# Lesson 3 Homework Solutions

May 5, 2020   7:28 PM

exercises: find unknown voltages and currents

1.

80 V drop

240 V gain

V drop = 100 ✓

60 V drop

(100V)

2.   12.5 A

2.5 A   4 A   I = 6.0 A

(6 A)

3.

12 V

V = 50 ✓

18 V

20 V

(50V)

4.   I = 3.0 A ✓

1 A

2 A

(3A)
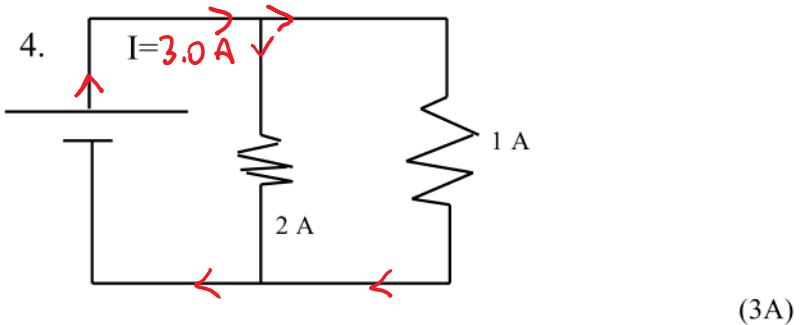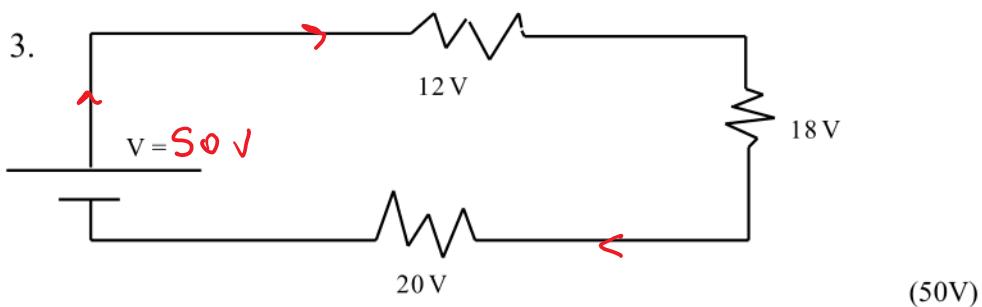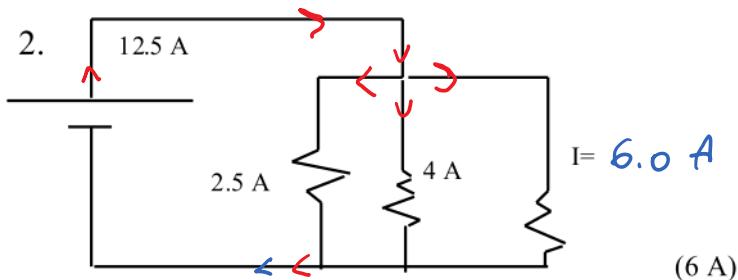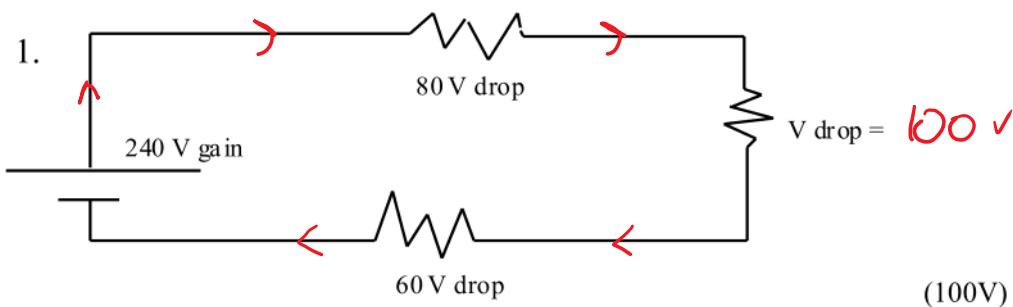
5. The three bulbs below are identical- which bulb is brightest? Explain your answer.   i) bulb A   ii) bulb
B   iii) bulb C   iv) equally bright
Note that bulb brightness depends on power, and therefore on both current and voltage drop
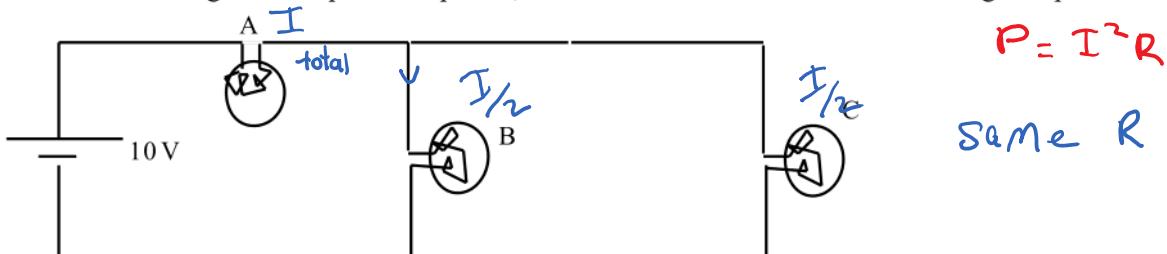
A I
total

