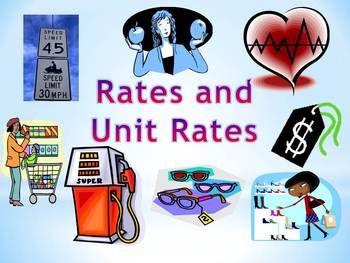
**Rate and Speed**

**Mathematics**

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| **Topic / Theme** | |
| --- | --- |
| Rate and speed | |
| **Grade Level** | **Duration** |
| Primary Four | 120 minutes |
| **Technology / Software** | **Device Compatibility** |
| Google Sheets, TinkerCad | Browser based activities |
| **Learning Objectives** | |
| Learners will be able to:   1. define what is the rate? 2. understand the use of rate in everyday situations 3. differentiate between rate, total quantity and number of units 4. apply the understanding of the concepts to solve a real life issue of water wastage | |

**1. Lesson Preparation**

| **Logistics / Materials** |
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| Items:   1. TinkerCAD available at <https://www.tinkercad.com/> 2. Worksheet\_Rate |
| **Installation** |
| 1. Software can be accessed via [https://www.tinkercad.com/](https://www.tinkercad.com/.%20) 2. Sample project can be accessed via - <https://www.tinkercad.com/things/jtSPvQGd9r4-watersaver7segment/editel?sharecode=b0unWmyv_Pm4hcE7QzAmNrlCo9Zuu_wPPnPUyGbtHmc> |
| It is expected that teachers will go through the videos referenced in the lesson plan as well as the sample project mentioned in the lesson preparation |

**2. Lesson Guide**

| The prerequisite to this lesson plan is three fold,   1. Students are expected to have familiarity with TinkerCAD interface 2. Students are expected to have familiarity with excel and writing formulas in excel/sheets. 3. Students are expected to have a fair understanding of ratio, and basic arithmetic operations. | |
| --- | --- |
| **Introduction (25 minutes)** | |
| **Slide** | **Activity** |
| 1 | Display slide 1  Start with the image and ask a question, how do we measure pulse rate? Why do we measure it?  Explain the students they are going to learn about rate?  How change in one quantity can affect another quantity. |
| 2 | Display slide 2  Play the video and ask students about their observations. |
| 3 | Display slide 3  Give the overview of concepts to be learnt in the current session. |
| 4 | Display slide 4  Explain to students what the rate is? Discuss different scenarios in daily life where we use the term rate. |
| 5 | Display slide 5  Select four volunteers from the students to work on the activity.  Three students fill the different size glasses and one volunteer to keep note of time taken to fill the glasses. |
| 6 | Display slide 6  Ask students to make a table for rate, total quantity, number of units, etc. depending on observations during last activity. |

| **Google Sheets/Microsoft Excel Activity (20 minutes)** | |
| --- | --- |
| **Slide** | **Group Activity**  Teachers can make different groups depending on the student's skils. |
| 1 | Display slide 8  This activity is designed for a group of students with basic skills.  Share the data of ten players with students and ask them to make an excel sheet and calculate strike rate of each player. |
| 2 | Display slide 9  This activity is designed for students with a good understanding of the basic arithmetic operations.  Ask them to make a table in excel sheet to calculate the rate in everyday utilities like electricity usage, water consumption, gas bill, internet bill, etc.  Apply formula to calculate rate for each utility. |
| 3 | Display slide 10  This activity is designed for students with a higher ability to solve problems in mathematics.  Ask students to any 10 different rates and derive an excel formula to calculate the unknown value.  e.g Heart rate, pulse rate, birth rate, etc. |

| **Solving real life problem 60 minutes** | |
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| **Slide** | **Activity** |
| 1 | Display slide 12  Play the video and explain to students about water scarcity in the world.  Introduce students to SDG6 (Sustainable Development Goals) i.e availability and sustainable management of water and sanitation for all.  Discuss about water scarcity. |
| 2 | Display slide 13  Play the video and ask their observations.  Ask them to point out different problems faced by people in specific areas due to water scarcity.  Discuss with students about solutions shown in the video. |
| 2 | Display slide 14  Discuss with the students to implement technology based solutions for the problem. Explain to students about a time based water distribution system. |
| 4 | Display slide 15  Play the video to show how to make simple circuits with an arduino in TinkerCAD application. |
| 5 | Display slide 16  Show video to understand interfacing of seven segment display with arduino in TinkerCAD application. |
| 6 | Display slide 17  Explain circuit diagrams to the students. |
| 7 | Display slide 18  Share the components list with students and ask them to work on a simulation circuit in TinkerCAD application. |
| 8 | Display slide 19  Discuss with students about,   * How can we automate the solution? * Are there any sensors we can use to replace the switches? |

| **Conclusion 15 minutes** | |
| --- | --- |
| **Slide** | **Activity** |
| 1 | Display slide 20  Summarize the concepts learned  Repeat the definitions of the concepts  Pose a question, how can we modify the switch based water dispenser to sensor based automated water dispenser. |

**3. Assessment Rubric**

**Informal Assessment:**

Teachers will move about the classroom setting providing feedback and making sure that students are participating within their groups.

**Formal Assessment**

| **Learning Outcomes** | **Approaching Expectation** | **Meeting Expectation** | **Exceeding Expectation** |
| --- | --- | --- | --- |
| Articulate various real life situations where rate is used | Were able to articulate 3 real life situations. | Were able to articulate 5 real life situations | Were able to articulate more than 5 real life situations |
| Working with spreadsheet tools | Were able to apply the given formula to arrive at the final quantity. | Were able to identify the relationship between two quantities and apply a formula to arrive at the final quantity. | Were able to articulate and identify the real life situations and complete the given task. |
| Simulation of a prototype | 1. Were able to complete the part of the prototype.  2. Were not able to suggest a sensor to replace the switches | 1. Were able to complete the prototype without seven segments.  2. Were able to suggest at most one sensor to replace the switches | 1. Were able to complete the prototype including seven segments.  2. Were able to suggest more than one sensor to replace the switches |

**Exemplar Student Work**

1. In a group of 2-3 students have taken a project to implement the simulation prototype into a physical prototype using Arduino UNO and switches.
2. Prototype being installed in school/home and being used every day.