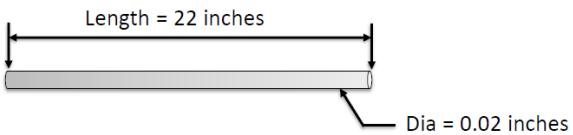
Exam Practice Problems (5 Point Questions)

Below are practice problems for the five point questions found on the exam. These questions come from past exams as well additional questions created by faculty. Please note that these are just examples of questions and may not cover all concepts that could be asked in the 5-point section on your exam.

Electron/Electricity Problems:

1. The number of valence electrons in the copper wire shown below is closest to…
    a. 8.1×10^{21}
    b. 8.4×10^{21}
    c. 8.7×10^{21}
    d. 9.0×10^{21}
    e. 9.3×10^{21}
    f. 9.6×10^{21}
    g. 9.9×10^{21}
    h. 10.2×10^{21}
    i. 10.5×10^{21}



density = 8.94 g/cm^3
atomic weight = 63.55 g/mol

2. If $1.57(10)^{19}$ electrons leave a DC power source over a 2-minute period, then the average current is closes to . . .
    a. 0.021A
    b. 0.032A
    c. 0.043A
    d. 0.054A
    e. 0.066A

3. A light bulb is powered using an AA battery rated at 2500mA·hr. The 1.5V battery lasts for 120 hours before the light bulb dims completely. Assuming a constant current, what is the resistance of the light bulb?
    a. 0.014 Ω
    b. 0.072 Ω
    c. 60 Ω
    d. 72 Ω
    e. 220 Ω
    f. 450 Ω

4. Given a solid cylinder of pure copper with a diameter of 0.5 inches and a height of 2 inches. The number of valence electrons in the copper cylinder is closest to:
    a. 4.452×10^{23}
    b. 4.952×10^{23}
    c. 5.452×10^{23}
    d. 5.952×10^{23}
    e. 6.452×10^{23}
    f. 6.952×10^{23}
    g. 7.452×10^{23}
    h. 7.952×10^{23}

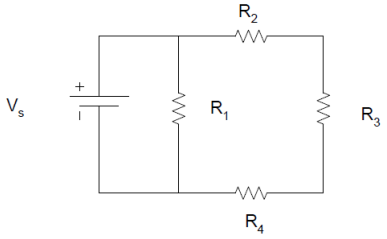
Atomic weight of Cu: $63.55 \frac{g}{mol}$

Density of Cu: $8.94 \frac{g}{cm^3}$

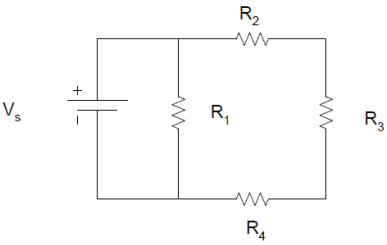
Avogadro's Number: $6.022 * 10^{23} \frac{atoms}{mol}$

Circuits Problems:

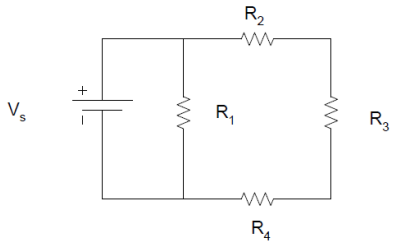
1. The resistors that are in parallel with each other are:
    a. R2 and R4
    b. R1 and R3
    c. Both R2 and R4 along with R1 and R3
    d. R1 and (R2 + R3 + R4)
    e. None of the above



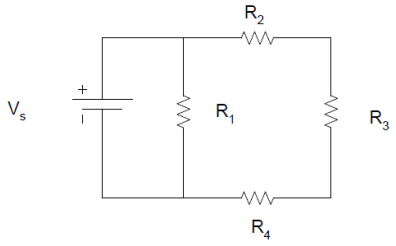
2. The voltage drop across R1 =
    a. Vs
    b. R1 times the current through R1
    c. The sum of the voltage drops across R2, R3, and R4
    d. None of the above
    e. Answers (a), (b), and (c)



3. If Req = 100Ω and Vs = 10V, the current leaving the voltage source must be
    a. 1000A
    b. 1000W
    c. 0.1A
    d. 0.1W
    e. None of the above

