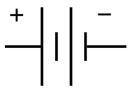
Name_____ Date_____ School_____

Science Olympiad Shock Value Test

Free Response

1.Draw the schematic symbol for (1 point each):

A. Light Bulb 

B. Battery 

C. Ammeter 

D. Resistor 

2. What does electricity's root, *electron,* mean in Greek (2 points)?

Electron means amber.

3.Which Greek Philosopher discovered electricity (2 points)?

Thales discovered electricity.

4. How was electricity discovered (2 points)?

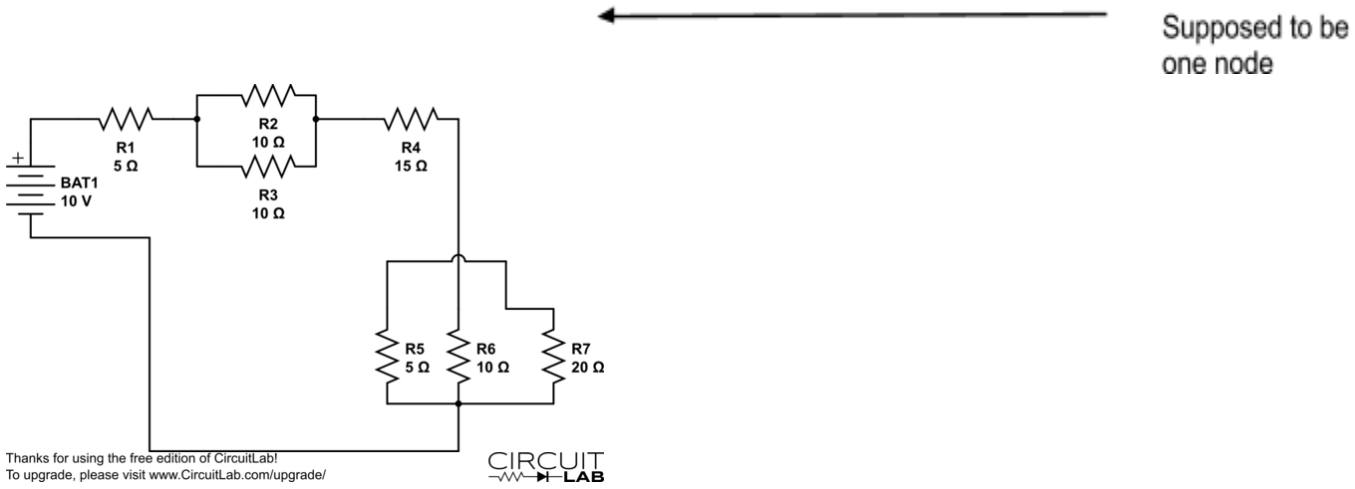
Electricity was discovered when Thales rubbed amber and cloth together, thus creating static electricity which attracted items such as feathers.

5. How is lightning produced (don't just answer the type, explain how) (5 points)?

Lightning is produced when water droplets rub against each other, thus creating static electricity until a discharge is able to be produced.

6.Find the total amount of ohmic resistance to the nearest tenth. (1 point)

27.9 Ohms



7. What is the charge of one coulomb (in electrons)? (1 point)

6.241509745 x 10^18 electrons

8. In a dry cell, what is the electrolyte (what happens to it)? (1 point)

The electrolyte becomes a paste.

9.What is the anode of a battery? (1 point)

The "negative" side where electrons flow out.

10. Which magnetic pole is the North Pole located in? (1 point)

The South Pole.

11.How does heat obstruct current at the atomic level? (1 point)

As atoms vibrate, free electrons are presented with obstacles, and thus prevented from going through as fast

(lowering the number of Amps).

