



**MATATAG**  
Bansang Makabata Batang Makabansa

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| <b>School:</b>                  |  | <b>Grade Level:</b>   | 7            |
| <b>Teacher:</b>                 |  | <b>Learning Area:</b> | TLE          |
| <b>Teaching Dates and Time:</b> |  | <b>Quarter:</b>       | Fourth       |
|                                 |  | <b>Week:</b>          | Week 3-Day 3 |

| <b>I. CONTENT, STANDARDS AND LEARNING COMPETENCIES</b> |                                                                                                                                                                                                                                                                                                                  | <b>ANNOTATIONS</b> |
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| <b>A. CONTENT STANDARDS</b>                            | Demonstrate an understanding of the uses and maintenance of hand tools, power tools, instruments, and equipment.                                                                                                                                                                                                 |                    |
| <b>B. PERFORMANCE STANDARDS</b>                        | The learners perform mensuration and calculations following safety precautions.                                                                                                                                                                                                                                  |                    |
| <b>C. LEARNING COMPETENCIES</b>                        | <b>Learning Competency:</b><br>Identify the uses and maintenance of hand tools, power tools, instruments, and equipment.                                                                                                                                                                                         |                    |
| <b>D. LEARNING OBJECTIVES</b>                          | <b>Learning Objectives:</b><br>1. Differentiate the hand tools, power tools, instruments, and equipment.<br>2. Identify and classify the common hand tools, power tools, instruments, and equipment used in industrial arts.<br>3. Explain the uses and characteristics of each tool, instrument, and equipment. |                    |
| <b>I. CONTENT</b>                                      |                                                                                                                                                                                                                                                                                                                  |                    |
| Instruments (analog, digital, and computer-based)      |                                                                                                                                                                                                                                                                                                                  |                    |
| <b>II. LEARNING RESOURCES</b>                          |                                                                                                                                                                                                                                                                                                                  |                    |
| <b>A. REFERENCES</b>                                   | Fleming, R. (2022, October 20). What are the types of hand tools and how are they important? Proline Blog.<br><a href="https://www.prolinerangehoods.com/blog/types-of-hand-tools/">https://www.prolinerangehoods.com/blog/types-of-hand-tools/</a>                                                              |                    |

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|                                    | <p>Hand and power tools: What you need to know   SafetyCulture. (2023, December 29). SafetyCulture.<br/><a href="https://safetyculture.com/topics/hand-and-power-tools/">https://safetyculture.com/topics/hand-and-power-tools/</a></p> <p>House, D. C. (2023, January 26). Zebra crossing rules in India. Blogs - DigitalCarHouse.com. <a href="https://digitalcarhouse.com/blog/zebra-crossing-rules-in-india/">https://digitalcarhouse.com/blog/zebra-crossing-rules-in-india/</a></p> <p>King, R. (2020, April 21). Hydraulics Vs Pneumatics. Hydraulics and Pneumatics – What’s the Difference, and Why the Confusion?<br/><a href="https://www.rowse.co.uk/blog/post/hydraulics-vs-pneumatics">https://www.rowse.co.uk/blog/post/hydraulics-vs-pneumatics</a></p> <p>Prasad, L. (2024, February 17). 23 Different types of air tools (Pneumatic tools) and their uses. ElectronicsHub.<br/><a href="https://www.electronicshub.org/air-tools/">https://www.electronicshub.org/air-tools/</a></p> <p>Robc. (2023, December 4). Hydraulics and pneumatics – What’s the difference, and why the confusion? - Worlifts. Worlifts.<br/><a href="https://www.worlifts.co.uk/expert-guides/hydraulics-and-pneumatics-whats-the-difference-and-why-the-confusion/">https://www.worlifts.co.uk/expert-guides/hydraulics-and-pneumatics-whats-the-difference-and-why-the-confusion/</a></p> <p>Team, L. C. (2023, October 7). 11 Types of hand tools and their usage   Linquip. Industrial Manufacturing Blog   linquip.<br/><a href="https://www.linquip.com/blog/types-of-hand-tools/">https://www.linquip.com/blog/types-of-hand-tools/</a></p> <p>Torc Stark. (2023, September 5). Common Hydraulic Tools: applications, operations. TorcStark®. <a href="https://torcstark.com/summary-of-common-hydraulic-tools/">https://torcstark.com/summary-of-common-hydraulic-tools/</a></p> <p>What is meant by “equality of educational opportunity”? Describe how education helps to facilitate social equality. (n.d.). Quora.<br/><a href="https://www.quora.com/What-is-meant-by-equality-of-educational-opportunity-Describe-how-education-helps-to-facilitate-social-equality">https://www.quora.com/What-is-meant-by-equality-of-educational-opportunity-Describe-how-education-helps-to-facilitate-social-equality</a></p> |
| <b>B. OTHER LEARNING RESOURCES</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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| <b>III. TEACHING AND LEARNING PROCEDURE</b> |                                                                                                                                             |  |
| <b>BEFORE/PRE-LESSON PROPER</b>             |                                                                                                                                             |  |
| <b>ACTIVATING PRIOR KNOWLEDGE</b>           | <b>Short Review</b><br><br><b>Power Tools</b><br><br>Power tools are tools powered by an external source such as electricity, batteries, or |  |