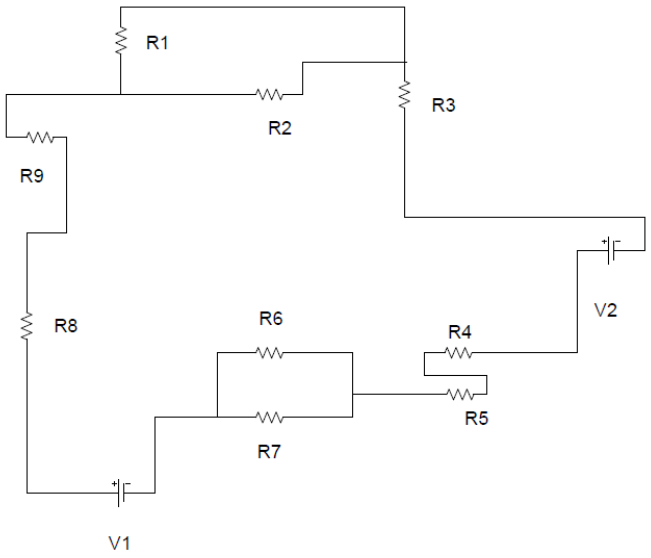


4. If Vs = 5V, the current through R1 = 1A and the current through R3 = 2A, then
    a. The current leaving the voltage source = 3A
    b. The current through R2 = 2A
    c. The power generated by the voltage source = 5W
    d. The power generated by the voltage source = 15W
    e. None of the above
    f. Answers (a), (b), and (d)

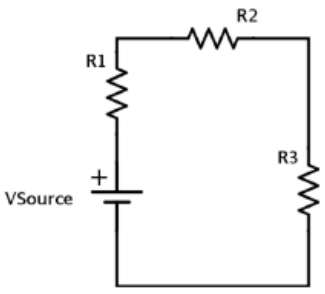


5. R_1 and R_2 are:
    a. in series
    b. in parallel
    c. neither (a) nor (b)
    d. both (a) and (b)

6. Using the circuit diagram from question 5, R_8 and R_9 are:
    a. in series
    b. in parallel
    c. neither (a) nor (b)
    d. both (a) and (b)



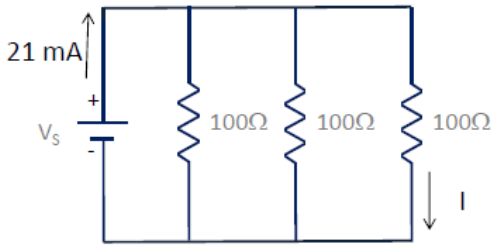
7. The voltage drop across R1 is closest to:
    a. 7.23 V
    b. 3.24 V
    c. 9.94 V
    d. 4.11 V
    e. 1.57 V
    f. 6.84 V
    g. 8.85 V
    h. 1.71 V



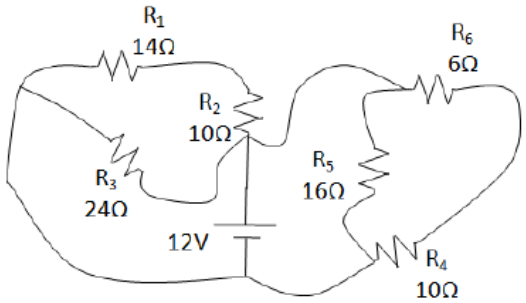
VSource = 12 V

R1 = 60 Ω
R2 = 25 Ω
R3 = 90 Ω

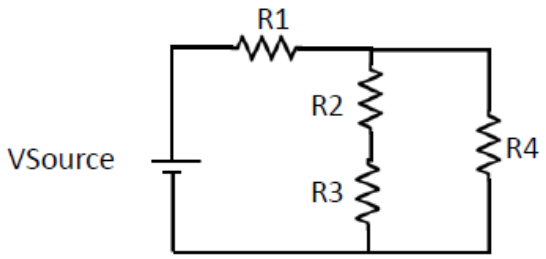
8. Given the circuit below, determine the value of I, the current going through the resistor on the right side of the circuit.
    a. 8A
    b. 7mA
    c. 27 mA
    d. 1.2 A
    e. 7V
    f. 120 mA
    g. Not enough information



9. Considering the circuit below, how much power is dissipated by R2?
    a. 7 W
    b. 10.3 W
    c. 87 W
    d. 3.5 W
    e. 14.4 W
    f. 0 W
    g. 1.2 W
    h. 2.5 W
    i. 6 W

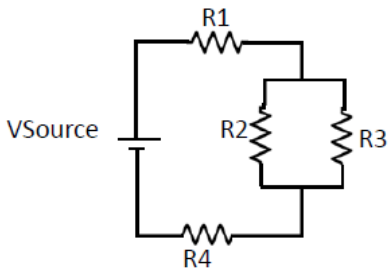


10. The power dissipated by R4 is closest to:
    a. 26.7 mW
    b. 320 mW
    c. 142 mW
    d. 240 mW
    e. 889 mW
    f. 3.2 W
    g. 2.88 W
    h. 184 W



