A-Level Physics: **w25 44**

9(a)	emission of electrons (from a metal surface)
	when electromagnetic radiation is incident (on surface)
9(b)(i)	threshold frequency = $2F$
9(b)(ii)	Planck constant = Φ / F
9(c)	two diagonal straight lines with positive gradient in the positive E_K region only, starting at non-zero values of f
	line labelled X passing through (F, 0) **and** line labelled Y passing through ($2F$,0) and extending to $3F$ or $+2\Phi$
	two diagonal straight lines with equal gradients
	X line extrapolates back to (0, $-\Phi$) **and** Y line extrapolates back to (0, -2Φ)

A-Level Physics: **s25 42**

9(a)	emission of electrons (from a metal surface)
	when electromagnetic radiation is incident (on surface / electrons)
9(b)(i)	current falls to zero when applied voltage equals energy per unit charge of emitted electrons
	energy of photon depends on frequency
	maximum energy of electron depends on energy of photon
9(b)(ii)	*Any three points from:* • threshold frequency = 1.5×10^{15} Hz • threshold wavelength = 2.0×10^{-7} m • work function = 6.2 eV (or 9.9×10^{-19} J) • Planck constant = 6.6×10^{-34} J s (**not** 6.63×10^{-34} J s) • number per unit time (of photons / electrons) = 1.7×10^{16} s^{-1} (in stage 1) • power of incident radiation = 0.028 W (in stage 1)

A-Level Physics: **w24 41**

8(a)	photoelectric effect
8(b)(i)	$E = hf$
	work function $= 6.63 \times 10^{-34} \times 8.8 \times 10^{14}$ $= 5.8 \times 10^{-19}$ J
8(b)(ii)	$hf = \Phi + \frac{1}{2} m v_{MAX}^2$
	$6.63 \times 10^{-34} \times 11 \times 10^{14} = (5.8 \times 10^{-19}) + (\frac{1}{2} \times 9.11 \times 10^{-31} \times v_{MAX}^2)$
	$v_{MAX} = 5.7 \times 10^5$ m s^{-1}
8(c)	E_{MAX} shown as zero from f = 8.0 to 8.8 and non-zero from f = 8.8 to 11
	all non-zero E_{MAX} shown as a single straight line with a positive gradient
	line passing through (11, 1.45)