HW due 1/17 (extended to 1/24 due to drop/add)

Due: 11:59pm on Sunday, January 24, 2016

You will receive no credit for items you complete after the assignment is due. Grading Policy

Exercise 1.6

A square field measuring 100.0 m by 100.0 m has an area of 1.00 hectare. An acre has an area of $43,600\ \mathrm{ft}^2$.

Part A

If a country lot has an area of 12.0 acres, what is the area in hectares?

ANSWER:

4.86 hectares

Correct

Exercise 1.10

The following conversions occur frequently in physics and are very useful.

Part A

Use $1\ \mathrm{mi} = 5280\ \mathrm{ft}$ and $1\ \mathrm{h} = 3600\ \mathrm{s}$ to convert 60 mph to units of $\mathrm{ft/s}$.

Express your answer using two significant figures.

ANSWER:

88 $\mathrm{ft/s}$

Correct

Part B

The acceleration of a freely falling object is 32 $\mathrm{ft/s^2}$. Use $1\ \mathrm{ft} = 30.48\ \mathrm{cm}$ to express this acceleration in units of $\mathrm{m/s^2}$.

Express your answer using two significant figures.

ANSWER:

9.8 $\mathrm{m/s^2}$

Correct

Part C

The density of water is 1.0 $\mathrm{g/cm^3}$. Convert this density to units of $\mathrm{kg/m^3}$.

Express your answer using two significant figures.

ANSWER:

1000 $\mathrm{kg/m^3}$

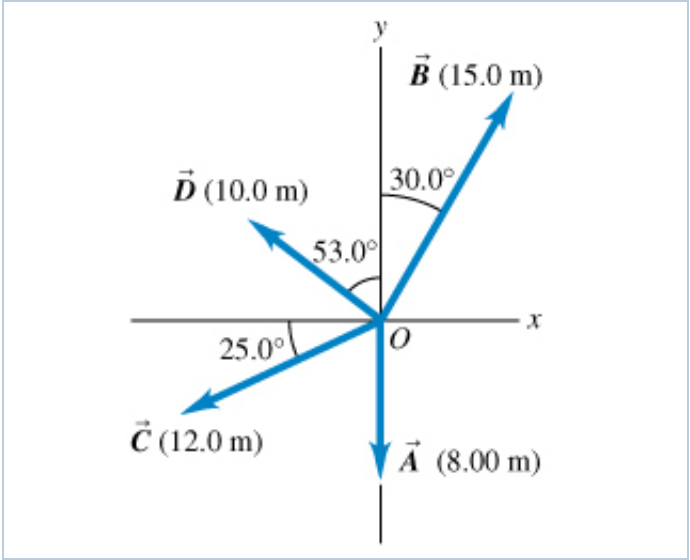
Correct

Exercise 1.24

Part A

For the vectors $\vec{A}$ and $\vec{B}$ in the figure , use a scale drawing to find the magnitude of the vector sum $\vec{A} + \vec{B}$.

Express your answer using two significant figures.



ANSWER:

9.0 m

Correct

Part B

Find the direction of the vector sum $\vec{A} + \vec{B}$.

Express your answer using two significant figures.

ANSWER:

34 $^\circ$ counterclockwise from $+x$-axis

Correct

Part C

Find the magnitude of the vector difference $\vec{A} - \vec{B}$.

Express your answer using two significant figures.

ANSWER:

22 m

Correct

Part D

Find the direction of the vector difference $\vec{A} - \vec{B}$.

Express your answer using three significant figures.

ANSWER:

250 $^\circ$ counterclockwise from $+x$-axis

Correct

Part E

Use your answers to find the magnitude of $-\vec{A} - \vec{B}$.

Express your answer using two significant figures.

ANSWER:

9.0 m

Correct

Part F

Find the direction of $-\vec{A} - \vec{B}$.

Express your answer using three significant figures.

ANSWER:

214 ° counterclockwise from $+x$-axis

Correct

Part G

Find the magnitude of $\vec{B} - \vec{A}$.

Express your answer using two significant figures.

ANSWER:

22 m

Correct

Part H

Find the direction of $\vec{B} - \vec{A}$.

Express your answer using two significant figures.

ANSWER:

70 ° counterclockwise from $+x$-axis

Correct

Exercise 1.28

Let the angle θ be the angle that the vector $\vec{A}$ makes with the +*x*-axis, measured counterclockwise from that axis. Find the angle θ for a vector that has the following components.

