



National
Qualifications
2014

X757/75/11

**Physics
Relationships Sheet**

THURSDAY, 22 MAY

9:00 AM – 11:00 AM



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$$E_p = mgh$$

$$d = vt$$

$$E_k = \frac{1}{2}mv^2$$

$$v = f\lambda$$

$$Q = It$$

$$T = \frac{1}{f}$$

$$V = IR$$

$$A = \frac{N}{t}$$

$$R_T = R_1 + R_2 + \dots$$

$$D = \frac{E}{m}$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$$

$$H = Dw_R$$

$$V_2 = \left(\frac{R_2}{R_1 + R_2} \right) V_s$$

$$\dot{H} = \frac{H}{t}$$

$$\frac{V_1}{V_2} = \frac{R_1}{R_2}$$

$$s = vt$$

$$P = \frac{E}{t}$$

$$d = \overline{v}t$$

$$P = IV$$

$$s = \overline{v}t$$

$$P = I^2 R$$

$$a = \frac{v-u}{t}$$

$$P = \frac{V^2}{R}$$

$$W = mg$$

$$E_h = cm\Delta T$$

$$F = ma$$

$$p = \frac{F}{A}$$

$$E_w = Fd$$

$$\frac{pV}{T} = \text{constant}$$

$$E_h = ml$$

$$p_1V_1 = p_2V_2$$

$$\frac{p_1}{T_1} = \frac{p_2}{T_2}$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

Additional Relationships

Circle

$$\text{circumference} = 2\pi r$$

$$\text{area} = \pi r^2$$

Sphere

$$\text{area} = 4\pi r^2$$

$$\text{volume} = \frac{4}{3}\pi r^3$$

Trigonometry

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

Electron Arrangements of Elements

Group 1 Group 2

(1)

1 H 1	4 Be 2,2
Hydrogen	(2)
3 Li 2,1	
Lithium	Beryllium
11 Na 2,8,1	12 Mg 2,8,2
Sodium	Magnesium
19 K 2,8,8,1	20 Ca 2,8,8,2
Potassium	Calcium
37 Rb 2,8,18,8,1	38 Sr 2,8,18,8,2
Rubidium	Strontium
55 Cs 2,8,18,18,8,1	56 Ba 2,8,18,18,8,2
Caesium	Barium
87 Fr 2,8,18,32,18,8,1	88 Ra 2,8,18,32,18,8,2
Francium	Radium

Key

Atomic number
Symbol
Electron arrangement
Name

Transition Elements

(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
21 Sc 2,8,9,2	22 Ti 2,8,10,2	23 V 2,8,11,2	24 Cr 2,8,13,1	25 Mn 2,8,13,2	26 Fe 2,8,14,2	27 Co 2,8,15,2	28 Ni 2,8,16,2	29 Cu 2,8,18,1	30 Zn 2,8,18,2
Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc
39 Y 2,8,18,9,2	40 Zr 2,8,18,10,2	41 Nb 2,8,18,12,1	42 Mo 2,8,18,13,1	43 Tc 2,8,18,13,2	44 Ru 2,8,18,15,1	45 Rh 2,8,18,16,1	46 Pd 2,8,18,18,0	47 Ag 2,8,18,18,1	48 Cd 2,8,18,18,2
Yttrium	Zirconium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palladium	Silver	Cadmium
57 La 2,8,18,18,9,2	72 Hf 2,8,18,32,10,2	73 Ta 2,8,18,32,11,2	74 W 2,8,18,32,12,2	75 Re 2,8,18,32,13,2	76 Os 2,8,18,32,14,2	77 Ir 2,8,18,32,15,2	78 Pt 2,8,18,32,17,1	79 Au 2,8,18,32,18,1	80 Hg 2,8,18,32,18,2
Lanthanum	Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury
89 Ac 2,8,18,32,18,9,2	104 Rf 2,8,18,32,32,10,2	105 Db 2,8,18,32,32,11,2	106 Sg 2,8,18,32,32,12,2	107 Bh 2,8,18,32,32,13,2	108 Hs 2,8,18,32,32,14,2	109 Mt 2,8,18,32,32,15,2	110 Ds 2,8,18,32,32,17,1	111 Rg 2,8,18,32,32,18,1	112 Cn 2,8,18,32,32,18,2
Actinium	Rutherfordium	Dubnium	Seaborgium	Bohrium	Hassium	Meitnerium	Darmstadtium	Roentgenium	Copernicium