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|                                     | <p>compressed air. They are commonly used in construction, woodworking, and metalworking to improve efficiency and precision. Examples of power tools include electric drills, circular saws, angle grinders, and sanders. Proper handling and safety measures, such as wearing personal protective equipment (PPE), are essential when using power tools.</p> <p><b>Common Pneumatic Tools</b></p> <p>Pneumatic tools are powered by compressed air, making them lightweight and efficient for high-speed operations. These tools are commonly used in automotive repair, construction, and industrial settings. Examples include air impact wrenches, pneumatic nail guns, air hammers, and spray guns. Regular maintenance, such as checking for air leaks and proper hose connections, ensures safe and effective use.</p> <p><b>Common Hydraulic Tools</b></p> <p>Hydraulic tools operate using liquid fluid pressure to generate force. They are typically used for lifting, bending, and cutting heavy materials in construction, automotive, and industrial applications. Common hydraulic tools include hydraulic jacks, hydraulic presses, and hydraulic cutters. These tools offer high power and precision but require regular inspection for leaks and proper fluid levels to maintain safety and efficiency.</p> <p>Understanding these tools and their proper use ensures workplace efficiency and safety.</p> |  |
| <b>LESSON<br/>PURPOSE/INTENTION</b> | <p>1. Lesson Purpose</p> <p>The purpose of this lesson is to help understand the different types of instruments used for measurement, data collection, and control in various fields such as engineering, science, and technology. By the end of the lesson, should be able to:</p> <ol style="list-style-type: none"> <li>1. <b>Differentiate between analog, digital, and computer-based instruments</b> based on their characteristics and functions.</li> <li>2. <b>Identify common examples</b> of each type of instrument and their applications in real-life scenarios.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |

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|                                 | <ol style="list-style-type: none"> <li><b>Understand the advantages and limitations</b> of analog, digital, and computer-based instruments.</li> <li><b>Develop skills in reading and interpreting measurements</b> from different types of instruments.</li> <li><b>Recognize the importance of accuracy, precision, and calibration</b> in using measurement instruments.</li> </ol> <p>This lesson aims to equip with the knowledge and skills needed to select and use the appropriate instruments for various tasks efficiently and accurately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |
| <b>LESSON LANGUAGE PRACTICE</b> | <p><b>2. Unlocking Content Vocabulary</b></p> <p>Understanding key terms related to instruments is essential for effectively using measurement tools in various fields. Below are important vocabulary words students should know:</p> <p><b>General Terms</b></p> <ol style="list-style-type: none"> <li><b>Instrument</b> – A device used for measuring, recording, or controlling a specific parameter.</li> <li><b>Measurement</b> – The process of determining the size, amount, or degree of something using instruments.</li> <li><b>Accuracy</b> – The degree to which a measurement aligns with the true or accepted value.</li> <li><b>Precision</b> – The consistency of repeated measurements, regardless of accuracy.</li> <li><b>Calibration</b> – The process of adjusting an instrument to ensure accurate measurements.</li> </ol> <p><b>Analog Instruments</b></p> <ol style="list-style-type: none"> <li><b>Analog Instrument</b> – A device that provides continuous, real-time</li> </ol> |  |