VSource = 12 V
R1 = 50 Ω
R2 = 100 Ω
R3 = 100 Ω
R4 = 200 Ω

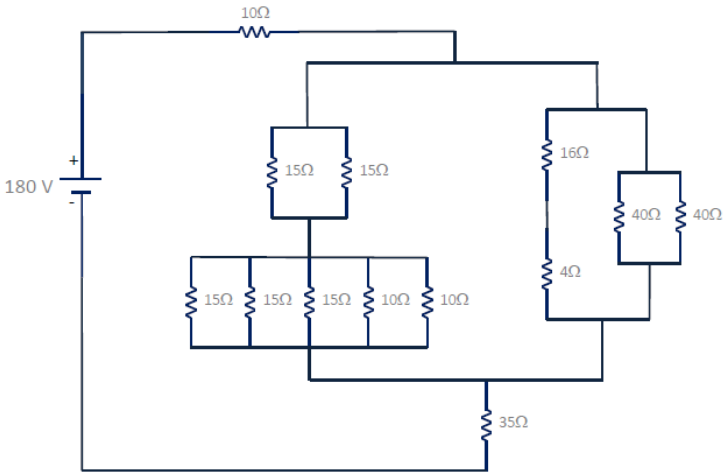
11. The voltage drop across R4 is closest to:
    a. 120 V
    b. 28.7 V
    c. 32.2V
    d. 22 V
    e. 90V
    f. 43 V
    g. 42.2 V
    h. 58.3 V



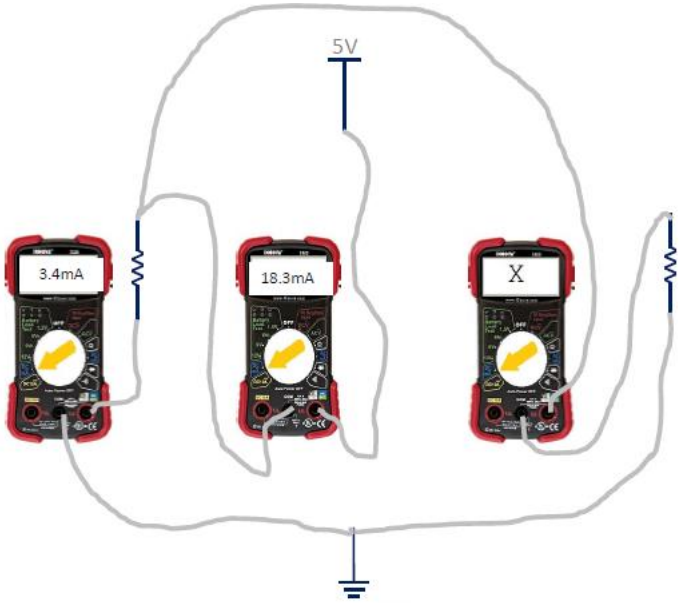
VSource = 90 V

R1 = 320Ω
R2 = 220 Ω
R3 = 470 Ω
R4 = 220 Ω

12. The current supplied by the 180 V source is closest to ...
    a. 0.7 A
    b. 0.1 A
    c. 2.1 A
    d. 10.0 A
    e. 5.2 A
    f. 3.6 A
    g. 6.7 A
    h. 1.8 A
    i. 20.0 A

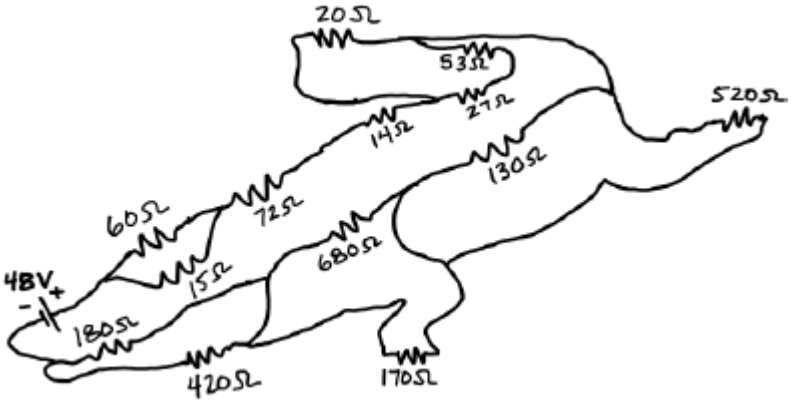


13. Using the circuit and information displayed on the multi meters below, the value you expect to see displayed as "X" is closest to ...
    a. 3.4 mA
    b. -3.4 mA
    c. 14.9 mA
    d. -14.9 mA
    e. 18.3 mA
    f. -18.3 mA
    g. 21.7 mA
    h. -21.7 mA
    i. Nothing since the fuse will blow



