

Student name: _____

The measured length of a cylindrical laser beam is 12.1 meters, its measured diameter is 0.00121 meters, and its measured intensity is $121 \times 10^5 \text{ W/m}^2$. Which of these measurements is the most precise?

length

diameter

intensity

All three are equally precise.

A sphere and a cube have the same volume. If the radius of the sphere is 5.00 cm, then what is the area of one side of the cube?

250 cm²

650 cm²

105 cm²

125 cm²

A sphere and a cube have the same volume. If the edge of one side of the cube is 5.00 cm, then what is the surface area of the sphere?

250 cm²

1500 cm²

105 cm²

121 cm²

Approximately how many water molecules are in one liter of water? One mole contains 6.02×10^{23} molecules, the density of water is 1.00×10^3 grams/liter and the mass of one mole of water is 18.0 grams.

6.02×10^{23}

$$334 \times 10^{25}$$

$$602 \times 10^{26}$$

$$108 \times 10^{28}$$

Vectors $\vec{A}$ and $\vec{B}$ have the same non-zero magnitude. The magnitude of $\vec{A} + \vec{B}$ is equal to the magnitude of $\vec{A} - \vec{B}$. What is the angle between $\vec{A}$ and $\vec{B}$?

30 degrees

45 degrees

60 degrees

90 degrees

Vectors $\vec{A}$ and $\vec{B}$ have the same magnitude v . The direction of $\vec{A}$ is north and the direction of $\vec{B}$ is 60 degrees west of south. What is the magnitude of $\vec{A} - \vec{B}$?

zero

v

$\sqrt{3} v$

$2v$

How many significant figures are in the number 0.00640?

1

2

3

4

5

What is the minimum number of post-it note sheets, length 3.00 inches and width 2.00 inches, you would need to make a straight line from the wall in your dorm room to the door which is 30.0 feet away from the wall?

50

80

120

180

200

A farmer has a field which is 0.50 km in length and 0.70 km in width. What is the area of his field?

0.35 km²

35 km²

35 km²

35 × 10² km²

A vector $\vec{A}$ with magnitude 25.0 m points along the positive y direction. If it is rotated by 50.0 degrees counterclockwise, what are the components of the vector?

$A_x = 25.0 \cos 50.0^\circ$ and $A_y = 25.0 \sin 50.0^\circ$

$A_x = 25.0 \cos 140^\circ$ and $A_y = 25.0 \sin 140^\circ$

$A_x = 25.0 \sin 140^\circ$ and $A_y = 25.0 \cos 140^\circ$

$A_x = 25.0 \tan 50.0^\circ$ and $A_y = 25.0 \sin 50.0^\circ$

A vector $\vec{A}$ with magnitude 25.0 m points along the positive x direction. If it is rotated by 50.0 degrees counterclockwise, what are the components of the vector?

$$A_x = 25.0 \cos 50.0^\circ \text{ and } A_y = 25.0 \sin 50.0^\circ$$

$$A_x = 25.0 \cos 310^\circ \text{ and } A_y = 25.0 \sin 310^\circ$$

$$A_x = 25.0 \sin 310^\circ \text{ and } A_y = 25.0 \cos 310^\circ$$

$$A_x = 25.0 \sin 50.0^\circ \text{ and } A_y = 25.0 \cos 50.0^\circ$$

A vector $\vec{A}$ with magnitude 25.0 m points along the negative x direction. If it is rotated by 50.0 degrees counterclockwise, what are the components of the vector?

$$A_x = 25.0 \cos 50.0^\circ \text{ and } A_y = 25.0 \sin 50.0^\circ$$

$$A_x = 25.0 \cos 230^\circ \text{ and } A_y = 25.0 \sin 230^\circ$$

$$A_x = 25.0 \sin 230^\circ \text{ and } A_y = 25.0 \cos 230^\circ$$

$$A_x = 25.0 \sin 50.0^\circ \text{ and } A_y = 25.0 \cos 50.0^\circ$$

A vector $\vec{A}$ with magnitude 25.0 m points along the negative y direction. If it is rotated by 50.0 degrees counterclockwise, what are the components of the vector?

$$A_x = 25.0 \cos 50.0^\circ \text{ and } A_y = 25.0 \sin 50.0^\circ$$

$$A_x = 25.0 \cos 320^\circ \text{ and } A_y = 25.0 \sin 320^\circ$$

$$A_x = 25.0 \sin 320^\circ \text{ and } A_y = 25.0 \cos 320^\circ$$

$$A_x = 25.0 \sin 50.0^\circ \text{ and } A_y = 25.0 \cos 50.0^\circ$$

What is the magnitude of the vector $\vec{A} = 4.0 \hat{x} - 6.0 \hat{y}$?

