

Cutnell/Johnson
Physics 7th edition

Classroom Response System Questions

Chapter 1 Introduction and Mathematical Concepts

Interactive Lecture Questions

1.2.1. A car starts from rest on a circular track with a radius of 150 m. Relative to the starting position, through what angle has the car swept out when it has traveled 150 m along the circular track?

- a) 1 radian
- b) $\pi/2$ radians
- c) π radians
- d) $3\pi/2$ radians
- e) 2π radians

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1.2.2. The radius of sphere A is one half that of sphere B. How do the circumference and volume of sphere B compare to sphere A?

- a) The circumference of B is 2 times that of A; and its volume is 4 times that of A.
- b) The circumference of B is 2 times that of A; and its volume is 6 times that of A.
- c) The circumference of B is 2 times that of A; and its volume is 8 times that of A.
- d) The circumference of B is 4 times that of A; and its volume is 6 times that of A.
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1.2.3. A section of a river can be approximated as a rectangle that is 48 m wide and 172 m long. Express the area of this river in square kilometers.

a) $8.26 \times 10^{-3} \text{ km}^2$

b) 8.26 km^2

c) $8.26 \times 10^3 \text{ km}^2$

d) 3.58 km^2

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1.2.4. Express the following statement as an algebraic expression:

“There are 264 gallons in a one cubic meter container.” Let G represent the number of gallons and M represent the number of one cubic meter containers.

a) $G = 264M$

b) $G = M/264$

c) $G = 0.00379M$

d) $M = G/264$

e) $M = G$

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1.3.1. Using the dimensions given for the variables in the table, determine which one of the following expressions is correct.

a) $f = \frac{g}{2\pi l}$

b) $f = 2\pi l g$

c) $2\pi f = \sqrt{\frac{g}{l}}$

d) $2\pi f = \sqrt{\frac{l}{g}}$

e) $f = 2\pi\sqrt{gl}$

variable	dimension
f	$\frac{1}{[T]}$
l	$[L]$
g	$\frac{[L]}{[T]^2}$

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1.3.2. Given the following equation: $y = c^n a t^2$, where n is an integer with no units, c is a number between zero and one with no units, the variable t has units of seconds and y is expressed in meters, determine which of the following statements is true.

- a) Through dimensional analysis, a has units of meters per second (m/s) and $n = 1$.
- b) Through dimensional analysis, a has units of meters per second (m/s) and $n = 2$.
- c) Through dimensional analysis, a has units of meters per second per second (m/s^2) and $n = 1$.
- d) Through dimensional analysis, a has units of meters per second per second (m/s^2) and $n = 2$.
- e) a has units of meters per second per second (m/s^2), but value of n cannot be determined through dimensional analysis.

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1.3.3. Given the mathematical expression $A = 3B$, determine which of the following statements is true.

- a) The ratio $B/A = 3$.
- b) A is three times smaller than B .
- c) The ratio $A/B = 1/3$.
- d) B is three times smaller than A .
- e) A and B can have any value. There is no relationship between them.

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1.4.1. The city of Denver is located approximately one mile (1.61 km) above sea level. Assume you are standing on a beach in Los Angeles, California, at sea level; estimate the angle of the resultant vector with respect to the horizontal axis between your location in California and Denver.

- a) between 1° and 2°
- b) between 0.5° and 0.9°
- c) between 0.11° and 0.45°
- d) between 0.06° and 0.10°
- e) less than 0.05°

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1.5.1. Which one of the following situations involves a vector?

- a) The submarine followed the coastline for 35 kilometers.
- b) The air temperature in Northern Minnesota dropped to $-4\text{ }^{\circ}\text{C}$.
- c) The Hubble Telescope orbits 598 km above the surface of the earth.
- d) The baseball flew into the dirt near home plate at 44 m/s.
- e) The flock of Canadian Geese was spotted flying due south at 5 m/s.

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1.6.1. Three vectors **A**, **B**, and **C** add together to yield zero: $\mathbf{A} + \mathbf{B} + \mathbf{C} = \mathbf{0}$. The vectors **A** and **C** point in *opposite* directions and their magnitudes are related by the expression: $A = 2C$. Which one of the following conclusions is correct?

- a) **A** and **B** have equal magnitudes and point in opposite directions.
- b) **B** and **C** have equal magnitudes and point in the same direction.
- c) **B** and **C** have equal magnitudes and point in opposite directions.
- d) **A** and **B** point in the same direction, but **A** has twice the magnitude of **B**.
- e) **B** and **C** point in the same direction, but **C** has twice the magnitude of **B**.

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1.6.2. When two vectors, **A** and **B**, are added together the resultant is vector **C**. Vector **A** points in the $+x$ direction and vector **B** points in the $-y$ direction. Which one of the following expressions is false?

a) $\mathbf{C} - \mathbf{A} = -\mathbf{B}$

b) $\mathbf{A} + \mathbf{B} + \mathbf{C} = 0$

c) $C^2 = A^2 + B^2$

d) $C < A + B$

e) $\mathbf{C} = \mathbf{A} + \mathbf{B}$

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1.7.1. During the execution of a play, a football player carries the ball for a distance of 33 m in the direction 76° north of east. To determine the number of meters gained on the play, find the northward component of the ball's displacement.

- a) 8.0 m
- b) 16 m
- c) 24 m
- d) 28 m
- e) 32 m

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