A9 Factor and Percentage Changes

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In questions A9.1 to A9.5, give the factor by which the quantity changes to two significant figures. So if it doubles, your answer is 2.0, and if it halves your answer is 0.50.

A9.1 By what factor does $E = mv^2/2$ change if v doubles?

A9.2 By what factor does

a) $V = -GM/r$ change if r is multiplied by 3.3?

b) $g = GM/r^2$ change if r is multiplied by 0.64?

A9.3 By what factor does v need to change if $E = mv^2/2$ is to halve?

A9.4 By what factor does d need to change in $I = P/(4\pi d^2)$ if P has multiplied by 5.2 and I is not to change?

A9.5 In $GMT^2 = 4\pi^2 r^3$, by what factor does T change if G and M remain constant, and r is multiplied by 3.5?

In questions A9.6 to A9.10, give the percentage change in the quantity. Use "+" or "−" to indicate increase or decrease (so a 3 % decrease would be given as −3 %).

A9.6 In $V = IR$, what is the percentage change in V if I increases by 8 %?

A9.7 In $E = mv^2/2$, what is the percentage change in E if v increases by 3 %

A9.8 In $f = 1/T$, what is the percentage change in f if T increases by 4 %?

A9.9 In $r = \sqrt{(A/\pi)}$, what is the % change in r if A decreases by 6 %?

A9.10 In

a) $E = VIt$, what is the percentage change in E if V increases by 1 %, I decreases by 2 % and t increases by 3 %?

b) $R = \rho L/A$, what is the percentage change in R if L increases by 7 % and A increases by 3 %?