1. The weight of a piece of wire is directly proportional to its length. A piece of wire is 25 cm long and has a weight of 6 grams. Another piece of the same wire is 30 cm long. Calculate the weight of the 30 cm piece of wire.

2. A ball falls vertically after being dropped. The ball falls a distance d meters in a time of t seconds. d is directly proportional to the square of t. The ball falls 20 meters in a time of 2 seconds.

(a) Find a formula for d in terms of t.

(b) Calculate the distance the ball falls in 3 seconds.

(c) Calculate the time the ball takes to fall 605 m.

3. The time, T seconds, it takes a water heater to boil some water is directly proportional to the mass of water, m kg, in the water heater. When m = 250, T = 600

(a) Find T when m = 400

The time, T seconds, it takes a water heater to boil a constant mass of water is inversely proportional to the power, P watts, of the water heater. When P = 1400, T = 360

(b) Find the value of T when P = 900

4. d is directly proportional to the square of t. d = 80 when t = 4

(a) Express d in terms of t.

(b) Work out the value of d when t = 7

(c) Work out the positive value of t when d = 45

5. p is inversely proportional to m. p = 48 when m = 9 Calculate the value of p when m = 12

6. r is inversely proportional to t. r = 12 when t = 0.2 Calculate the value of r when t = 4.

7. The shutter speed, S, of a camera varies inversely as the square of the aperture setting, f. When f = 8, S = 125

(a) Find a formula for S in terms of f

(b) Hence, or otherwise, calculate the value of S when f = 4

8. The force, F, between two magnets is inversely proportional to the square of the distance, x, between them. When x = 3, F = 4.

(a) Calculate F when x = 2.

(b) Calculate x when F = 64.