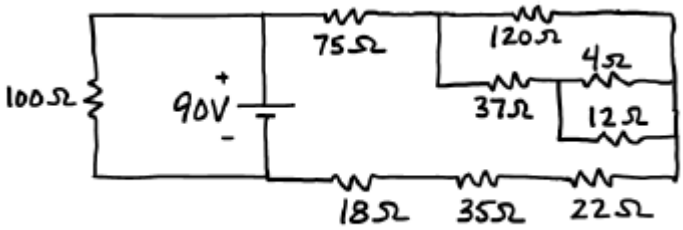
14. The current flowing through the 15Ω resistor is closest to ...

a. 20 mA
b. 8.6 mA
c. 13 mA
d. 10.3 mA
e. 7.11 mA
f. 69 mA
g. 18 mA
h. 22.6 mA
i. 42 mA
j. 80 mA

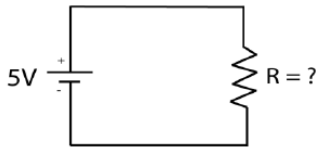


15. The voltage across the 4Ω resistor in the circuit shown is closest to ...

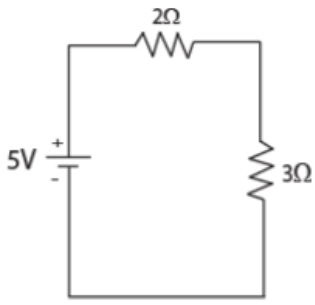
a. 2.29 V
b. 1.50 V
c. 1.61 V
d. 1.72 V
e. 1. 13 V
f. 1.84 V
g. 2.06 V
h. 1.95 V
i. 1.39 V
j. 2.29 V



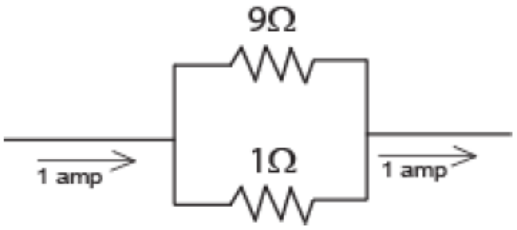
16. If a current of 40mA (1000mA = 1A) leaves the power source, then the resistance R is closest to …
    a. 0.1 Ω
    b. 0.25 Ω
    c. 125 Ω
    d. 250 Ω
    e. 1250 Ω



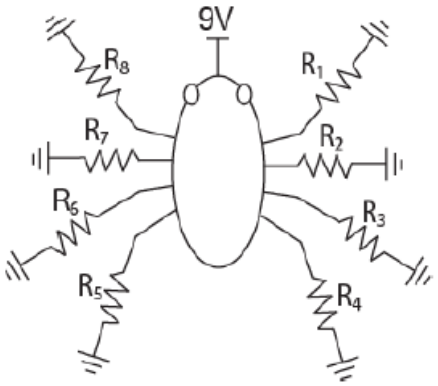
17. The power consumed 3 Ω resistor is closest to . . .
    a. 0.11W
    b. 0.33W
    c. 0.50W
    d. 1.0W
    e. 2.0W
    f. 3.0W
    g. 5.0W



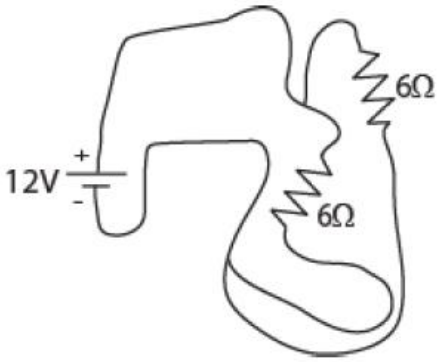
18. A portion of a circuit is shown below. If a current of 1 amp enters and leaves as shown, then the total power consumed by the two resistors is closest to . . .
    a. 0.5W
    b. 0.9W
    c. 1.1W
    d. 9W
    e. 10W



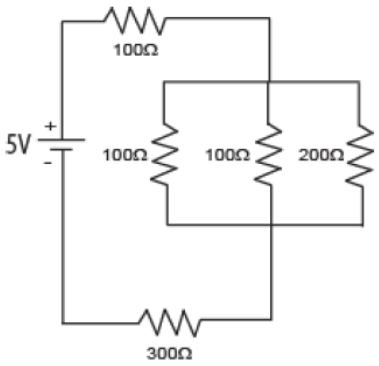
19. If each of the 8 resistors has a resistance of 1 Ω, then the voltage drop across R1 is closest to . . .
    a. 1V
    b. 2V
    c. 3V
    d. 4V
    e. 5V
    f. 6V
    g. 9V



