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

1) A lamp is connected to a cell by two wires and glows. A student adds a switch to the loop and opens it. Which result is correct, and why?

A) The lamp goes out, because opening the switch breaks the complete loop and stops the current everywhere in it.

B) The lamp dims but stays lit, because only part of the current is stopped at the switch.

C) The lamp stays lit, because current already in the wires keeps flowing past the gap.

D) The lamp goes out only if the switch is placed before the lamp, not after it.

2) In a series circuit with a battery and two lamps, one ammeter is placed before the first lamp, one between the lamps, and one after the second lamp. What should the three ammeters read?

A) The first reads the most and the last reads the least, because the lamps use up current.

B) All three read the same value, because current is the same at every point in a series circuit.

C) The first and last read the same, but the middle one reads less because of the lamp before it.

D) The middle ammeter reads the most, because the current is shared between the two lamps.

3) A student says, "The lamps in a series circuit get hot and give out light, so they must be using up the current." Which response best corrects this idea?

A) The lamps use up current and energy equally, so both are lower after each lamp.

B) The lamps do not use up anything, so they heat up only because of the wires.

C) The lamps transfer energy, which makes them hot and bright, but the current stays the same because the charge has nowhere else to go.

D) The lamps use up some current, but the battery replaces it before it returns.

4) A series circuit with two lamps and a three volt battery has a current of 0.2 amps. A third lamp is added to the loop. What happens to the readings on the ammeters and to the lamps?

A) The ammeters read different values, with the one nearest the battery reading highest.

B) All ammeters still read 0.2 amps, and the lamps stay equally bright.

C) All ammeters still read equal values but smaller, about 0.14 amps, and the lamps get dimmer.

D) All ammeters read more than 0.2 amps, and the lamps get brighter.

5) Tracing from one battery terminal along the wires, you find there is only one route back to the other terminal, with two lamps on that route. How are the lamps connected, and why?

A) In series, because the current splits at a junction between the lamps.

B) In parallel, because the current has to pass through both lamps.

C) In series, because a single route means the components are one after another in a single loop.

D) In parallel, because both lamps are on the same wire.

6) A student connects a lamp to a cell with two wires and the lamp lights. She places a switch in the loop before the lamp, then moves it to after the lamp and opens it each time. What does she observe?

A) The lamp goes out only when the switch is after the lamp, because current must reach the lamp first.

B) The lamp goes out only when the switch is before the lamp, because current must pass the switch first.

C) The lamp goes out in both positions, because the switch position does not matter as long as the loop is broken.

D) The lamp stays lit in both positions, because the current already passed the switch.

7) A teacher removes one of the two wires joining a lamp to a cell. Which description of the lamp and the current is correct?

A) The lamp gets brighter, because all the current collects at the lamp.

B) The lamp goes out straight away, because the current cannot travel from one terminal around to the other.

C) The lamp slowly dims, because the cell gradually runs out of current.

D) The lamp stays lit, because the remaining wire still carries current to the lamp.

8) A student says that in a series circuit the last ammeter should read the lowest value because the lamps have used up some current on the way round. Which statement best compares what the lamps use up with what they do not?

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

B) The lamps use up both energy and current, but the battery replaces the current at each lamp.

C) The lamps use up energy as they heat and light, but the current is the same everywhere because charge cannot leak out or pile up.

D) The lamps use up neither energy nor current, so they only pass the current on.

9) A series circuit has two lamps and a three volt battery, and each ammeter reads 0.2 amps. A third lamp is added to the loop. Which explanation best accounts for the new readings of 0.14 amps?

A) The battery loses energy when a lamp is added, so only the first ammeter reads less.

B) Each extra lamp makes it harder for the battery to push a current round the loop, so the current falls everywhere equally.

C) The third lamp uses up part of the current, so only the ammeters after it read less.

D) The current is shared out among three lamps, so each lamp receives a third of it.

10) In a circuit, current leaves the battery, reaches a junction, and splits so that each of two lamps is on its own path. The branch currents then meet at a second junction and return to the battery. How are the lamps connected, and what is the key evidence?

A) In series, because the current passes through both lamps on the way back to the battery.

B) In series, because the current is the same at every point of the circuit.

C) In parallel, because there is a single route with the lamps one after another.

D) In parallel, because the route divides and each lamp is on a separate branch.