I/2

I/2   B

10 V

$P = I^2 R$

same R

6. Find unknown voltages and currents

40 V

6. Find unknown voltages and currents

V= 40 V
I= 2A

100 V   2A

10 OHM
V= 10 V
I= 1 A

R= 20 Ω

V= 50 V
I= 1 A
R=50 OHM

V= 50 ✓
I= 1 A
R=50 OHM

10 OHM
1 A
V= 10 ✓

note: two identical resistors in
parallel will split the current evenly

(40V 2A 20 OHM; 50V 1A; 50V 1A; 10V 1A; 10V)

V = IR

7. Find unknown voltages and currents

4A
V= 8.0 ✓

V= 4
I= 2 A

2A
4V

12 V
I= 4 A

(4A; 8V; 4V 2A)

8. Find unknown voltages and currents

7 A

6V
2A

V= 6.0 ✓
I= 3 A

4A
V= 6.0 ✓

9A
V= 6.0 ✓

(6V;
6V 3A;
6V)

9. Find unknown voltages and currents

6V
6A

3V
I= 6 A

V= 13 V
I= 6 A

I= 4 A V= 4 ✓

2A   4V

(13V 6A;
6A;
4A 4V)

10. Find unknown voltages and currents

2V
I=7A

V=55
I=7A

I=3A V=43 ✓

2A
V=
10 ✓

10V
5A

4A V=43 ✓

(7A; 7A; 10V; 3A 43V; 43V)

11. Find unknown voltages and currents

20 OHM
1A
V=20 ✓

5 OHM
V=5 ✓
I=1A

80 V
I=1A

R=55Ω V=55 ✓ I=1A

(1A; 20V; 5V 1A;
1A 55 OHM 55V)

$R = \dfrac{V}{I}$

12. Find unknown voltages and currents

120 V
I=5A

20 OHM
I=3A
V=60 ✓

V=60 ✓
I=3A
R=20Ω

V=120V
I=2A
R=60Ω

(5A; 60 V;
60V 3A 20 OHM;
120 V 60 OHM)

