Quiz 3

This is a preview of the published version of the quiz

Started: Feb 8 at 8:27am

Quiz Instructions

You may use notes, books, and canvas resources. You may not use online calculators or any simulation tools.

Write your answer in reasonable units, e.g., 2 mA instead of 0.002 A (but as always, you won't get marked off if you don't, so long as the answer is correct). Include units! **You will use lose points for missing units**.

The number of significant digits is the number of digits after the first non-zero digit.

The following are to three significant digits:

- 0.0456 A
- 45.6 mA

The following are not to three significant digits:

- 0.045 A (it only has two significant digits)
- 45.673 mA (it has five significant digits)

As always, canvas will give you a nominal score that I will manually adjust on saturday.

Question 1 — 1 pts

Which of the following expressions is an accurate way to calculate the power dissipated by a resistor? Select all that apply.

- [x] P = IV
- [ ] P = I(R^2) — I^2R, but not IR^2
- [ ] P = (V^2)R — V^2/R, but not V^2R
- [ ] P = V / I — $R = V/I$, but not $P = V/I$

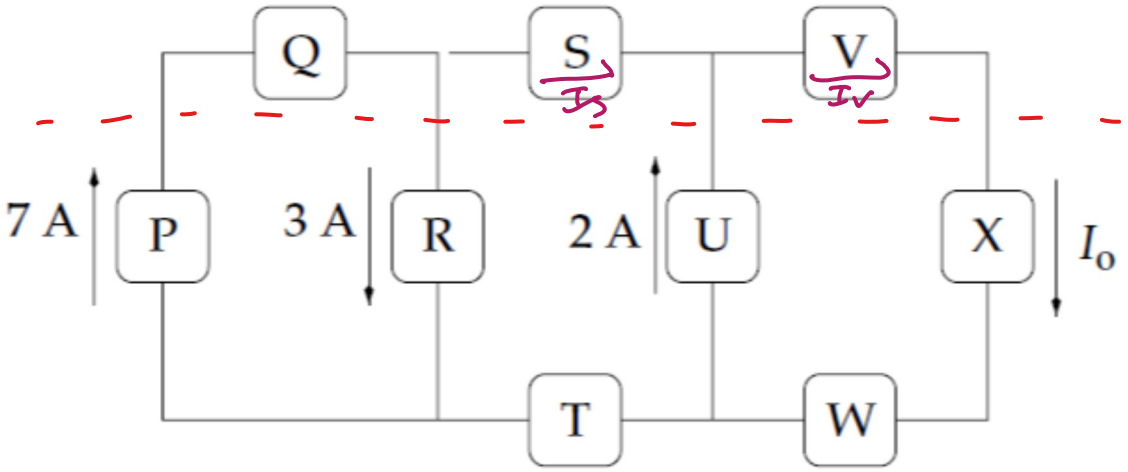
Question 2

1 pts

$7A + 2A = 3A + I_o \Rightarrow \boxed{I_o = 6A}$

"up" "down"

In the figure, what is the current, I_o?