11) A 3 volt battery is connected to two identical lamps in parallel. Each branch carries 0.3 amps. What current flows through the battery, and why?

A) 0.3 amps, because each lamp gets the same current as the battery

B) 0.6 amps, because the branch currents add up to the current through the battery

C) 0.6 amps, because the battery pushes 0.6 amps through each lamp

D) 0.15 amps, because the battery current is shared equally between the two lamps

12) Two identical lamps are connected to a 3 volt battery. In a series circuit, each lamp has 1.5 volts across it. In a parallel circuit, how many volts are across each lamp, and how does the brightness compare?

A) 1.5 volts across each lamp, so the parallel lamps are equally bright

B) 1.5 volts across each lamp, so the parallel lamps are brighter

C) 3 volts across each lamp, so the parallel lamps are brighter

D) 3 volts across each lamp, so the parallel lamps are dimmer

13) A student wants to measure the current through a lamp and also the potential difference across the same lamp. How should the two meters be connected?

A) The ammeter in parallel with the lamp, and the voltmeter in series with the lamp

B) Both meters in parallel with the lamp

C) The ammeter in series with the lamp, and the voltmeter in parallel with the lamp

D) Both meters in series with the lamp

14) The filament in one of two lamps breaks. In which circuit does the other lamp stay lit, and why?

A) In a series circuit, because the current can pass around the broken filament

B) In a parallel circuit, because the gap breaks only its own branch and the other lamp still has the full battery voltage

C) In a series circuit, because the good lamp gets the whole voltage once the other fails

D) In a parallel circuit, because the good lamp now receives double the current and shines brighter

15) A householder wants a kitchen light to work without turning on the whole house, and wants the other lights to stay on if one bulb blows. Which wiring suits this, and what is the reason?

A) Series, because a blown bulb shows which lamp to replace by making all the lamps dark

B) Series, because one switch can then control each lamp separately

C) Parallel, because each lamp has its own branch with its own switch and a failure stays in that branch

D) Parallel, because the lamps then share the supply voltage equally and each is dimmer

16) Two identical lamps are connected in series to a 3 volt battery. The same two lamps are then connected in parallel to the same battery. A student compares the current in one lamp in each circuit. Which comparison is correct?

A) Each lamp carries 0.15 amps in parallel because the current is split between the lamps.

B) Each lamp carries 0.3 amps in parallel, which is more than the 0.2 amps in series.

C) Each lamp carries 0.3 amps in both circuits, so the brightness is the same.

D) Each lamp carries 0.2 amps in parallel, which is less than the 0.3 amps in series.

17) A student connects two identical lamps in parallel to a battery and measures 0.3 amps in one branch. The student then wants to predict the current in the wire next to the battery. Which prediction is correct, and why?

A) 0.15 amps, because the current is shared out between the two lamps before the battery.

B) 0.3 amps, because the current is the same everywhere in the circuit.

C) 0.6 amps, because nothing is lost or created at a junction, so the branch currents sum to the total.

D) 0.6 amps, because each lamp creates extra current at the junction.

18) A student wants to find the potential difference across a lamp in a working circuit without breaking the circuit open. Which meter and connection should be used, and why?

A) An ammeter in parallel with the lamp, because it compares the two sides of the lamp.

B) A voltmeter in series with the lamp, because the current must pass through it.

C) A voltmeter in parallel with the lamp, because potential difference compares one side of the component with the other.

D) An ammeter in series with the lamp, because this avoids breaking the circuit.

19) Two identical lamps are connected in series to a battery. The filament in one lamp breaks and both lamps go out. Why do both lamps go out, and what makes the faulty lamp hard to identify by sight?

A) The broken filament halves the voltage, so both lamps go out, and the faulty lamp is slightly warmer.

B) The broken filament uses up all the current, so the good lamp gets none, and the faulty lamp is slightly dimmer.

C) The broken filament makes the current take another path, so both lamps dim, and the faulty lamp flickers.

D) The broken filament leaves a gap in the only loop, so no current flows anywhere, and both lamps are equally dark.

20) In a parallel circuit with two identical lamps on a 3 volt battery, one lamp fails. What happens to the other lamp, and why?

A) It becomes brighter, because the battery's whole current now goes through it.

B) It stays equally bright, because it still has the full 3 volts across it.

C) It goes out, because the circuit loop is broken.

D) It becomes dimmer, because the supply is now shared with a gap.