

Section: 1-1 Topic: Units Type: Factual

Which of the following is a fundamental unit of the SI system of units?

A) kilometer B) joule C) kilogram D) gram E) newton

Ans: C

Section: 1-1 Topic: Units Type: Factual

The SI unit for mass is

A) μg B) mg C) g D) kg E) lb

Ans: D

Section: 1-1 Topic: Units Type: Factual

The prefix “giga” means

A) 10^{12} B) 10^6 C) 10^3 D) 10^9 E) 10^{15}

Ans: D

Section: 1-1 Topic: Units Type: Factual

Which of the following is NOT one of the fundamental physical quantities in the SI system?

A) mass

B) length

C) force

D) time

E) All of these are fundamental physical quantities in the SI system.

Ans: C

Section: 1-1 Topic: Units Type: Factual

The prefix “mega” means

A) 10^2 B) 10^9 C) 10^{-3} D) 10^6 E) 10^{-6}

Ans: D

Section: 1-1 Topic: Units Type: Factual

The prefix “pico” means

A) 10^{-12} B) 10^{-6} C) 10^{-3} D) 10^6 E) 10^9

Ans: A

Section: 1-1 Topic: Units Type: Factual

The prefix “micro” means

A) 10^{-12} B) 10^{-6} C) 10^{-3} D) 10^{-2} E) 10^{-1}

Ans: B

Section: 1-1 Topic: Units Type: Factual

The prefix “milli” means

A) 10^{-12} B) 10^{-6} C) 10^{-3} D) 10^{-2} E) 10^{-1}

Ans: C

Section: 1-1 Topic: Units Type: Factual

The prefix “centi” means

- A) 10^{-12} B) 10^{-6} C) 10^{-3} D) 10^{-2} E) 10^{-1}

Ans: D

Section: 1-1 Topic: Units Type: Factual

The prefix “kilo” means

- A) 10^{12} B) 10^8 C) 10^6 D) 10^3 E) 10^1

Ans: D

Section: 1-1 Topic: Units Type: Factual

The prefix “nano” means

- A) 10^{-12} B) 10^{-6} C) 10^{-3} D) 10^{-2} E) None of these is correct.

Ans: E

Section: 1-1 Topic: Units Type: Factual

Which of the following prefixes does NOT represent a fractional part of a whole unit?

- A) nano B) micro C) kilo D) milli E) deci

Ans: C

Section: 1-1 Topic: Units Type: Factual

Which of the following prefixes does NOT represent a quantity larger than a single unit?

- A) kilo B) mega C) giga D) tera E) femto

Ans: E

Section: 1-1 Topic: Units Type: Factual

Which of the following is NOT one of the fundamental units in the SI system?

- A) Newton
B) meter
C) kilogram
D) second
E) All of the above are fundamental units in the SI system.

Ans: A

Section: 1-1 Topic: Units Type: Factual

The fundamental physical quantities are

- A) mass, length, time, temperature, amount of a substance, current, and luminous intensity.
B) weight, length, time, temperature, amount of a substance, current, and luminous intensity.
C) mass, length, time, temperature, force, current, and luminous intensity.
D) mass, length, time, force, momentum, amount of a substance, and current.
E) weight, length, time, temperature, amount of a substance, potential energy, and luminous intensity.

Ans: A

Section: 1–2 Topic: Conversion of Units Type: Numerical

The density of seawater was measured to be 1.07 g/cm^3 . This density in SI units is

- A) $1.07 \times 10^{-3} \text{ kg/m}^3$
- B) $(1/1.07) \times 10^3 \text{ kg/m}^3$
- C) $1.07 \times 10^3 \text{ kg}$
- D) $1.07 \times 10^{-3} \text{ kg}$
- E) $1.07 \times 10^3 \text{ kg/m}^3$

Ans: E

Section: 1–2 Topic: Conversion of Units Type: Numerical

To convert a quantity from km/h to m/s, you must

- A) multiply by 1000 and divide by 60.
- B) multiply by 1000 and divide by 3600.
- C) multiply by 60 and divide by 1000.
- D) multiply by 3600 and divide by 1000.
- E) None of these is correct.