longer version

$I_S = 7A - 3A = 4A$

$I_V = I_S + 2A = 6A$

$I_X = I_V = \boxed{6A}$

Question 3

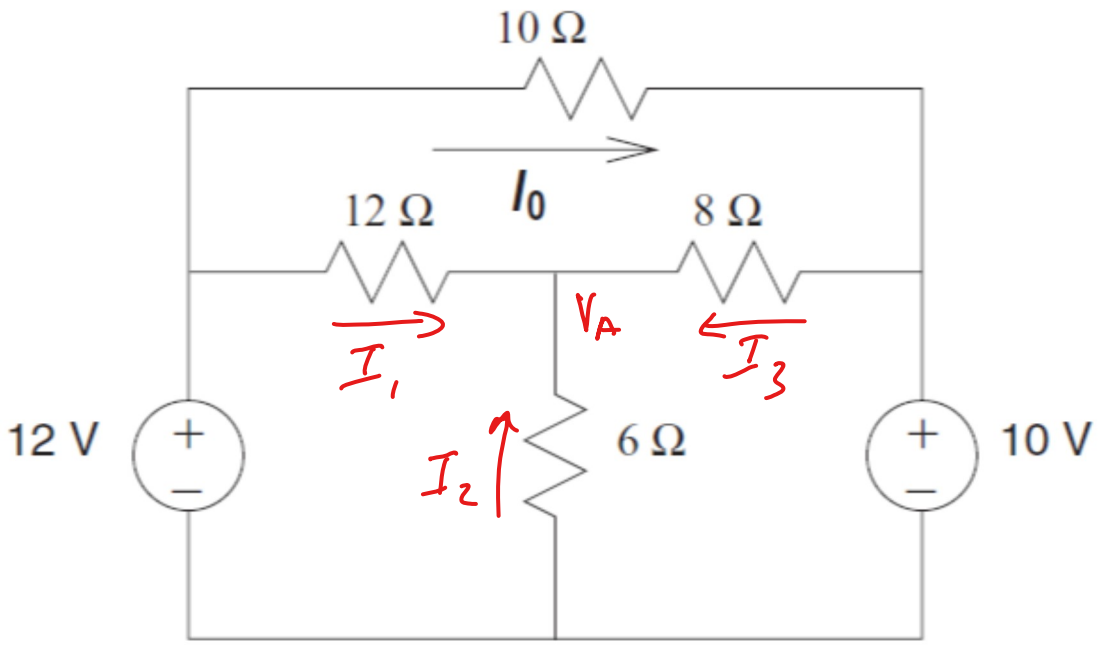
1 pts

should be 10Ω

What is the current, I_o, through the 10kOhm resistor?

$I_{10\Omega} = \frac{\Delta V}{R} = \frac{12V - 10V}{10\Omega} = \boxed{0.2\,A}$

(If you used 10kΩ to get 0.2mA, that's fine.)



Question 4

1 pts

In the figure in the previous problem, what is the voltage at the junction of the 6, 8, and 12 Ohm resistors?

I_1 I_2 I_3

$$\frac{12 - V_A}{12\Omega} + \frac{0 - V_A}{6\Omega} + \frac{10 - V_A}{8\Omega} = 0$$

- 2V
- 4V
- 6V
- a dollar...

$$\Rightarrow \underbrace{\frac{12V}{12\Omega} + \frac{10V}{8\Omega}}_{\frac{9}{4}\left(\frac{V}{\Omega}\right)} = \underbrace{\left[\frac{1}{12\Omega} + \frac{1}{6\Omega} + \frac{1}{8\Omega}\right]}_{\left[\frac{2+4+3}{24\Omega}\right]} V_A$$

$$V_A = \frac{24}{4} \cdot 9\,V = \boxed{6V}$$

Question 5

1 pts

What sized resistor, R, would be needed to make V_A=3.3 V. Write your answer to the nearest kOhm.

$V_A = \frac{20k\Omega}{20k\Omega + R} \cdot 5V$

$\Rightarrow R + 20k\Omega = \frac{5V}{3.3V} \cdot 20k\Omega$

$R = \frac{5}{3.3} \cdot 20k\Omega - 20k\Omega = 10,303\,\Omega$

ROUNDS TO $\boxed{10k\Omega}$

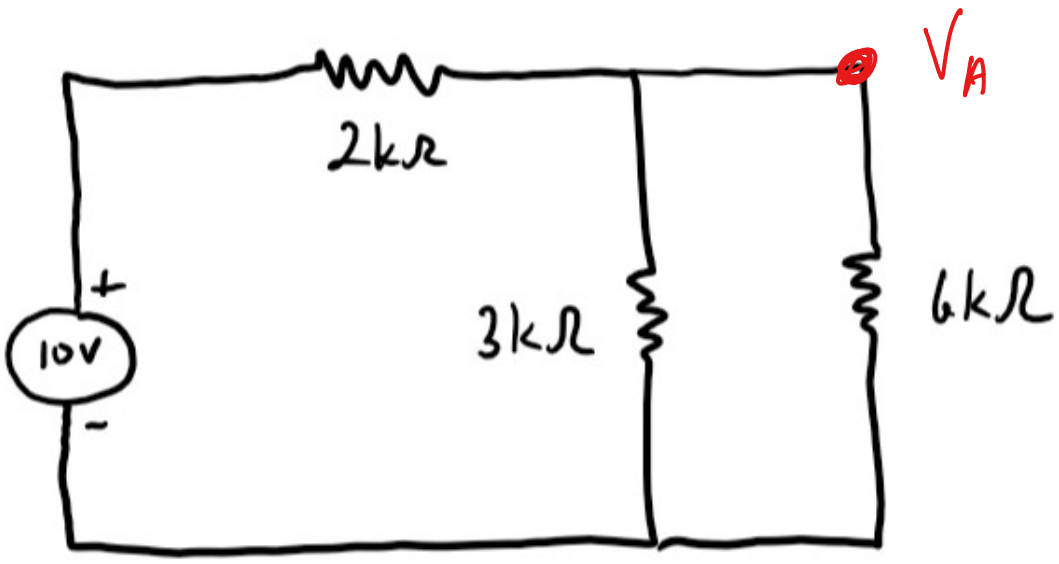
Question 6 1 pts

Given the circuit below, how much power does the 6 kOhm resistor dissipate? Write your answer to three significant digits.

