(On request – Colin)

Q- A step-down transformer has an output of 14.5 V and 0.66 A when connected to an incoming 268 V line. What is the ratio of primary to secondary loops (keep in mind this may not be an integer answer)?
a) What current does the transformer draw from the incoming line?
b) What is the power output of the transformer?

The ratio of the primary to the secondary loops is the same as the input and output voltage and thus is given by

$$\frac{V_{output}}{V_{input}} = \frac{n_s}{n_p}$$

Or $\quad \frac{n_p}{n_s} = \frac{V_{input}}{V_{output}} = \frac{268}{14.5} = 18.5$

a)

For an ideal transformer output power is same as input power and thus

$$V_{input} * I_{input} = V_{output} * I_{output}$$

Or $\quad I_{input} = \frac{V_{output} * I_{output}}{V_{input}} = \frac{14.5 * 0.66}{268} = 3.57 * 10^{-2} \, A = 35.7 \, mA$

b)

The output (or input) power of the transformer is given by

$$P_{output} = V_{output} * I_{output} = 14.5 * 0.66 = 9.57W$$