Ans: B

Section: 1–2 Topic: Conversion of Units Type: Numerical

To convert a quantity from m/s to km/h, you must

- A) multiply by 1000 and divide by 60.
- B) multiply by 1000 and divide by 3600.
- C) multiply by 60 and divide by 1000.
- D) multiply by 3600 and divide by 1000.
- E) None of these is correct.

Ans: D

Section: 1–2 Topic: Conversion of Units Type: Numerical

To convert a quantity from km/(hr · s) to m/s^2 , you must

- A) multiply by 1000 and divide by 60.
- B) multiply by 60 and divide by 3600.
- C) multiply by 60 and divide by 1000.
- D) multiply by 3600 and divide by 1000.
- E) None of these is correct.

Ans: E

Section: 1–2 Topic: Conversion of Units Type: Numerical

To convert a quantity from g/cm^3 to kg/m^3 , you must

- A) multiply by 0.01.
- B) multiply by 100.
- C) multiply by 1000.
- D) multiply by 0.001.
- E) multiply by 1,000,000.

Ans: C

Section: 1–2 Topic: Conversion of Units Type: Numerical

In doing a calculation, you arrive at an expression in which the numerator is in kilometers and the denominator is in meters per second. When the calculation is completed, the result will be in units of

- A) meters, if you divide by 1000.
- B) meters, if you multiply by 1000.
- C) seconds, if you divide by 1000.
- D) seconds, if you multiply by 1000.
- E) meters squared per second, if you multiply by 1000.

Ans: D

Section: 1–2 Topic: Conversion of Units Type: Numerical

You are traveling at a speed of 80 km/hr. Your speed in mph is approximately

- A) 30 B) 40 C) 50 D) 60 E) 70

Ans: C

Section: 1–2 Topic: Conversion of Units Type: Conceptual

In doing a calculation, you end up with a fraction having m/s in the numerator and m/s² in the denominator. The result will have units of

- A) m²/s³ B) s⁻¹ C) s³/m² D) s E) m/s

Ans: D

Section: 1–2 Status: New to 5th edition Topic: Conversion of Units

Type: Numerical

The density of an object equals its mass divided by its volume. The mass of Earth is 6×10^{24} kg and its radius is 4×10^3 miles. The mass of the Sun is 2×10^{33} g and its radius is 7×10^5 km. Calculate the Earth's density divided by that of the Sun.

- A) 4×10^{-1} B) 4×10^2 C) 4×10^0 D) 4×10^1 E) none of the above

Ans: C

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

The dimensions of mass density are

- A) MLT^{-1} B) ML^3 C) ML^2 D) ML^{-1} E) None of these is correct.

Ans: E

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

The dimensions of two quantities MUST be identical if you are either _____ or _____ the quantities.

- A) adding; multiplying D) adding; subtracting
B) subtracting; dividing E) All of these are correct.
C) multiplying; dividing

Ans: D

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

In the expression $F_{\text{net}} = ma$, m must have the dimensions

- A) ML/T^2 B) M C) L/T^2 D) L/T E) ML^2/T^2

Ans: B

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If K has dimensions ML^2/T^2 , the k in $K = kmv^2$ must

- A) have the dimensions ML/T^2 . D) have the dimensions L^2/T^2 .
B) have the dimensions M . E) be dimensionless.
C) have the dimensions L/T^2 .

Ans: E

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If x and t represent distance and time, respectively, the C in $x = \frac{1}{2}Ct^2$ must

- A) have the dimensions ML/T^2 .
- B) have the dimensions M .
- C) have the dimensions L/T^2 .
- D) have the dimensions L^2/T^2 .
- E) be dimensionless.

Ans: C

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If v and t represent velocity and time, respectively, C_1 in $v = C_1e^{-C_2t}$ must

- A) have the dimensions L/T .
- B) have the dimensions L^2/T .
- C) have the dimensions L/T^2 .
- D) have the dimensions L^2/T^2 .
- E) be dimensionless.

Ans: A

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If v and t represent velocity and time, respectively, C_2 in $v = C_1e^{-C_2t}$ must

- A) have the dimensions L/T .
- B) have the dimensions $1/T$.
- C) have the dimensions L/T^2 .
- D) have the dimensions L^2/T^2 .
- E) be dimensionless.

Ans: B

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If x and t represent position and time, respectively, the A in $x = A \cos Bt$ must

- A) have the dimensions L/T .
- B) have the dimensions $1/T$.
- C) have the dimensions L .
- D) have the dimensions L^2/T^2 .
- E) be dimensionless.

