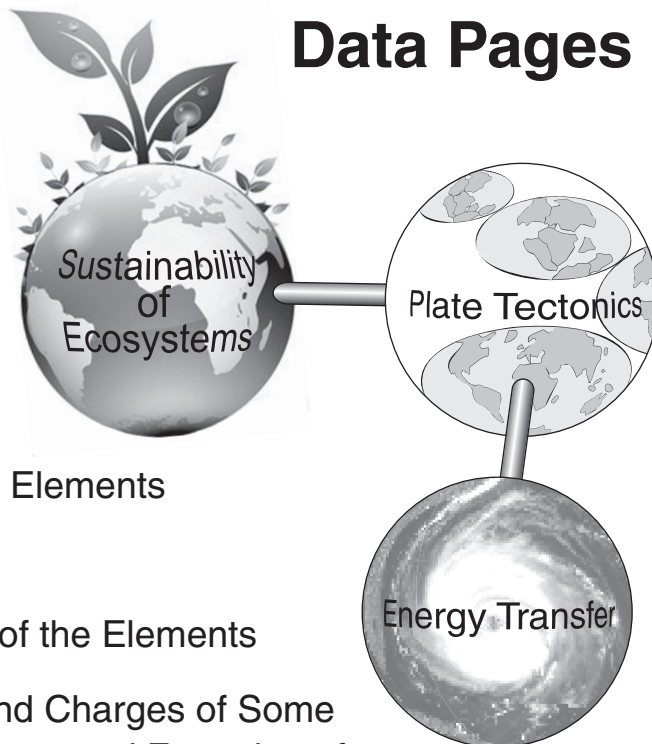
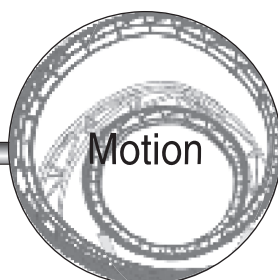
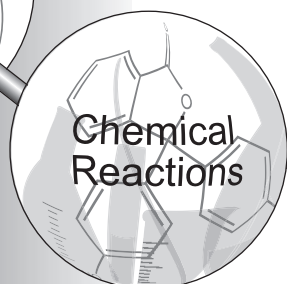
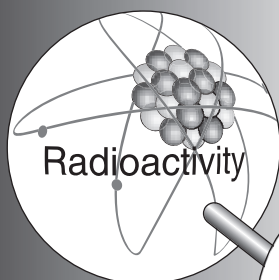


# SCIENCE 10

## Data Pages



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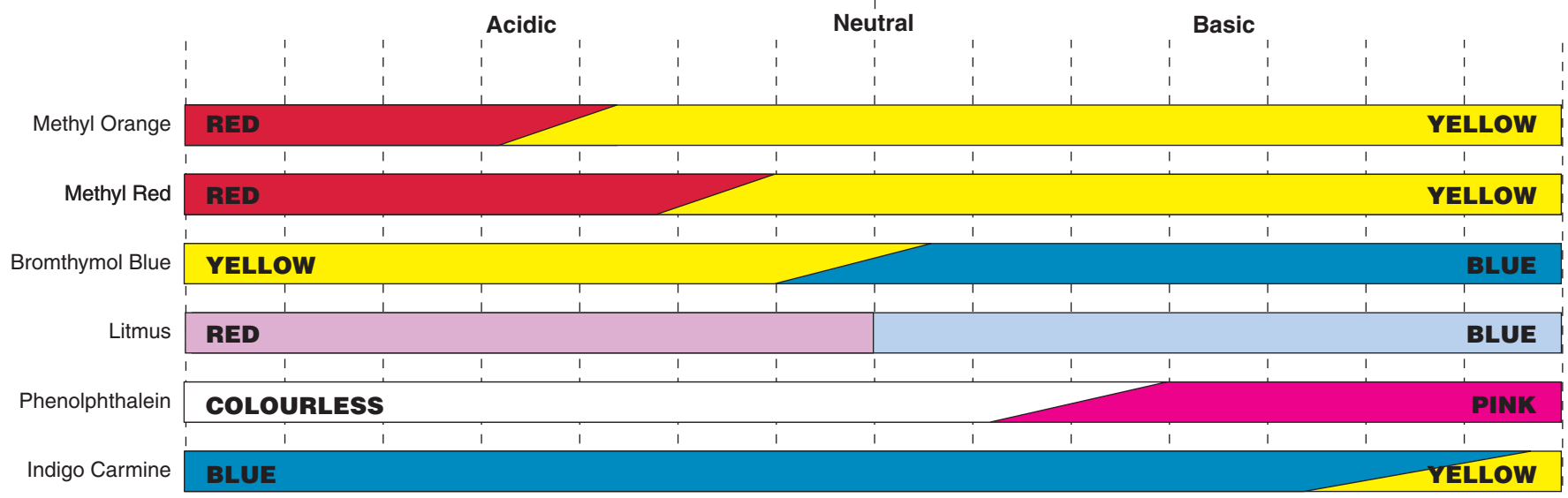
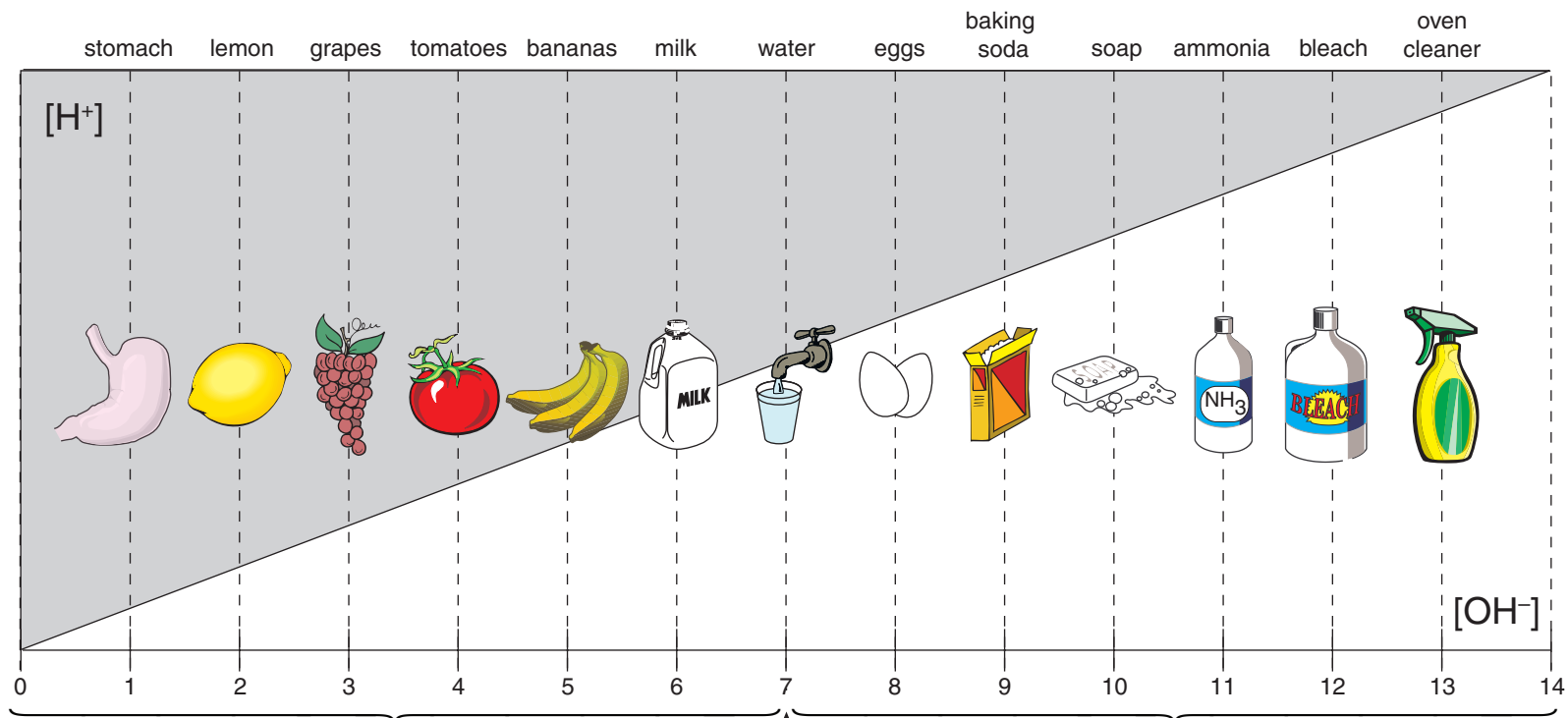