13. Find unknown voltages and currents

20 OHM   10 OHM

V=20 ✓
I=1A

I=1A
V=10 ✓

15 OHM
V=105 ✓
I=7A

5 OHM
6A
V=
30 ✓
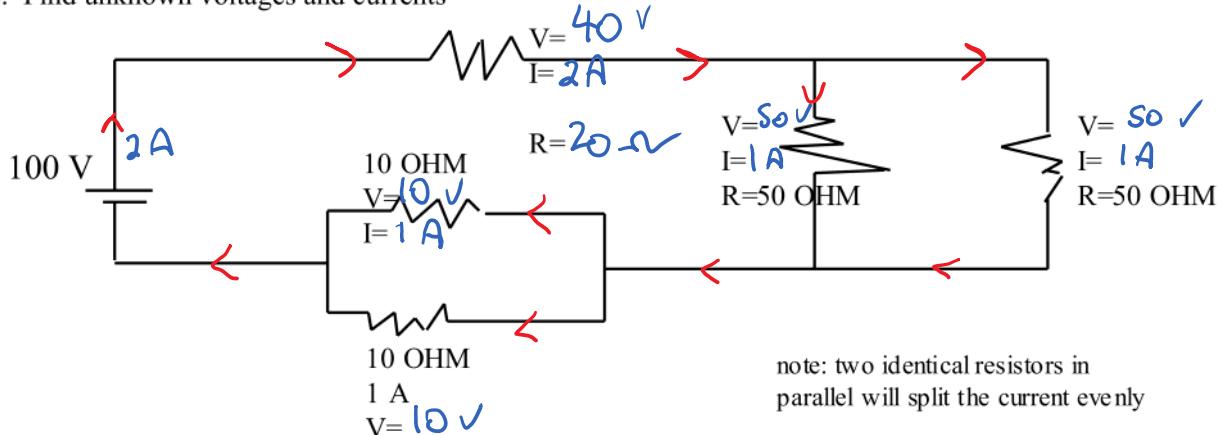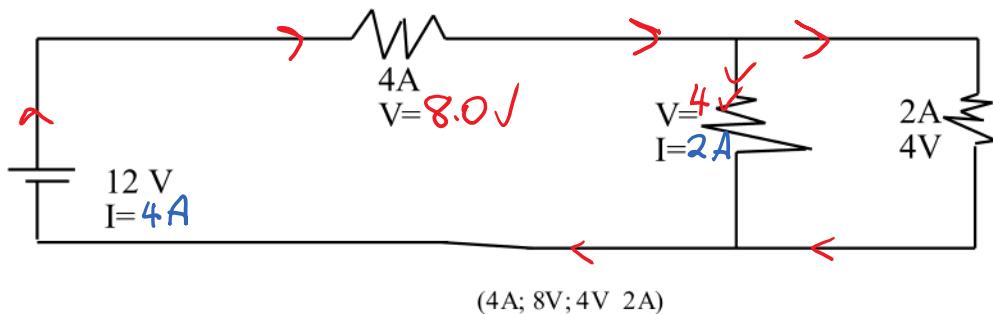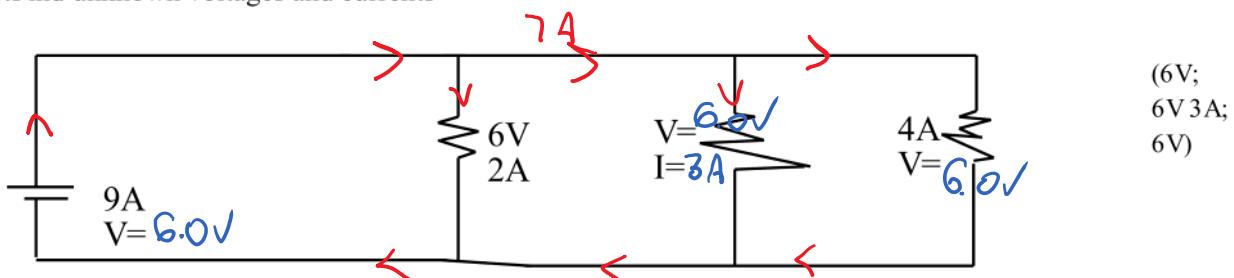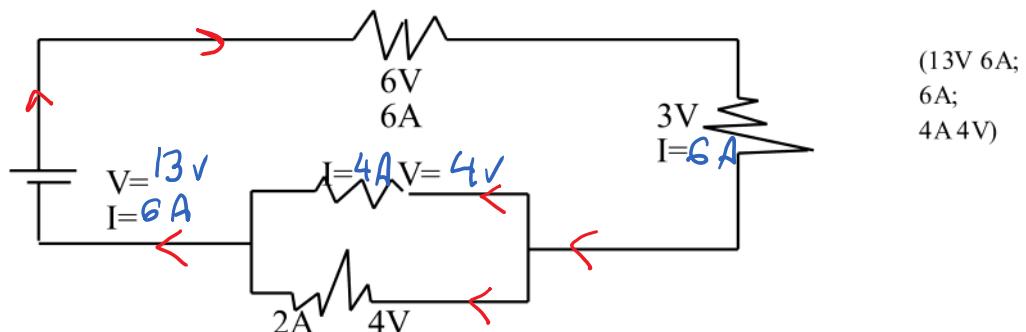