Year 11 Science: Science language, graphs and judging a claim

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A graph's axis starts at 20. Brand X scored 30 and brand Y scored 25. How many times taller does X's bar look, and what is the real percentage difference compared with Y?

2. Towns with more libraries have more crime. Give the most likely reason.

3. 50 people took a cold remedy and most felt better within 5 days. What convention is missing?

4. Which is more honest about a single study: "proves" or "suggests"? Why?

Exam-style question: phones and sleep

Resource: SleepRight NZ, which sells blue-light-blocking glasses, posts "Late-night phone use wrecks teen sleep and grades! Blue light suppresses melatonin, disrupting the circadian rhythm." A bar graph shows phone users after 10 pm sleep 7.0 and others 8.0, with the axis starting at 6.5 and no units. A footnote says 40 students at one Auckland school filled in an online survey; it was not peer reviewed.

5. (a) Who published this information, and why?

6. (b) State one science-related claim in the post.

7. (c) Identify the science language used.

8. (d) Identify the science conventions used, or missing.

9. (e) How well do the language and conventions support the claim? Use evidence from the resource.

Fix the mistake

10. Correct this statement: "The resource uses words like germinate and polymer, so the claim is supported."

11. Correct this statement: "The graph matches the claim, so the claim is true."

12. Correct this statement: "Ice cream sales and drownings rise together, so ice cream causes drowning."

13. Correct this statement: "There is no peer review, so the claim is wrong."

Answer key (for parents and tutors)

1. A graph's axis starts at 20. Brand X scored 30 and brand Y scored 25. How many times taller does X's bar look, and what is the real percentage difference compared with Y?
   Bar heights are 30 − 20 = 10 and 25 − 20 = 5, so X looks 2 times as tall; the real difference is 5 ÷ 25 × 100 = 20% more.
2. Towns with more libraries have more crime. Give the most likely reason.
   A third factor: bigger towns have more people, so more libraries and more crime; libraries do not cause crime.
3. 50 people took a cold remedy and most felt better within 5 days. What convention is missing?
   A control group taking a placebo, since most colds get better in about that time anyway.
4. Which is more honest about a single study: "proves" or "suggests"? Why?
   "Suggests", because one study can support a conclusion but cannot prove it; new evidence could change it.
5. (a) Who published this information, and why?
   SleepRight NZ, a company selling blue-light glasses; to persuade teenagers or parents to buy them, while seeming to inform (Achieved).
6. (b) State one science-related claim in the post.
   Using a phone late at night makes teenagers sleep less (or lowers their grades) (Achieved).
7. (c) Identify the science language used.
   Melatonin, circadian rhythm, blue light, suppresses (Achieved).
8. (d) Identify the science conventions used, or missing.
   A bar graph with a cut-off axis and no units, a sample of 40 from one school, a survey with no control group, no peer review, and a conflict of interest (Achieved).
9. (e) How well do the language and conventions support the claim? Use evidence from the resource.
   Merit: the words melatonin and circadian rhythm make the post sound expert, but they are not explained or linked to any measurement in the study, so they add authority without evidence. The axis starting at 6.5 makes a 1 hour difference look like a threefold gap, and with no units we cannot even be sure it is hours. Excellence: these weaknesses add up. 40 students from one school is a small, narrow sample, and because it is a survey it only shows a correlation; teens who stay up on phones may differ in other ways, such as stress or homework. SleepRight profits from the claim and the work was not peer reviewed, so nobody independent checked it. Nothing in the resource measures grades at all. The claim is weakly supported; a peer-reviewed study of many schools, with a group randomly asked to stop phone use at 10 pm and a graph from 0 with units, would make it far stronger.
10. Correct this statement: "The resource uses words like germinate and polymer, so the claim is supported."
    Name the words, then say whether they are used correctly and explained, and how that changes how believable the claim is.
11. Correct this statement: "The graph matches the claim, so the claim is true."
    Judge how the graph is drawn (axis start, units, labels, sample) and why it was included, not just whether it agrees with the claim.
12. Correct this statement: "Ice cream sales and drownings rise together, so ice cream causes drowning."
    A correlation shows a link, not a cause; a third factor such as hot weather can drive both.
13. Correct this statement: "There is no peer review, so the claim is wrong."
    Missing peer review means nobody independent has checked it, which makes the claim less certain, not false.