# Q5 is HT only

# Single-step calculations

1. F = ke = 0.75 x 0.75 = 0.5625 = 0.56 N
2. W = mg = 75 x 10 = 750 N
3. V = IR = 6.5 x 38 = 247 = 250 V
4. GPE = mgh = 56 x 10 x 17 = 9520 = 9500 J
5. *ρ = mv = 175 x 45 = 7875 = 7900 kg m/s*
6. KE = 0.5mv² = 8.75 = 9 J
7. Q = It => I = Q/t = 87/47 = 1.851 = 1.9 A
8. E = VQ => V = E/Q = 0.184 = 0.18 V
9. F = ma = 112.5 = 110 N
10. P = E/t = 45/75 = 0.6 W
11. a = Δv/t = 0.83 m/s²
12. W = mg => g = W/m = 56/12 = 4.67 = 4.7 N/Kg
13. W = Fs = 78 x 6.5 = 507 = 510 J
14. P = IV = 48 x 12.5 = 600 W

# Multi-step calculations:

1. A) v = s/t = 1800/60 = 30 m/s

B)s = v x t = 30 x 300 = 9000 m

1. A) 28 -8 = 20 m/s

B) a = Δv/t = 20/8 = 2.5 = 3 m/s²

1. A) 200 W = 200 J/s

B) E = P x t = 200 x (2 x 60) = 24000 J

C) (i) Q = I x t = 5 x (2 x 60) = 600 C

(ii) E = V x Q => V = E/Q = 24000/600 = 40 V

1. A) a = Δv/t = 40/10 = 4 m/s²

**or**

v²-u² = 2as => a = (v²-u²)/2s = 1600/400 = 4 m/s²

B) F = m x a = 5 x 4 = 20 N

1. A) W = m x g = (70 + 20) x 10 = 900 N

B) Resultant force = 0 N (constant velocity)

1. A) v = s/t = 20/35 = 0.57 = 0.6 m/s

B) s = v x t = 0.6 x 60 = 36 = 40 m

**or**

s = v x t = 0.57 x 60 = 34.2 = 30 m