



MALDEN CATHOLIC

The Codivisional High School

Course 3630 AP Physics 1 Required Summer Review Packet

All work is due Day 1 2022-2023

Mr. Rick Kates katesr@maldencatholic.org

Welcome to AP Physics 1

This course focus is based on AP Physics 1 Big Ideas - Major Concepts

The big ideas serve as the foundation of the course and allow students to create meaningful connections among concepts. They are often abstract concepts or themes that become threads that run throughout the course. Revisiting the big ideas and applying them in a variety of contexts allows students to develop deeper conceptual understanding. Below are the big ideas of the course and a brief description of each.

BIG IDEA 1: SYSTEMS

- Objects and systems have properties such as mass and charge. Systems may have internal structure.

BIG IDEA 2: FIELDS

- Fields existing in space can be used to explain interactions.

BIG IDEA 3: FORCE INTERACTIONS

- The interactions of an object with other objects can be described by forces.

BIG IDEA 4: CHANGE

- Interactions between systems can result in changes in those systems.

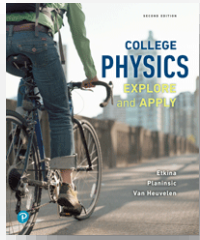
BIG IDEA 5: CONSERVATION

- Changes that occur as a result of interactions are constrained by conservation laws.

To get started, this summer packet is a mathematical review/concept to enable us to start off Day 1 into Kinematics.

Assignment

1. Review Chapter 1 in Textbook-Textbook is your reference guide.



Etkina, Planinsic & Van Heuvelen, *College Physics: Explore and Apply 2nd Edition*
ISBN-13: 978-0134601823, Pearson 2019

2. Watch the following videos on APlusPhysics.com for review & examples.
 - a. [What is Physics](#)
 - b. [Significant Figures](#)
 - c. [Scientific Notation](#)
 - d. [Metric System](#)
 - e. [Scalar and Vector Quantities](#)
3. Work on the problems assigned on the following pages. Show all work on separate paper.

College Physics: Explore and Apply, 2e (Etkina, Planinsic, and Van Heuvelen)
Chapter 1 Introduction

1.1 Conceptual Questions

1) In the product A , B , **and** C , the quantity 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) 10
- B) 5
- C) 4
- D) 3
- E) 2

2) In the quotient $\frac{A}{B \cdot C}$, the quantity 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

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

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

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

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

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

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

6) The number of significant figures in 10001 is

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

7) The number of significant figures in 0.01500 is

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

8) The number of significant figures in 0.040 is

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

Answer: B

9) 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

10) 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

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

- A) 300 kg
- B) 200 kg
- C) 150 kg
- D) 50 kg
- E) 20 kg

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

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

13) 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

14) A reasonable estimate for the height of the walls of a room in an ordinary American home is

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

15) 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

16) 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

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

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}

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

- A) 0.9
- B) 0.91
- C) 0.911
- D) 0.9108

4) 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. Rounded 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

5) 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 (a leaf) in the book, rounded to the proper number of significant figures?

- A) 0.0039 cm
- B) 0.00393 cm
- C) 0.00785 cm
- D) 0.0079 cm
- E) 0.072 cm

6) 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 opposite corner?

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

7) 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) 3.86379 m²
- D) 3.8638 m²
- E) 3.864 m²

8) From 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

9) 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

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

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

11) 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

12) 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

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

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

14) 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

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

- A) 1 kl
- B) 10^{-6} μ l
- C) 0.01 ml
- D) 0.1 L

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

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

17) 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

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

19) The quantity 0.00325×10^{-8} mm is equivalent to

- A) 3.25×10^{-12} cm
- B) 3.25×10^{-11} cm
- C) 3.25×10^{-10} cm
- D) 3.25×10^{-9} cm
- E) 3.25×10^{-8} cm

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

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

Answer: B

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

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

22) 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

23) 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

24) 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

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

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

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

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

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

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

28) Which of the following is the most reasonable estimate of the number of characters (typed letters or numbers) in a 194-page book? Assume an average of 600 words per page and a reasonable average number of letters per word.

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

29) 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

30) 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