer: E

Var: 1

10) What is the sum of  $1.53 + 2.786 + 3.3$  written with the correct number of significant figures?

A) 8

B) 7.6

C) 7.62

D) 7.616

E) 7.6160

Answer: B

Var: 3

11) What is the difference between 103.5 and 102.24 written with the correct number of significant figures?

A) 1

B) 1.3

C) 1.26

D) 1.260

E) 1.2600

Answer: B

Var: 3

12) What is the product of 11.24 and 1.95 written with the correct number of significant figures?

A) 22

B) 21.9

C) 21.92

D) 21.918

E) 21.9180

Answer: B

Var: 3

13) What is the result of  $1.58 \div 3.793$  written with the correct number of significant figures?

A)  $4.1656 \times 10^{-1}$

B)  $4.166 \times 10^{-1}$

C)  $4.17 \times 10^{-1}$

D)  $4.2 \times 10^{-1}$

E)  $4 \times 10^{-1}$

Answer: C

Var: 3

14) What is  $34 + (3) \times (1.2465)$  written with the correct number of significant figures?

- A) 37.7
- B) 37.74
- C)  $4 \times 10^1$
- D) 38
- E) 37.7395

Answer: D

Var: 5

15) What is  $56 + (32.00)/(1.2465 + 3.45)$  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

16) Add 3685 g and 66.8 kg and express your answer in milligrams (mg).

- A)  $7.05 \times 10^7$  mg
- B)  $7.05 \times 10^4$  mg
- C)  $7.05 \times 10^5$  mg
- D)  $7.05 \times 10^6$  mg

Answer: A

Var: 50+

17) Express  $(4.3 \times 10^6)^{-1/2}$  in scientific notation.

- A)  $4.8 \times 10^{-4}$
- B)  $2.1 \times 10^3$
- C)  $2.1 \times 10^{-5}$
- D)  $2.1 \times 10^4$

Answer: A

Var: 40

18) What is  $0.205^{2/3}$ , expressed to the proper number of significant figures?

- A) 0.348
- B) 0.35
- C) 0.3
- D) 0.3477

Answer: A

Var: 50+

19) 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 should be written as

- A)  $0.7 \text{ m}^2$ .
- B)  $0.68 \text{ m}^2$ .
- C)  $0.682 \text{ m}^2$ .
- D)  $0.6818 \text{ m}^2$ .
- E)  $0.68175 \text{ m}^2$ .

Answer: C

Var: 1

20) The following exact conversion equivalents are given:  $1 \text{ m} = 100 \text{ cm}$ ,  $1 \text{ in} = 2.54 \text{ cm}$ , and  $1 \text{ ft} = 12 \text{ in}$ . If a computer screen has an area of  $1.27 \text{ ft}^2$ , this area is closest to

- A)  $0.00284 \text{ m}^2$ .
- B)  $0.0465 \text{ m}^2$ .
- C)  $0.118 \text{ m}^2$ .
- D)  $0.284 \text{ m}^2$ .
- E)  $4.65 \text{ m}^2$ .

Answer: C

Var: 1

21) In addition to  $1 \text{ m} = 39.37 \text{ in.}$ , the following exact conversion equivalents are given:  $1 \text{ mile} = 5280 \text{ ft}$ ,  $1 \text{ ft} = 12 \text{ in}$ ,  $1 \text{ hour} = 60 \text{ min}$ , and  $1 \text{ min} = 60 \text{ s}$ . If a particle has a velocity of 8.4 miles per hour, its velocity, in m/s, is closest to

- A)  $3.8 \text{ m/s}$ .
- B)  $3.0 \text{ m/s}$ .
- C)  $3.4 \text{ m/s}$ .
- D)  $4.1 \text{ m/s}$ .
- E)  $4.5 \text{ m/s}$ .

Answer: A

Var: 50+

22) A weight lifter can bench press 171 kg. How many milligrams (mg) 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+

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

- A) 15 ns
- B) 67 ns
- C) 11 ns
- D) 65 ns

Answer: A

Var: 50+

24) The shortest wavelength of visible light is approximately 400 nm. Express this wavelength in centimeters.

- A)  $4 \times 10^{-5}$  cm
- B)  $4 \times 10^{-7}$  cm
- C)  $4 \times 10^{-9}$  cm
- D)  $4 \times 10^{-11}$  cm
- E)  $400 \times 10^{-11}$  cm

Answer: A

Var: 1

25) The wavelength of a certain laser is 0.35 micrometers, where 1 micrometer =  $1 \times 10^{-6}$  m. Express this wavelength in nanometers.

