

(S) atomic clock
1. The SI standard of time is based on:

- A. the daily rotation of the earth
- B. the frequency of light emitted by Kr86
- C. the yearly revolution of the earth about the sun
- D. a precision pendulum clock
- E. none of these

Ans: E

10^{-9}
1. A nanosecond is:

- A. 109s
- B. 10^{-9} s
- C. 10^{-10} s
- D. 10^{-10} s
- E. 10^{-12}

Ans: B

$$\begin{aligned} 1 \text{ ms} &= 10^{-3} \text{ s} \\ 1 \mu\text{s} &= 10^{-6} \text{ s} \\ 1 \text{ ns} &= 10^{-9} \text{ s} \\ 1 \text{ ps} &= 10^{-12} \text{ s} \end{aligned}$$



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1. The SI standard of length is based on:

- A. the distance from the north pole to the equator along a meridian passing through Paris
- B. wavelength of light emitted by Hg198
- C. wavelength of light emitted by Kr86
- D. a precision meter stick in Paris
- E. the speed of light

Ans: E

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In 1866, the U. S. Congress defined the U. S. yard as exactly $3600/3937$ international meter. This was done primarily because:

- A. length can be measured more accurately in meters than in yards
- B. the meter is more stable than the yard
- C. this definition relates the common U. S. length units to a more widely used system
- D. there are more wavelengths in a yard than in a meter
- E. the members of this Congress were exceptionally intelligent

Ans: C

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Which of the following is closest to a yard in length?

- A. 0.01 m
- B. 0.1m
- C. 1m
- D. 100m
- E. 1000 m

Ans: C

$$1 \text{ yd} = 0.91 \text{ m}$$

shift 8 05

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There is no SI base unit for area because:

- A. an area has no thickness; hence no physical standard can be built
- B. we live in a three (not a two) dimensional world
- C. it is impossible to express square feet in terms of meters
- D. area can be expressed in terms of square meters ^{m²}
- E. area is not an important physical quantity

Ans: D

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The SI base unit for mass is: ^{kg}

- A. gram
- B. pound
- C. kilogram
- D. ounce
- E. kilopound

Ans: C

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A gram is:

- A. 10^{-6} kg
- B. 10^{-3} kg
- C. 1 kg
- ~~D. 10^3 kg~~
- ~~E. 10^6 kg~~

Ans: B

$$\frac{1 \text{ kg}}{10^3} = \frac{10^3 \text{ g}}{10^6}$$
$$1 \text{ Mg} = 10^6 \text{ g}$$

$$1 \text{ Gg} = 10^9 \text{ g}$$

$$1 \text{ g} = 10^{-3} \text{ kg}$$

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A gram is:

$1g = 10^{-3}kg$ $1kg = 10^3g$

A. $10^{-6}kg$
 B. $10^{-3}kg$
 C. $1kg$
 D. 10^3kg
 E. 10^6kg

Ans: B

$1g = 0.001kg$
 $1kg = 1000g$
 $1g = \frac{kg}{1000}$

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$(5.0 \times 10^4) \times (3.0 \times 10^{-6}) =$

A. 1.5×10^{-3}
 B. 1.5×10^{-1}
 C. 1.5×10^1
 D. 1.5×10^3
 E. 1.5×10^5

Ans: B

$-2 + 1 = -1$
 15×10^{-2}
 1.5×10^{-1}
 0.15

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$0.5 \times 10^6 + 3 \times 10^6 = 3.5 \times 10^6$
 $5.0 \times 10^5 + 3.0 \times 10^6 =$

A. 8.0×10^5
 B. 8.0×10^5
 C. 5.3×10^5
 D. 3.5×10^5
 E. 3.5×10^6

Ans: E

$0.5 \times 10^6 + 3.0 \times 10^6 = 3.5 \times 10^6$

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$(7.0 \times 10^6) / (2.0 \times 10^{-6}) =$

A. 3.5×10^{-12}
 B. 3.5×10^{-6}
 C. 3.5
 D. 3.5×10^6
 E. 3.5×10^{12}

Ans: E

$7 \times 10^6 / 2 \times 10^{-6} = 3.5 \times 10^{12}$

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The number of significant figures in 0.00150 is:

A. 2

B. 3

C. 4

D. 5

E. 6

Ans: B

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The number of significant figures in 15.0 is:

A. 1

B. 2

C. 3

D. 4

E. 5

Ans: C

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$$\begin{array}{r} 3.2 \times 2.7 = 8.64 \end{array}$$

