Name : _dolution_   Section:_____   CWRU e-mail:_____

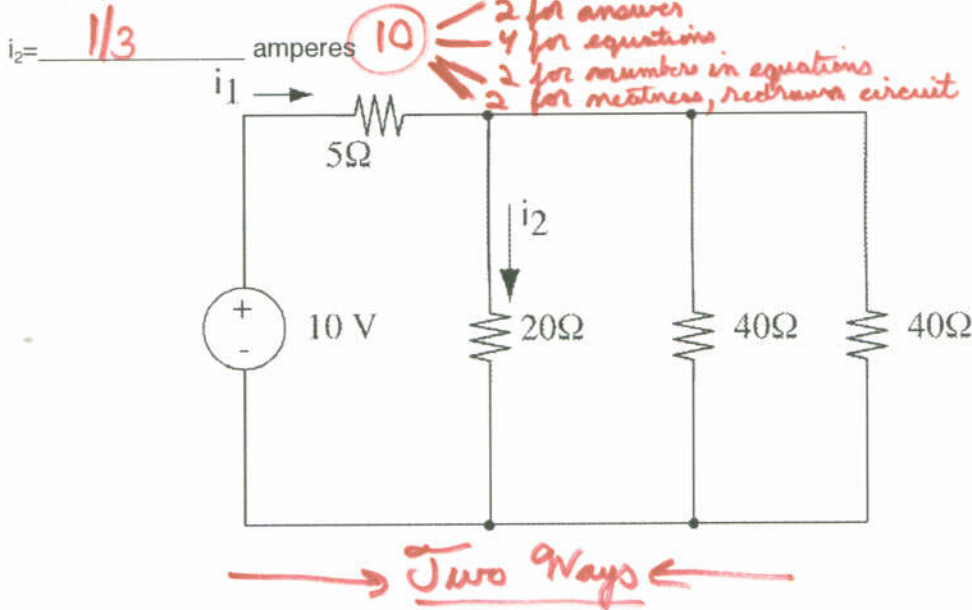**Quiz No. 3**   2/4/05

PUT ANSWERS IN THE SPACE PROVIDED AND SHOW YOUR WORK IF APPROPRIATE
STATE ALL ASSUMPTIONS

EQUIVALENT CIRCUITS. VOLTAGE AND CURRENT DIVISION

1. (10 points) Determine the current i_2 going through the 20Ω resistor in the circuit shown below.

$i_2=$ __1/3__ amperes   ⑩ < 2 for answer
                                4 for equations
                                2 for numbers in equations
                                2 for neatness, redrawn circuit

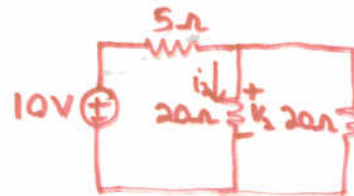→ Two Ways ←

Current Division

✦ convert circuit into:

$$i_s = \frac{10V}{5\Omega} = 2A$$

$$i_s = \left[\frac{\frac{1}{20}}{\frac{1}{5} + \frac{1}{20} + \frac{1}{40} + \frac{1}{40}} \right] (2A) = \frac{1}{3}$$

$$\boxed{i_s = \frac{1}{3}}$$
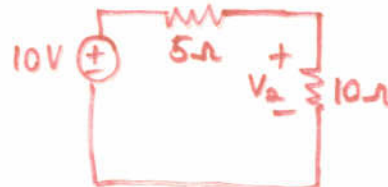
Voltage Division

✦ convert circuit into:

$$i_2 = \frac{V_2}{20\Omega}$$

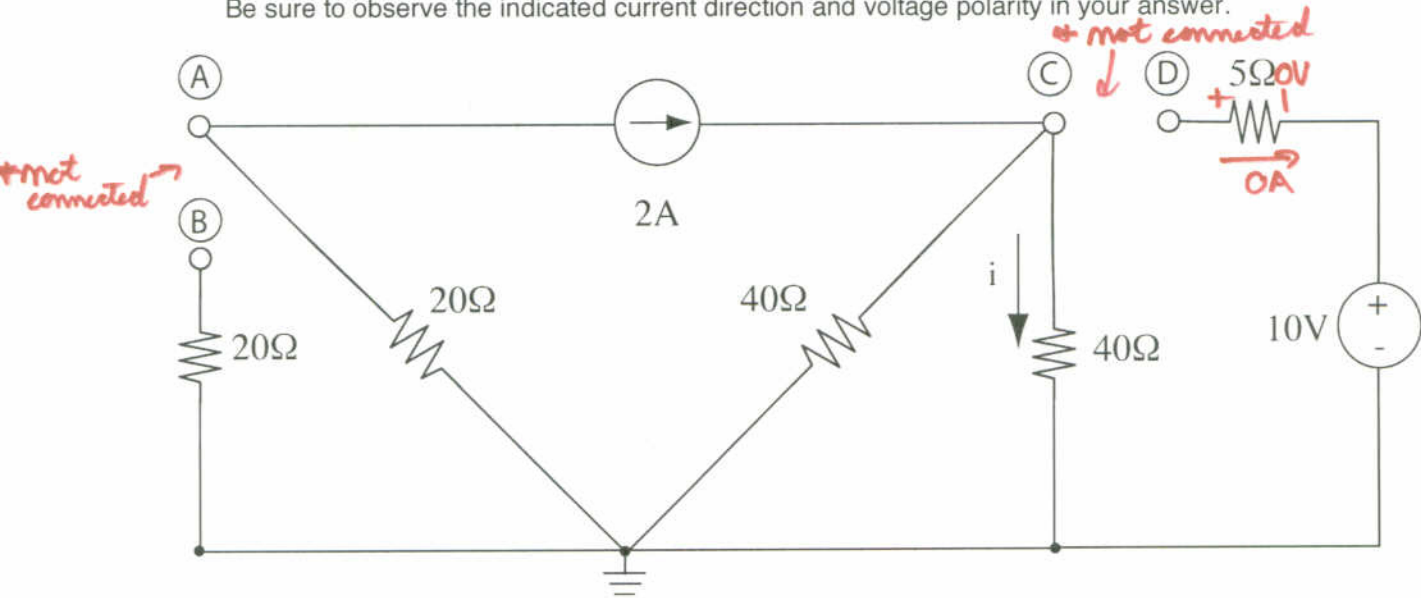$$i_2 = \frac{20/3}{20} = \boxed{i_2 = \frac{1}{3}}$$

$$V_2 = \frac{10\Omega}{5\Omega + 10\Omega} (10V) = \frac{20}{3} V$$

COMBINED CONSTRAINTS

2. (10 points) Determine the numerical values of the indicated parameters for the circuit shown below. Be sure to observe the indicated current direction and voltage polarity in your answer.

V_D, the voltage at point D with respect to ground	10V ② — 2 for answer
i, the current through the vertical 40Ω resistor (note the indicated direction)	1A ② — same as above
V_C, the voltage at point C with respect to ground	40V ② — same as above
V_B, the voltage at point B with respect to ground	0V ② — same as above
V_A, the voltage at point A with respect to ground	−40V ② — same as above

→ Just the voltage source, 10V

→ Current division: $i = \dfrac{\frac{1}{40}}{\frac{1}{40} + \frac{1}{40}} (2A) = 1A$

→ voltage with respect to ground

node

+

V

−