



National
Qualifications
2019

X857/75/11

**Physics
Relationships sheet**

WEDNESDAY, 15 MAY

1:00 PM – 3:30 PM



* X 8 5 7 7 5 1 1 *

$$d = vt$$

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

$$s = vt$$

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

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

$$F = ma$$

$$W = mg$$

$$E_w = Fd$$

$$E_p = mgh$$

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

$$Q = It$$

$$V = IR$$

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

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

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

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

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

$$P = IV$$

$$P = I^2R$$

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

$$E_h = cm\Delta T$$

$$E_h = ml$$

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

$$p_1V_1 = p_2V_2$$

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

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

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

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

$$v = f\lambda$$

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

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

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

$$H = Dw_r$$

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

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

Key

Atomic number Symbol Electron arrangement Name

Transition Elements

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

Group 3 Group 4 Group 5 Group 6 Group 7 Group 8 Group 9 Group 10 Group 11 Group 12
(18)

(13)	5	B	6	C	7	N	8	O	9	F	10	Ne
	2,3	Boron	2,4	Carbon	2,5	Nitrogen	2,6	Oxygen	2,7	Fluorine	2,8	Neon
	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar
	2,8,3	Aluminium	2,8,4	Silicon	2,8,5	Phosphorus	2,8,6	Sulfur	2,8,7	Chlorine	2,8,8	Argon
	31	Ga	32	Ge	33	As	34	Se	35	Br	36	Kr
	2,8,18,3	Gallium	2,8,18,4	Germanium	2,8,18,5	Arsenic	2,8,18,6	Selenium	2,8,18,7	Bromine	2,8,18,8	Krypton
	49	In	50	Sn	51	Sb	52	Te	53	I	54	Xe
	2,8,18,18,3	Indium	2,8,18,18,4	Tin	2,8,18,18,5	Antimony	2,8,18,18,6	Tellurium	2,8,18,18,7	Iodine	2,8,18,18,8	Xenon
	81	Tl	82	Pb	83	Bi	84	Po	85	At	86	Rn
	2,8,18,32,18,3	Thallium	2,8,18,32,18,4	Lead	2,8,18,32,18,5	Bismuth	2,8,18,32,18,6	Polonium	2,8,18,32,18,7	Astatine	2,8,18,32,18,8	Radon

Lanthanides

57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu
Lanthanum	2,8,18,18,9,2	Cerium	2,8,18,20,8,2	Praseodymium	2,8,18,21,8,2	Neodymium	2,8,18,22,8,2	Promethium	2,8,18,23,8,2	Samarium	2,8,18,24,8,2	Europium	2,8,18,25,8,2	Gadolinium	2,8,18,25,9,2	Terbium	2,8,18,27,8,2	Dysprosium	2,8,18,28,8,2	Holmium	2,8,18,29,8,2	Erbium	2,8,18,30,8,2	Thulium	2,8,18,31,8,2	Ytterbium	2,8,18,32,8,2	Lutetium	2,8,18,32,9,2

Actinides

89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr
Actinium	2,8,18,32,18,9,2	Thorium	2,8,18,32,18,10,2	Protactinium	2,8,18,32,20,9,2	Uranium	2,8,18,32,21,9,2	Neptunium	2,8,18,32,22,9,2	Plutonium	2,8,18,32,24,8,2	Americium	2,8,18,32,25,8,2	Curium	2,8,18,32,25,9,2	Berkelium	2,8,18,32,27,8,2	Californium	2,8,18,32,28,8,2	Einsteinium	2,8,18,32,29,8,2	Fermium	2,8,18,32,30,8,2	Mendelevium	2,8,18,32,31,8,2	Nobelium	2,8,18,32,32,8,2	Lawrencium	2,8,18,32,32,9,2