Part A

$A_x = 1.80\ \text{m}$, $A_y = -0.500\ \text{m}$

ANSWER:

344 °

Correct

Part B

$A_x = 3.60\ \text{m}$, $A_y = 2.00\ \text{m}$

ANSWER:

29.1 °

Correct

Part C

$A_x = -3.00\ \text{m}$, $A_y = 3.40\ \text{m}$

ANSWER:

131 °

Correct

Part D

$A_x = -2.90\ \text{m}$, $A_y = -4.40\ \text{m}$

ANSWER:

237 °

Correct

Exercise 1.40

You are given two vectors $\vec{A} = -3.00\hat{\imath} + 7.00\hat{\jmath}$ and $\vec{B} = 8.00\hat{\imath} + 2.00\hat{\jmath}$. Let the counterclockwise angles be positive.

Part A

What angle θ_A, where $0^\circ \leq \theta_A < 360^\circ$, does $\vec{A}$ make with the $+x$-axis?

ANSWER:

θ_A = 113 °

Correct

Part B

What angle θ_B, where $0^\circ \leq \theta_B < 360^\circ$, does $\vec{B}$ make with the $+x$-axis?

ANSWER:

θ_B = 14.0 °

Correct

Part C

Vector $\vec{C}$ is the sum of $\vec{A}$ and $\vec{B}$, so $\vec{C} = \vec{A} + \vec{B}$. What angle θ_C, where $0^\circ \leq \theta_C < 360^\circ$, does $\vec{C}$ make with the $+x$-axis?

ANSWER:

θ_C = 60.9 °

Correct

Problem 1.70

A ship leaves the island of Guam and sails 270 km at 53.0 $^\circ$ north of west.

Part A

In which direction must it now head so that its resultant displacement will be 127 km directly east of Guam?

ANSWER:

θ = 36.7 $^\circ$ south of east

Correct

Part B

How far must it sail?

Express your answer with the appropriate units.

ANSWER:

R = 361 km

Correct

Problem 1.78

In the methane molecule, CH_4, each hydrogen atom is at a corner of a regular tetrahedron with the carbon atom at the center. In coordinates where one of the $\mathrm{C—H}$ bonds is in the direction of $\hat{i} + \hat{j} + \hat{k}$, an adjacent $\mathrm{C—H}$ bond is in the $\hat{i} - \hat{j} - \hat{k}$ direction.

Part A

Calculate the angle between these two bonds.

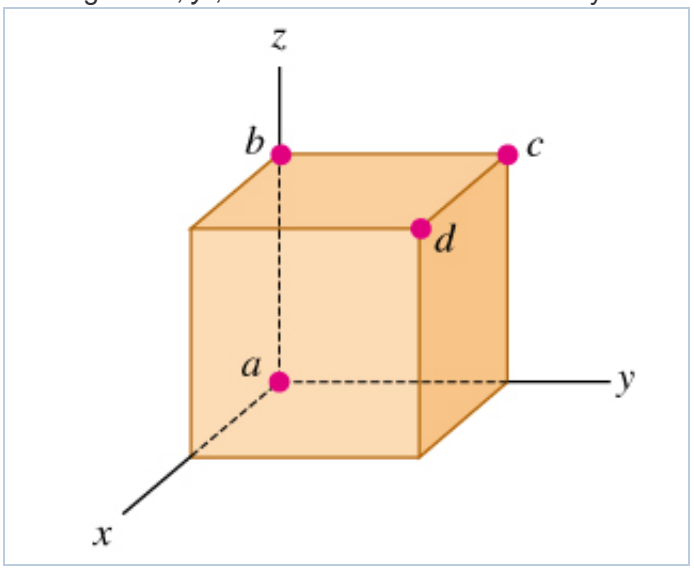
ANSWER:

θ = 109 $^\circ$

Correct

Problem 1.80

A cube is placed so that one corner is at the origin and three edges are along the *x*-, *y*-, and z -axes of a coordinate system (the figure). Use vectors to answer the questions.



Part A

Find the angle between the edge along the z-axis (line ab) and the diagonal from the origin to the opposite corner (line ad).

ANSWER:

θ = 54.7 °

Correct

Part B

Find the angle between line ac (the diagonal of a face) and line ad .

ANSWER:

θ = 35.3 °

Correct

Score Summary:

Your score on this assignment is 100%.
You received 40 out of a possible total of 40 points.