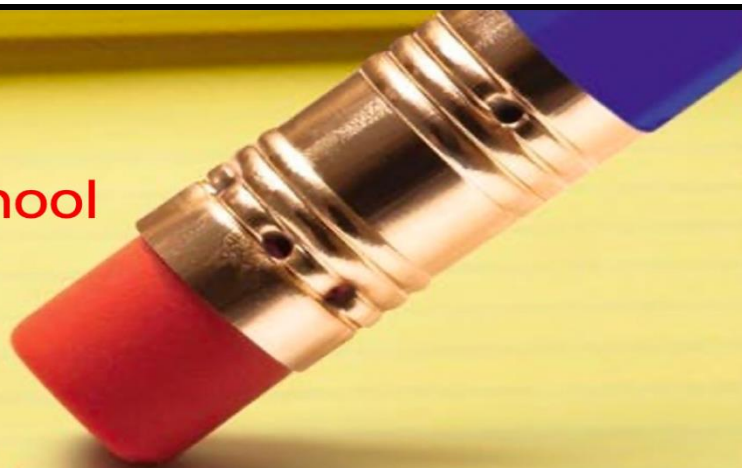




The Indian High School

Oud Metha



BEYOND BOUNDARIES

Summer Assignments 2024-25

Multidisciplinary project: Series and parallel circuit

GRADE: 6

SUBJECT: (Science, Mathematics)

Submission: 05th September 2024

LEARNING OUTCOMES:

Students will:

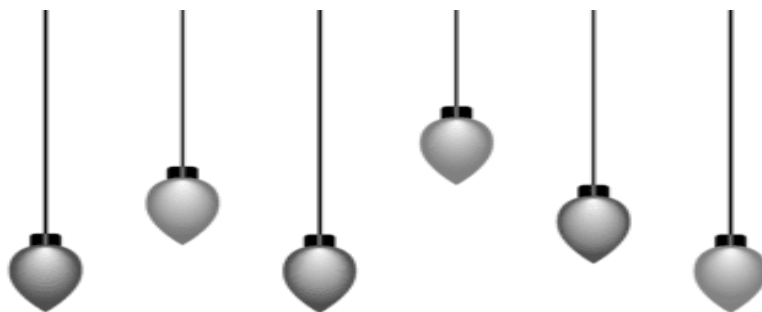
1. Identify and label components in series and parallel circuits.
2. Explain the path of current flow in parallel and series circuits.
3. Differentiate between series and parallel circuits.
4. Design and construct a series/parallel circuit using provided materials, ensuring all connections are secure and functional.
5. Provide real life examples where series and parallel circuits are used, explaining the reasoning behind each configuration.

SKILLS DEVELOPED:

- Research skills
- Life skills
- Critical thinking skills & Analytical Skills



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SEIRIES AND PARALLEL CIRCUITS



Submitted by:

Name: _____

Roll No: _____

Grade: **6**

Division: _____



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Big Question

In what ways does the arrangement of components in various circuits impact the performance, safety, design and functionality of electrical systems in buildings, including wiring networks and lighting arrangements?

LEARNING OBJECTIVE:

Design and construct a series/parallel circuit using provided materials, ensuring all connections are secure and functional.

ENGAGE:

"What do you think connects the world of modern technology, from your smartphone to the power grid, in a seamless web of functionality and power?" How would you describe this secret pathway that keeps everything running smoothly -lighting of building, charging of your device and so on?"

We need electricity for many purposes to make our life easier. Electricity is the flow of electrical charges. Electricity needs a path to flow. That is what we call a circuit. An electric circuit is a path through which the electricity flows.

An electric circuit has components like an electrical device like bulb, source of electricity like cell, switch, wire. You can represent the electric circuits with diagrams, using different symbols electric components. This is called a circuit diagram.

Create a concept map illustrating the components of a simple circuit. You can draw in the given space below / use any AI tool to design your concept map. Once completed, print your concept map, and attach it in the given space below.



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EXPLORE:

Click on the given link and watch the video and dive into the world of circuits.

https://www.youtube.com/watch?v=ny8GC5zkN4k&ab_channel=WorldOfScience

We use different electrical appliances in our daily life like refrigerator, AC, switches, water heater etc. For celebrating Diwali / Eid/ Christmas we often use light bulbs /LED bulbs to decorate our house. Have you ever wondered what type of connection is used in its circuit?

Look around your house.

Name the objects /circuits which is in series connection and parallel connection: -

<i>Series circuit</i>	<i>Parallel circuit</i>

Let's design.....