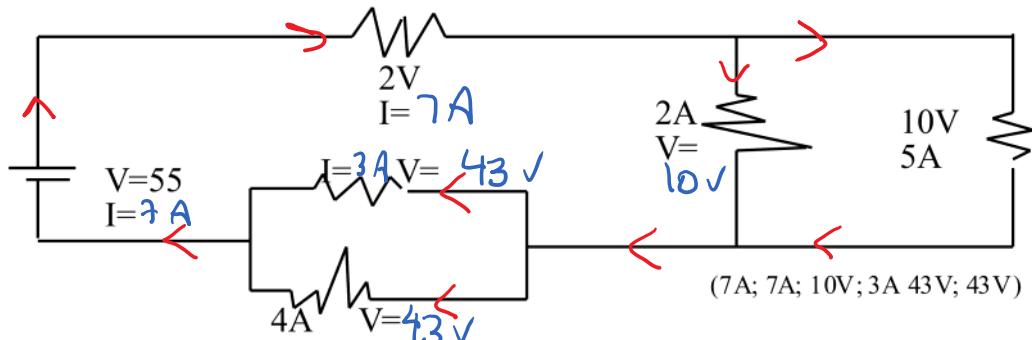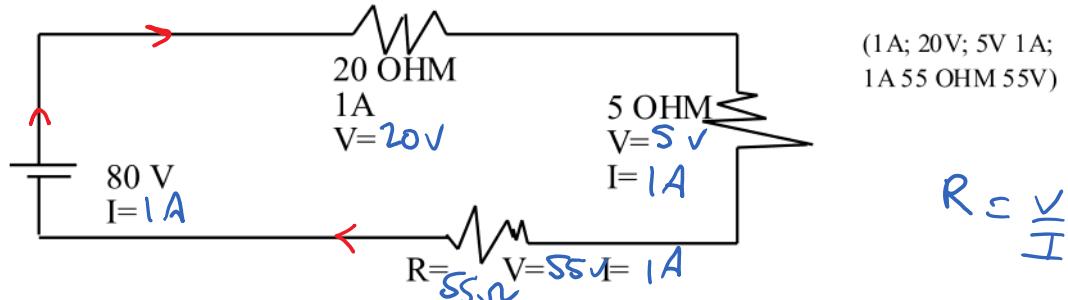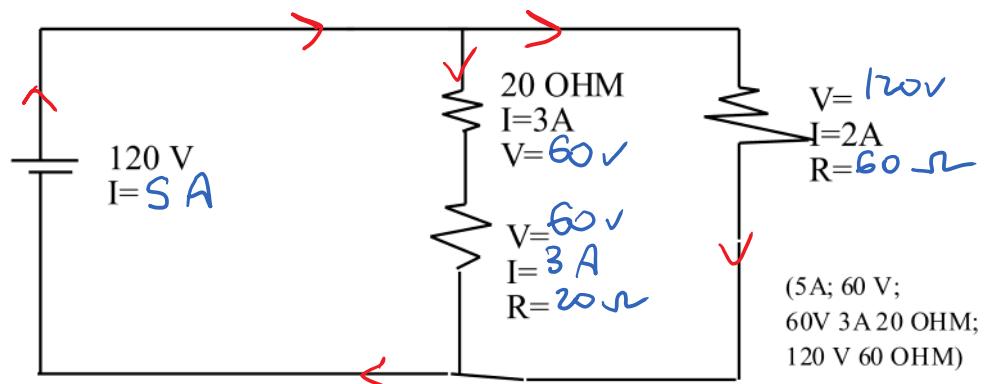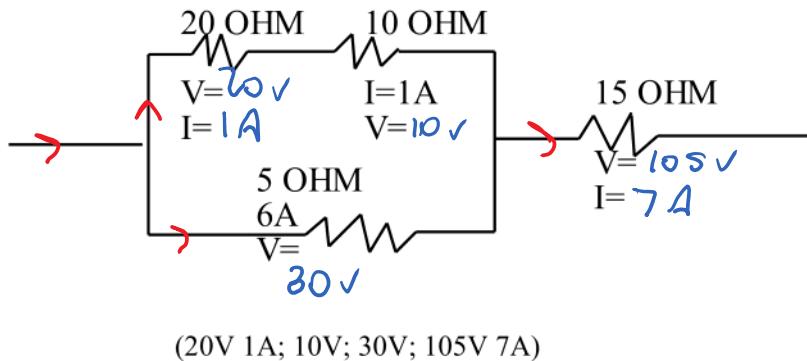
note: in problesm such as
these, assume that the two
end wires are connected to
a cell. that has not been
shown