\* These Science 10 Data Pages may be retained for classroom use. They **do not** need to be returned to the Ministry with the completed examinations.

# PERIODIC TABLE OF THE ELEMENTS

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p>Atomic Number → 22              Symbol → <b>Ti</b>              Name → Titanium              Atomic Mass → 47.9</p> </div> <div style="text-align: center;"> <p>METALS ←</p> <p>→ NON-METALS</p> </div> </div>																				
<b>1</b> + <b>H</b> Hydrogen 1.0																	<b>1</b> - <b>H</b> Hydrogen 1.0	<b>18</b> <b>He</b> Helium 4.0		
<b>1</b>	<b>2</b>											<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>			
3 + <b>Li</b> Lithium 6.9	4 2+ <b>Be</b> Beryllium 9.0											5 <b>B</b> Boron 10.8	6 <b>C</b> Carbon 12.0	7 3- <b>N</b> Nitrogen 14.0	8 2- <b>O</b> Oxygen 16.0	9 - <b>F</b> Fluorine 19.0	10 0 <b>Ne</b> Neon 20.2			
11 + <b>Na</b> Sodium 23.0	12 2+ <b>Mg</b> Magnesium 24.3	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	13 3+ <b>Al</b> Aluminium 27.0	14 <b>Si</b> Silicon 28.1	15 3- <b>P</b> Phosphorus 31.0	16 2- <b>S</b> Sulfur 32.1	17 - <b>Cl</b> Chlorine 35.5	18 0 <b>Ar</b> Argon 39.9			
19 + <b>K</b> Potassium 39.1	20 2+ <b>Ca</b> Calcium 40.1	21 3+ <b>Sc</b> Scandium 45.0	22 4+ <b>Ti</b> Titanium 47.9	23 5+ <b>V</b> Vanadium 50.9	24 3+ <b>Cr</b> Chromium 52.0	25 2+ <b>Mn</b> Manganese 54.9	26 3+ <b>Fe</b> Iron 55.8	27 2+ <b>Co</b> Cobalt 58.9	28 2+ <b>Ni</b> Nickel 58.7	29 2+ <b>Cu</b> Copper 63.5	30 2+ <b>Zn</b> Zinc 65.4	31 3+ <b>Ga</b> Gallium 69.7	32 4+ <b>Ge</b> Germanium 72.6	33 3- <b>As</b> Arsenic 74.9	34 2- <b>Se</b> Selenium 79.0	35 - <b>Br</b> Bromine 79.9	36 0 <b>Kr</b> Krypton 83.8			
37 + <b>Rb</b> Rubidium 85.5	38 2+ <b>Sr</b> Strontium 87.6	39 3+ <b>Y</b> Yttrium 88.9	40 4+ <b>Zr</b> Zirconium 91.2	41 3+ <b>Nb</b> Niobium 92.9	42 2+ <b>Mo</b> Molybdenum 95.9	43 7+ <b>Tc</b> Technetium (98)	44 3+ <b>Ru</b> Ruthenium 101.1	45 3+ <b>Rh</b> Rhodium 102.9	46 2+ <b>Pd</b> Palladium 106.4	47 + <b>Ag</b> Silver 107.9	48 2+ <b>Cd</b> Cadmium 112.4	49 3+ <b>In</b> Indium 114.8	50 4+ <b>Sn</b> Tin 118.7	51 3+ <b>Sb</b> Antimony 121.8	52 2- <b>Te</b> Tellurium 127.6	53 - <b>I</b> Iodine 126.9	54 0 <b>Xe</b> Xenon 131.3			
55 + <b>Cs</b> Cesium 132.9	56 2+ <b>Ba</b> Barium 137.3	57 3+ <b>La</b> Lanthanum 138.9	72 4+ <b>Hf</b> Hafnium 178.5	73 5+ <b>Ta</b> Tantalum 180.9	74 6+ <b>W</b> Tungsten 183.8	75 4+ <b>Re</b> Rhenium 186.2	76 3+ <b>Os</b> Osmium 190.2	77 3+ <b>Ir</b> Iridium 192.2	78 4+ <b>Pt</b> Platinum 195.1	79 3+ <b>Au</b> Gold 197.0	80 2+ <b>Hg</b> Mercury 200.6	81 1+ <b>Tl</b> Thallium 204.4	82 2+ <b>Pb</b> Lead 207.2	83 3+ <b>Bi</b> Bismuth 209.0	84 2+ <b>Po</b> Polonium (209)	85 - <b>At</b> Astatine (210)	86 0 <b>Rn</b> Radon (222)			
87 + <b>Fr</b> Francium (223)	88 2+ <b>Ra</b> Radium (226)	89 3+ <b>Ac</b> Actinium (227)	104 <b>Rf</b> Rutherfordium (261)	105 <b>Db</b> Dubnium (262)	106 <b>Sg</b> Seaborgium (263)	107 <b>Bh</b> Bohrium (262)	108 <b>Hs</b> Hassium (265)	109 <b>Mt</b> Meitnerium (266)	110 <b>Ds</b> Darmstadtium (281)	111 <b>Rg</b> Roentgenium (272)	112 <b>Uub</b> Ununbium (285)	113 <b>Uut</b> Ununtrium (284)	114 <b>Uuq</b> Ununquadium (289)	115 <b>Uup</b> Ununpentium (288)	116 <b>Uuh</b> Ununhexium (292)	117 <b>Uus</b> Ununseptium (?)	118 <b>Uuo</b> Ununoctium (294)			
Alkali Metals		Alkaline Earth Metals																Halogens		Noble Gases
<p>Based on mass of C-12 at 12.00.</p> <p>Any value in parentheses is the mass of the most stable or best known isotope for elements which do not occur naturally.</p>																				
58 3+ <b>Ce</b> Cerium 140.1	59 3+ <b>Pr</b> Praseodymium 140.9	60 3+ <b>Nd</b> Neodymium 144.2	61 3+ <b>Pm</b> Promethium (145)	62 3+ <b>Sm</b> Samarium 150.4	63 3+ <b>Eu</b> Europium 152.0	64 3+ <b>Gd</b> Gadolinium 157.3	65 3+ <b>Tb</b> Terbium 158.9	66 3+ <b>Dy</b> Dysprosium 162.5	67 3+ <b>Ho</b> Holmium 164.9	68 3+ <b>Er</b> Erbium 167.3	69 3+ <b>Tm</b> Thulium 168.9	70 3+ <b>Yb</b> Ytterbium 173.0	71 3+ <b>Lu</b> Lutetium 175.0							
90 4+ <b>Th</b> Thorium 232.0	91 5+ <b>Pa</b> Protactinium 231.0	92 6+ <b>U</b> Uranium 238.0	93 5+ <b>Np</b> Neptunium (237)	94 4+ <b>Pu</b> Plutonium (244)	95 3+ <b>Am</b> Americium (243)	96 3+ <b>Cm</b> Curium (247)	97 3+ <b>Bk</b> Berkelium (247)	98 3+ <b>Cf</b> Californium (251)	99 3+ <b>Es</b> Einsteinium (252)	100 3+ <b>Fm</b> Fermium (257)	101 2+ <b>Md</b> Mendelevium (258)	102 2+ <b>No</b> Nobelium (259)	103 3+ <b>Lr</b> Lawrencium (262)							