2.0

6.0034

7.2

10

The volume of a rectangular block of width $w = 116.5$ cm, depth $d = 164.8$ cm, and height $h = 105.1$ cm is (given in scientific notation and with the correct number of significant figures):

$$2018 \times 10^6 \text{ cm}^3$$

$$202 \times 10^6 \text{ cm}^3$$

$$20178 \times 10^6 \text{ cm}^3$$

$$20 \times 10^6 \text{ cm}^3$$

$$201784 \times 10^6 \text{ cm}^3$$

The surface area of a window pane of length 20.5 cm and width 11.9 cm is (given in scientific notation and with the correct number of significant figures):

$$24395 \times 10^2 \text{ cm}^2$$

$$2440 \times 10^2 \text{ cm}^2$$

$$244 \times 10^2 \text{ cm}^2$$

$$24 \times 10^2 \text{ cm}^2$$

$$20 \times 10^2 \text{ cm}^2$$

Assume that the mass of any cell in the human body is 5×10^{-15} kg. If Alice has a mass of 50 kg how many cells are there in her body?

$$10^{17} \text{ cells}$$

$$10^{16} \text{ cells}$$

$$10^{15} \text{ cells}$$

$$10^{14} \text{ cells}$$

$$10^{13} \text{ cells}$$

A car's gasoline tank has the shape of a right rectangular box having a square base of side 62 cm. Its capacity is 56 liters. If there are 50 liters of gasoline in the tank, what is the distance between the top of the tank and the gasoline surface in the tank? Assume the car is parked on level ground.

14.6 cm

13.0 cm

22.5 cm

1.56 cm

33.5 cm

A car's gasoline tank has the shape of a right rectangular box having a square base of side 65 cm. Its capacity is 68 liters. If the distance between the top of the tank and the gasoline surface in the tank is 5.60 cm, what volume of gasoline is in the tank? Assume the car is parked on level ground.

30.6 liters

57.8 liters

62.1 liters

44.4 liters

23.0 liters

A car's gasoline tank has the shape of a right rectangular box and has a square base. Its capacity is 61.0 liters. If there are 45.0 liters of gasoline in the tank and the distance between the top of the tank and the gasoline surface in the tank is 4.30 cm, what is the length of one side of the tank's square base? Assume the car is parked on level ground.

119 cm

102 cm

3.72 cm

61.0 cm

14.2 cm

Three vectors are all in the same plane, they have equal magnitudes and make 120° angles with each other. We can say that

the magnitude of their resultant is one-third the magnitude of the component vectors.

the magnitude of their resultant is equal to the magnitude of the component vectors.

the magnitude of their resultant is more than three times the magnitude of each component vector.

the magnitude of their resultant is three times the magnitude of each component vector.

the magnitude of their resultant is zero.

The answer with the correct number of significant figures to the following calculation: $1.345 \times 6.72 + 4.51$ is

13.5484.

13.548.

13.55.

13.6.

14

The distance to the Sun is one hundred fifty billion meters, which in scientific notation can be written as

$150 \times 10^9 \text{ m}$

$150 \times 10^6 \text{ m.}$

$150 \times 10^{11} \text{ m}$

$15 \times 10^{10} \text{ m.}$

$$15 \times 10^{10} \text{ m}$$

The number of centimeters in 2.50 miles is

$$4.02 \times 10^5 \text{ cm}$$

$$1.56 \times 10^5 \text{ cm}$$

$$4.02 \times 10^3 \text{ cm}$$

$$8.95 \times 10^6 \text{ cm}$$

$$2.54 \times 10^4 \text{ cm}$$

The number of square meters in a square mile is

$$260 \text{ m}^2$$

$$260 \times 10^5 \text{ m}^2$$

$$161 \times 10^3 \text{ m}^2$$

$$260 \times 10^6 \text{ m}^2$$

$$161 \times 10^6 \text{ m}^2$$

The radius of the Earth is $6.38 \times 10^6 \text{ m}$. The Earth's radius in miles is

27000 miles.