Ans: C

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

If x and t represent position and time, respectively, the B in $x = A \cos Bt$ must

- A) have the dimensions L/T .
- B) have the dimensions $1/T$.
- C) have the dimensions L .
- D) have the dimensions L^2/T^2 .
- E) be dimensionless.

Ans: B

Section: 1–3 Topic: Dimensions of Physical Quantities Type: Conceptual

In Newton's Law of Gravity the universal gravitational constant $G = Fr^2/m_1m_2$, where F is the gravitational force between the two masses, m_1 and m_2 , and r is the distance between them. What are the dimensions of G ?

- A) $L^2M^{-1}T^2$
- B) $L^3M^{-1}T^{-2}$
- C) $L^2M^{-2}T^{-2}$
- D) $L^3M^{-1}T^2$
- E) $L^{-3}M^1T^3$

Ans: B

Section: 1–3 Status: New to 6th edition Topic: Dimensions of Physical Quantities
Type: Conceptual

The dimensions of energy, E , are ML^2/T^2 . Using dimensional analysis, E is the product of which two quantities?

- A) Mass divided by time squared D) force times distance
B) Force times acceleration E) force divided by time squared
C) Mass times acceleration

Ans: D

Section: 1–4 Topic: Scientific Notation Type: Numerical
Evaluate:

$$(4.0 \times 10^{-6})(3.0 \times 10^4)$$

- A) 12×10^{10} B) 1.2×10^{-10} C) 12×10^{-5} D) 1.2×10^{-1} E) 12×10^{-10}

Ans: D

Section: 1–4 Topic: Scientific Notation Type: Numerical
Evaluate:

$$\frac{(2\pi \times 10^3)(3.0 \times 10^7)}{(4.2 \times 10^5)^2}$$

- A) 1.1×10^5 B) 1.7×10^{-4} C) 3.6×10^{-8} D) 4.5×10^5 E) 1.1

Ans: E

Section: 1–4 Topic: Scientific Notation Type: Numerical
Compute:

$$\frac{(3 \times 10^8)(8 \times 10^4)}{(6 \times 10^5)}$$

- A) 1×10^{17} D) 4×10^7
B) 6×10^7 E) None of these is correct.
C) 8×10^{17}

Ans: D

Section: 1–4 Topic: Scientific Notation Type: Numerical
Compute:

$$\frac{(6.2 \times 10^{-4}) + (4.0 \times 10^{-5})}{(2.0 \times 10^{-3})}$$

- A) 3.3×10^{-6} D) 3.3×10^{-1}
B) 5.1×10^6 E) None of these is correct.
C) 5.1×10^{-12}

Ans: D

Section: 1–4 Topic: Scientific Notation Type: Numerical

When we look up in the sky the Sun appears about as big as the moon; however, we know that the Sun is much further away. Given that the radius of the Sun is about 7×10^8 m and that the radius of the moon is about 2×10^6 m, calculate approximately the number of times the moon could fit inside the Sun.

A) 4×10^2 B) 4×10^6 C) 4×10^7 D) 1×10^5 E) 2×10^5

Ans: C

Section: 1–4 Topic: Scientific Notation Type: Numerical

Compute:

$(12 \times 10^6 - 2 \times 10^7) / (-12 \times 10^7 + 7 \times 10^6)$

A) 7.1×10^{-2} B) 7.0×10^6 C) 2.0×10^{-8} D) -7.1×10^{-2} E) 2×10^5

Ans: A

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Conceptual

The measurement 5.130×10^{-4} has _____ significant figures.

A) two B) three C) one D) seven E) four

Ans: E

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Conceptual

The measurement 23.0040 has _____ significant figures.

A) six B) three C) five D) four E) two

Ans: A

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

The number of seconds in a month is of the order of

A) 10^3 B) 10^8 C) 10^5 D) 10^{10} E) 10^6

Ans: E

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Factual

Earth's population, expressed as an order of magnitude, is closest to

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

Ans: B

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

The chemical agent dioxin can be toxic or hazardous to humans in concentrations as small as one part per billion. If I am testing a soil sample that has a mass of 1.0 kg, how much dioxin would have to be present for me to label it toxic or hazardous?

