

SCIENCE 9 - UNIT C REVIEW

Key
2

1. Static electricity refers to charges that
- A. travel through a conductor
 - B. exist on a neutral object
 - C. can be collected and held in one place
 - D. power your computer

2. Which of the following correctly identifies the charges on the particles of an atom?

	Proton	Electron	Neutron
A.	positive	neutral	negative
B.	negative	positive	neutral
C.	neutral	negative	positive
D.	positive	negative	neutral

3. Which of the following statements describes a solid neutral object becoming positively charged?

- A. Protons have been removed from this object.
- B. Electrons have been removed from this object.
- C. Protons have been added to this object.
- D. Electrons have been added to this object.

4. A object that contains 5 million electrons can still be neutral because

- A. electrons have no charge
- B. the electrons are spread out evenly in the object
- C. it also contains 5 million protons
- D. the object is an insulator

5. Static charge can apply a force without touching the other object. This type of force is called

- A. action-at-a-distance force
- B. long distance force
- C. contact force
- D. imaginary force

6. Which of the following is true of charged objects?

- A. Like charges attract and opposite charges repel.
- B. Like charges repel and neutral objects are repelled by charged objects.
- C. Like charges repel and opposite charges attract.
- D. Like charges attract and neutral objects are attracted to charged objects.

7. Which of the following would increase the force between two charged objects?

- A. increasing the distance between the objects
- B. increasing the charge on the objects
- C. decreasing the charge on the objects
- D. none of the above

8. Which of the following best describes a neutral solid object that is charged by conduction?

- A. The electrons in the neutral solid object relocate when a charged object is brought near.
- B. The protons in the neutral solid object relocate when a charged object is brought near.
- C. The electrons in the neutral object transfer onto a positively charged object.
- D. The protons in the neutral object transfer onto a negatively charged object.

9. Which of the following best describes a neutral solid object that is charged by induction?

- A. The electrons in the neutral solid object relocate when a charged object is brought near.
- B. The protons in the neutral solid object relocate when a charged object is brought near.
- C. The electrons in the neutral object transfer onto a positively charged object.
- D. The protons in the neutral object transfer onto a negatively charged object.

10. An electroscope that is charged positive would have its metal leaves separated. A negatively charged rod is brought close to, but not touching the knob of the positive electroscope.

- The metal leaves would
- A. move farther apart
 - B. move closer together
 - C. not move
 - D. become negatively charged

11. The amount of electric energy stored in charge depends on which two factors?

- A. current, amount of voltage
- B. current, amount of resistance
- C. voltage, amount of charge
- D. voltage, amount of resistance

12. Which combination of materials could be used to produce the best electrochemical cell?

- A. two silver electrodes and an acidic solution
- B. an aluminum electrode, a copper electrode, and an acidic solution
- C. two silver electrodes and water
- D. an aluminum electrode, a copper electrode, and water

13. Which of the following is not a common energy source used to produce electrical energy?

- A. friction
- B. thermocouples
- C. piezoelectric crystals
- D. elastic

14. Which of the following is not an electric load?

- A. battery
- B. light bulb
- C. resistor
- D. buzzer

15. Which statement correctly defines the difference between static electricity and current electricity?

- A. Static electricity is the flow of positive charge, whereas current electricity is the flow of negative charge.
- B. Static electricity is the flow of charge in a circuit, whereas in current electricity the charge stays in one place.
- C. Static electricity is the flow of negative charge, whereas current electricity is the flow of positive charge.
- D. In static electricity, the charge stays in one place, whereas current electricity is the flow of charge in a circuit.

16. Conventional current is defined as

- A. the flow of charge from positive to negative
- B. the flow of charge from negative to positive
- C. the flow of electrons
- D. the current caused by sources other than batteries

17. An electric device that slows down current and changes electrical energy into other forms is called a

- A. battery
- B. conductor
- C. resistor
- D. switch

Use the resistor colour coding chart to answer question 18.