$P = I^2R$ or $\frac{V^2}{R}$. In this case

$V_A = 10V \cdot \frac{3||6}{2+3||6} = 10V \cdot \frac{2}{2+2} = 5V$

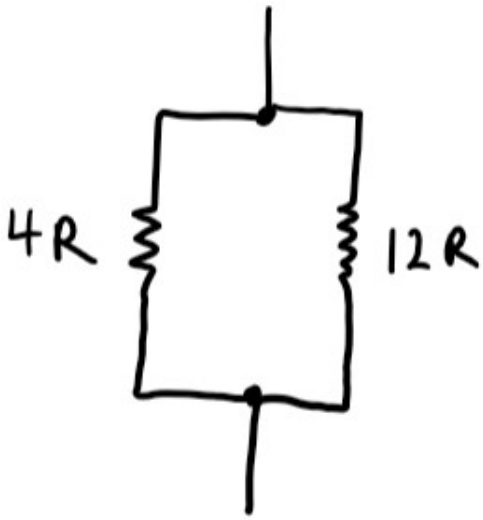
So $P = \frac{(5V)^2}{3||6\,k\Omega} = \frac{(5V)^2}{6k\Omega} = 0.00416666\ldots W = \boxed{4.17\,mW}$



Question 7

1 pts

What is the equivalent resistance of the two resistors, which are wired in parallel?



$$R_{eq} = \frac{4R \cdot 12R}{4R + 12R} = \frac{48R^2}{16R}$$

$$= \boxed{3R}$$

(You really should have 3R, but I accepted "3Ω")

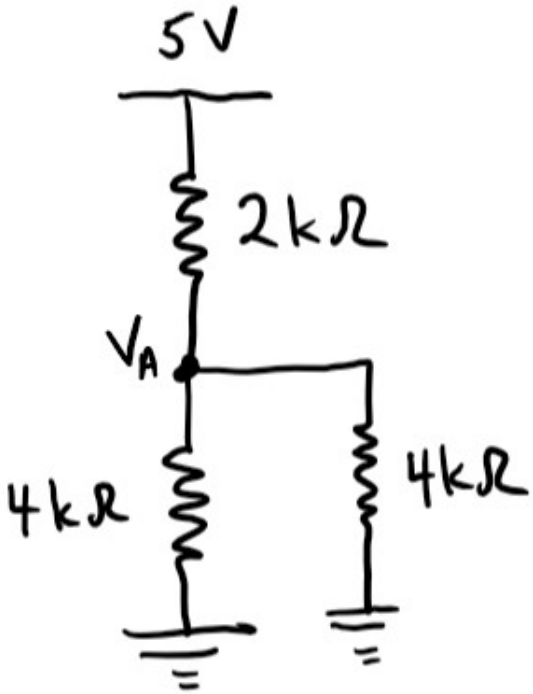
Question 8

1 pts

What is the voltage, V_A, at the junction of the voltage divider?

$$V_A = 5V \cdot \frac{4k\Omega \| 4k\Omega}{2k\Omega + 4k\Omega \| 4k\Omega} = 5V \cdot \frac{2k\Omega}{2k\Omega + 2k\Omega}$$

$$= \boxed{2.5V}$$



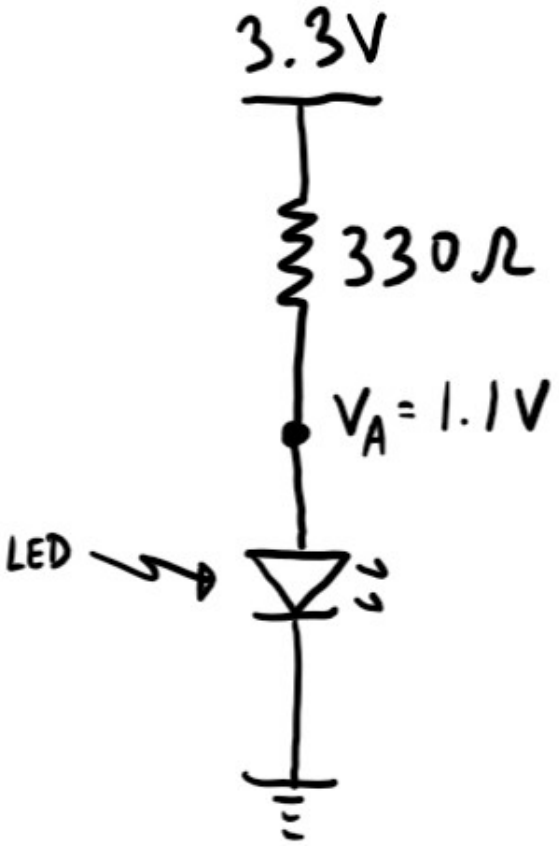
Question 9

1 pts

The circuit shown is from your microcontroller homework. How much current is flowing through the diode? Write your answer to three significant digits.