- A)  $3.5 \times 10^2$  nm
- B)  $3.5 \times 10^3$  nm
- C)  $3.5 \times 10^1$  nm
- D)  $3.5 \times 10^4$  nm

Answer: A

Var: 50+

26) A certain CD-ROM disk can store approximately  $6.0 \times 10^2$  megabytes of information, where  $10^6$  bytes = 1 megabyte. If an average word requires 9.0 bytes of storage, how many words can be stored on one disk?

- A)  $6.7 \times 10^7$  words
- B)  $5.4 \times 10^9$  words
- C)  $2.1 \times 10^7$  words
- D)  $2.0 \times 10^9$  words

Answer: A

Var: 9

27) A plot of land contains 5.8 acres. How many square meters does it contain? [1 acre = 43,560 ft<sup>2</sup>]

- A)  $2.3 \times 10^4$  m<sup>2</sup>
- B)  $7.1 \times 10^3$  m<sup>2</sup>
- C)  $7.0 \times 10^4$  m<sup>2</sup>
- D)  $5.0 \times 10^4$  m<sup>2</sup>

Answer: A

Var: 50+

28) A person on a diet loses 1.6 kg in a week. How many micrograms/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

29) Albert uses as his unit of length (for walking to visit his neighbors or plowing his fields) the albert (A), the distance Albert can throw a small rock. One albert is 92 meters. How many square alberts is equal to one acre? (1 acre =  $43,560 \text{ ft}^2 = 4050 \text{ m}^2$ )

Answer: 1.29 A<sup>2</sup>

Var: 50+

30) Convert a speed of 4.50 km/h to units of ft/min. (1.00 m = 3.28 ft)

A) 0.246 ft/min

B) 82.3 ft/min

C) 165 ft/min

D) 246 ft/min

E) 886 ft/min

Answer: D

Var: 1

31) The exhaust fan on a typical kitchen stove pulls 600 CFM (cubic feet per minute) through the filter. Given that 1.00 in. = 2.54 cm, how many cubic meters per second does this fan pull?

A)  $0.283 \text{ m}^3/\text{sec}$

B)  $0.328 \text{ m}^3/\text{sec}$

C)  $3.05 \text{ m}^3/\text{sec}$

D)  $32.8 \text{ m}^3/\text{sec}$

Answer: A

Var: 1

32) The mass of a typical adult woman is closest to

A) 20 kg.

B) 35 kg.

C) 75 kg.

D) 150 kg.

Answer: C

Var: 1

33) The height of the ceiling in a typical home, apartment, or dorm room is closest to

A) 100 cm.

B) 200 cm.

C) 400 cm.

D) 500 cm.

Answer: B

Var: 1



34) Approximately how many times does an average human heart beat in a year?

A)  $4 \times 10^5$

B)  $4 \times 10^6$

C)  $4 \times 10^7$

D)  $4 \times 10^8$

E)  $4 \times 10^9$

Answer: C

Var: 1

35) Approximately how many times does an average human heart beat in a lifetime?

A)  $3 \times 10^{11}$

B)  $3 \times 10^{10}$

C)  $3 \times 10^9$

D)  $3 \times 10^8$

E)  $3 \times 10^7$

Answer: C

Var: 1

36) Approximately how many pennies would you have to stack to reach an average 8-foot ceiling?

A)  $2 \times 10^2$

B)  $2 \times 10^3$

C)  $2 \times 10^4$

D)  $2 \times 10^5$

E)  $2 \times 10^6$

Answer: B

Var: 1

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

A)  $3 \times 10^4$

B)  $3 \times 10^5$

C)  $3 \times 10^6$

D)  $3 \times 10^7$

E)  $3 \times 10^8$

Answer: A

Var: 1

38) Estimate the number of pennies that would fit in a box one foot long by one foot wide by one foot tall.

A)  $5 \times 10^2$

B)  $5 \times 10^3$

C)  $5 \times 10^4$

D)  $5 \times 10^5$

E)  $5 \times 10^6$

Answer: C

Var: 1

39) A marathon 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)  $4.5 \times 10^4$  strides

B)  $4.5 \times 10^3$  strides

C)  $4.5 \times 10^5$  strides

D)  $4.5 \times 10^6$  strides

Answer: A

Var: 1