

Appendix A

Useful Formulas

Abbreviations

inch = in

feet = ft

yard = yd

mile = mi

millimeter = mm

centimeter = cm

meter = m

kilometer = km

second = sec = s

minute = min

hour = hr

year = yr

ounce = oz

pound = lb

gram = g

kilogram = kg

quart = qt

gallon = gal

milliliter = ml

liter = L

Joule = J

calorie = cal

atmosphere = atm

Coulomb = C

radian = rad

degree = deg
= °

miles per hour = mi/hr
= mph

feet per second = ft/sec
= ft/s

meters per second = m/sec
= m/s

revolutions
per minute = rev/min
= RPM

Conversion Factors

Length

$$1 \text{ in} = 2.54 \text{ cm}$$

$$1 \text{ ft} = 0.3048 \text{ m}$$

$$1 \text{ mi} = 1.609344 \text{ km}$$

Volume

$$1 \text{ gal} = 3.7854 \text{ L}$$

$$1 \text{ qt} = 0.946353 \text{ L}$$

Energy

$$1 \text{ J} = 1 \text{ kg m}^2/\text{s}^2$$

$$1 \text{ cal} = 4.184 \text{ J}$$

Mass

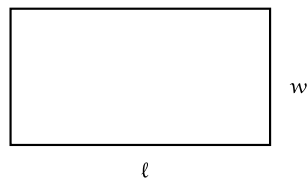
$$1 \text{ oz} = 28.3495 \text{ g}$$

$$1 \text{ lb} = 0.453592 \text{ kg}$$

Formulas from Plane and Solid Geometry

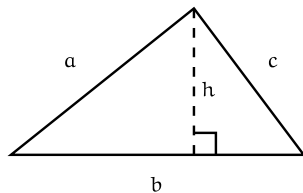
Rectangle

- Perimeter = $2\ell + 2w$
- Area = ℓw



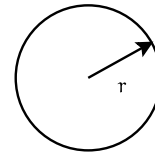
Triangle

- Perimeter = $a + b + c$
- Area = $\frac{1}{2}bh$



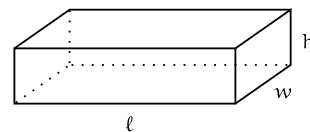
Circle

- Perimeter = $2\pi r$
- Area = πr^2



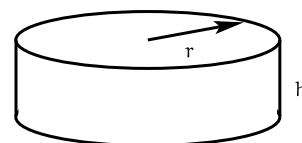
Rectangular prism

- Surface Area = $2(\ell w + \ell h + wh)$
- Volume = ℓhw



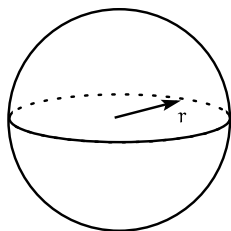
Right circular cylinder

- Surface Area = $2\pi r^2 + 2\pi rh$
- Volume = $\pi r^2 h$



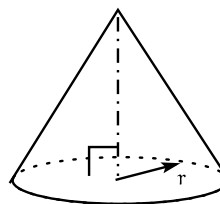
Sphere

- Surface Area = $4\pi r^2$
- Volume = $\frac{4}{3}\pi r^3$



Right circular cone

- Surface Area = $\pi r^2 + \pi r s$
- Volume = $\frac{1}{3}\pi r^2 h$



Constants

Avogadro's number = $N = 6.022142 \times 10^{23}$

speed of light = $c = 2.99792 \times 10^8 \text{ m/s}^2$

density of water = 1 g/cm^3

mass of earth = $5.9736 \times 10^{24} \text{ kg}$

earth's equatorial radius = $3,960 \text{ mi} = 6.38 \times 10^6 \text{ m}$

acceleration of gravity at earth's surface = $32 \text{ ft/sec}^2 = 9.8 \text{ m/s}^2$

Algebra

- $a^x a^y = a^{x+y}$
- $(a^x)^y = a^{xy}$
- $a^0 = 1$
- $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$
- $\frac{a^x}{a^y} = a^{x-y}$
- $\sqrt[n]{a} = a^{1/n}$
- $(a + b)(c + d) = ac + ad + bc + bd$
- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- Quadratic Formula: If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

- Completing the Square: $ax^2 + bx + c = a \left(x + \frac{b}{2a} \right)^2 - \frac{b^2}{4a} + c$

Trigonometry

- | | |
|---|---|
| <ul style="list-style-type: none">• $\sin(-x) = -\sin x$• $\cos(-x) = \cos x$• $\sin\left(\frac{\pi}{2} - x\right) = \cos x$• $\cos\left(\frac{\pi}{2} - x\right) = \sin x$• $\sin\left(\frac{\pi}{2} + x\right) = \cos x$• $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$• $\sin(\pi - x) = \sin x$ | <ul style="list-style-type: none">• $\cos(\pi - x) = -\cos x$• $\sin(\pi + x) = -\sin x$• $\cos(\pi + x) = -\cos x$• $\sin(x + y) = \sin x \cos y + \cos x \sin y$• $\cos(x + y) = \cos x \cos y - \sin x \sin y$• $\sin^2 x + \cos^2 x = 1$• $\sin 2x = 2 \sin x \cos x$• $\cos 2x = \cos^2 x - \sin^2 x$ |
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