A) a picogram

D) a milligram

B) a kilogram

E) a nanogram

C) a microgram

Ans: C

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

An impurity in a manufacturing process will cause a batch to be rejected if the impurity exceeds one part per million. What is the maximum amount of impurity that could be present if the batch contains 100 kg of the product?

- A) 100 micrograms
B) 100 nanograms
C) 100 grams
D) 100 megagrams
E) 100 milligrams

Ans: E

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Factual

What is the order of magnitude of Earth's tallest mountain heights?

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

Ans: B

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

The longest bridge on Earth is of the order of

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

Ans: B

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Factual

A person inhales about 1 L of air per breathe. Estimate the number of air molecules inhaled.

- A) 10^{10} B) 10^{14} C) 10^{18} D) 10^{22} E) 10^{26}

Ans: D

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

Estimate the number of raindrops needed to fill a volume of $1\text{m} \times 1\text{m} \times 1\text{cm}$.

- A) 10^3 B) 10^5 C) 10^7 D) 10^9 E) 10^{11}

Ans: C

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

Light travels at 3×10^8 m/s, and it takes about 8 min for light from the sun to travel to Earth. Based on this, the order of magnitude of the distance from the sun to Earth is

- A) 10^{10} m B) 10^8 m C) 10^9 m D) 10^6 m E) 10^{11} m

Ans: E

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

The momentum of a body is defined to be the product of its mass and its velocity. If the mass of an air-track glider is known to be 225 g and its velocity is measured to be 3.1 cm/s, its momentum should be reported as

- A) $697.5 \text{ g} \cdot \text{cm/s}$
 B) $698 \text{ g} \cdot \text{cm/s}$
 C) $7.0 \times 10^2 \text{ g} \cdot \text{cm/s}$
 D) $6.98 \times 10^2 \text{ g} \cdot \text{cm/s}$
 E) $6.975 \times 10^2 \text{ g} \cdot \text{cm/s}$

Ans: C

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Numerical

The net force acting on a body is defined to be the product of the mass of the body and its resultant acceleration. If the mass of a body is known to be 184 kg and its acceleration is measured to be 2.4 m/s^2 , the resultant force should be reported as

- A) $4.4 \times 10^2 \text{ kg} \cdot \text{m/s}^2$ D) $4.416 \text{ kg} \cdot \text{m/s}^2$
 B) $441.6 \text{ kg} \cdot \text{m/s}^2$ E) $4.42 \times 10^2 \text{ kg} \cdot \text{m/s}^2$
 C) $442 \text{ kg} \cdot \text{m/s}^2$

Ans: A

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Factual

Which of the following represents a value of current measured to at least five significant figures?

- A) $2.375 \times 10^4 \text{ A}$ D) $23.75 \times 10^1 \text{ A}$
 B) 0.00347 A E) 50.300 A
 C) $3.0 \times 10^5 \text{ A}$

Ans: E

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Conceptual

The size of a proton is of the order of 10^{-15} m and the size of the visible universe is of the order of 10^{26} m . From this information you can conclude that

- A) the size of the universe is 26 orders of magnitude greater than that of the proton.
 B) the size of the universe is 41 orders of magnitude greater than that of the proton.
 C) the size of the proton is 11 orders of magnitude greater than that of the universe.
 D) the size of the universe is 15 orders of magnitude greater than that of the proton.
 E) the size of the proton is 15 orders of magnitude greater than that of the universe.

Ans: B

Section: 1–5 Topic: Significant Figures & Order of Magnitude Type: Conceptual

The mass of an electron is of the order of 10^{-30} kg and the mass of the universe is believed to be of the order of 10^{52} kg . From this information you can conclude that

- A) the mass of Earth is 52 orders of magnitude greater than that of the electron.
 B) the mass of Earth is 30 orders of magnitude greater than that of the electron.
 C) the mass of the electron is 82 orders of magnitude greater than that of Earth.
 D) the mass of Earth is 82 orders of magnitude greater than that of the electron.
 E) the mass of the electron is 30 orders of magnitude greater than that of Earth.

Ans: D

Section: 1–5 Status: New to 5th edition Topic: Significant Figures & Order of Magnitude Type: Numerical

Light travels at $3 \times 10^8 \text{ m/s}$, and the size of a proton is about 1 fm. Calculate the order of magnitude for the time taken for light to pass across a proton.