10200 miles.

24900 miles.

7940 miles.

3970 miles.

What is the volume of a box that has dimensions $3.50 \text{ cm} \times 1.000 \text{ cm} \times 4.000 \text{ cm}$?

49.0 cm

14 cm³

14.0 cm³

14.00 cm³

If $A = 17.0079$, $B = 2.05$, and $C = 3.1415926$, then what is $A/B + C$?

11.

11.4

11.44

11.438

What is the magnitude and direction (with respect to the positive x-axis) of the vector $-3.7 \hat{x} + 2.76 \hat{y}$?

4.61 at 36.7°

4.6 at -37°

4.6 at 37°

4.6 at 143°

An American football receiver starts at the 20 yard-line, 15 yards to the right of the quarterback. He runs 10 yards forward and then turns to the right and runs 10 yards before catching the ball thrown by the quarterback. If the quarterback is standing on the 15 yard-line, how far must he throw the ball?

16 yards

29 yards

31 yards

40 yards

If you head at a compass heading of 15° for 25 m, then go on a heading of 280° for 18 m, how far are you from your starting point?

15 m

29 m

32 m

38 m

Given that the formula for Newtonian gravitation is $F = Gm_1m_2/r^2$, where F is the force, m_1 and m_2 are masses, and r is a unit of length. What are the units for the universal gravitational constant G?

$\text{kg}^3/(\text{m} \cdot \text{s}^2)$

$\text{m}^3/(\text{kg} \cdot \text{s}^2)$

$\text{kg} \cdot \text{m}/\text{s}^2$

kg^2/m^2

Given two vectors, $\vec{A} = 3\hat{x} + 4\hat{y}$ and $\vec{B} = -2\hat{x} + 3\hat{y}$

What is the magnitude of the vector $\vec{A} + 3\vec{B}$?

15.3

17.6

18.8

13.3

20.0

What are the polar coordinates of the vector $3\hat{x} - 2\hat{y}$?

(3.6; 33.7°)

$$(3.6; 146.3^\circ)$$

$$(4.2; 33.7^\circ)$$

$$(4.2; -33.7^\circ)$$

$$(3.6; -33.7^\circ)$$

Express the polar vector $(22; 124^\circ)$ in unit vector notation.

$$18.2\hat{x} - 12.3\hat{y}$$

$$-12.3\hat{x} + 18.2\hat{y}$$

$$12.3\hat{x} - 18.2\hat{y}$$

$$12.3\hat{x} + 18.2\hat{y}$$

$$-18.2\hat{x} + 12.3\hat{y}$$

What is the sum of the polar vectors $(13; 65^\circ)$ and $(21; 135^\circ)$?

$$(21.5; 23.3^\circ)$$

$$(28.2; 109.4^\circ)$$

$$(14.3; 43.2^\circ)$$

$$(25.4; -24.3^\circ)$$

$$(12.2; 124.2^\circ)$$

A spherical balloon has a radius of 20 cm. It starts losing air and its radius shrinks at a rate of 1 cm/s. What is the rate of change of the balloon's volume when its radius reaches 5 cm?

$$-3.14 \times 10^{-4} \text{ m}^3/\text{s}$$

$$-3.14 \text{ m}^3/\text{s}$$

$$-1 \times 10^{-4} \text{ m}^3/\text{s}$$

$$-5 \times 10^{-4} \text{ m}^3/\text{s}$$

$$-3.14 \times 10^{-2} \text{ m}^3/\text{s}$$

If vector $\vec{A} = 3.2\hat{x} + 4.5\hat{y}$ and vector $\vec{B} = 5.7\hat{x} - 1.9\hat{y}$, where $\hat{x}$ and $\hat{y}$ are the units vectors along the x and the y directions respectively, calculate the magnitude of vector $\vec{C} = 3\vec{A} - 2\vec{B}$.