12.In Fleming's left-hand rule (for motors), what do the thumb, pointer, and middle finger represent? (3 points)

Thumb:Thrust/Motion
Pointer: Field
Middle:Current

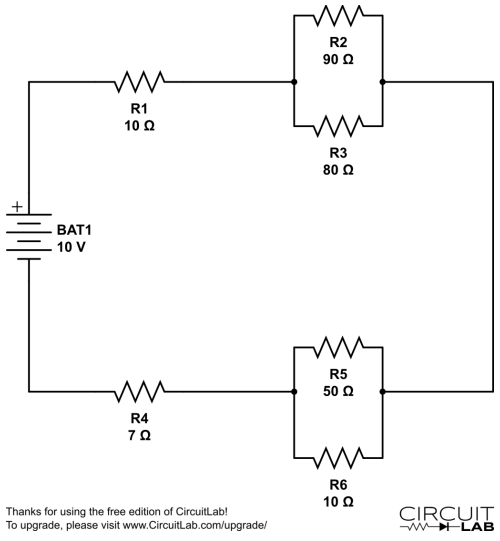
13.How do you define the north and south pole of a magnet?

The magnetic field flows out from the north Pole to the south Pole (basically they spread out into ellipses that separate, but converge at the south pole).

14. Who united electricity and magnetism? (1 point)

James Clerk Maxwell.

15. What is the total amount of Ohmic resistance to the nearest tenth? (1 point)

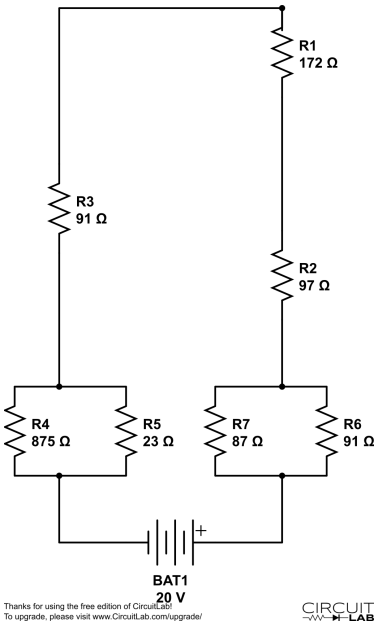


67.7

16. What is the total amount of Ohmic resistance to the nearest tenth? (1 point)

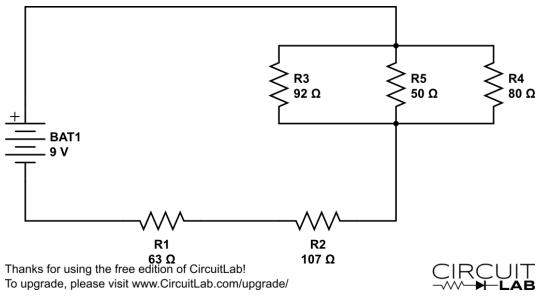
137.5

17. What is the total amount of Ohmic resistance to the nearest tenth? (1 point)



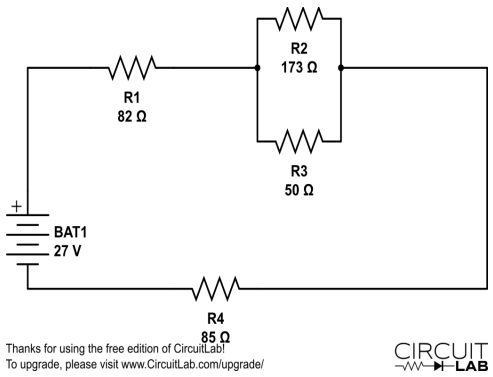
426.9

18. What is the total amount of Ohmic resistance to the nearest tenth? (1 point)



193.1

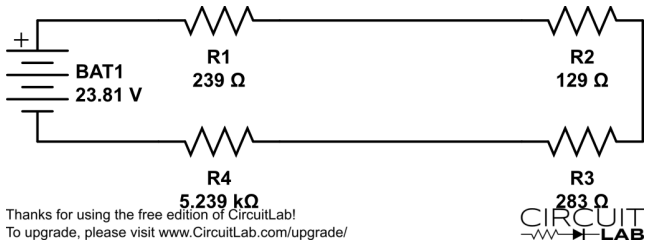
19. What is the total amount of Ohmic resistance to the nearest tenth? (1 point)



205.8

20. What is the amount of voltage drop in R4 to the nearest hundredth? (2 points)

21.18 V



21. What is the total amount of amps coursing through number 21 (to the nearest thousandth)? (2 points)

.004

22. What is a short circuit? (1 point)

A short circuit is where current is met by a very low (or no) resistance, thus resulting in the current being excessive.