# pH SCALE



# ALPHABETICAL LISTING OF THE ELEMENTS

Element	Symbol	Atomic Number	Element	Symbol	Atomic Number
Actinium	Ac	89	Mendelevium	Md	101
Aluminium	Al	13	Mercury	Hg	80
Americium	Am	95	Molybdenum	Mo	42
Antimony	Sb	51	Neodymium	Nd	60
Argon	Ar	18	Neon	Ne	10
Arsenic	As	33	Neptunium	Np	93
Astatine	At	85	Nickel	Ni	28
Barium	Ba	56	Niobium	Nb	41
Berkelium	Bk	97	Nitrogen	N	7
Beryllium	Be	4	Nobelium	No	102
Bismuth	Bi	83	Osmium	Os	76
Bohrium	Bh	107	Oxygen	O	8
Boron	B	5	Palladium	Pd	46
Bromine	Br	35	Phosphorus	P	15
Cadmium	Cd	48	Platinum	Pt	78
Calcium	Ca	20	Plutonium	Pu	94
Californium	Cf	98	Polonium	Po	84
Carbon	C	6	Potassium	K	19
Cerium	Ce	58	Praseodymium	Pr	59
Cesium	Cs	55	Promethium	Pm	61
Chlorine	Cl	17	Protactinium	Pa	91
Chromium	Cr	24	Radium	Ra	88
Cobalt	Co	27	Radon	Rn	86
Copper	Cu	29	Rhenium	Re	75
Curium	Cm	96	Rhodium	Rh	45
Darmstadtium	Ds	110	Roentgenium	Rg	111
Dubnium	Db	105	Rubidium	Rb	37
Dysprosium	Dy	66	Ruthenium	Ru	44
Einsteinium	Es	99	Rutherfordium	Rf	104
Erbium	Er	68	Samarium	Sm	62
Europium	Eu	63	Scandium	Sc	21
Fermium	Fm	100	Seaborgium	Sg	106
Fluorine	F	9	Selenium	Se	34
Francium	Fr	87	Silicon	Si	14
Gadolinium	Gd	64	Silver	Ag	47
Gallium	Ga	31	Sodium	Na	11
Germanium	Ge	32	Strontium	Sr	38
Gold	Au	79	Sulfur	S	16
Hafnium	Hf	72	Tantalum	Ta	73
Hassium	Hs	108	Technetium	Tc	43
Helium	He	2	Tellurium	Te	52
Holmium	Ho	67	Terbium	Tb	65
Hydrogen	H	1	Thallium	Tl	81
Indium	In	49	Thorium	Th	90
Iodine	I	53	Thulium	Tm	69
Iridium	Ir	77	Tin	Sn	50
Iron	Fe	26	Titanium	Ti	22
Krypton	Kr	36	Tungsten	W	74
Lanthanum	La	57	Uranium	U	92
Lawrencium	Lr	103	Vanadium	V	23
Lead	Pb	82	Xenon	Xe	54
Lithium	Li	3	Ytterbium	Yb	70
Lutetium	Lu	71	Yttrium	Y	39
Magnesium	Mg	12	Zinc	Zn	30
Manganese	Mn	25	Zirconium	Zr	40
Meitnerium	Mt	109			

## NAMES, FORMULAE AND CHARGES OF SOME POLYATOMIC IONS

Positive Ions	Negative Ions
$\text{NH}_4^+$ Ammonium	$\text{CH}_3\text{COO}^-$ Acetate
	$\text{CO}_3^{2-}$ Carbonate
	$\text{ClO}_3^-$ Chlorate
	$\text{ClO}_2^-$ Chlorite
	$\text{CrO}_4^{2-}$ Chromate
	$\text{CN}^-$ Cyanide
	$\text{Cr}_2\text{O}_7^{2-}$ Dichromate
	$\text{HCO}_3^-$ Hydrogen carbonate, bicarbonate
	$\text{HSO}_4^-$ Hydrogen sulfate, bisulfate
	$\text{HS}^-$ Hydrogen sulfide, bisulfide
	$\text{HSO}_3^-$ Hydrogen sulfite, bisulfite
	$\text{OH}^-$ Hydroxide
	$\text{ClO}^-$ Hypochlorite
	$\text{NO}_3^-$ Nitrate
	$\text{NO}_2^-$ Nitrite
	$\text{ClO}_4^-$ Perchlorate
	$\text{MnO}_4^-$ Permanganate
	$\text{PO}_4^{3-}$ Phosphate
	$\text{PO}_3^{3-}$ Phosphite
	$\text{SO}_4^{2-}$ Sulfate
	$\text{SO}_3^{2-}$ Sulfite