- A) 10^{-7} s B) 10^{-8} s C) 10^{-22} s D) 10^{-23} s E) 10^{23} s

Ans: C

Section: 1–5 Status: New to 5th edition Topic: Significant Figures & Order of Magnitude Type: Numerical

If Earth is approximately 4.5 billion years old, estimate the order of magnitude for the number of times it has rotated about its own axis. (Assume a constant rate of rotation.)

- A) 10^9 B) 10^{10} C) 10^{11} D) 10^{12} E) 10^{14}

Ans: D

Section: 1–5 Status: New to 5th edition Topic: Significant Figures & Order of Magnitude Type: Numerical

If you have a music CD collection of about 150 discs, estimate the order of magnitude of the number of heartbeats you would have if you listened all the way through your collection.

- A) 10^6 B) 10^8 C) 10^{10} D) 10^4 E) 10^3

Ans: A

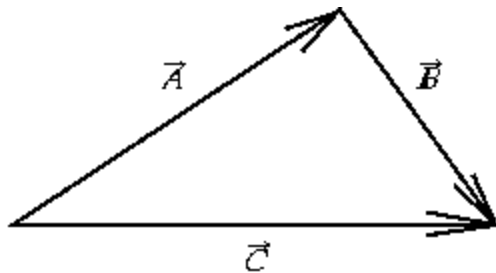
Section: 1–5 Status: New to 5th edition Topic: Significant Figures & Order of Magnitude Type: Numerical

A diehard music lover still prefers to listen to his vinyl records, which rotate at $33\frac{1}{3}$ revolutions per minute. If he listens for an average of three hours per day, estimate the order of magnitude for the number of revolutions his turntable makes in a year.

- A) 10^7 B) 10^2 C) 10^6 D) 10^5 E) 10^4

Ans: C

Section: 1–7 Topic: General Properties of Vectors Type: Conceptual

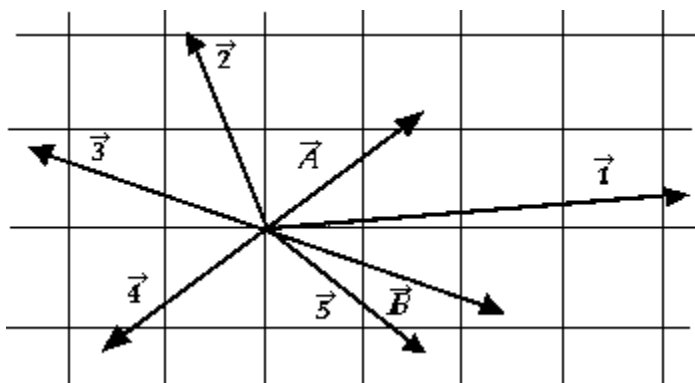


The vector equation that describes the relationship among vectors A , B , and C is