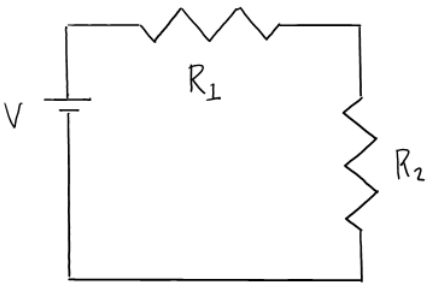
20. The current leaving the power source is closest to . . .
    a. 0.33A
    b. 0.66A
    c. 1.0A
    d. 1.3A
    e. 2A
    f. 4A



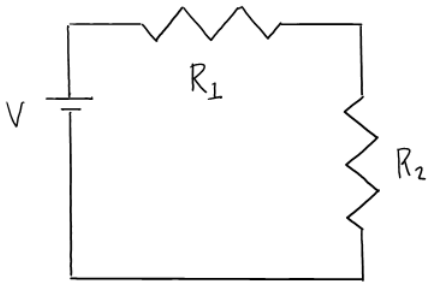
21. The current passing through the 200Ω resistor is closest to . . .
    a. 2.3mA
    b. 4.6mA
    c. 5.8mA
    d. 7.9mA
    e. 13.2mA
    f. 20mA



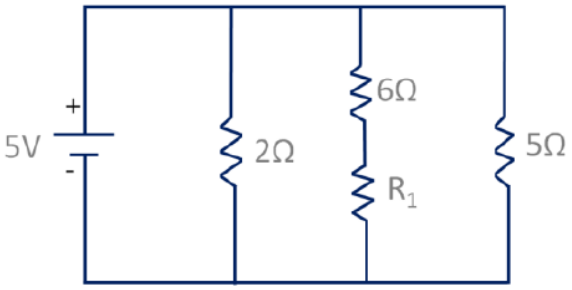
22. Given the circuit shown below where V = 5 Volts, R1 = 100 Ohms, and R2 = 220 Ohms, the power in the 220 Ohm resistor is closest to:
    a. 0.014 Watts
    b. 0.034 Watts
    c. 0.054 Watts
    d. 0.074 Watts
    e. 0.094 Watts
    f. 0.114 Watts
    g. 0.134 Watts



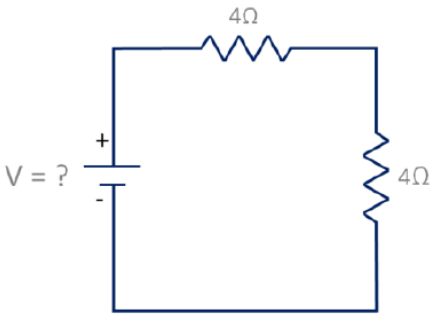
23. Given the circuit shown below where V = 9 Volts, R1 = 220 Ohms, and R2 = 470 Ohms, the voltage drop across the 470 Ohm resistor is closest to:
    a. 3.13 Volts
    b. 3.63 Volts
    c. 4.13 Volts
    d. 4.63 Volts
    e. 5.13 Volts
    f. 5.63 Volts
    g. 6.13 Volts
    h. 6.63 Volts



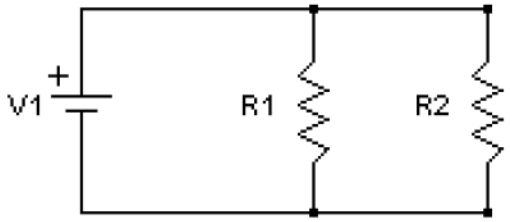
24. If the total current leaving the 5 V source is 4 A, then the value of R1 is closest to:
    a. 1 Ω
    b. 2 Ω
    c. 3 Ω
    d. 4 Ω
    e. 5 Ω



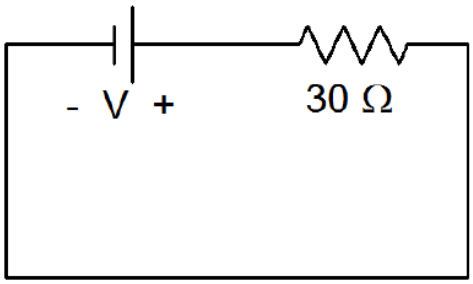
25. If the power dissipated by each resistor is 9 W, then the value of the voltage source is closest to:
    a. 4 V
    b. 5 V
    c. 6 V
    d. 9 V
    e. 12 V