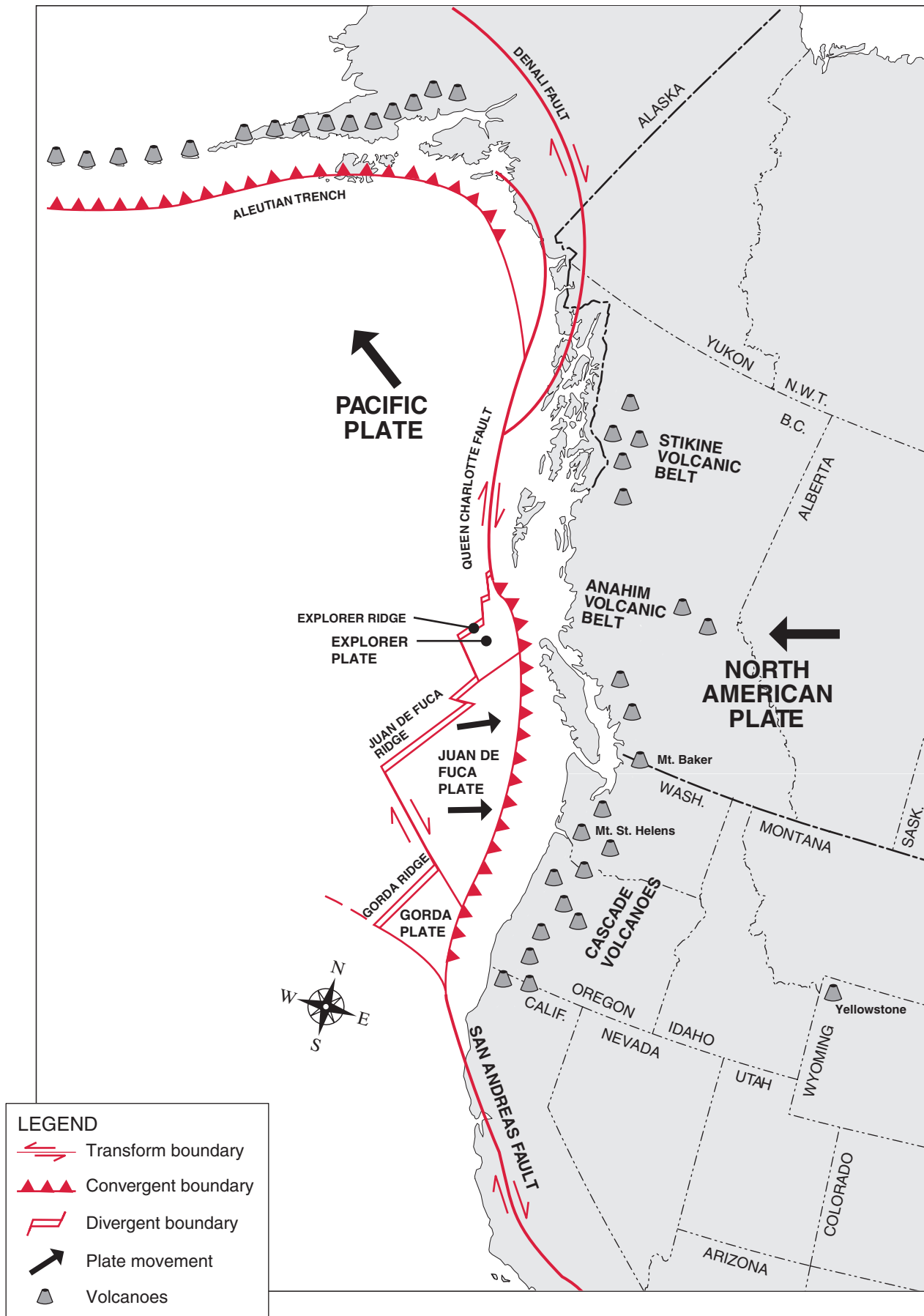
## NAMES AND FORMULAE OF COMMON ACIDS

Hydrochloric acid	$\text{HCl}$
Sulfuric acid	$\text{H}_2\text{SO}_4$
Nitric acid	$\text{HNO}_3$
Acetic acid	$\text{HCH}_3\text{COO}$