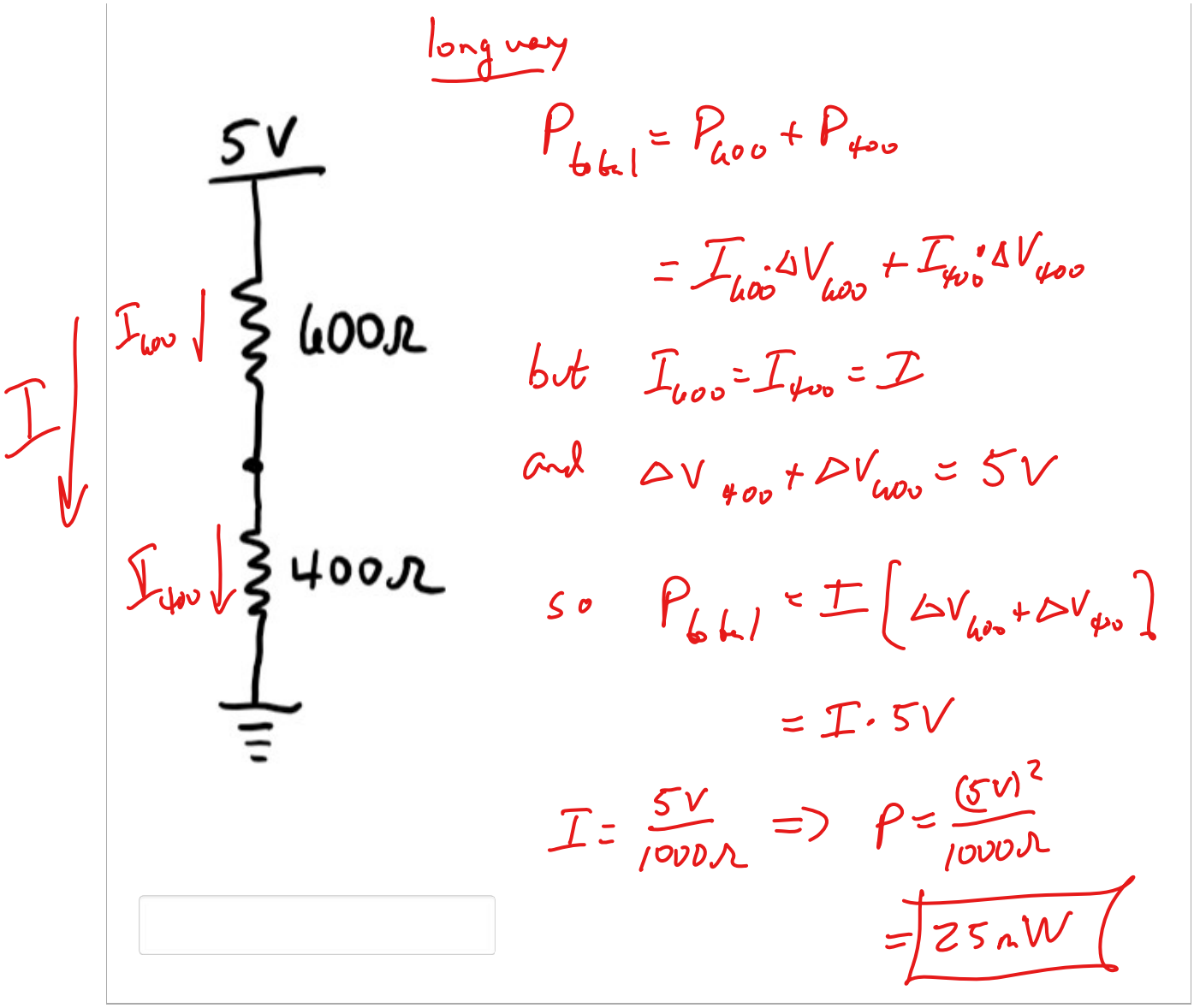
$$I_{LED} = I_{resistor} = \frac{\Delta V_R}{R} = \frac{3.3V - 1.1V}{330\Omega}$$

$$= \frac{2.2V}{330\Omega} = \boxed{6.67\,mA}$$



Question 10 1 pts

How much power is dissipated by the resistors (total) in the following circuit? Write your answer to three significant digits.



Not saved Submit Quiz