10.3

17.4

-6.7

26

-12.3

A man walks 15 m due east, then makes a sharp left turn and walks 23 m due north and then climbs up a vertical ladder to the top of 6 m high structure. Calculate the total displacement of the man.

36 m

44 m

28 m

33 m

None are correct.

Consider vector $\vec{A} = 3.2\hat{x} + 4.5\hat{y}$ and vector $\vec{B} = 5.7\hat{x} - 1.9\hat{y}$. If $\vec{C} = 3\vec{A} - 2\vec{B}$, calculate the angle vector $\vec{C}$ makes with respect to the +x axis.

-84°

-96°

84°

96°

-6°

Square A has sides of 5.6 cm. Square B has sides of twice as long as does square A. What is area of square B?

$130 \times 10^{-2} \text{ m}^2$

$125 \times 10^{-2} \text{ m}^2$

$125 \times 10^{-2} \text{ m}^2$

$1 \times 10^{-2} \text{ m}^2$

$13 \times 10^{-2} \text{ m}^2$

A CD that is 0.75 mm thick has outer diameter of 128 mm and inner diameter of 15 mm. The volume of the CD is

1920 mm^3 .

5300 mm^3 .

9520 mm^3 .

38079 mm^3 .

Kobe Bryant of the LAL (LA Lakers) was 6'6" tall. His height in meters was

6.2 m .

3.5 m .

2.9 m .

1.98 m .

The fraction of a kilogram in a milligram is

10^{-6} .

$10^{-4}.$

$10^{-3}.$

$10^{-2}.$

The fraction of a cubic kilometer in a cubic millimeter is

$10^{-6}.$

$10^{-9}.$

$10^{-12}.$

$10^{-18}.$

The fraction of a square kilometer in a square millimeter is

$10^{-6}.$

$10^{-9}.$

$10^{-12}.$

$10^{-3}.$

The solution of $(375 \times 10^{-9}) - (621 \times 10^{-10})$ in scientific notation is

$192 \times 10^{-9}.$

$313 \times 10^{-9}.$

$483 \times 10^{-10}.$

$374 \times 10^{-9}.$

Given two vectors, $\vec{A} = 3\hat{x} + 4\hat{y}$ and $\vec{B} = -2\hat{x} + 3\hat{y}$

What is the magnitude of the vector $\vec{A} + 3\vec{B}$?

15.3

17.6

18.8

13.3

20.0

27500 people live in the Duchy of Grand Fenwick, which has a land area of a square 5.8 km on each side. How many people live there per square km?

820

817

810

809

The speed limit on your street is 35 mi/hr. What is this speed in m/s?

16 m/s

22 m/s

56 m/s

78 m/s

What is the ratio of the Earth's density to that of Venus? Their radii are 6378 km and 6051 km, and their masses 5.97×10^{24} kg and 4.87×10^{24} kg, respectively.

0.96

1.05

1.16

1.44

What is the sum of the lengths of all the edges of a cube whose volume is 397 m^3 ?

4.53 m

9.50 m

12.67 m

19.00 m

Vector $\vec{A}$ has length 15.2 m and is directed along the x-axis. Vector $\vec{B}$ has length 23.0 m and is directed along the y-axis. Vector $\vec{C} = \vec{B} - \vec{A}$ has length 6.3 m and is directed along the -y axis. What is the length of the vector $\vec{C}$?

18.4 m

22.4 m

24.7 m

28.3 m

33.0 m

The sides of a rectangle are measured to have lengths 0.234 cm and 12.78 cm. Find the area of the rectangle using the correct number of significant figures.

299052 cm^2

29905 cm^2

2991 cm^2

2990 cm^2

299 cm^2

A bicycle tire is inflated to a pressure of 93 psi. What is a pressure of 93 psi in the SI unit pascals (Pa)?

$$64 \times 10^1 \text{ Pa}$$

$$16 \times 10^2 \text{ Pa}$$

$$16 \times 10^4 \text{ Pa}$$

$$32 \times 10^4 \text{ Pa}$$

$$64 \times 10^5 \text{ Pa}$$

A cube with a volume of V consists of 6 faces each with an area of A . If the area of each face is increased by a factor of 64, by what factor does the volume increase?