Think of any such case and find out what type of circuit is used. Then design its circuit [parallel/ series circuit] using PHET simulation. After completing your design take a printout and attach in the space given in the worksheet.

https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html

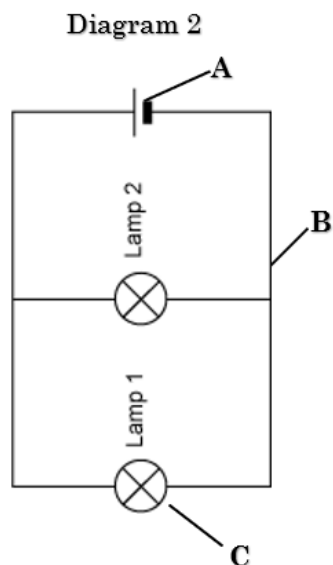
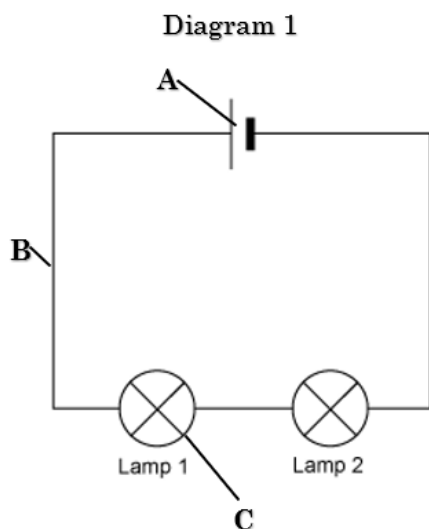


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EXPLAIN:

Let's think and answer.....

Observe the given diagrams... and answer the following questions.



1. What components do the letters A, B and C represent?

A..... B..... C.....

2. What type of connection is shown by the way the bulbs are arranged in Diagram 1?

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3. What type of connection is shown by the way the bulbs are arranged in Diagram 2?

.....

4. Compare the glow of bulbs in series and parallel connections.

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ELABORATE:

1. When it comes to designing electronic devices, which do you think is more advantageous based on reliability and performance-series circuits or parallel circuits? Justify your answer.

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2. In a series and parallel circuits, like in Diagram 1 & diagram 2, how is the brightness of the first bulb affected when the second bulb is connected?

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3. "Imagine you're decorating for the holidays with a string of Christmas lights connected in series. If one bulb burns out, what do you notice happening to the other bulbs on the string? Can you explain why this happens?"

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4. If you could make one everyday object 'smarter' by integrating an electrical circuit into it, what would it be and why?

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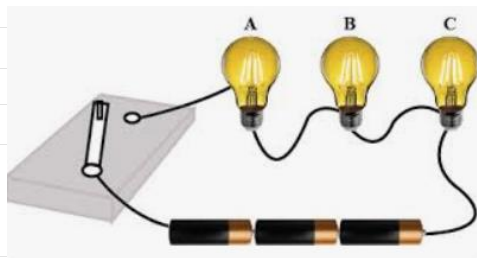
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Evaluate:

1. In a circuit containing three identical light bulbs, Bulb A, Bulb B, and Bulb C, which are connected as shown below:



If Bulb B were to burn out while the circuit is in operation, which of the following statements accurately describes the behavior of the other bulbs, Bulb A and Bulb C?

- A) Bulb A and Bulb C will remain lit with the same brightness as before Bulb B burned out.
- B) Bulb A and Bulb C will both go out immediately.
- C) Bulb A will remain lit, but Bulb C will go out immediately.
- D) Bulb C will remain lit, but Bulb A will go out immediately.

2. John wants to light up his room using two light bulbs. He has the option to connect them either in series or in parallel to a battery. Which of the following statements best describes the advantage of connecting the light bulbs in parallel?

- A) Connecting the light bulbs in parallel will make them last longer.
- B) Connecting the light bulbs in parallel will make the room brighter.
- C) Connecting the light bulbs in parallel will ensure that if one bulb burns out, the other bulb will remain lit.
- D) Connecting the light bulbs in parallel will save energy.

EXTENDED ACTIVITY

Design and construct an electrical device using either parallel or series circuit. Bring your model to class and explain its function, type of circuit and reason for choosing the type of circuit in your device.



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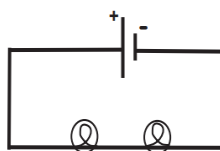
ENGAGE

A Math connection Electricity powers our homes, schools, and gadgets, but have you ever wondered how it gets to where it needs to go?

Understanding electricity involves a bit of science and a pinch of math. Let's explore the fascinating world of series and parallel circuits and see how math plays a crucial role.

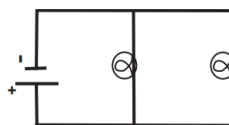
Series Circuits:

Imagine you have a string of holiday lights. If one light goes out, they all go out. This is a series circuit. In a series circuit, components are connected one after another, forming a single path for the electric current to flow. In a Series circuit, the light bulbs run along one single path and are placed beside each other.



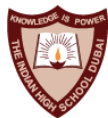
Parallel circuit:

An example of a parallel circuit is the wiring system of a house. A single electric power source supplies all the lights and appliances with the same voltage. If one of the lights burns out, current can still flow through the rest of the lights and appliances. In a Parallel circuit, the light bulbs run along different paths and are Parallel to each other.

