**Name:**
**Surname:**
**Class:**

1) A lamp is connected to a cell by two wires and is lit. A student places a switch in the loop after the lamp instead of before it. What happens when the switch is opened?

A) The lamp stays lit, because the switch is after the lamp and the current has already passed it.

B) The lamp goes out only if the switch is placed before the lamp.

C) The lamp goes out, because opening the switch breaks the loop wherever it is placed.

D) The lamp becomes dimmer but stays lit, because only part of the loop is broken.

2) On a circuit diagram, two wires cross each other at a point where no dot is drawn. What does this show?

A) The diagram is drawn incorrectly because wires must never cross.

B) The wires are not connected; one simply passes over the other.

C) The current splits equally between the two wires.

D) The wires are connected, because any crossing joins wires.

3) Two circuit diagrams use the same components. One is drawn as a tall thin rectangle and the other as a wide flat rectangle, and the connections between components are identical. How should they be compared?

A) They are the same circuit only if both are drawn with the same side lengths.

B) They are different circuits, because the flat one has more current.

C) They are different circuits, because the tall one has a longer wire path.

D) They are the same circuit, because only the connections matter and not the shape.

4) A student loosens a clip on one side of a working lamp and the lamp goes out. She tightens it and loosens a clip on the other side of the lamp. What should she find?

A) The lamp only dims, because the break is on the far side of the lamp.

B) The lamp stays lit, because the current has already passed the break.

C) The lamp goes out again, because a break anywhere in the loop stops the current everywhere.

D) The lamp goes out only if the clip loosened is the one nearest the cell.

5) Two lamps are in series with a battery, and ammeters are placed before the first lamp, between the lamps and after the second lamp. A student predicts that the last ammeter will read the least because the lamps use up current. Which statement is correct?

A) The prediction is wrong, because there is only one path, so every part of the circuit carries the same current.

B) The prediction is correct, because the current gets weaker the further it travels.

C) The prediction is correct, because each lamp uses up some current.

D) The prediction is wrong, because the first ammeter will read the least.

6) A student has a series circuit with two identical lamps and measures 0.20 A everywhere. She adds a third identical lamp to the loop. What should she expect to see?

A) The current differs from lamp to lamp, with the largest reading nearest the battery.

B) The current is the same everywhere in the loop but larger than before, and the lamps are brighter.

C) The current stays at 0.20 A everywhere and the lamps stay equally bright.

D) The current is the same everywhere in the loop but smaller than before, and the lamps are dimmer.

7) Which statement correctly separates what lamps in a series circuit use up from what they do not use up?

A) The lamps use up current but not energy, so the current is smaller after each lamp.

B) The lamps take energy from the circuit, but the current is not used up because the charge has nowhere else to go.

C) The lamps use up neither energy nor current, so they get hot only because of the battery.

D) The lamps use up both energy and current, so the readings fall along the loop.

8) Two identical lamps are connected in parallel to a battery. Each branch carries 0.30 A. What current flows through the single part of the circuit that carries the battery's whole current, and why?

A) 0.90 A, because the single part must carry the two branch currents plus an extra amount.

B) 0.30 A, because the current is the same at every point in any circuit.

C) 0.60 A, because the branch currents add up to the current through the battery.

D) 0.15 A, because the battery current is shared out and each lamp takes half of it.

9) In a parallel circuit, one branch has a lamp that carries 0.30 A. The other lamp is replaced by a dimmer lamp, and its branch now carries 0.18 A. What does the ammeter in the single part of the circuit read?

A) 0.60 A

B) 0.12 A

C) 0.48 A

D) 0.30 A

10) A student swaps the positions of two lamps on separate branches of a parallel circuit, so that the lamp that was drawn on top is now drawn below. How does the new circuit compare with the original?

A) It is a different circuit, because the lamp on the top branch always receives more current.

B) It is the same circuit, because each lamp is still on its own path between the same two junctions.

C) It is a different circuit, because the branches must be in a fixed order along the loop.

D) It is the same circuit only if the two lamps carry different currents.