Colour	black	brown	red	orange	yellow	green	blue	violet	grey	white
Numeric Value	0	1	2	3	4	5	6	7	8	9

18. Calculate the resistance of a resistor with the following three bands of colours: blue, yellow, red.

- A. 4600 Ω
- B. 64 200 Ω
- C. 6400 Ω
- D. 642 Ω

19. What is the purpose of an ohmmeter?

- A. to measure current
- B. to measure voltage
- C. to measure resistance
- D. to measure charge

20. A current of 2.0 A flows through a 12 Ω resistor. What is the voltage across this resistor?

- A. 2.0 V
- B. 6.0 V
- C. 12 V
- D. 24 V

$$\frac{V}{IR} \quad V = I \times R$$

21. Two identical resistors are connected in series to a battery. How does the current through the second resistor compare to the current through the first resistor?

- A. half the current
- B. twice the current
- C. the same current
- D. no current

	Series	Parallel
VT	add	same
IT	same	add
RT	add	$\frac{1}{R} \dots$

22. Two identical resistors are connected in parallel to a battery. How does the voltage across the second resistor compare to the voltage across the first resistor?

- A. half the voltage
- B. twice the voltage
- C. the same voltage
- D. half the voltage of the battery

23. A load is connected to a battery. If a second identical load is added in series to the first, what happens to the total resistance of the circuit and the current leaving the battery?

- A. Total resistance increases and the current increases.
- B. Total resistance increases and the current decreases.
- C. Total resistance decreases and the current increases.
- D. Total resistance decreases and the current decreases.

24. A load is connected to a battery. If a second identical load is added in parallel to the first, what happens to the total resistance of the circuit and the current leaving the battery?

- A. Total resistance increases and the current increases.
- B. Total resistance increases and the current decreases.
- C. Total resistance decreases and the current increases.
- D. Total resistance decreases and the current decreases.

25. Which of the following units would be used if measuring a large amount of energy?

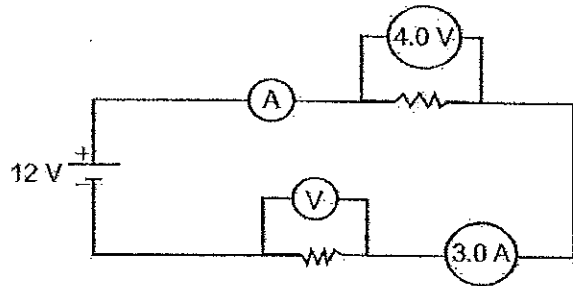
- A. joule
- B. watt
- C. coulomb
- D. kilowatt-hour

26. Which one of the following best represents a series pathway?

- A. walking from home to school
- B. running a lap on an oval running track
- C. going through the checkouts at a large grocery store
- D. driving across Canada

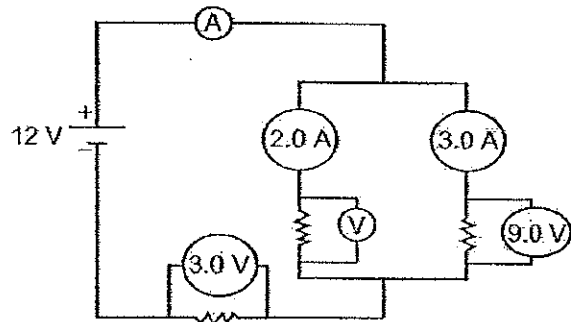
27. In the circuit shown below, what would be the readings on the voltmeter V, and ammeter A?

	Voltmeter V	Ammeter A
A.	3.0 V	1.0 A
B.	4.0 V	3.0 A
C.	8.0 V	3.0 A
D.	12 V	9.0 A



28. In the circuit shown below, what would be the readings on the voltmeter V, and ammeter A?

	Voltmeter V	Ammeter A
A.	9.0 V	2.0 A
B.	9.0 V	5.0 A
C.	12 V	5.0 A
D.	12 V	12 A



29. What is the current through a 180 W light bulb, if it is connected to 120 V?

- A. 0.67 A
- B. 1.5 A
- C. 120 A
- D. 21 600 A

30. What is the energy consumption of an 1800 W microwave oven used for 30 min?

- A. 0.90 kW·h
- B. 54 kW·h
- C. 900 kW·h
- D. 54 000 kW·h

31. The charge on the electron and proton are

	Proton	Electron
A.	negative	negative
B.	negative	positive
C.	positive	negative
D.	positive	positive

32. A neutral solid object is rubbed with wool and becomes positively charged. Which statement best describes the transfer of charge?