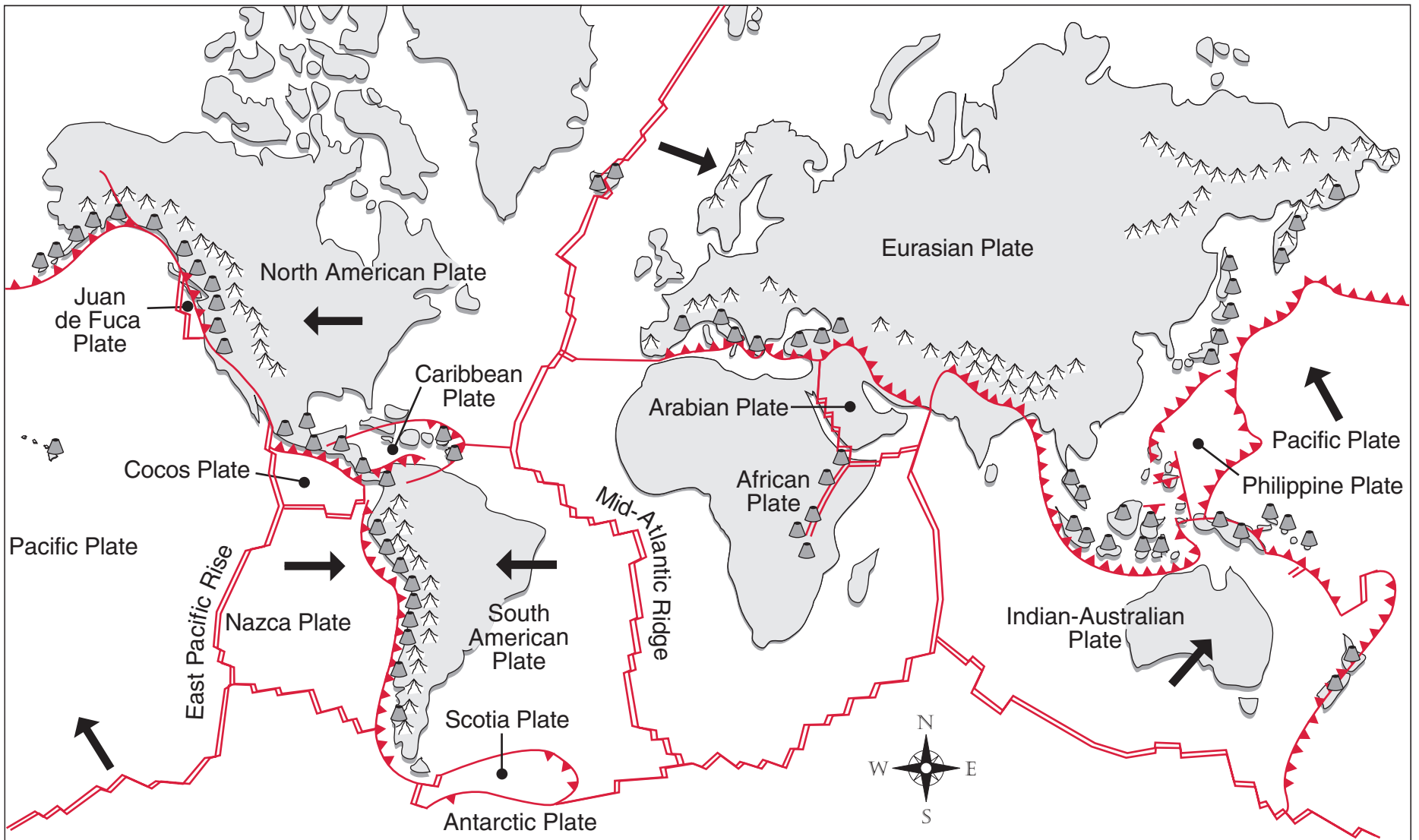
## PREFIXES

1	mono
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

# MAP OF THE PACIFIC COAST OF NORTH AMERICA



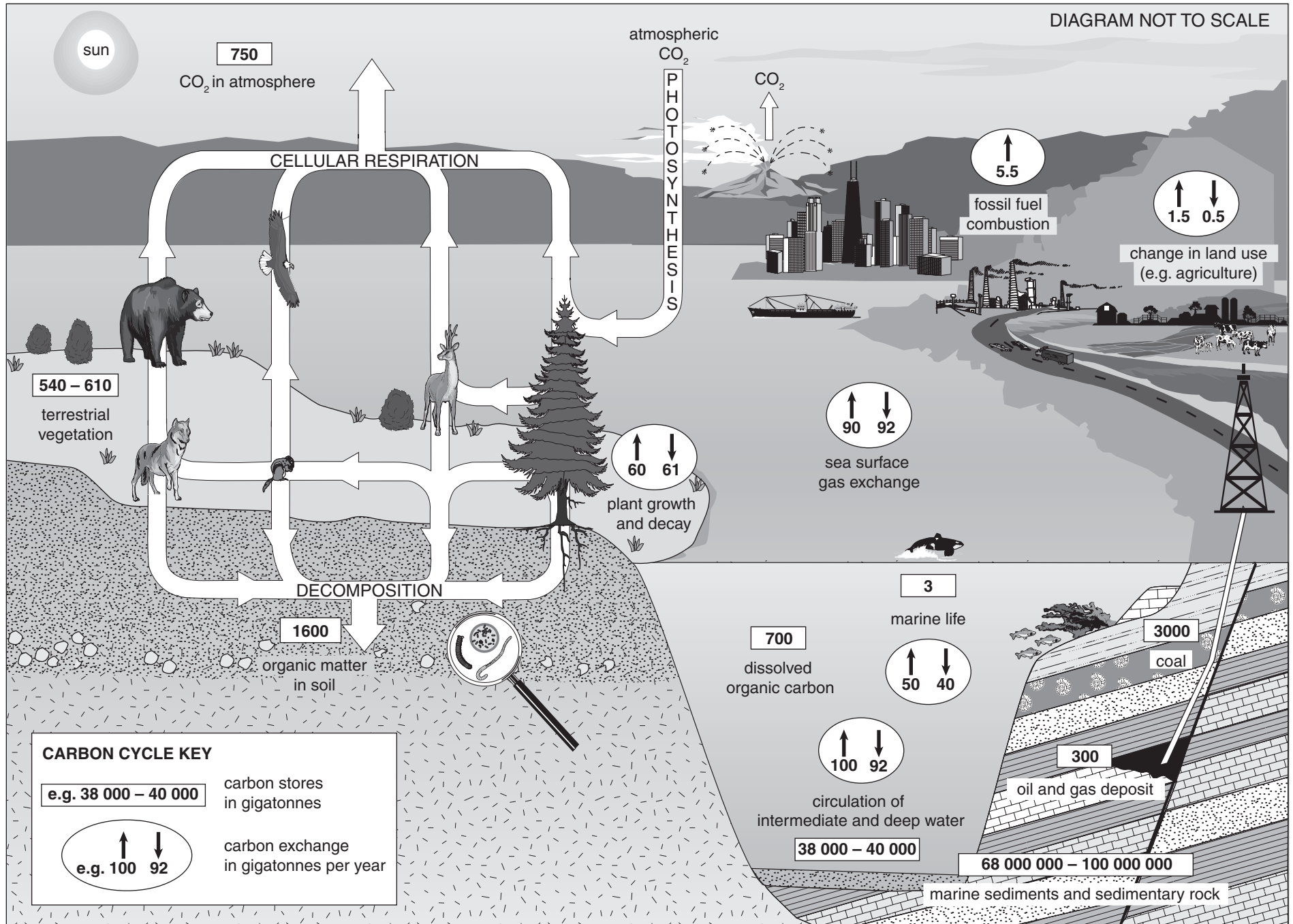
# WORLD TECTONIC PLATE BOUNDARIES MAP



- Divergent boundary
- ▲
▲
▲
 Convergent boundary
- Transform boundary
- Mountains
- Volcanoes
- Plate movement relative to the African Plate