11) A student builds a circuit with two identical lamps in series, then rewires the same lamps in parallel with the same battery. Each lamp carries 0.20 A in series. Which result should she observe in the parallel circuit?

A) Each lamp carries 0.30 A and is brighter, and the battery lasts longer than in series.

B) Each lamp carries 0.10 A and is dimmer, and the battery runs down faster.

C) Each lamp carries 0.30 A and is brighter, but the battery supplies more current and runs down faster.

D) Each lamp carries 0.20 A and is equally bright, but the battery supplies more current.

12) A student wants to measure the current through a lamp that is already lit in a working circuit. How should the ammeter be connected, and what must she do to the circuit?

A) In series with the lamp, after opening the circuit to insert it into the loop.

B) In parallel across the lamp, without opening the circuit.

C) In parallel across the lamp, after opening the circuit to insert it.

D) In series with the lamp, without opening the circuit.

13) A student accidentally connects an ammeter directly across a lamp instead of in the loop. What is most likely to happen, and why?

A) The lamp lights normally, because an ammeter measures current without affecting it.

B) The lamp becomes brighter, because the meter adds a second path that increases the current in the lamp.

C) The lamp goes out and the meter reads zero, because an ammeter lets almost no current through.

D) The lamp goes out and the meter may be damaged, because the ammeter offers an easy route and almost all the current goes through it.

14) A student places a voltmeter in the loop of a series circuit with a lamp, instead of across the lamp. What does she observe?

A) The lamp barely lights, because the voltmeter lets almost no current through.

B) The lamp becomes brighter, because the voltmeter adds a second route for current.

C) The lamp lights normally, because a voltmeter does not affect the current.

D) The lamp goes out and the voltmeter is damaged, because almost all the current flows through it.

15) Two unlike lamps are connected in series to a 3.0 V battery. A voltmeter shows 2.0 V across the first lamp. What is the potential difference across the second lamp, and what rule does this show?

A) 1.0 V, because the supply's potential difference is shared between the components and the shares add up to 3.0 V.

B) 2.0 V, because each lamp in series gets the same potential difference as the other.

C) 1.5 V, because the potential difference must always be shared equally in series.

D) 3.0 V, because each component in series receives the full battery potential difference.

16) A string of decorative lights is wired in series and all the lamps have gone dark, though only one filament has broken. Why is it hard to tell which lamp has failed?

A) The broken lamp glows more brightly than the others, which makes it look healthy.

B) The broken lamp stays lit while the others go dark, which hides the fault.

C) Every lamp is equally dark, because the single broken loop stops the current through all of them.

D) The supply potential difference drops to zero, so the lamps cannot be tested.

17) Two lamps are connected in parallel to a battery. The filament in one lamp breaks. What happens to the other lamp, and why?

A) It stays lit but becomes dimmer, because the broken lamp no longer shares the supply with it.

B) It stays lit at the same brightness, because its own branch is unbroken and still has the full battery potential difference across it.

C) It becomes brighter, because the current that went through the broken lamp now passes through it.

D) It goes out, because the gap breaks the only loop in the circuit.

18) Three identical lamps are connected in series with a 6.0 V battery. A student then rewires the same lamps in parallel with the same battery. What is the potential difference across one lamp in each arrangement?

A) 6.0 V in series and 2.0 V in parallel

B) 2.0 V in series and 2.0 V in parallel

C) 6.0 V in series and 6.0 V in parallel

D) 2.0 V in series and 6.0 V in parallel

19) Using the idea of energy, why does each lamp in a parallel circuit get the full potential difference of the battery?

A) Each unit of charge passes through only one lamp before returning to the battery, so it spends all of its energy there.

B) Each unit of charge passes through every lamp, so the lamps share its energy equally.

C) Charge gains extra energy as it passes through the junction between branches.

D) The battery produces more energy for each extra branch that is added.

20) Why are a fuse and the main switch for a household circuit deliberately placed in series with the circuit?

A) Components in series make each lamp brighter as more are switched on.

B) Components in series give each lamp the full supply potential difference.

C) Anything in series can break the whole loop, which is what a safety device needs to do.

D) Components in series let the faulty lamp identify itself when it fails.