- A. Protons are transferred from the wool onto the object.
- B. Electrons are transferred from the object onto the wool.
- C. Protons are created in the solid object.
- D. Electrons in the solid object have been destroyed.

33. One of the laws of static charge states that

- A. like charges attract
- B. opposite charges repel
- C. opposite charges attract
- D. neutral objects are repelled by charged objects

34. Both AA and AAA batteries have a 1.5 V potential difference across their terminals. How is it possible for them to have different amounts of electrical potential energy?

- A. They have different amounts of resistance.
- B. They are different sizes.
- C. They have different voltages.
- D. They can separate different amounts of charge.

35. The load in an electric circuit

- A. is the source of electric energy
- B. can turn the circuit on or off by closing or opening the circuit
- C. is the wire through which electric current flows
- D. transforms electrical energy into other forms of energy

36. Electrical resistance is determined by calculating

- A. the potential difference across a load divided by the current flowing through it
- B. the current flowing through a load divided by the potential difference across it
- C. the current across a load divided by the potential difference flowing through it
- D. the potential difference across a load multiplied by the current flowing through it

$$\frac{V}{I} = R \quad R = \frac{V}{I}$$

37. Which of the following correctly identifies the meter used to measure the following quantities?

	Measuring voltage	Measuring current	Measuring resistance
A	ammeter	voltmeter	ohmmeter
B	ohmmeter	ammeter	voltmeter
C	voltmeter	ammeter	ohmmeter
D	voltmeter	ohmmeter	ammeter

38. Which of the following describes the current in a series circuit?

- A. The current decreases as it moves through the circuit.
- B. The current is the same at every point in the circuit.
- C. The current is greatest through the load.
- D. The current is the greatest at the negative terminal of the battery.

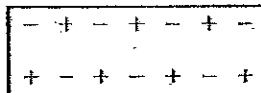
39. A circuit contains a battery and a resistor. Which of the following correctly describes the total resistance when a second resistor is added to a circuit in either series or parallel?

	Total resistance when the second resistor is added in series	Total resistance when the second resistor is added in parallel
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

40. Two light bulbs are connected in parallel to a source of constant voltage. If one of the bulbs is unscrewed, the voltage across the other bulb will

- A. double
- B. halve
- C. remain the same
- D. become zero

Use the following diagram of a neutral solid object to answer question 41.



41. Two charged objects are positioned 5 cm away from each other. Describe the change in the force between these two objects when

- (a) the charge on one of the objects is increased \uparrow
- (b) the distance between the objects is increased to 10 cm \downarrow
- (c) the charge on both of the objects is decreased \downarrow

42. Use (-) to represent electrons and (+) to represent protons to complete the diagrams.

(a) A positive rod is positioned near the original object.



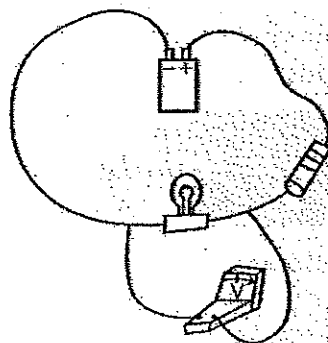
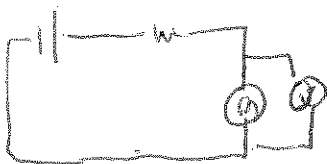
(b) A positive rod is touched to the original object.



43. The Styrofoam™ chips used for packing often have a static charge and “cling” to you. Describe how you could use an acetate strip to determine whether the Styrofoam™ chips are positively or negatively charged.

Acetate is +
chip repels it is +
attracts it is -

44. Draw a circuit diagram for the following circuit.



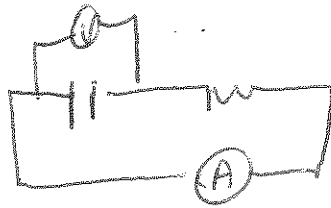
45. Calculate the following using Ohm's law.