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|  | <p>readings using mechanical or electrical signals.</p> <p>7. <b>Dial Gauge</b> – An analog instrument with a needle that moves along a scale to display measurements.</p> <p>8. <b>Manometer</b> – A pressure-measuring instrument that uses a liquid column for reading values.</p> <p>9. <b>Thermometer (Mercury/Alcohol-based)</b> – A device that measures temperature based on liquid expansion in a tube.</p> <p>10. <b>Voltmeter (Analog)</b> – A device that measures electrical voltage using a needle and scale.</p> <p><b>Digital Instruments</b></p> <p>11. <b>Digital Instrument</b> – A device that provides discrete numerical readings using electronic displays.</p> <p>12. <b>Digital Multimeter</b> – A tool used to measure voltage, current, and resistance electronically.</p> <p>13. <b>Digital Thermometer</b> – A temperature-measuring device that displays readings on an electronic screen.</p> <p>14. <b>LCD (Liquid Crystal Display)</b> – A type of screen used to display numerical measurements in digital instruments.</p> <p>15. <b>Resolution</b> – The smallest measurable change an instrument can detect and display.</p> <p><b>Computer-Based Instruments</b></p> <p>16. <b>Computer-Based Instrument</b> – A measurement tool that connects to a computer for data processing and analysis.</p> <p>17. <b>Sensor</b> – A device that detects physical changes (e.g.,</p> |  |
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|                                  | <p>temperature, pressure) and converts them into electronic signals.</p> <p>18. <b>Data Logger</b> – A computerized system that records and stores measurement data over time.</p> <p>19. <b>Oscilloscope</b> – A computer-based instrument used to visualize and analyze electrical signals.</p> <p>20. <b>Software Interface</b> – A program that allows users to interact with and control computer-based instruments.</p> <p>Mastering these terms will help students understand and effectively use different types of instruments.</p>                                                                                                                                                                                                                                                                                                                                                                                    |  |
| <b>DURING/LESSON PROPER</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <b>READING THE KEY IDEA/STEM</b> | <p><b>SUB-TOPIC 3: Instruments (Analog, Digital, and Computer-based) and Equipment and Accessories</b></p> <p><b>1. Explication</b></p> <p><b>What is an Analog Instrument?</b></p> <p>An analog instrument shows the measurement results either in a wave or by the deflection of a pointer on an analog scale. Analog instruments work on the principle of electromagnetic induction, consisting of a magnet (permanent or electromagnet) and a coil through which the current flows. The measurement is then performed by the interaction between the magnet's magnetic field and the magnetic field produced by the electric current in the coil, and the results of the measurement are generally shown by the deflection of a pointer on a scale.</p> <p>Examples of analog instruments include:</p> <p>1. Analog multimeter – a device that measures electrical quantities such as voltage, current, and resistance.</p> |  |

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|  | <p>2. Analog thermometer – a device that measures temperature using a liquid-filled tube or coil that expands or contracts in response to temperature changes.</p> <p>3. Analog pressure gauge – a device used to measure the pressure of gases or liquids using a mechanical mechanism to display the pressure reading on a dial physically.</p> <p>4. Analog oscilloscope – a device used to measure and display voltage signals over time using a cathode-ray tube to represent the signal visually.</p> <p>5. Analog caliper – a device used to measure the distance between two points using a slider with a scale and pointer to indicate the measurement.</p> <p><b>What is a Digital Instrument?</b></p> <p>A digital instrument is a measuring instrument that represents the output in the form of digits on a screen (LCD or LED). The principle of a digital instrument is based on the binary number system where two binary digits (0 and 1) denote two distinct values. Digital instruments are made of solid-state devices such as diodes, transistors, MOSFETs, LEDs, etc. The results shown by the digital instruments are straightforward and accurate. Some common examples of digital instruments are digital multimeters, digital ammeters and voltmeters, digital energy meters, digital speedometers, etc.</p> <p>Examples of Digital instruments include:</p> |  |
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1.  
Digital  
Caliper



2. Digital  
Multimeter



3.  
Digital  
Measuring  
Tape



4.  
Digital  
Weighing  
Scale



### What is a Computer-Based Instrument?

Computer-based instruments are devices used for measuring, monitoring, controlling, and analyzing various processes within the industrial arts field. Their computing capabilities allow them to perform tasks more accurately and efficiently than traditional instruments.

Some examples of computer-based instruments in industrial arts include:

1. Car Scanner – a car scanner is a common tool in the automotive industry used by automotive technicians and engineers to read trouble codes generated by the vehicle system

2. Oscilloscope—An oscilloscope is a device that measures and displays voltage signals as a waveform. It is commonly used in electronics and telecommunications to analyze and diagnose circuit problems.

3. Spectrum Analyzer—A spectrum analyzer is a device used to measure the frequency spectrum of a signal. It is commonly used in telecommunications, audio engineering, and radio frequency (RF) testing to analyze and diagnose signals.

4. Logic Analyzer—A logic analyzer is a device used to capture and analyze digital signals in a system. It is commonly used in computer hardware development and debugging to test and diagnose digital circuits.



5. Data Acquisition System—A data acquisition system is a computer-based instrument that measures and records physical phenomena such as temperature, pressure, or vibration. It typically consists of sensors, signal conditioning hardware, and software for data analysis.