- A) $B = C + A$ D) $A = B - C$
 B) $B = C - A$ E) $A = B + C$
 C) $C = A - B$

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

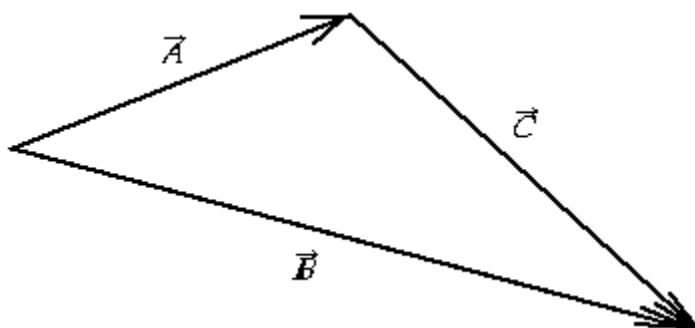


The vector in the figure that could represent the vector $A - B$ is

- A) 1 B) 2 C) 3 D) 4 E) 5

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

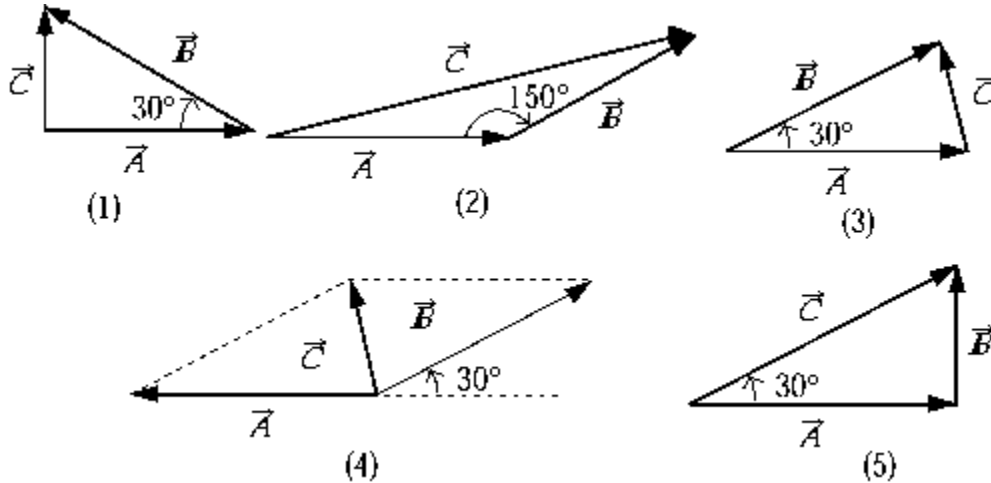


Which of the following vector equations correctly describes the relationship among the vectors shown in the figure?

- A) $A + B - C = 0$ D) $A + B + C = 0$
 B) $A - B + C = 0$ E) None of these equations is correct.
 C) $A - B - C = 0$

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual



The angle between vectors A and B is 30° , and their sum is C . Which vector diagram correctly describes the vectors A , B , and C ?

- A) 1 B) 2 C) 3 D) 4 E) 5

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

Two vector quantities, whose directions can be altered at will, can have a resultant of any magnitude between the limits 0 and 200. The magnitude of each vector quantity must therefore be

- A) between 0 and 80. D) exactly 100.
B) between 120 and 200. E) more than 100.
C) less than 100.

Ans: D

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

Two vector quantities, whose directions can be altered at will, can have a resultant between the limits 5 and 15. The magnitudes of these two vector quantities could be

- A) 2 and 2 B) 5 and 10 C) 20 and 40 D) 20 and 50 E) 59 and 97

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

The components of a vector are $A_x = -10$ units and $A_y = 6$ units. What angle does this vector make with the positive x axis?

- A) 31° B) -31° C) $180^\circ - 31^\circ$ D) $180^\circ + 31^\circ$ E) $90^\circ - 31^\circ$

Ans: C

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

What is the least number of non-zero vectors that can be added to give a resultant equal to zero?

- A) 2 B) 3 C) 4 D) 5 E) It cannot be done.

Ans: A

Section: 1–7 Topic: General Properties of Vectors Type: Numerical
Three vectors A , B , and C have the following x and y components:

	A	B	C
x component	+6	–3	+2
y component	–3	+4	+5

The magnitude of the resultant of A , B , and C is

A) 3.3 B) 5.0 C) 11 D) 7.8 E) 14

Ans: D

Section: 1–7 Topic: General Properties of Vectors Type: Numerical
Three vectors A , B , and C have the following x and y components:

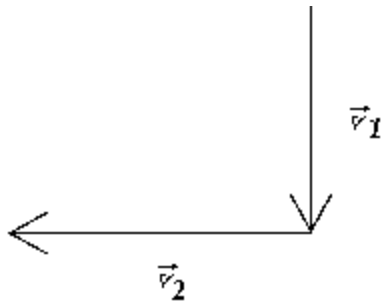
	A	B	C
x component	+6	–3	+2
y component	–3	+4	+5

The angle that the resultant makes with the positive direction of the x axis is

A) 1.2° B) 36° C) 50° D) 40° E) 70°

Ans: C

Section: 1–7 Topic: General Properties of Vectors Type: Numerical



A car proceeding due south at 60 km/h (v_1) makes a right turn, after which it is traveling due west at 80 km/h (v_2). What is its change in velocity ($v_2 - v_1$)?

