

## TIMSS 2019 – Restricted Use Items – Physics

Benchmark 2

Knowing

Scientists sent a special vehicle to Mars to make a map of the surface of the planet. A diagram of the vehicle is shown.



The vehicle has a different weight on Mars than it has on the Earth.

Why does the vehicle have different weights on the two planets?

- (A) The vehicle lost mass when it was transported from Earth to Mars.
- (B) The vehicle gained mass when it began moving on Mars.
- (C) The magnetic attraction on Earth is different from Mars.
- (D) The gravitational attraction on Earth is different from Mars.

Benchmark 3

Applying

Nada hangs her cell phone under a glass bowl as shown. The ringer on the phone is turned on. She removes the air from under the bowl so that her phone is in a vacuum.



Nada asks her friend to call her phone. Will they hear it ring?

(Check one box.)

Yes

No

Explain your answer.

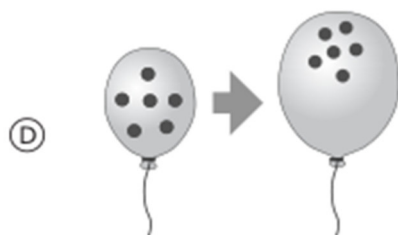
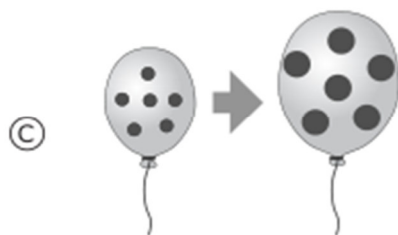
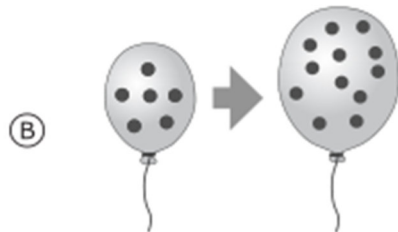
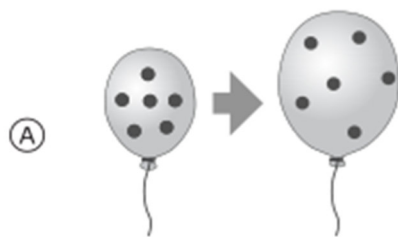
Benchmark 4

Applying

Gas inside of a balloon expands when heated.

What happens to the gas molecules when the balloon expands?

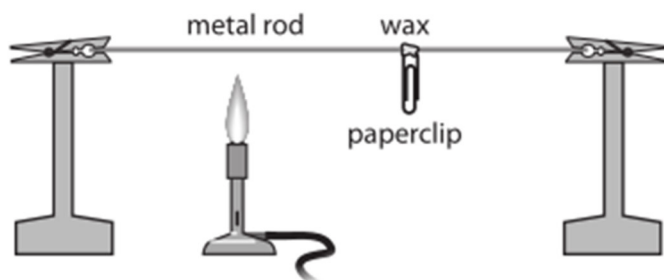
● = gas molecule



## Reasoning

Tom investigates whether iron conducts heat better than copper. He uses wax to attach one paperclip to an iron rod and another paperclip to a copper rod.

He heats each rod until the wax melts and the paperclip falls off. Tom measures how much time it takes for each paperclip to fall off its rod.



How should Tom design his experiment?

Fill in one circle in each row to show the things Tom should do to make sure he will be able to tell which metal is a better conductor of heat.

	Yes	No
Use the same type of wax on both rods.-----	(A)	(B)
Use a higher flame for the copper rod than for the iron rod. -----	(A)	(B)
Use paperclips made from different materials for each rod. -----	(A)	(B)
Attach the paperclip the same distance from the flame for both rods. -----	(A)	(B)
Use a thick iron rod and a thin copper rod.-----	(A)	(B)
Use more wax on the iron rod than on the copper rod. --	(A)	(B)