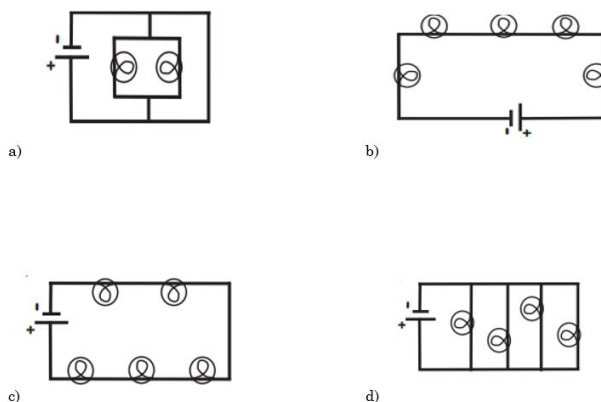


- 1) Ryan has a string of Christmas lights on his tree in his house and wants to know if his lights are connected in a parallel or series circuit. How can he check this.

- 2) For each of the diagrams below, determine if the light bulbs are in a series or parallel circuit:



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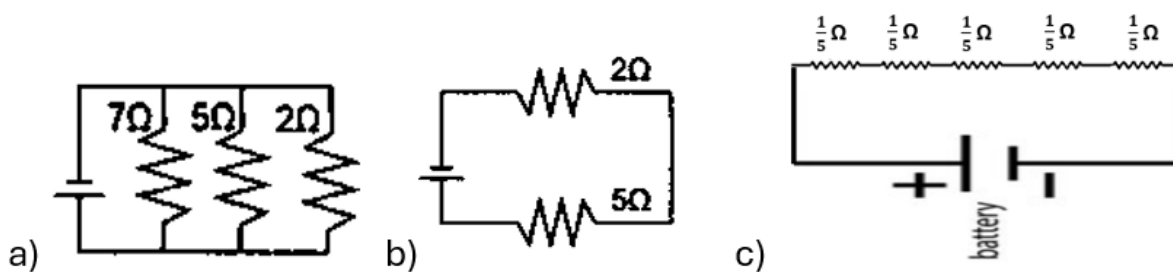
EXPLORE

Total resistance in a circuit

- If three resistors R_1 , R_2 , R_3 are connected in series then the total resistance is calculated using the relation $R_{total} = R_1 + R_2 + R_3$
- If three resistors R_1 , R_2 , R_3 are connected in parallel then the total resistance is calculated using the relation $\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

EVALUATE

- 1) Determine the equivalent (total) resistance for each of the following circuits below.





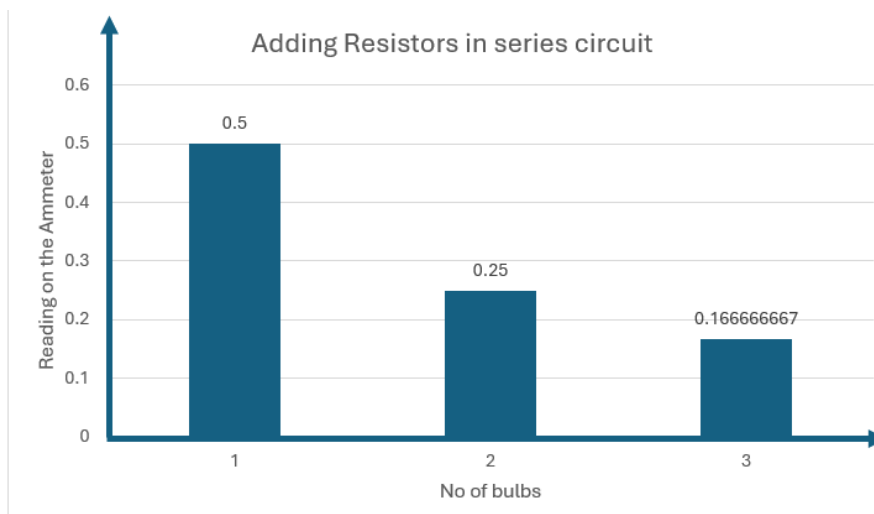
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INVESTIGATE:

Testing the strength of the current of the circuit when resistors are added.

An investigation was done to determine the change in strength of the current when the resistors(bulbs) are added. (Note: The volt remains 1.5 throughout)

1. The graphs below show the Ammeter reading when bulbs(resistors) were added to the series circuit.



- a) What happened to the ammeter reading when more bulbs were added to the series?
-
2. The table below shows the Ammeter reading when bulbs(resistors) were added to the parallel circuit.

S.No	Resistors added to the circuit	Ammeter Reading
1	1 bulb	0.5
2	2 bulbs	1
3	3 bulbs	1.5

- a) What happened to the ammeter reading when more bulbs were added to the parallel circuit?
- b) Visualization of graphs using AI tools- Data Visualization.
<https://app.rawgraphs.io/> .



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