- A) 100 km/h 37° north of west D) 20 km/h 37° north of west
B) 100 km/h 37° south of west E) 20 km/h 37° south of west
C) 20 km/h west

Ans: A

Section: 1-7 Topic: General Properties of Vectors Type: Numerical

Two vectors A and B are added to give a resultant R . The components of A are $A_x = -8.0$ units and $A_y = 6.0$ units and the components of B are $B_x = 1.0$ units and $B_y = -1.0$ units. The magnitude of vector R is

- A) -1.0 units B) $+8.6$ units C) $+19$ units D) $+2.0$ units E) -3.2 units

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Numerical

Vector A has components $A_x = +4.0$ units and $A_y = +3.2$ units, whereas vector B has components $B_x = +2.5$ units and $B_y = +5.5$ units. The angle between the two vectors is

- A) 24° B) 65° C) 27° D) 39° E) 14°

Ans: C

Section: 1-7 Topic: General Properties of Vectors Type: Numerical

Vectors A , B , and C have the following components, expressed in arbitrary units:

	A	B	C
x component	$+4.60$	-3.10	$+5.30$
y component	-3.10	$+2.30$	-2.50

Vector D is defined so that

$$A + B + C + D = 0$$

The magnitude and direction of D relative to the positive x axis are

- A) 7.6 units at -26° D) 3.5 units at 29°
 B) 7.6 units at 154° E) 10 units at 29°
 C) 14 units at 26°

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Numerical

Vectors A and B have the following components:

$$\begin{array}{ll} A_x = 5 \text{ units} & A_y = 2 \text{ units} \\ B_x = 3 \text{ units} & B_y = 4 \text{ units} \end{array}$$

The angle between the positive x axis and the vector $A - B$ is

- A) -45° B) 194° C) 37° D) -54° E) 86°

Ans: A

Section: 3–2 Topic: General Properties of Vectors Type: Numerical
 Vectors A and B have the following components:

	A	B
x component	+5 units	–3 units
y component	–2 units	–4 units

The magnitude of the vector $A - B$ is

A) 6.3 units B) 10.0 units C) 2.8 units D) 8.2 units E) 16 units

Ans: D

Section: 1–7 Topic: General Properties of Vectors Type: Numerical
 The components of four vectors are as follows:

	A	B	C	D
x component	+2.5 units	+6.1 units	–3.6 units	–1.5 units
y component	+4.3 units	–2.1 units	+1.0 units	–7.3 units

The angle that the resultant vector makes with the positive x axis is

A) -40° B) 59° C) -49.5° D) 37° E) -23°

Ans: C

Section: 1–7 Topic: General Properties of Vectors Type: Numerical
 Vectors A , B , C , and D have the following components:

	A	B	C	D
x component	+2.5 units	+6.1 units	–3.6 units	–1.5 units
y component	+4.3 units	–2.1 units	+1.0 units	–7.3 units

The magnitude of the resultant is

A) –4.6 units B) 5.4 units C) 29 units D) 3.5 units E) 7.3 units

Ans: B

Section: 1–7 Topic: General Properties of Vectors Type: Numerical

The length of the vector $A = 3\hat{i} - 4\hat{j} + 5\hat{k}$ is approximately

A) 5.00 units B) 6.40 units C) 5.83 units D) 7.07 units E) 50.0 units

Ans: D

Section: 1–7 Topic: General Properties of Vectors Type: Numerical

What angle does the vector $A = 3\hat{i} - 4\hat{j} + 5\hat{k}$ make with the positive z axis?

A) 55.5° B) 45.0° C) 64.9° D) 34.5° E) 25.1°

Ans: B

Section: 1-7 Topic: General Properties of Vectors Type: Numerical

The length of the vector $A = 5\hat{i} + 12\hat{j}$ is

- A) 169 units
- B) 144 units
- C) 25 units
- D) 17 units
- E) None of these is correct.

Ans: E

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual

Given vector A , the vector $3A$

- A) has a magnitude 3 times that of A .
- B) points in the same direction as A .
- C) has components each of which is 3 times those of A .
- D) makes the same angle with a given axis as does A .
- E) is described by all of these.