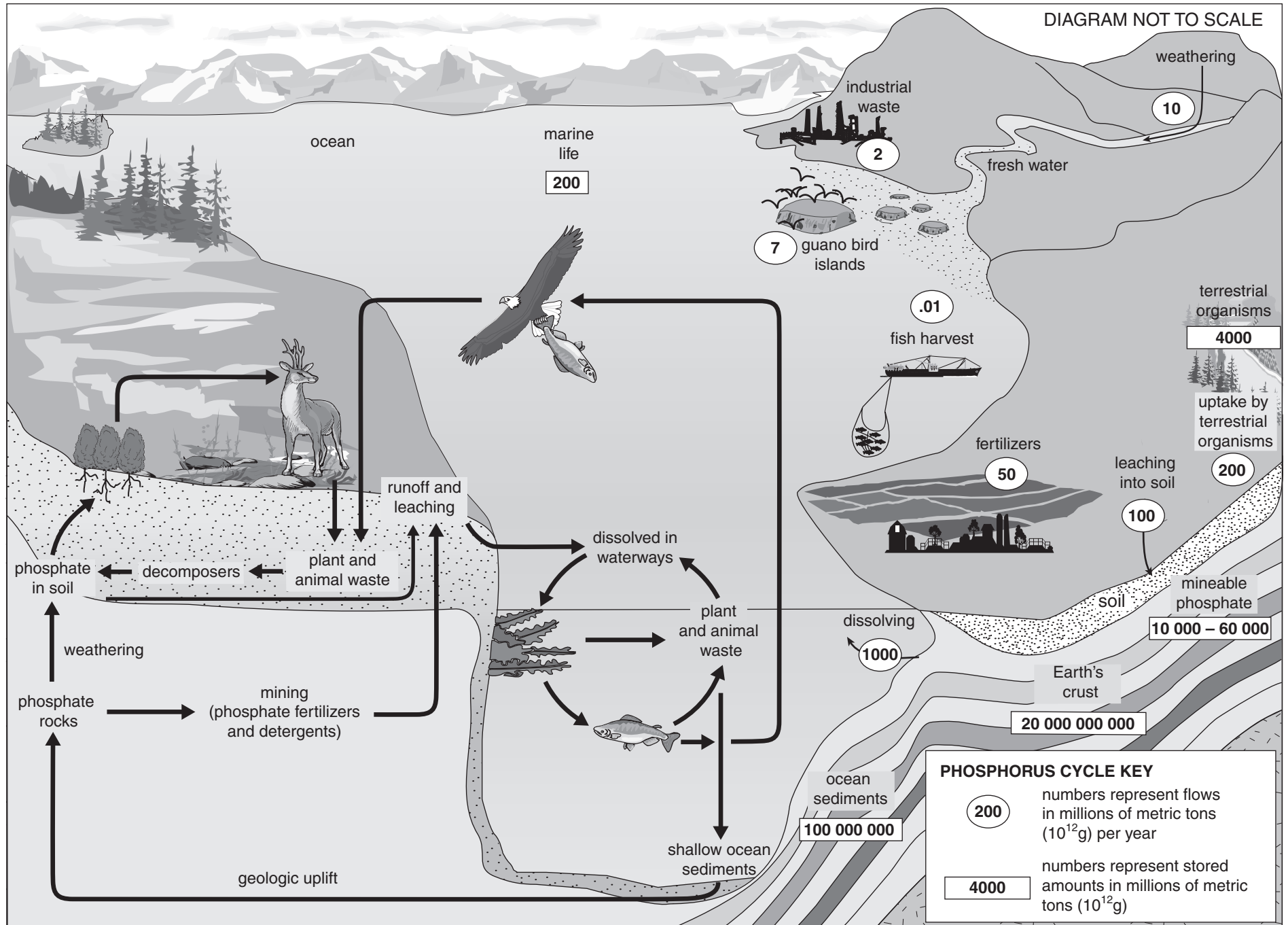
# THE CARBON CYCLE



Different sources will provide varying information.

