

Measuring Time Concept Storyline

Unifying Concept

Humans have always been interested in measuring the passage of time and have devised many strategies to do so.

Unit Concept

The cycles of the sun and phases of the moon, the rate of fall of objects in water, and the period of the swing of a pendulum may be used to measure the passage of time.

Grade-Level Concept

Time may be measured by monitoring the cyclic periods of natural systems and by using mechanical devices.

Subconcept 1

The cyclic periods of natural phenomena may be used to monitor time.

Lesson 1: Pre-Unit Assessment: Before Clocks

Students discuss their ideas and questions about time.

Lesson 2: Making a Record of Shadows

Students record the shadows cast by a gnomon.

Lesson 3: Does the Sun Move?
Students graph the data from Lesson 2 and consider how shadows are formed.

Lesson 4: Counting Days: Devising a Calendar
Students read about calendars used by other cultures and design their own calendars.

Lesson 5: Predicting the Phases of the Moon
Students predict and observe the phases of the moon.

Lesson 6: Observing the Phases of the Moon
Students use a model to continue their study of the phases of the moon.

Subconcept 2

Mechanical devices that change at a constant rate may be used to measure time.

Lesson 7: Using Water to Measure Time

Students experiment with sinking objects to measure time.

Lesson 8: Planning an Experiment with Sinking Water Clocks

Students plan a controlled experiment to identify variables that affect their clocks.

Lesson 9: Experimenting with Sinking Water Clocks
Students conduct the tests they designed in Lesson 8 and summarize their findings.

Lesson 16: Building a One-Minute Timer
Students design and build a device to measure one minute of time.

Subconcept 3

The uniform period of a swinging pendulum may be used to measure time.

Lesson 10: Investigating Pendulums

Students plan an experiment to find out how changing a variable affects the frequency of a pendulum.

Lesson 11: Experimenting with Pendulums
Students conduct their experiments and share their results.

Lesson 12: Comparing Results
Students explore the effect of an additional variable on the frequency of a pendulum.

Lesson 13: Constructing a Clock Escapement
Students build an escapement to keep a pendulum swinging.

Lesson 14: Adjusting the Clock Escapement
Students brainstorm how to improve the operation of their escapements.

Lesson 15: Calibrating the Clock
Students are challenged to make their pendulums swing as long as possible.

Lesson 17: Post-Unit Assessment: Sharing What We Know about Measuring Time
Students discuss and reflect on what they have learned.