

# USE WITH GRADES 5-11

## Periodic Table of the Elements

1	H	1.008																	2	He	4.003																																
3	Li	6.941	4	Be	9.012																	9	F	18.998	10	Ne	20.18																										
11	Na	22.99	12	Mg	24.305																	17	Cl	35.453	18	Ar	39.948																										
19	K	39.098	20	Ca	40.078	21	Sc	44.956	22	Ti	47.88	23	V	50.942	24	Cr	51.996	25	Mn	54.938	26	Fe	55.85	27	Co	58.933	28	Ni	58.69	29	Cu	63.546	30	Zn	65.39	31	Ga	69.723	32	Ge	72.61	33	As	74.923	34	Se	78.96	35	Br	79.904	36	Kr	83.8
37	Rb	85.47	38	Sr	87.62	39	Y	88.906	40	Zr	91.224	41	Nb	92.906	42	Mo	95.94	43	Tc	98.91	44	Ru	101.07	45	Rh	102.91	46	Pd	106.42	47	Ag	107.87	48	Cd	112.41	49	In	114.82	50	Sn	118.71	51	Sb	121.75	52	Te	127.6	53	I	126.9	54	Xe	131.29
55	Cs	132.91	56	Ba	137.33	57	* La	138.91	72	Hf	178.49	73	Ta	180.95	74	W	183.85	75	Re	186.2	76	Os	190.2	77	Ir	192.2	78	Pt	195.08	79	Au	196.97	80	Hg	200.59	81	Tl	204.38	82	Pb	207.2	83	Bi	208.98	84	Po	209	85	At	210	86	Rn	222
87	Fr	223	88	Ra	226.02	89	** Ac	227	104	Rf	261.11	105	Db	262.11	106	Sg	263.12	107	Bh	262.12	108	Hs	265	109	Mt	266	110	Ds	269	111	Rg	272																					
*Lanthanoid Series																																																					
58	Ce	140.12	59	Pr	140.91	60	Nd	144.24	61	Pm	145	62	Sm	150.36	63	Eu	151.97	64	Gd	157.25	65	Tb	158.92	66	Dy	162.5	67	Ho	164.93	68	Er	167.26	69	Tm	168.93	70	Yb	173.04	71	Lu	174.97												
**Actinoid Series																																																					
90	Th	232.04	91	Pa	231.04	92	U	238.03	93	Np	237.05	94	Pu	244	95	Am	243	96	Cm	247	97	Bk	247	98	Cf	251	99	Es	254	100	Fm	257	101	Md	258	102	No	259	103	Lr	260												

Information for the Periodic Table of the Elements obtained from Royal Society of Chemistry.

2700744

# USE WITH GRADES 7–9

## Science Reference Sheet

### Motion and Forces

$$v_{avg} = \frac{\Delta x}{\Delta t} \quad v = v_0 + at$$

$$x = v_0 t + \frac{1}{2} at^2 \quad v^2 = v_0^2 + 2ax$$

$$\Sigma F = F_{net} = ma \quad a_c = \frac{v^2}{r}$$

$$F_g = G \frac{m_1 m_2}{R^2} \quad F_g = mg$$

$$\text{Mechanical Advantage (MA)} = \frac{\text{load force}}{\text{effort force}}$$

$$\text{Efficiency} = \frac{\text{work output}}{\text{work input}} \times 100\%$$

$a$  = acceleration

$a_c$  = centripetal acceleration

$F$  = force

$F_g$  = gravitational force or weight

$g$  = gravitational acceleration

$G$  = universal gravitational constant

$m$  = mass

$r$  = radius

$R$  = distance between  $m_1$  and  $m_2$

$t$  = time

$v$  = speed

$v_{avg}$  = average speed

$v_0$  = initial speed

$x$  = distance

### Waves

$$v = f\lambda \quad n = \frac{c}{v}$$

$c$  = the speed of light

$f$  = frequency

$n$  = index of refraction

$v$  = wave speed

$\lambda$  = wavelength

### Conservation of Momentum and Energy

$$W = Fd \cos \theta \quad KE = \frac{1}{2} mv^2$$

$$PE = mgh \quad P = \frac{W}{t}$$

$$p = mv \quad \Delta p = m\Delta v = Ft$$

$$m_1 v_1 + m_2 v_2 = m_1 v_1' + m_2 v_2'$$

$d$  = distance

$F$  = force

$g$  = gravitational acceleration

$h$  = height

$KE$  = kinetic energy

$m$  = mass

$p$  = momentum

$P$  = power

$PE$  = potential energy

$t$  = time

$v$  = speed

$W$  = work

$\theta$  = angle

### Electric and Magnetic Phenomena

$$E = \frac{F}{q} \quad V = IR$$

$$P = IV \quad P = I^2 R$$

$E$  = electric field

$F$  = force

$I$  = current

$P$  = power

$q$  = charge

$R$  = resistance

$V$  = potential difference or voltage

### Heat and Thermodynamics

$$Q = mc\Delta T \quad Q = mL$$

$$W = P\Delta V \quad Q = \Delta U + W$$

$c$  = specific heat capacity

$L$  = latent heat

$m$  = mass

$P$  = pressure

$Q$  = heat

$T$  = temperature

$U$  = internal energy

$V$  = volume

$W$  = work

### Physical Constants

Gravitational acceleration on Earth:

$$g = 9.8 \text{ m/s}^2$$

Universal gravitational constant:

$$G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$$

Proton mass:

$$m = 1.67 \times 10^{-27} \text{ kg}$$

Electron mass:

$$m = 9.11 \times 10^{-31} \text{ kg}$$

Elementary charge:

$$e = 1.6 \times 10^{-19} \text{ C}$$

Speed of light:

$$c = 3.0 \times 10^8 \text{ m/s}$$

### General

$$d = \frac{m}{v}$$

$d$  = density

$m$  = mass

$v$  = volume