(a) A light bulb is connected to a 9.0 V battery. The current through the light bulb is measured to be 300 mA. What is the resistance of the light bulb?

$$R = \frac{V}{I} = \frac{9V}{.3A} = 30 \Omega$$

(b) A 16 V source is connected to a 2.5 kΩ load. What is the current through this load? Give your answer in both amperes (A) and milliamperes (mA).

$$I = \frac{V}{R} = \frac{16V}{2500 \Omega} = .0064A = 6.4mA$$



46. You are given a load of an unknown resistance. Describe how you would determine this load's resistance using a battery, voltmeter, ammeter, and connecting wires.

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

47. A battery is connected to two light bulbs connected in parallel. If the first light bulb "burns out," what happens to the second light bulb? Explain

Stay on, has its own circuit.

48. A 1400 W hair dryer is used for 15 min.

- (a) Calculate the electrical energy consumed in the following units:

- (i) joules

$$E = P \times t = 1400 \text{ W} \times (15 \text{ min} \times 60 \frac{\text{sec}}{\text{min}}) = 1260,000$$

- (ii) kilowatt-hours

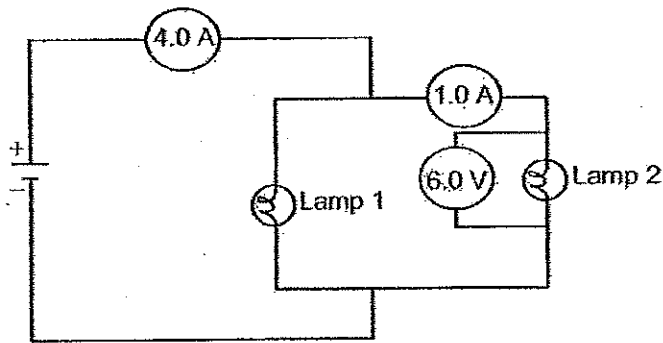
$$1.400 \text{ kW} \times 0.25 \text{ hr} = 0.35 \text{ kW} \cdot \text{h}$$

- (b) If the cost of electricity is 8¢ per kW·h, calculate how much it costs to use this hair dryer

$$0.35 \text{ kW} \cdot \text{h} \times \frac{8¢}{\text{Kw} \cdot \text{h}} = 2.8¢ \sim 3¢$$

49. Place negative (-) signs and positive (+) signs in the blank rectangles to represent the following charges.

neutral	negative	positive
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> + + + - - - </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> + + + - - - - - </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> + + + - </div>



50. Use the diagram above to find

(a) the current through Lamp

$$3 \text{ A}$$

(b) the voltage across Lamp 1

$$6 \text{ V}$$

(c) the power lost in Lamp 1

$$P = I \cdot V = 3 \times 6 = 18 \text{ W}$$

51. (a) Explain the difference between an insulator and a conductor. — e^- move easily

e^- don't move easily

(b) Give an example of an insulator

wood

(c) Give an example of a conductor

copper

52. In terms of charge transfer, what is the difference between charging by conduction and charging by induction?

no e^- transferred
no touching

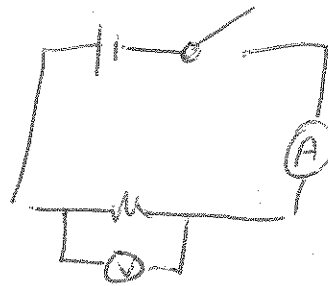
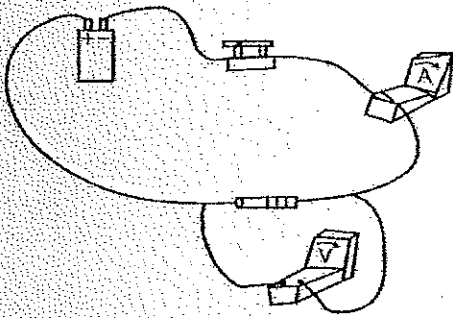
e^- transferred
touching

53. Two charged objects are located near one another. Use the words increases or decreases to complete the following statements regarding the force between these two charges.
- (a) Increasing the charge on one of the objects ↑ the force between the two charged objects.
- (b) Increasing the distance between the two objects ↓ the force between the two charged objects.
- (c) Decreasing the distance between the two objects ↑ the force between the two charged objects.