2 He 2	10 Ne 2,8
Helium	Neon
5 B 2,3	6 C 2,4
Boron	Carbon
13 Al 2,8,3	14 Si 2,8,4
Aluminium	Silicon
31 Ga 2,8,18,3	32 Ge 2,8,18,4
Gallium	Germanium
49 In 2,8,18,18,3	50 Sn 2,8,18,18,4
Indium	Tin
81 Tl 2,8,18,32,18,3	82 Pb 2,8,18,32,18,4
Thallium	Lead
83 Bi 2,8,18,32,18,5	84 Po 2,8,18,32,18,6
Bismuth	Polonium
51 Sb 2,8,18,18,5	52 Te 2,8,18,18,6
Antimony	Tellurium
85 I 2,8,18,18,7	86 Xe 2,8,18,18,8
Iodine	Xenon
35 Br 2,8,18,7	36 Kr 2,8,18,8
Bromine	Krypton
33 As 2,8,18,5	34 Se 2,8,18,6
Arsenic	Selenium
31 Ga 2,8,18,3	32 Ge 2,8,18,4
Gallium	Germanium
15 P 2,8,5	16 S 2,8,6
Phosphorus	Sulfur
17 Cl 2,8,7	18 Ar 2,8,8
Chlorine	Argon
7 N 2,5	8 O 2,6
Nitrogen	Oxygen
9 F 2,7	10 Ne 2,8
Fluorine	Neon
13 Al 2,8,3	14 Si 2,8,4
Aluminium	Silicon
5 B 2,3	6 C 2,4
Boron	Carbon
7 N 2,5	8 O 2,6
Nitrogen	Oxygen
9 F 2,7	10 Ne 2,8
Fluorine	Neon

Group 3 Group 4 Group 5 Group 6 Group 7 Group 0

(18)

57 La 2,8,18,18,9,2	58 Ce 2,8,18,20,8,2	59 Pr 2,8,18,21,8,2	60 Nd 2,8,18,22,8,2	61 Pm 2,8,18,23,8,2	62 Sm 2,8,18,24,8,2	63 Eu 2,8,18,25,8,2	64 Gd 2,8,18,25,9,2	65 Tb 2,8,18,27,8,2	66 Dy 2,8,18,28,8,2	67 Ho 2,8,18,29,8,2	68 Er 2,8,18,30,8,2	69 Tm 2,8,18,31,8,2	70 Yb 2,8,18,32,8,2	71 Lu 2,8,18,32,9,2
Lanthanum	Cerium	Praseodymium	Neodymium	Promethium	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium
89 Ac 2,8,18,32,18,9,2	90 Th 2,8,18,32,18,10,2	91 Pa 2,8,18,32,20,9,2	92 U 2,8,18,32,21,9,2	93 Np 2,8,18,32,22,9,2	94 Pu 2,8,18,32,24,8,2	95 Am 2,8,18,32,25,8,2	96 Cm 2,8,18,32,25,9,2	97 Bk 2,8,18,32,27,8,2	98 Cf 2,8,18,32,28,8,2	99 Es 2,8,18,32,29,8,2	100 Fm 2,8,18,32,30,8,2	101 Md 2,8,18,32,31,8,2	102 No 2,8,18,32,32,8,2	103 Lr 2,8,18,32,32,9,2
Actinium	Thorium	Protactinium	Uranium	Neptunium	Plutonium	Americium	Curium	Berkelium	Californium	Einsteinium	Fermium	Mendelevium	Nobelium	Lawrencium

Lanthanides

Actinides