6. Power Quality Analyzer—A power quality analyzer is a device used to measure and analyze electrical power quality in a system. It is commonly used in industrial and commercial applications to monitor voltage sags, harmonics, and other power disturbances.

7. Temperature Calibrator—A temperature calibrator is a device that calibrates and tests temperature sensors and instruments. It can simulate different temperature ranges to ensure the accuracy of temperature measurement devices.

8. Pressure Gauge Calibration System – a pressure gauge calibration system is a computer-based instrument to calibrate and test pressure gauges and sensors. It can generate and measure pressure levels to verify the accuracy of pressure measurement devices.

**Equipment and Accessories:**

1. Construction services—Equipment and accessories could include concrete mixers, dump trucks, loaders, cranes, scaffolding, and safety gear.

2. Electro-mechanical services—Equipment and accessories could include electronic components such as circuit boards, machinery parts such as gears and motors, and tools such as soldering irons.

3. Electrical services—Equipment and accessories could include wiring, switches, outlets, and tools such as wire cutters and voltage testers.

4. Automotive and small engine services – equipment and accessories could include diagnostic tools such as OBD scanners, replacement parts such as spark plugs and

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|                                                                           | <p>filters, and maintenance tools such as wrenches and socket sets.</p> <p><b>2. Worked Example</b></p> <ul style="list-style-type: none"> <li>• Divide the class into 4 groups.</li> <li>• Let them differentiate between analog, digital, and computer-based tools.</li> <li>• Let them also consider the equipment and accessories for construction, electromechanical, electrical, automotive, and small engine services.</li> <li>• Let them present their answer in class and facilitate the discussion.</li> </ul> <p><b>3. Lesson Activity: Identification of Tools</b></p> <p><b>Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Identify the tools classified as analog, digital, and computer based.</li> <li>2. Determine the equipment and accessories for construction, electro- mechanical, electrical, automotive, and small engine services.</li> </ol> <p><b>Instructions:</b></p> <ul style="list-style-type: none"> <li>• Have a group activity. Let the students think of 9 tools, 3 analog, 3 digital, and 3 computer-based. Also, 3 Equipment and Accessories in each area, construction services, electro-mechanical, electrical, and automotive, and small engine services</li> <li>• Let them present their work in class.</li> <li>• Facilitate the discussion, especially when students need further explanations.</li> </ul> |  |
| <b><i>DEVELOPING and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM</i></b> | <p><b>Activity: "Exploring Measurement Instruments" – Developing and Deepening Understanding</b></p> <p><b>Objective:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |

- Differentiate between analog, digital, and computer-based instruments.
- Identify real-life applications of different measurement instruments.
- Analyze the advantages and limitations of each type of instrument.

**Materials Needed:**

- ✓ Pictures or actual instruments (e.g., analog thermometer, digital multimeter, computer-based oscilloscope)
- ✓ Chart paper or printed worksheets
- ✓ Markers or pens
- ✓ Research materials (books, internet access, or teacher-prepared notes)

**Activity Steps:**

**1. Know – Introduction & Identification**

 **Discussion Starter:**

- Ask students: “What instruments have you seen or used before?”
- Show images or real examples of analog, digital, and computer-based instruments.
- Explain the characteristics of each type with real-life applications.

 **Matching Game:**

- Provide students with a list of instruments (e.g., dial gauge, digital thermometer, data logger).
- Have them classify each instrument as analog, digital, or computer-based.

**2. Use – Group Research & Presentation**

 **Group Activity:**

- **Divide students into three groups:**
  - Group 1: Research on Analog Instruments
  - Group 2: Research on Digital Instruments
  - Group 3: Research on Computer-Based Instruments

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|                                                | <ul style="list-style-type: none"> <li>• <b>Each group answers:</b> <ul style="list-style-type: none"> <li>• What are the key features of your assigned instruments?</li> <li>• Where are these instruments commonly used?</li> <li>• What are the advantages and disadvantages?</li> </ul> </li> <li>•  <b>Presentation:</b> <ul style="list-style-type: none"> <li>• Each group presents their findings using visual aids (chart paper, PowerPoint, or verbal presentation).</li> </ul> </li> <li>• <b>3. Master – Application and Critical Thinking</b> <ul style="list-style-type: none"> <li>•  <b>Scenario-Based Questions:</b> <ul style="list-style-type: none"> <li>• Present real-life situations and ask: "Which type of instrument would be most effective and why?" <ul style="list-style-type: none"> <li>• Example: "A doctor needs to check a patient's temperature quickly and accurately. What instrument should they use?"</li> <li>• Example: "A scientist needs to record environmental temperature changes over a week. Which instrument is best?"</li> </ul> </li> </ul> </li> <li>•  <b>Reflection:</b> <ul style="list-style-type: none"> <li>• Ask students: "Why is it important to choose the right instrument for the right task?"</li> <li>• Have them write a short response or discuss as a class.</li> </ul> </li> </ul> </li> </ul> |  |
| <b>AFTER AFTER/POST-LESSON</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| <b>MAKING GENERALIZATIONS AND ABSTRACTIONS</b> | Worksheet<br><br>Synthesis/Extended<br>What you have learned<br>In a one sheet of paper write something you understand about the lesson we discussed today.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |

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| <p><b>EVALUATING LEARNING</b></p> | <p><b>Directions:</b> Read each question carefully and choose the best answer. Encircle the letter of your choice.</p> <p><b>Analog Instruments</b></p> <ol style="list-style-type: none"> <li><b>What is an analog instrument?</b> <ol style="list-style-type: none"> <li>A device that provides measurements in digital form</li> <li>A tool that uses mechanical or electrical signals to give continuous readings</li> <li>A computer-based measuring tool</li> <li>A device that only measures electrical quantities</li> </ol> </li> <li><b>Which of the following is an example of an analog instrument?</b> <ol style="list-style-type: none"> <li>Digital multimeter</li> <li>Analog thermometer</li> <li>Data logger</li> <li>Oscilloscope</li> </ol> </li> <li><b>How does an analog voltmeter display reading?</b> <ol style="list-style-type: none"> <li>With an LCD screen</li> <li>Using a moving needle on a scale</li> <li>By storing data in a computer</li> <li>With LED indicators</li> </ol> </li> <li><b>What is a limitation of analog instruments compared to digital instruments?</b> <ol style="list-style-type: none"> <li>They are more expensive</li> <li>They cannot be used in industries</li> <li>They may be harder to read due to human error</li> <li>They are always inaccurate</li> </ol> </li> </ol> <p><b>Digital Instruments</b></p> <ol style="list-style-type: none"> <li><b>What is a digital instrument?</b> <ol style="list-style-type: none"> <li>A device that provides numerical readings using electronic displays</li> <li>A mechanical device with a moving needle</li> <li>A tool that only measures temperature</li> <li>An instrument that operates without any power source</li> </ol> </li> </ol> | <p><b>Answers:</b></p> <ol style="list-style-type: none"> <li>b. A tool that uses mechanical or electrical signals to give continuous readings</li> <li>b. Analog thermometer</li> <li>b. Using a moving needle on a scale</li> <li>c. They may be harder to read due to human error</li> <li>a. A device that provides numerical readings using electronic displays</li> <li>c. Digital multimeter</li> <li>b. They provide precise and easy-to-read numerical values</li> <li>c. It is connected to a computer for data processing and analysis</li> <li><b>c. Data logger</b></li> <li>c. Storing and analyzing data over time for research and monitoring</li> </ol> |
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|                                                                             | <p>6. <b>Which of the following is an example of a digital instrument?</b></p> <ul style="list-style-type: none"> <li>a. Mercury thermometer</li> <li>b. Dial pressure gauge</li> <li>c. Digital multimeter</li> <li>d. Analog clock</li> </ul> <p>7. What is the main advantage of digital instruments over analog instruments?</p> <ul style="list-style-type: none"> <li>a. They do not need electricity</li> <li>b. They provide precise and easy-to-read numerical values</li> <li>c. They are cheaper than analog instruments</li> <li>d. They do not require calibration</li> </ul> <p><b>Computer-Based Instruments</b></p> <p>8. <b>What defines a computer-based instrument?</b></p> <ul style="list-style-type: none"> <li>a. It only works with battery power</li> <li>b. It is operated manually with no electronic components</li> <li>c. It is connected to a computer for data processing and analysis</li> <li>d. It always has an analog display</li> </ul> <p>9. <b>Which of the following is an example of a computer-based instrument?</b></p> <ul style="list-style-type: none"> <li>a. Dial caliper</li> <li>b. Digital weighing scale</li> <li>c. Data logger</li> <li>d. Mercury thermometer</li> </ul> <p>10. <b>What is a common use of computer-based instruments?</b></p> <ul style="list-style-type: none"> <li>a. Measuring temperature using mercury expansion</li> <li>b. Manually checking electrical resistance</li> <li>c. Storing and analyzing data over time for research and monitoring</li> <li>d. Displaying readings using a needle and scale</li> </ul> |  |
| <b>ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <b>REMARKS</b>                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |

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**Prepared by:**

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*Subject Teacher*

**Reviewed by:**

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*Master Teacher/Head Teacher*