8

64

384

512

4096

A string with a length of 13.1 m is tightly tied between two trees. The second tree is some distance east and north of the first tree. If the second tree is 9.8 m east of the first tree, how far north of the first tree is the second tree?

3.3 m

6.6 m

8.7 m

11.5 m

22.9 m

Consider the vectors $\vec{A} = (A_x, A_y) = (+7.07 \text{ m}, +7.07 \text{ m})$ and $\vec{B} = (B_x, B_y) = (+5.00 \text{ m}, +8.66 \text{ m})$. What is the angle between these two vectors?

15°

30°

45°

60°

75°

The width of the nail of your thumb is approximately equal to which of the following units:

1 μm .

1 mm.

1 cm.

1 m.

1 km.

A driver from Canada enters the U.S. The posted speed limit is 45 mph. What is this posted speed limit in km/h?

31

45

53

67

72

A gardener wants to build a circular fence around his vegetable garden. If he has 100 feet (1 ft = 0.3048 m) of wire, what is the maximum area covered?

0.0000739 km²

0.002342 km²

23.4 km²

75.2 km²

8199 km²

A right cylinder has a cross-sectional area of 25.0 cm² and a height of 50.0 cm. What is the volume of the cylinder in SI units?

0.000125 m³

0.00125 m³

0.0125 m³

0.125 m³

1250 m³

Vector $\vec{A}$ has a length of 5 and an angle of 30° with respect to the positive x-axis. Vector $\vec{B}$ has a length of 5 and an angle of 150° with respect to the positive x-axis. What is the angle with respect to the positive x-axis for the vector $\vec{C} = \vec{A} - \vec{B}$?

0°

30°

90°

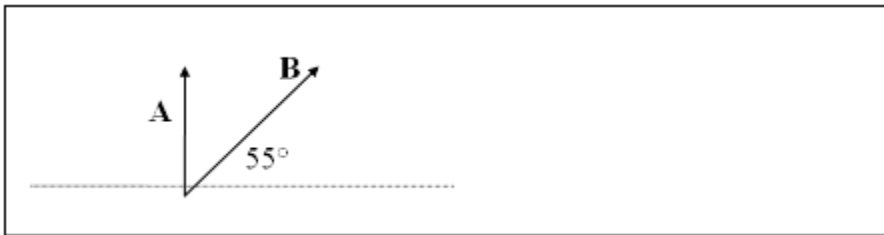
135°

180°

Vector $\vec{A}$ has a length of 5 and an angle of 30° with respect to the positive x-axis. Vector $\vec{B}$ has a length of 5 and an angle of 150° with respect to the positive x-axis. What is the angle with respect to the positive x-axis for the vector $\vec{C} = \vec{B} - \vec{A}$?

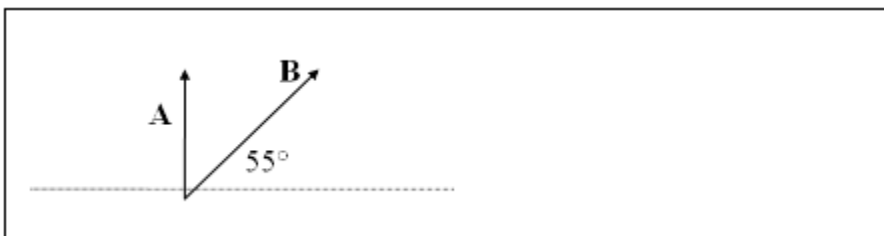
- 0°
- 30°
- 90°
- 135°
- 180°

Vector $\vec{A}$ points along the y-axis with length 5.0, vector $\vec{B}$ makes an angle of 55° with respect to the x-axis and has a length of 7.0. What is the length of vector $\vec{A} - \vec{B}$?



- 4.1
- 12.
- 2.0
- 35.
- 9.9

Vector $\vec{A}$ points along the y-axis with length 5.0, vector $\vec{B}$ makes an angle of 55° with respect to the x-axis and has a length of 7.0. What is the length of vector $\vec{A} + \vec{B}$?



- 11.
- 12.

15.

8.6

9.3

Answer Key

Test name: CH1 University Physics with Modern Physics E3

D

B

D

B

D

C

C

C

A

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C

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