

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

With two or more teammates, choose a small device problem and agree on three materials, one changed factor, controls and jobs. Your teacher supplies and approves safe materials and tools. Build or assemble the device and carry out three tests, one per material, keeping agreed conditions the same. Use a metric tool to record an actual result and a stopwatch to record each start, end and elapsed time. Explain which material worked best in these tests. Use extra paper for your shared plan and conclusion.

DEVICE / MATERIAL	CONTROLS	ACTUAL RESULT + TOOL/UNIT	START / END / ELAPSED

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)

Illustrative completed bumper tests: the same toy car, ramp height and start line were used. The ruler measured travel after first touching the bumper; less travel was better. Real teams must collect their own data.

DEVICE / MATERIAL	CONTROLS	ACTUAL RESULT + TOOL/UNIT	START / END / ELAPSED
Cardboard bumper	Same car, ramp, line	Ruler: 6 cm	2:00 / 2:10 / 10 s
Foam bumper	Same controls	Ruler: 2 cm	2:15 / 2:25 / 10 s
Folded-cloth bumper	Same controls	Ruler: 4 cm	2:30 / 2:40 / 10 s

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. Teacher setup: supply a toy car, low stable ramp, book, cardboard, foam, folded cloth, tape, ruler and stopwatch for the suggested bumper test, or approve an equally accessible device. Define and demonstrate the metric result before testing. Divide builder/releaser, measurer and recorder jobs; partners may combine jobs. Observe actual collaboration, construction and tool use. Times in the sample are stopwatch minutes:seconds; each difference is 10 seconds. Foam worked best only in those illustrative tests; accept the team's actual evidence, including ties or inconclusive results.