Proportionality Homework

1) The current I flowing through a circuit is directly proportional to the voltage V applied to the circuit. When the voltage is 12 volts, the current is 0.3A.

(a) Find a formula giving I in terms of V.
(b) What would the current be if 20 volts were applied to the circuit?
(c) What voltage would be necessary to produce a current of 0.7A ?

2) The intensity L of light is inversely proportional to the square of the distance d from the source. If L = 40 when d = 5,

(a) Find a formula giving L in terms of d
(b) Find L when d = 2
(c) Find d when L = 20

3) The safe speed, V km/h, at which a car can round a bend of radius R metres varies directly as the square root of R. If the safe speed on a bend of radius 25m is 40km/h,

(a) Find a formula giving V in terms of R.
(b) Find the safe speed around a bend of radius 15m.
(c) What is the minimum radius of bend allowable on a road designed to be safe at 110km/h ?

4) For a given mass of gas at a given temperature, the pressure P is inversely proportional to the volume V. If P = 100 N when V = $2.4m^3$

(a) Find a formula giving P in terms of V
(b) Find the pressure when the gas is compressed to a volume of $2m^3$

5) The force G exerted by gravity on a satellite is inversely proportional to the square of the distance D between the satellite and the centre of the earth. When D = 6400km (the radius of the earth), G = 5000N.

(a) Find a formula giving G in terms of D.
(b) Find the force exerted by gravity on the satellite if it is orbiting 10000km above the centre of the earth.
(c) Find the force exerted by gravity on the satellite if it is orbiting 10000km above the *surface* of the earth.

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