

IBSMO

International British Science & Mathematics Olympiad

Science — Sample Questions

Junior Level

Grade 3–4

Question 1 — Physics — Fair Testing

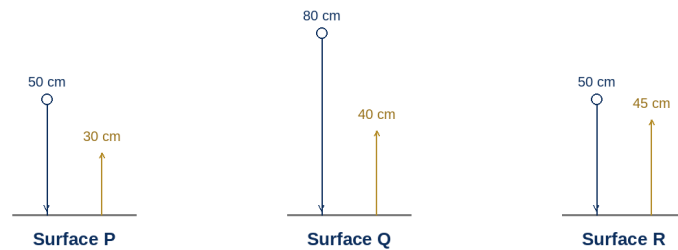
A pupil wants to find out which surface makes a ball bounce highest. She drops the same ball onto three surfaces:

Surface P: dropped from 50 cm → bounces to 30 cm

Surface Q: dropped from 80 cm → bounces to 40 cm

Surface R: dropped from 50 cm → bounces to 45 cm

She concludes: "Surface Q makes the ball bounce highest, since it reached 40 cm."



Why is this conclusion not valid?

- A) The ball was not the same on each surface
- B) Surface Q was tested from a different starting height, so the results cannot be fairly compared ✓**
- C) 40 cm is not higher than 30 cm
- D) Bounce height cannot be measured accurately

Answer: B. A fair comparison needs the same drop height. At the same 50 cm drop, Surface R (45 cm) actually performs better than P (30 cm) — Q's result cannot be compared at all.

Question 2 — Physics / Materials — Counterexamples

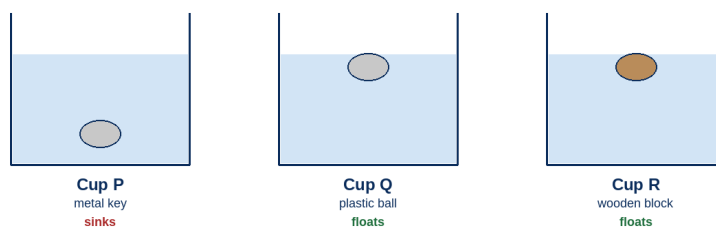
Three identical cups of water each contain one object:

Cup P: a small metal key → sinks

Cup Q: a large plastic ball → floats

Cup R: a small wooden block → floats

Amelia concludes: "Big objects float, and small objects sink."



Why is Amelia's conclusion incorrect?

A) Plastic always floats, regardless of size

B) The small wooden block also floats, which disproves the idea that size alone determines floating ✓

C) Metal objects can never float

D) The cups were not identical

Answer: B. *Cup R is a direct counterexample: it is small, yet it floats — so size cannot be the rule that explains the results.*

Question 3 — Biology — Valid vs. Unsupported Conclusions

A gardener records the number of flowers on three plants:

Plant P: 6 hours of sunlight → 12 flowers

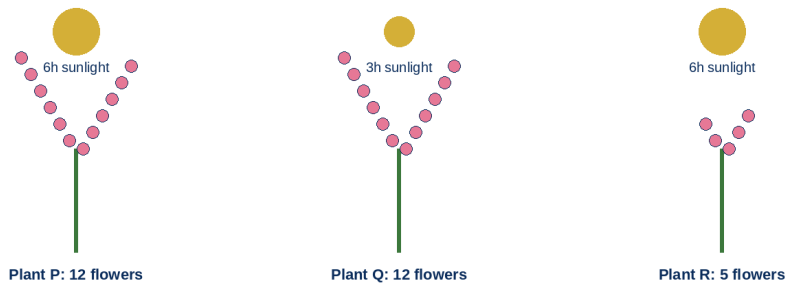
Plant Q: 3 hours of sunlight → 12 flowers

Plant R: 6 hours of sunlight → 5 flowers

Grace says: "Sunlight is the only thing that affects flowering, since P and R both got 6 hours."

Oliver says: "Since P and R got the same sunlight but different results, something else besides sunlight must also matter."

Jack says: "Q must be a completely different type of plant."



Whose conclusion is best supported by the data?

A) Only Grace

B) Only Oliver ✓

C) Oliver and Jack

D) Grace and Oliver

Answer: B. *P and R received the same sunlight but produced very different results, which directly disproves Grace's claim and supports Oliver's. Jack's claim about the plant type is not something the data can show — it is an unsupported guess.*

Question 4 — Earth Science — Observation and Explanation

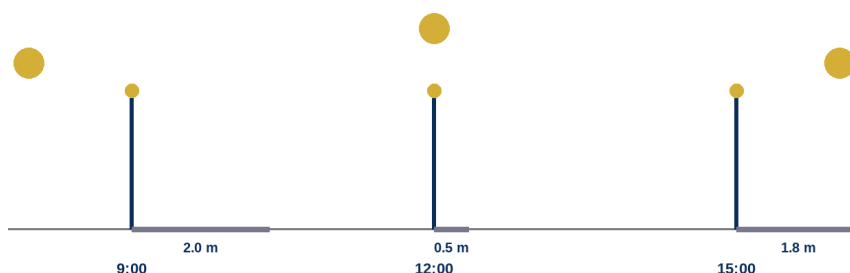
Sophie measures the shadow of the same pole at different times:

9:00 → shadow is 2 m long

12:00 → shadow is 0.5 m long

15:00 → shadow is 1.8 m long

She concludes: "The pole itself must be getting shorter and then longer during the day."



Why is Sophie's conclusion wrong?

A) A pole cannot change height in a day — the changing shadow length is caused by the Sun's position changing, not the pole ✓

- B) Shadows are always the same length at any time of day
- C) The measurements must have been taken incorrectly
- D) Only moonlight can create shadows of this length

Answer: A. The pole's height is fixed. As the Sun's position in the sky changes through the day, the angle of light changes — and that is what changes the shadow's length.

Question 5 — Scientific Reasoning — Isolating Variables

Three identical cups of hot water are wrapped and left for 10 minutes:

Cup P: wool cloth, closed lid → still very warm

Cup Q: wool cloth, open lid → cooled down a lot

Cup R: paper towel, closed lid → cooled down only a little

Harry concludes: "Only the type of wrapping material affects how fast the water cools."



Why doesn't this experiment fully support Harry's claim?

- A) Wool is always a better insulator than paper
- B) Both the wrapping material and whether the lid was open or closed differ between the cups, so the effect of the material alone cannot be isolated ✓**
- C) Water always cools down over time regardless of wrapping
- D) Paper towels cannot be used in scientific experiments

Answer: B. To test the material fairly, only the material should change — here the lid status changes too (closed vs. open), so we cannot tell which factor caused the difference between P and Q.