23. Why is a short circuit dangerous? (1 point)

Short circuits can cause huge amounts of heat, thus exploding or releasing the hydrogen gas and electrolytes. Consequently, skin can be charred and other effects may happen (including death).

24. What is a closed circuit? (1 point)

A closed circuit is a complete circuit without any interruptions, thus allowing electrons to flow.

25. What is an open circuit? (1 point)

An open circuit is one that has a break or interruption, disrupting the flow of electrons (stopping current).

26. What two items does a fuel cell use? (1 point)

A combustible fuel and an oxidizer

27. If batteries are connected in a parallel circuit, is it safe for them to each be separate voltages (e.g. a parallel circuit with three batteries, one being 2 volts, the second being 4 volts, and the third being 6)? Why?
(2 points)

No. The batteries will overpower each other.

28. Does an open switch allow electrons to flow through it? (1 point)

No.

29. What is Joule's law? (1 point)

P=IE (can be substituted by other equations like P=I^2*R)

30. How are resistors rated (hint: it's not only resistance)? (1 point)

The ability to dissipate watts and resistance

31. What is a device called if it can perform a *useful* task with power? (1 point)

It is called a "load"

32. What is a varistor? (1 point)

A varistor a resistor that variates the amount of resistance with the amount of voltage.

33. Does the arrangement of a resistive circuit matter when calculating power (e.g. parallel, series, etc.)? (1 point)

No

34. What is dynamic electricity also known as? (1 point)

Current

35. What is negative resistance? (1 point)

Negative resistance is when voltage is applied and the current through a unit is decreased

36. What is the Earth's magnetic field also known as? (1 point)

The geomagnetic field

37. If a cell is large, is its internal resistance large or small? (1 point)

Small

38.Do normal conductors contain resistance? (1 point)

Yes

39. To become a superconductor, what is the maximum amount of resistance allowed? (1 point)

Zero Ohms

40. For presently known superconductors, what must be done so that they may superconduct? (1 point)

They must be cooled (extremely below room temperature) and the minimum temperature for the material to superconduct, the *transition temperature,* must be reached.

Multiple Choice

1. What does one horsepower equal? (1 point)

A. 745.7 watts
B. 612.2 watts
C. 587.21 watts
D. Horsepower does not compute into watts

2. What does an electron equal? (1 point)

A. -1.61*10^-19 C
B. -1.60*10^-19 C

C. -1.61*10^-18 C
D. -1.60*10^-18 C

3.Say there was a motor generating power (watts) by the second. If the current was .36 Amps and the resistance was 75.26 Ohms, how many watts would it generate per second (to the nearest whole)? (1 point)

A. 9.8 watts.
B. 27.2 watts.
C. 20.5 watts.
D. None of the above

4. What happens when two unlike charges are brought together? (1 point)

A. They Attract
B. They Repel
C. Nothing

5. What happens when two like charges are brought together? (1 point)
A. They Attract
B. They Repel
C. Nothing happens

6.Who founded Ohm's law?

A. Alexander Ohm
B. Edward Ohm
C. Gustav Ohm
D. Georg Ohm

7. According to Kirchhoff's laws, what is the sum of all the currents in a node? (1 point)

A. 0
B. 1
C. -1
D. 10

8.Electrons move _____
A. alongside the current
B. in the opposite way of the current

9. What is the Joule equal to? (1 point)

A. A force of 1 newton exerted for 1 meter
B. A force of 1 newton exerted for 1 dekameter

C. A force of 1 newton extended for 1 decimeter
D. A force of 1 newton extended for 1 hectometer

10. How many Ohms does the ideal Ammeter have? (1 point)

A. 2 Ohms
B. 1 Ohm
C. 0 Ohms
D. 3 Ohms