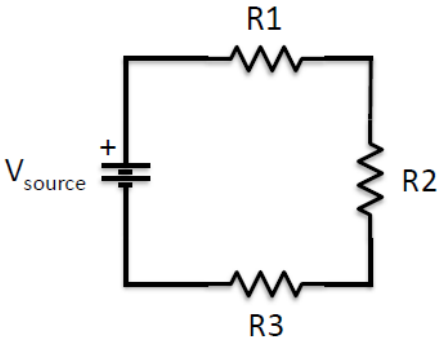
26. For the circuit below (where V1 = 9V, R1 = 330Ω, R2 = 1kΩ), the current passing through R1 is closest to:
    a. 0.011A
    b. 0.027A
    c. 0.064A
    d. 0.191A
    e. 0.333A



27. Suppose the net number of electrons that leave the negative side of the battery in 2 hours is 2.247×10^{22}. The power being dissipated by the resistor would be closest to:
    a. 97 MW (MW = megawatts: 106 Watts)
    b. 97 kW (kW = kilowatts: 103 Watts)
    c. 27 kW
    d. 900 W
    e. 30 W
    f. 15 W
    g. 7.5 W
    h. 17 mW (mW = milliwatts: 10-3 Watts)
    i. 8.3 mW



28. The voltage across R1 in the circuit shown below is closest to…
    a. 0.5 V
    b. 1.5 V
    c. 2.5 V
    d. 3.5 V
    e. 4.4 V
    f. 5.5 V
    g. 6.5 V
    h. 7.5 V
    i. 8.5 V
    j. 9.5 V

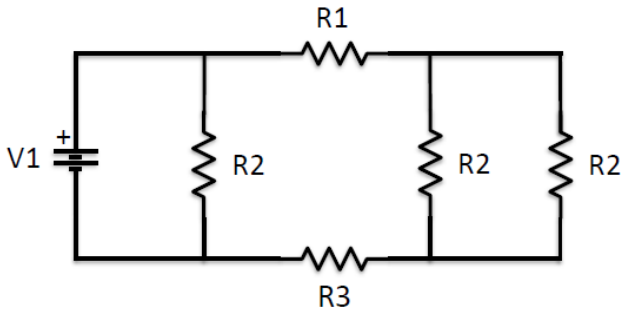


V_{source} = 9 V

R1 = 10 Ω
R2 = 20 Ω
R3 = 30 Ω

29. The equivalent resistance (Req) of the resistor network shown below is closest to…

a. 143 Ω
b. 153 Ω
c. 163 Ω
d. 173 Ω
e. 183 Ω
f. 193 Ω
g. 203 Ω
h. 213 Ω
i. 223 Ω

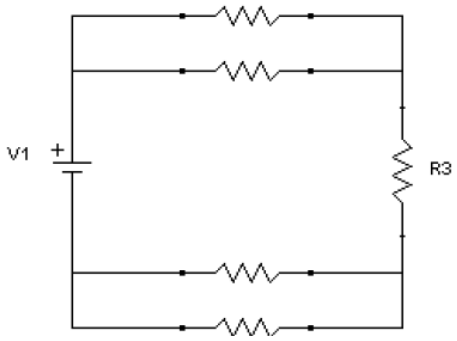


V_{source} = 6 V

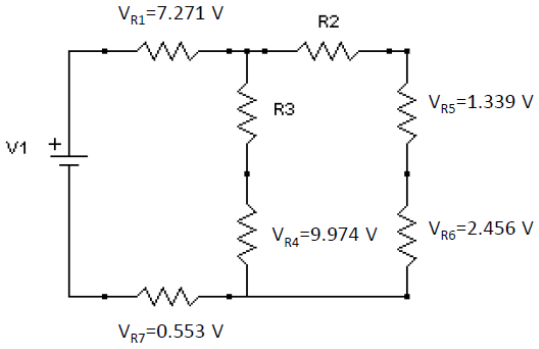
R1 = 100 Ω
R2 = 200 Ω
R3 = 300 Ω

30. For the circuit below (where V1 = 5 V, and each of the unlabeled resistors has a 1 V voltage drop), the voltage drop across R3 is closest to...