54. Explain why, when testing an unknown charge, the only sure way to identify the kind of charge is to observe its repulsion with a known charge.

attraction could be neutral or opposite charge

55. Using correct circuit symbols, draw a circuit diagram for the following circuit.



56. Use Ohm's law to calculate the following.

- (a) A circuit takes 0.60 A of current from a 12 V battery. What is the resistance of this circuit?

$$R = \frac{V}{I} = \frac{12V}{.6A} = 20 \Omega$$

- (b) A 12 M Ω resistor is connected to a 60 kV high power line. What is the current, in milliamperes (mA) through this resistor?

$$I = \frac{V}{R} = \frac{60,000 V}{12,000,000 \Omega} = .005 A = 5 \text{ mA}$$

1000Ω

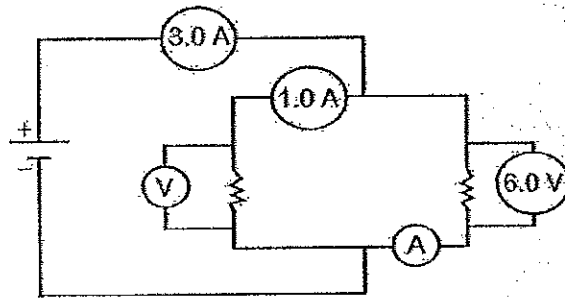
(c) A resistor with brown, black, and red bands of colour has a current of 0.020 A flowing through it.

(i) What is the voltage across this resistor? $V = I \times R = .02 \times 1000 \Omega = 20V$

Colour	black	brown	red	orange	yellow	green	blue	violet	grey	white
Numeric value	0	1	2	3	4	5	6	7	8	9

(ii) Use the colour code to find the value of this resistor. 1000Ω

Use the circuit shown at right to answer question 57.



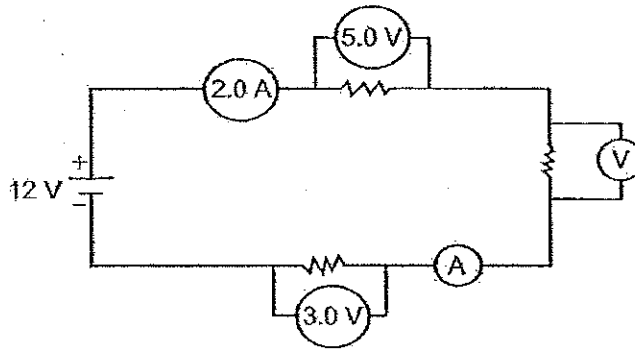
57. (a) Are the resistors in the above circuit connected in series or parallel? parallel

(b) Determine the voltage V, and the current A.

$V = 6.0V$
 $I = A = 2.0A$

Voltage = _____ Current = _____

Use the circuit shown at right to answer question 58.



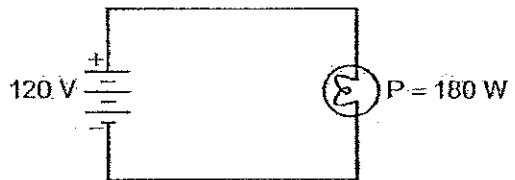
$5 + 3 + V = 12$

58. (a) Are the resistors in the above circuit connected in series or parallel? Series
 (b) Determine the voltage at V, and the current at A.

	series	parallel
V_T	add	same
I_T	same	add
R_T	add	$\frac{1}{R_T}!$

Voltage = 4V Current = 2.0A

Use the circuit shown at right to answer question 59.



59. (a) If the light bulb has a power rating of 180 W, what is the current through the bulb?

$I = \frac{P}{V} = \frac{180W}{120V} = 1.5A$

- (b) If the light bulb is left on for 12 h, how much electrical energy, in kilowatt-hours, is consumed by the light bulb

$180kW \times 12h = 2.16 Kw \cdot h$

- (c) If the cost of electricity is 7¢ per kilowatt-hour, how much did it cost to operate this light bulb in (b)?

$2.16Kwh \times \frac{7¢}{Kwh} = 15.12¢ \approx 15¢$