Ans: E

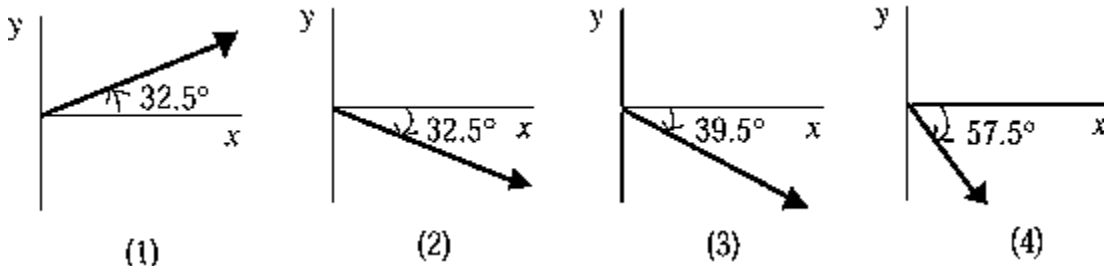
Section: 1-7 Topic: General Properties of Vectors Type: Numerical

What angle does the vector $A = 5\hat{i} - 12\hat{j}$ make with the positive x axis?

- A) 67.4°
- B) 22.6°
- C) 36.9°
- D) 53.1°
- E) 24.6°

Ans: A

Section: 1-7 Topic: General Properties of Vectors Type: Conceptual



A velocity vector has an x component of $+5.5$ m/s and a y component of -3.5 m/s. The diagram that gives the direction of the vector is

- A) 1
- B) 2
- C) 3
- D) 4
- E) None of these is correct.

Ans: B

Section: 1-7 Status: New to 6th edition Topic: General Properties of Vectors

Type: Conceptual

A vector of magnitude 5 points in the $+y$ direction. Another vector of magnitude 4 is added to the first vector. The largest possible magnitude of the sum is

- A) 1
- B) 4
- C) 5
- D) 9
- E) 10

Ans: D

Section: 1–7 Status: New to 6th edition Topic: General Properties of Vectors
Type: Conceptual

A vector of magnitude 5 points in the +y direction. Another vector of magnitude 4 is subtracted from the first vector. The smallest possible magnitude of the sum is

- A) 1 B) 4 C) 5 D) 9 E) 10

Ans: A

Section: 1–7 Status: New to 6th edition Topic: General Properties of Vectors
Type: Conceptual

Three vectors A , B and C are added together. Which statement below best describes the additive property of the three vectors?

- A) $(A + B) + C$ D) $C + A + B$
B) $A + (B + C)$ E) all the other statements
C) $C + B + A$

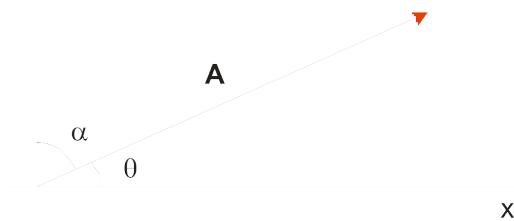
Ans: E

Section: 1–7 Topic: General Properties of Vectors Type: Conceptual
The components of a vector

- A) are not unique.
B) depend on the axes chosen.
C) can have one of the components equal to zero.
D) can be negative.
E) All of the above.

Ans: E

Section: 1–7 Topic: General Properties of Vectors Type: Conceptual
A vector A is shown below. The x and y components of the vector are, respectively,
y



- A) $(A \sin \alpha, A \cos \alpha)$ or $(A \sin \theta, A \cos \theta)$
B) $(A \sin \alpha, A \cos \alpha)$ or $(A \cos \theta, A \sin \theta)$
C) $(A \sin \alpha, A \sin \alpha)$ or $(A \sin \theta, A \cos \theta)$
D) $(A \cos \alpha, A \cos \alpha)$ or $(A \sin \theta, A \cos \theta)$
E) $(A \cos \alpha, A \cos \alpha)$ or $(A \cos \theta, A \cos \theta)$

Ans: B

Section: 1–7 Topic: General Properties of Vectors Type: Conceptual

If the resultant vector of the sum of three vectors is zero, the three vectors must have the following property.

- A) The sum of each component of the three vectors is zero.
- B) The sum of any two vectors is the negative of the third vector.
- C) All three vectors lie in the same plane.
- D) The magnitude of the sum of any two vectors is equal to the magnitude of the third vector.
- E) All the above are correct.

Ans: E

Section: 1–7 Topic: General Properties of Vectors Type: Conceptual

Which of the following is NOT a vector?

- A) velocity
- B) acceleration
- C) displacement
- D) mass
- E) force

Ans: D