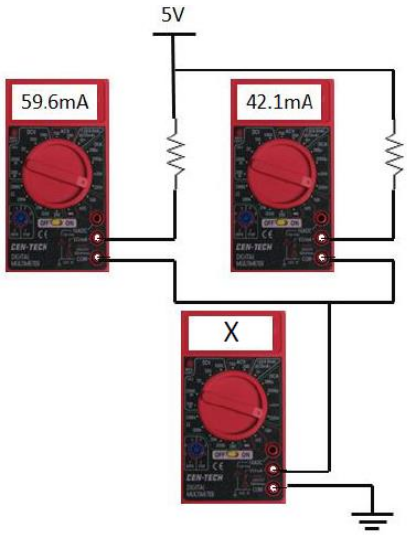
a. 0 V
b. 1 V
c. 2 V
d. 3 V
e. 4 V
f. 5 V
g. not enough information



31. For the circuit below (where V1 = 18 V), the voltage drop across R2 is closest to...
    a. 0 V
    b. 3.687 V
    c. 4.996 V
    d. 6.381 V
    e. 7.883 V
    f. 9.432 V
    g. not enough information



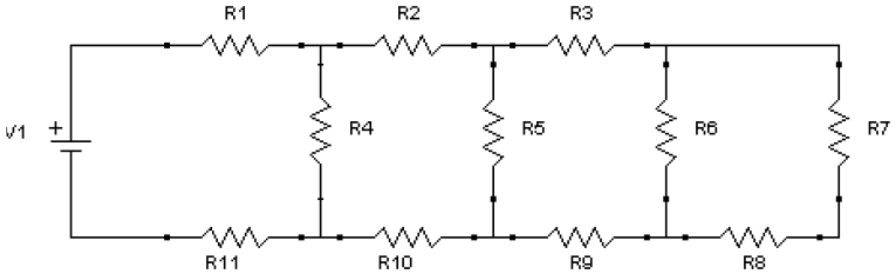
32. Using the circuit and information displayed on the multimeters below, the value you expect to see displayed as "X" is closest to...
    a. -17.5 mA
    b. -42.1 mA
    c. -59.6 mA
    d. -101.7 mA
    e. 17.5 mA
    f. 42.1 mA
    g. 59.6 mA
    h. 101.7 mA
    i. not enough information



33. Using the circuit and information in the table provided below, the current leaving the power source is closest to...

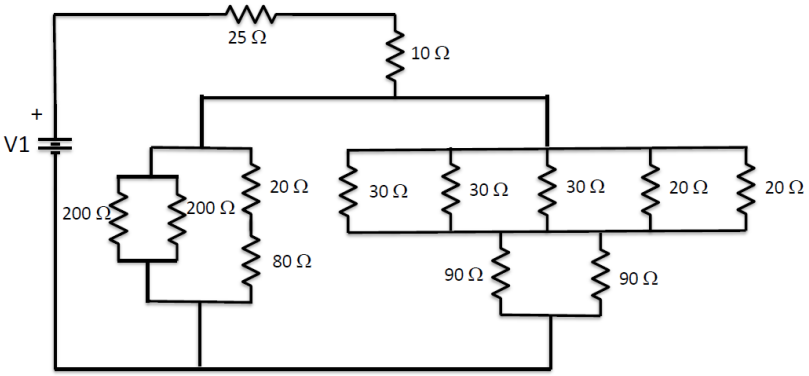
a. 0.12 A
b. 0.18 A
c. 0.23 A
d. 0.43 A
e. 0.55 A
f. 0.96 A
g. 1.08 A
h. not enough information

Resistor	Measured Current
R4	0.23 A
R5	0.18 A
R6	0.43 A
R7	0.12 A
R8	0.12 A

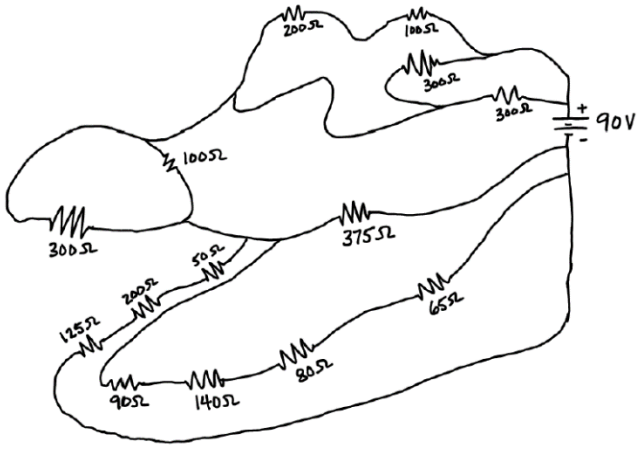


34. The current supplied by the 120 V battery is closest to...

a. 0.1 A
b. 0.5 A
c. 1.0 A
d. 2.0 A
e. 3.3 A
f. 5.0 A
g. 6.7 A
h. 10.0 A
i. 20.0 A



35. The power supplied to this circuit by the 90 V source is closest to…
    a. 0.5 W
    b. 2.5 W
    c. 7.5 W
    d. 15 W
    e. 27 W
    f. 32 W
    g. 53 W
    h. 75 W
    i. 150 W
    j. 300 W



Excel Problems:

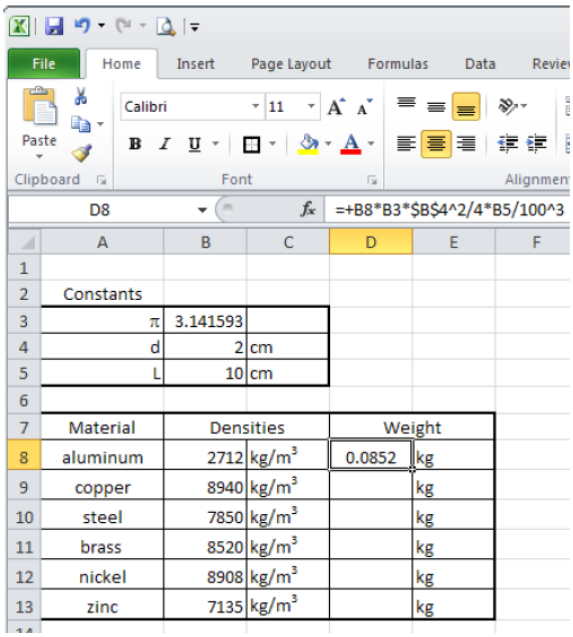
1. A teacher is creating an Excel spreadsheet to calculate the students' overall grades. The formula for the overall grade is: homework grade x homework weight+ Exam 1 grade x Exam 1 weight+ Exam 2 grade x Exam 2 weight. What formula should be used for the overall grade for Student A so that the teacher could drag the formula down and not have to manipulate the formula for the other students?
   a. =B5*$C$1+D5*$C$2+C5*$C$3
   b. =B5*$C$1+C5*$C$2+D5*$C$3
   c. =B5*C1+C5*C2+D5*C3
   d. =B$5*$C$1+C$5*$C$2+D$5*$C$3
   e. =B5*$C1+C5*$C2+D5*$C3
   f. =$B$5*C1+$C$5*C2+$D$5*C3
   g. B5*$C$1+C5*$C$2+D5*$C$3

	A	B	C	D	E
1	homework weight		0.1		
2	Exam 1 weight		0.4		
3	Exam 2 weight		0.5		
4	Student	Homework Grade	Exam 1 Grade	Exam 2 Grade	Overall Grade
5	A	95	88	93	91.2
6	B	62	54	71	63.3
7	C	81	62	95	80.4

2. In the Excel spreadsheet shown below, the formula in cell D8 is

   =+B8*B3*$B$4^2/4*B5/100^3

   If this formula is copied into the cells directly below it (cells D9 through D13), which of the following would be the formula that will be pasted into cell D12?
   a. =+0.0852
   b. =+0.279853
   c. =+B8*B3*$B$4^2/4*B5/100^3
   d. =+B11*B6*$B$7^2/4*B8/100^3
   e. =+B12*B7*$B$8^2/4*B9/100^3
   f. =+B13*B8*$B$9^2/4*B10/100^3
   g. =+B8*B3*$B$4^2/4*B5/100^3
   h. =+B11*B6*$B$4^2/4*B8/100^3
   i. =+B12*B7*$B$4^2/4*B9/100^3
   j. =+B13*B8*$B$4^2/4*B10/100^3



3. The formula to find the density of a gas is

$$density = \frac{P}{R \cdot T}$$

where P is pressure, R is a gas-specific constant, and T is absolute temperature. If you would like to enter a formula for density of CO2 into cell C8 in such a way as to be able to copy and paste it (or fill with the little black square on the lower right of C8) into all the cells in the block C8:F12 without modification, then you should enter the formula:

a. =B8/($C2*C6)
b. =$B8/($C$2*C$6)
c. =B$8/($C$2*$C6)
d. =B8*1000/($C$2*C6)
e. =$B$8*1000/($C$2*$C$6)
f. =B$8*1000/($C$2*$C6)
g. =$B8*1000/($C$2*C$6)
h. =$B$8/(1000*$C$2*C6)
i. =$B8/(1000*$C$2*C$6)
j. = B$8/(1000*$C$2*$C6)

	A	B	C	D	E	F
1		Gas Constants				
2		CO_2	189	J/(kg*K)		
3		H_2	4127	J/(kg*K)		
4		O_2	260	J/(kg*K)		
5						
6		Temperature (K):	275	280	285	290
7		Pressure (kPa):	Density (kg/m^3)			
8		90	1.732			
9		95				
10		100				
11		105				
12		110				

Note: *It would be a good idea to carry out a hand calculation to make sure you are handling the units correctly.*

UNIT REMINDERS:

$Pa = \frac{N}{m^2}$ *and* $kPa = 1{,}000Pa$ *and* $J = N \cdot m$