

Cool Cup Test

Plan a fair test with variables, metric tools, and elapsed time.

4.1.b “planning and carrying out investigations identify variables when planning an investigation collaboratively plan and conduct investigations use tools and/or materials to design and/or build a device that solves a specific problem take...”

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the test variable and the controlled variables. Circle each tool or measurement, and number the two clock times 1 and 2 so you can find elapsed time.

Testing Cup Sleeves

- ① Maya’s team wanted to build a sleeve that would keep a cup of cold water cool during recess. They used felt, foil, and cardboard to make three sleeves. Each sleeve fit around an identical cup. Before testing, the team agreed that the sleeve material was the one change they would make. This was their test variable.
- ② They poured 200 milliliters of water into each cup. Using a thermometer, they measured each water temperature in degrees Celsius at the start and after the test. They kept the cup size, water amount, starting temperature, and sunny test spot the same. These were controlled variables. A graduated cylinder measured the water amount in metric units.
- ③ At 1:05 p.m., the team recorded the starting temperatures. They checked again at 1:20 p.m., so the test lasted 15 minutes. The felt sleeve kept the water coolest. The team repeated the test twice more before choosing felt for its lunch-cup sleeve. Repeating a test can make results more dependable when conditions stay the same.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What device did Maya’s team build, and what problem was it meant to solve?

2 What was the test variable? Name two controlled variables.

3 Which tool measured the water amount, and which tool measured temperature? Include the metric units named in the passage.

4 What were the starting and ending clock times? How much time elapsed?

3 YOUR TURN _____ Your own words

Choose a problem that a small device could solve. Use all three rows to plan three fair tests of your device, changing one material while keeping other conditions the same and recording a metric measurement and elapsed time.

PROBLEM AND DEVICE	CHANGED MATERIAL	WHAT STAYS THE SAME	TOOL AND METRIC MEASUREMENT	START, END, ELAPSED TIME

PART 1 • READ AND MARK

Underline the test variable and the controlled variables. Circle each tool or measurement, and number the two clock times 1 and 2 so you can find elapsed time. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What device did Maya's team build, and what problem was it meant to solve?	They built cup sleeves to keep cold water cool during recess.
2	What was the test variable? Name two controlled variables.	The test variable was sleeve material. Controlled variables included cup size, water amount, starting temperature, and the sunny test spot.
3	Which tool measured the water amount, and which tool measured temperature? Include the metric units named in the passage.	A graduated cylinder measured 200 milliliters of water. A thermometer measured temperature in degrees Celsius.
4	What were the starting and ending clock times? How much time elapsed?	The test started at 1:05 p.m. and ended at 1:20 p.m. The elapsed time was 15 minutes.

PART 3 • YOUR TURN (SAMPLE ANSWER)

PROBLEM AND DEVICE	CHANGED MATERIAL	WHAT STAYS THE SAME	TOOL AND METRIC MEASUREMENT	START, END, ELAPSED TIME
Stop a toy car before it hits a book, cardboard bumper	cardboard	same toy car, ramp height, and start line	ruler, stopping distance in cm	2:00 to 2:10, 10 seconds
Stop a toy car before it hits a book, foam bumper	foam	same toy car, ramp height, and start line	ruler, stopping distance in cm	2:15 to 2:25, 10 seconds
Stop a toy car before it hits a book, folded-cloth bumper	folded cloth	same toy car, ramp height, and start line	ruler, stopping distance in cm	2:30 to 2:40, 10 seconds

Accept equivalent controlled variables that would make the tests fair. In Part 3, check that the student names one changed material, keeps other test conditions consistent, uses a metric tool and unit, and records a reasonable elapsed time.