

Test Bank to Accompany

Physics for Scientists and Engineers
Third Edition

by

Knight

Pearson Education, Inc.

c.2013
1/9/2012

Contents

Chapter 1	Concepts of Motion.....	1
Chapter 2	Kinematics in One Dimension.....	11
Chapter 3	Vectors and Coordinate Systems	34
Chapter 4	Kinematics in Two Dimensions	44
Chapter 5	Force and Motion	58
Chapter 6	Dynamics I: Motion Along a Line.....	70
Chapter 7	Newton's Third Law	84
Chapter 8	Dynamics II: Motion in a Plane	109
Chapter 9	Impulse and Momentum	116
Chapter 10	Energy.....	121
Chapter 11	Work	137
Chapter 12	Rotation of a Rigid Body	171
Chapter 13	Newton's Theory of Gravity	209
Chapter 14	Oscillations.....	222
Chapter 15	Fluids and Elasticity.....	235
Chapter 16	A Macroscopic Description of Matter	256
Chapter 17	Work, Heat, and the First Law of Thermodynamics.....	266
Chapter 18	The Micro/Macro Connection.....	294
Chapter 19	Heat Engines and Refrigerators	304
Chapter 20	Traveling Waves.....	317
Chapter 21	Superpositions	332
Chapter 22	Wave Optics.....	347
Chapter 23	Ray Optics	360
Chapter 24	Optical Instruments	378
Chapter 25	Electric Charges and Forces.....	390
Chapter 26	The Electric Field	400
Chapter 27	Gauss's Law	413
Chapter 28	The Electric Potential	429
Chapter 29	Potential and Field	443
Chapter 30	Current and Resistance.....	465

Chapter 31 Fundamentals of Circuits	475
Chapter 32 The Magnetic Field.....	504
Chapter 33 Electromagnetic Induction.....	543
Chapter 34 Electromagnetic Fields and Waves.....	566
Chapter 35 AC Circuits.....	581
Chapter 36 Relativity	593
Chapter 37 The Foundations of Modern Physics.....	605
Chapter 38 Quantization	607
Chapter 39 Wave Functions and Uncertainty	620
Chapter 40 One-Dimensional Quantum Mechanics.....	625
Chapter 41 Atomic Physics	633
Chapter 42 Nuclear Physics	643

Chapter 1 Concepts of Motion

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) The current definition of the standard kilogram of mass is based on
- A) the mass of the earth.
 - B) the mass of the sun.
 - C) the mass a particular object kept in France.
 - D) the mass of a cesium-133 atom.

Answer: C

Var: 1

- 4) 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

- 5) 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

- 6) 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

7) 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

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

- A) True
- B) False

Answer: B

Var: 1

9) 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

10) 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 1.2×10^{-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 7.35×10^{-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) 1.776×10^{-3} .
- B) 1.776×10^{-4} .
- C) 17.72×10^4 .
- D) 1772×10^5 .
- E) 177.2×10^7 .

Answer: B

Var: 5

4) 0.00325×10^{-8} cm can also be expressed in mm 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.
- E) 3.25×10^{-8} mm.

Answer: C

Var: 1

5) If, in a parallel universe, π has the value 3.14149, express π 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) 1.13×10^3
- B) 1133.3000
- C) 1.1×10^3
- 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) 4.1656×10^{-1}
- B) 4.166×10^{-1}
- C) 4.17×10^{-1}
- D) 4.2×10^{-1}
- E) 4×10^{-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) 4×10^1
- 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) 7.05×10^7 mg
- B) 7.05×10^4 mg
- C) 7.05×10^5 mg
- D) 7.05×10^6 mg

Answer: A

Var: 50+

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

- A) 4.8×10^{-4}
- B) 2.1×10^3
- C) 2.1×10^{-5}
- D) 2.1×10^4

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 m².
- B) 0.68 m².
- C) 0.682 m².
- D) 0.6818 m².
- E) 0.68175 m².

Answer: C

Var: 1

20) The following exact conversion equivalents are given: 1 m = 100 cm , 1 in = 2.54 cm, and 1 ft = 12 in. If a computer screen has an area of 1.27 ft², this area is closest to

- A) 0.00284 m².
- B) 0.0465 m².
- C) 0.118 m².
- D) 0.284 m².
- E) 4.65 m².

Answer: C

Var: 1

21) In addition to 1 m = 39.37 in., the following exact conversion equivalents are given:

1 mile = 5280 ft , 1 ft = 12 in , 1 hour = 60 min, and 1 min = 60 s. If a particle has a velocity of 8.4 miles per hour, its velocity, in m/s, is closest to

- A) 3.8 m/s.
- B) 3.0 m/s.
- C) 3.4 m/s.
- D) 4.1 m/s.
- E) 4.5 m/s.

Answer: A

Var: 50+

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

- A) 1.71×10^8 mg
- B) 1.71×10^9 mg
- C) 1.71×10^7 mg
- D) 1.71×10^6 mg

Answer: A

Var: 50+

- 23) 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+

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

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

Answer: A

Var: 1

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

A) 3.5×10^2 nm
 B) 3.5×10^3 nm
 C) 3.5×10^1 nm
 D) 3.5×10^4 nm

Answer: A

Var: 50+

- 26) A certain CD-ROM disk can store approximately 6.0×10^2 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) 6.7×10^7 words
 B) 5.4×10^9 words
 C) 2.1×10^7 words
 D) 2.0×10^9 words

Answer: A

Var: 9

- 27) A plot of land contains 5.8 acres. How many square meters does it contain? [1 acre = 43,560 ft²]

A) 2.3×10^4 m²
 B) 7.1×10^3 m²
 C) 7.0×10^4 m²
 D) 5.0×10^4 m²

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 A²

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) 4×10^5
- B) 4×10^6
- C) 4×10^7
- D) 4×10^8
- E) 4×10^9

Answer: C

Var: 1

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

- A) 3×10^{11}
- B) 3×10^{10}
- C) 3×10^9
- D) 3×10^8
- E) 3×10^7

Answer: C

Var: 1

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

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

Answer: B

Var: 1

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

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

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

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

Answer: A

Var: 1

- 40) The period of a pendulum is the time it takes the pendulum to swing back and forth once. If the only dimensional quantities that the period depends on are the acceleration of gravity, g , and the length of the pendulum, ℓ , what combination of g and ℓ must the period be proportional to? (Acceleration has SI units of $\text{m} \cdot \text{s}^{-2}$).

A) g/ℓ
 B) $g\ell^2$
 C) $g\ell$
 D) $\sqrt{g\ell}$
 E) $\sqrt{\ell/g}$

Answer: E

Var: 1

- 41) The speed of a wave pulse on a string depends on the tension, F , in the string and the mass per unit length, μ , of the string. Tension has SI units of $\text{kg} \cdot \text{m} \cdot \text{s}^{-2}$ and the mass per unit length has SI units of $\text{kg} \cdot \text{m}^{-1}$. What combination of F and μ must the speed of the wave be proportional to?

A) F / μ
 B) μ / F
 C) $\sqrt{\mu / F}$
 D) $\sqrt{\mu F}$
 E) $\sqrt{F / \mu}$

Answer: A

Var: 1

- 42) The position x , in meters, of an object is given by the equation $x = A + Bt + Ct^2$, where t represents time in seconds. What are the SI units of A , B , and C ?

A) m, m, m
 B) m, s, s
 C) m, s, s^2
 D) m, m/s, m/s^2
 E) m/s, m/s^2 , m/s^3

Answer: A

Var: 1