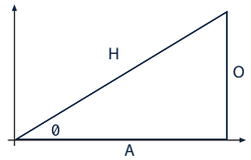
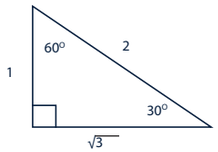
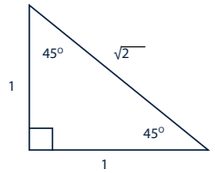
# Numeracy Skills

## Trigonometry




$\sin 30^\circ = \frac{1}{2}$ $\sin 60^\circ =$ _____ $\sin 45^\circ =$ _____

$\cos 30^\circ = \frac{\sqrt{3}}{2}$ $\cos 60^\circ =$ _____ $\cos 45^\circ =$ _____

$\tan 30^\circ = \frac{1}{\sqrt{3}}$ $\tan 60^\circ =$ _____ $\tan 45^\circ =$ _____

$\sin\theta = \frac{O}{H} \frac{\text{opposite}}{\text{hypotenuse}}$ SOH

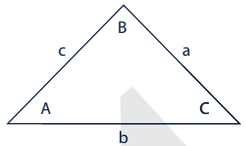
$\cos\theta = \frac{A}{H} \frac{\text{adjacent}}{\text{hypotenuse}}$ CAH

$\tan\theta = \frac{O}{A} \frac{\text{opposite}}{\text{adjacent}}$ TOA

**Remember! SOH CAH TOA**

**Sine Law:**

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$




**Cosine Law:**

$a^2 = b^2 + c^2 - 2bc \cos A$

$b^2 = a^2 + c^2 - 2ac \cos B$

$c^2 = a^2 + b^2 - 2ab \cos C$

**Rules of Indices:**

$a^n \times a^m = a^{(n+m)}$

$a^n \div a^m = a^{(n-m)}$

$a^0 = 1$

$(a^n)^m = a^{nm}$

$\sqrt{a} = a^{1/2}$

$a^{-n} = 1/a^n$

## Algebra

**Addition:**

$a+b = b+a$

$a+(b+c) = (a+b)+c$

**Multiplication:**

$ab = ba$

**Expanding Brackets:**

$a(b+c) = ab+ac$

$(a+b)^2 = a^2+2ab+b^2$

$(a+b)^3 = a^3+3a^2b+3ab^2+b^3$

$a(b-c) = ab-ac$

$(a-b)^2 = a^2-2ab+b^2$

$\{a-b)^3 = a^3-3a^2b+3ab^2-b^3$

$(a+b)(a-b) = a^2 - b^2$

$(a+b)(c+d) = ac+ad+bc+bd$

$(a+b)(a+c) = a^2+ac+ab+bc$

**Factorising**:

$a^2-b^2 = (a+b)(a-b)$

$a^3+b^3 = (a+b)(a^2-ab+b^2)$

$a+2ab+b^2 = (a+b)^2$

$a^3-b^3 = (a-b)(a^2+ab+b^2)$

$a^2-2ab+b^2 = (a-b)^2$

$a^3b-ab = ab(a+1)(a-1)$

**The Quadratic Equation:**

For $ax^2+bx+c = 0$ then $x = \frac{-b \pm -\sqrt{b^2 - 4ac}}{2a}$

## The Periodic Table of the Elements

Key: 7 Li lithium 3 — relative atomic mass; symbol; name; atomic (proton) number

| Group 1 | 2 | | | | | | | | | | | 3 | 4 | 5 | 6 | 7 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 H hydrogen 1 | | | | | | | | | | | | | | | | | 4 He helium 2 |
| 7 Li lithium 3 | 9 Be beryllium 4 | | | | | | | | | | | 11 B boron 5 | 12 C carbon 6 | 14 N nitrogen 7 | 16 O oxygen 8 | 19 F fluorine 9 | 20 Ne neon 10 |
| 23 Na sodium 11 | 24 Mg magnesium 12 | | | | | | | | | | | 27 Al aluminium 13 | 28 Si silicon 14 | 31 P phosphorus 15 | 32 S sulfur 16 | 35.5 Cl chlorine 17 | 40 Ar argon 18 |
| 39 K potassium 19 | 40 Ca calcium 20 | 45 Sc scandium 21 | 48 Ti titanium 22 | 51 V vanadium 23 | 52 Cr chromium 24 | 55 Mn manganese 25 | 56 Fe iron 26 | 59 Co cobalt 27 | 59 Ni nickel 28 | 63.5 Cu copper 29 | 65 Zn zinc 30 | 70 Ga gallium 31 | 73 Ge germanium 32 | 75 As arsenic 33 | 79 Se selenium 34 | 80 Br bromine 35 | 84 Kr krypton 36 |
| 85 Rb rubidium 37 | 88 Sr strontium 38 | 89 Y yttrium 39 | 91 Zr zirconium 40 | 93 Nb niobium 41 | 96 Mo molybdenum 42 | [98] Tc technetium 43 | 101 Ru ruthenium 44 | 103 Rh rhodium 45 | 106 Pd palladium 46 | 108 Ag silver 47 | 112 Cd cadmium 48 | 115 In indium 49 | 119 Sn tin 50 | 122 Sb antimony 51 | 128 Te tellurium 52 | 127 I iodine 53 | 131 Xe xenon 54 |
| 133 Cs caesium 55 | 137 Ba barium 56 | 139 La* lanthanum 57 | 178 Hf hafnium 72 | 181 Ta tantalum 73 | 184 W tungsten 74 | 186 Re rhenium 75 | 190 Os osmium 76 | 192 Ir iridium 77 | 195 Pt platinum 78 | 197 Au gold 79 | 201 Hg mercury 80 | 204 Tl thallium 81 | 207 Pb lead 82 | 209 Bi bismuth 83 | [209] Po polonium 84 | [210] At astatine 85 | [222] Rn radon 86 |
| [223] Fr francium 87 | [226] Ra radium 88 | [227] Ac* actinium 89 | [261] Rf rutherfordium 104 | [262] Db dubnium 105 | [266] Sg seaborgium 106 | [264] Bh bohrium 107 | [277] Hs hassium 108 | [268] Mt meitnerium 109 | [271] Ds darmstadtium 110 | [272] Rg roentgenium 111 | [285] Cn copernicium 112 | [ ] Uut Ununtrium 113 | [287] Fl flerovium 114 | [ ] Uup Ununpentium 115 | [291] Lv livermorium 116 | [ ] Uus Ununseptium 117 | [ ] Uuo Ununoctium 118 |

Metals ← → Non-metals

Group 1 - Alkali Metals; Group 2 - Alkaline Earth Metals; Transition Metals; Other Metals; Non-metals; Group 0 - Noble Gases; Metalloid; Group 7 - Halogens

** The lanthanides (atomic numbers 58-71) and the actinides (atomic numbers 90-103) have been omitted.*

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

SAMPLE