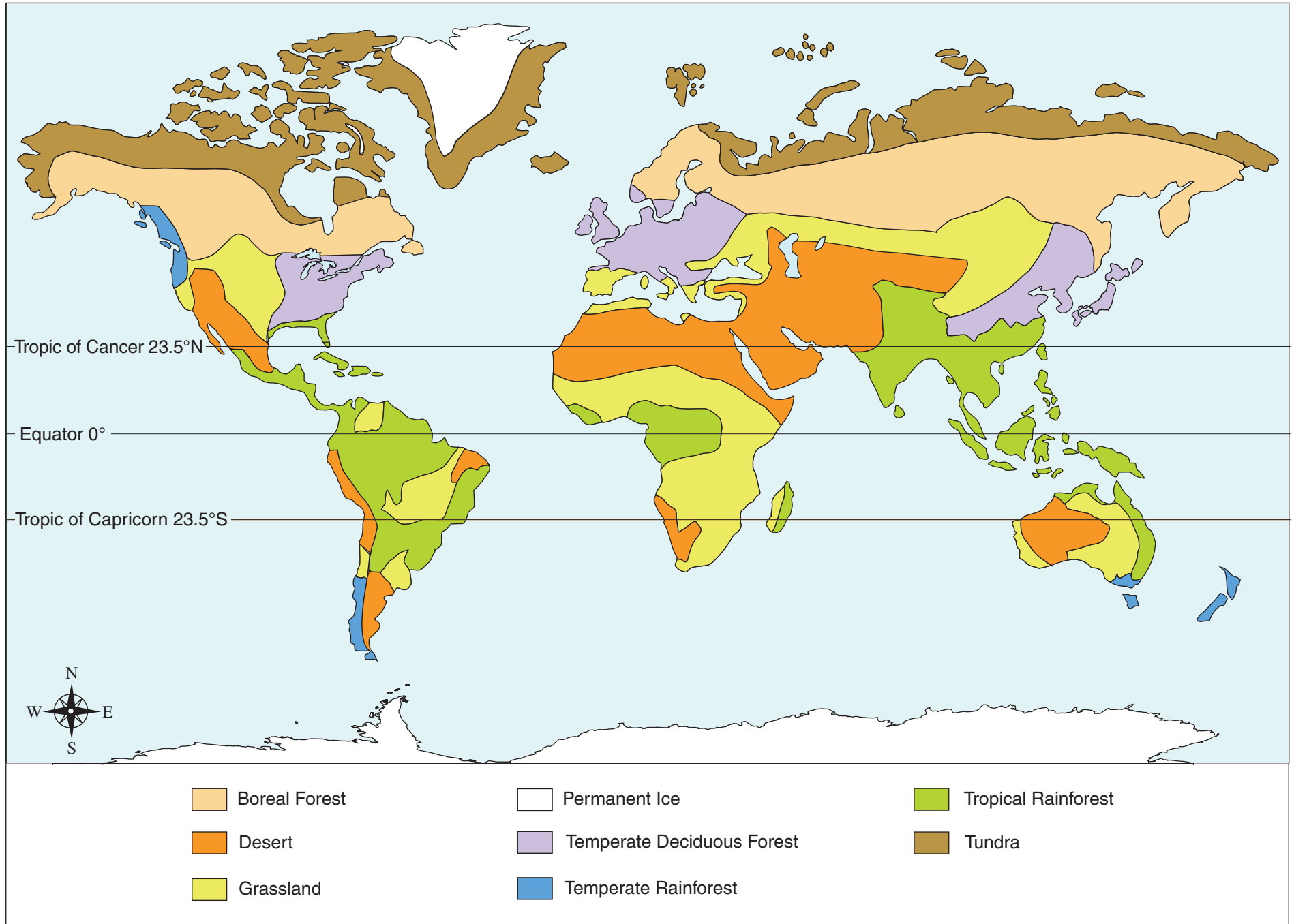


# THE PHOSPHORUS CYCLE



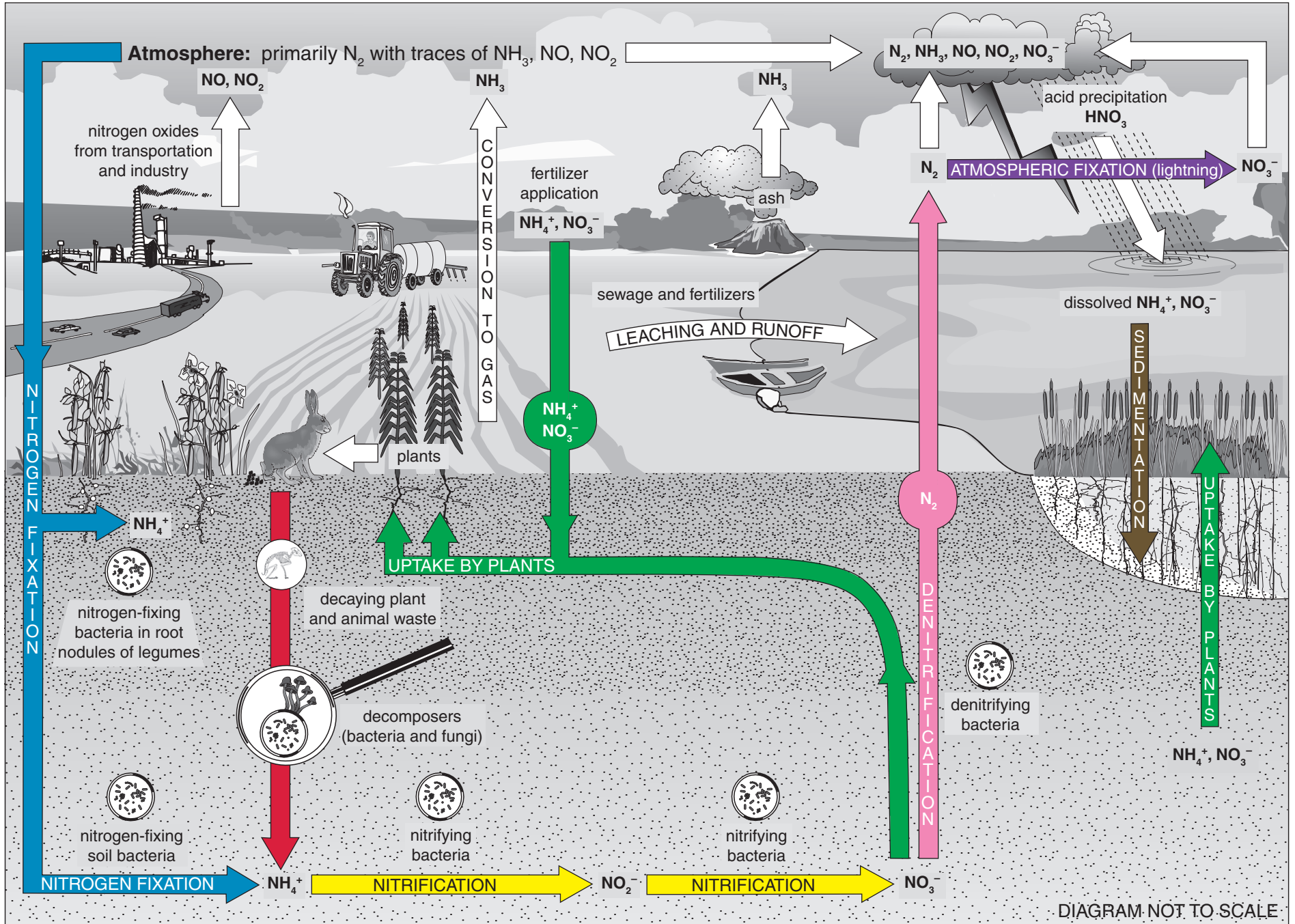
Different sources will provide varying information.

# BIOMES OF THE WORLD



Different sources will provide varying information.

# THE NITROGEN CYCLE



## COMMON ISOTOPE PAIRS CHART

Isotope		Half-life of Parent (years)
<i>Parent</i>	<i>Daughter</i>	
Carbon-14	Nitrogen-14	5730
Uranium-235	Lead-207	710 million
Potassium-40	Argon-40	1.3 billion
Uranium-238	Lead-206	4.5 billion
Thorium-235	Lead-208	14 billion
Rubidium-87	Strontium-87	47 billion

## RADIOACTIVITY SYMBOLS

${}^4_2\alpha$ , ${}^4_2\text{He}$	${}^0_{-1}\beta$ , ${}^0_{-1}e$	${}^0_0\gamma$
${}^1_0n$	${}^1_1p$ , ${}^1_1\text{H}$	

## UNITS AND ABBREVIATIONS

Quantity	Unit	Symbol
distance (d)	metre	m
time (t)	second	s
	minute	min
	hour	h
	year	a

## EQUATIONS OF MOTION

$v_{av} = \frac{\Delta d}{\Delta t}$	$a = \frac{\Delta v}{\Delta t}$	$\Delta v = v_f - v_i$
$\Delta d = v_{av} \Delta t$	$\Delta v = a \Delta t$	$v_i = v_f - \Delta v$
$\Delta t = \frac{\Delta d}{v_{av}}$	$\Delta t = \frac{\Delta v}{a}$	$v_f = v_i + \Delta v$