A-Level Physics: **w25 41**

7(a)	(induced) e.m.f. is (directly) proportional to rate
	of change of (magnetic) flux (linkage)
7(b)(i)	flux = e.m.f. × time
	flux = 0.54 × 15 = 8.1 Wb
7(b)(ii)	$\Phi = BA$
	area = 8.1 / (38 × 10^{-6}) = 2.1 × 10^{5} m^2
7(b)(iii)	area = speed × time × width
	v = (2.1 × 10^5) / (15 × 68) = 210 m s^{-1}
7(b)(iv)	opposing force (due to current in wings) must be backwards
	from Fleming's left-hand rule, current (in wings) must be from Q to P
	current is from – to + inside an e.m.f. source so P is at higher potential

A-Level Physics: **s25 44**

7(a)(i)	loss of energy (of oscillations)
	due to resistive forces
7(a)(ii)	amplitude (of oscillations) decreases gradually **or** oscillations continue (for several periods)
7(a)(iii)	cutting of (magnetic) flux causes induced e.m.f. (in coil) **or** induced e.m.f. causes current (in resistor / circuit)
	current causes dissipation of thermal energy in resistor **or** current in resistor causes dissipation of thermal energy
	thermal energy comes from energy of oscillations
7(b)	(for any given e.m.f.) current is lower so thermal energy dissipated at a lower rate **or** (for any given e.m.f.) current is lower so the resistive force is lower
	oscillations are less damped **or** smaller decrease in amplitude of oscillations (in each period) **or** oscillations continue for longer

A-Level Physics: **m25 42**

7(a)	(induced) e.m.f. is (directly) proportional to rate
	of change of (magnetic) flux (linkage)
7(b)(i)	(uniform acceleration so) velocity is (directly) proportional to time
	(Fig. 7.2 shows) e.m.f. is (directly) proportional to time so E is proportional to v.

7(b)(ii)	($v = at$ so) distance moved in time $\Delta t = at\Delta t$
	$\Phi = BA$
	$E = (\Delta\Phi / \Delta t) = B \times L \times (at\Delta t) / \Delta t = BLat$
7(b)(iii)	$B = (0.30 \times 10^{-3}) / (0.45 \times 7.8 \times 2.0)$
	$= 4.3 \times 10^{-5}$ T