A. 9
 B. 8
 C. 8.6
 D. 8.64
 E. 8.640

Ans: C

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$$1.513 + 27.3 = 28.813$$

A. 29
 B. 28.8
 C. 28.9
 D. 28.81
 E. 28.813

Ans: B

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mph
1 mi is equivalent to 1609 m so 55 mph is:

- A. 15 m/s
- B. 25 m/s
- C. 66 m/s
- D. 88 m/s
- E. 1500 m/s

Ans: B

$$\frac{55 \text{ mi}}{\cancel{\text{h}}} \times \frac{1609 \text{ m}}{1 \text{ mi}} \times \frac{1 \cancel{\text{h}}}{3600 \text{ s}}$$

$$\underline{24.6 \text{ m/s}}$$

A sphere with a radius of 1.7 cm has a volume of:

- A. $2.1 \times 10^{-5} \text{ m}^3$
- B. $9.1 \times 10^{-4} \text{ m}^3$
- C. $3.6 \times 10^{-3} \text{ m}^3$
- D. 0.11 m^3
- E. 21 m^3

Ans: A

$$V = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \pi (1.7 \times 10^{-2})^3$$

$$= \underline{2.1 \times 10^{-5} \text{ m}^3}$$



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A sphere with a radius of 1.7 cm has a surface area of:

$$r = 1.7 \times 10^{-2} \text{ m}$$

A. $2.1 \times 10^{-5} \text{ m}^2$

B. $9.1 \times 10^{-4} \text{ m}^2$

C. $3.6 \times 10^{-3} \text{ m}^2$

D. 0.11 m^2

E. 36 m^2

Ans: C

$$\begin{aligned} S.A. &= 4\pi r^2 \\ &= 4\pi (1.7 \times 10^{-2})^2 \\ &= 3.6 \times 10^{-3} \text{ m}^2 \end{aligned}$$

A right circular cylinder with a radius of 2.3 cm and a height of 1.4 m has a volume of:

A. 0.20 m^3

B. 0.14 m^3

C. $9.3 \times 10^{-3} \text{ m}^3$

D. $2.3 \times 10^{-3} \text{ m}^3$

E. $7.4 \times 10^{-4} \text{ m}^3$

Ans: D

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi (2.3 \times 10^{-2})^2 (1.4) \\ &= 2.3 \times 10^{-3} \text{ m}^3 \end{aligned}$$



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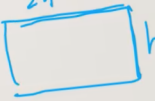
A right circular cylinder with a radius of 2.3 cm and a height of 1.4 cm has a total surface area of:

- A. $1.7 \times 10^{-3} \text{ m}^2$
 B. $3.2 \times 10^{-3} \text{ m}^2$
 C. $2.0 \times 10^{-3} \text{ m}^2$
 D. $5.3 \times 10^{-3} \text{ m}^2$
 E. $7.4 \times 10^{-3} \text{ m}^2$

Ans: D

$$SA = 2\pi r^2 + 2\pi rh$$

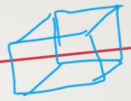
$$= 2\pi(0.023)^2 + 2\pi(0.023)(0.14)$$

$$= 5.3 \times 10^{-3} \text{ m}^2$$



A cubic box with an edge of exactly 1 cm has a volume of:

- A. 10^{-9} m^3
 B. 10^{-6} m^3
 C. 10^{-3} m^3
 D. 10^3 m^3
 E. 10^6 m^3

Ans: B



$$V = L^3 = (0.01 \text{ m})^3$$

$$= 10^{-6} \text{ m}^3$$



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A square with an edge of exactly 1 cm has an area of:

- A. 10^{-6} m^2
- B. 10^{-4} m^2
- C. 10^2 m^2
- D. 10^4 m^2
- E. 10^6 m^2

Ans: B

Diagram of a square with side length 1 cm. Handwritten calculations show the conversion of 1 cm to 10^{-2} m and the area calculation:

$$A = l^2 = 10^{-2} \times 10^{-2} = 10^{-4} \text{ m}^2$$

1 m is equivalent to 3.281 ft. A cube with an edge of 1.5 ft has a volume of:

- A. $1.2 \times 10^2 \text{ m}^3$
- B. $9.6 \times 10^{-2} \text{ m}^3$
- C. 10.5 m^3
- D. $9.5 \times 10^{-2} \text{ m}^3$
- E. 0.21 m^3

Ans: B

Handwritten calculations show the conversion of 1.5 ft to meters and the volume calculation:

$$1.5 \text{ ft} \times \frac{1 \text{ m}}{3.281 \text{ ft}} = 0.457 \text{ m}$$

$$V = l^3 = (0.457 \text{ m})^3 = 0.096 \text{ m}^3 = 9.6 \times 10^{-2} \text{ m}^3$$



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