(20V 1A; 10V; 30V; 105V 7A)
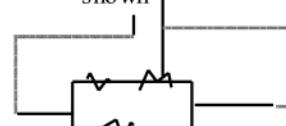
14. What can be said about the currents I_1 and I_2 if the resistance of R_2 is half the resistance of R_1?

I1
R

I2
R/2

10 V
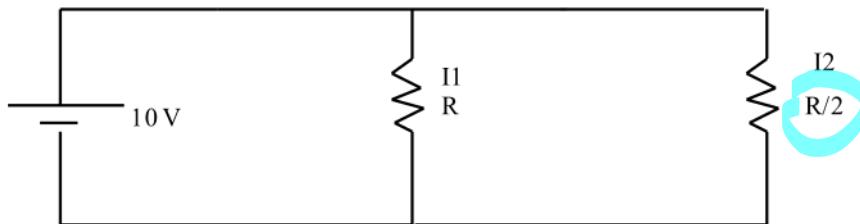
I2 = 2 * I1

15. What can be said about the voltage drops V_1 and V_2 if the resistance of R_1 is three times the resistance of R_2?


3R
V1

V

R
V2

same I

$V_1 = I(3R) > V_2 = IR$

V1 = 3 * V2
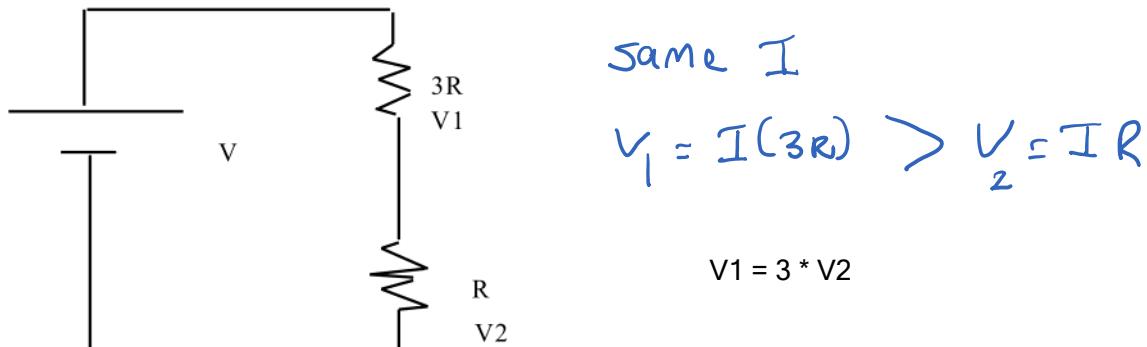
explain your answer using appropriate physics principles

16. What can be said about the resistances R_1 and R_2 if the current through R_2 is three times the current through R_1?

10 V

10v   I
       R1

10v   3I
       R2

R_2 is 3 x smaller than R_1

explain your answer using appropriate physics principles

$R = \dfrac{V}{I}$