Year 12 Science: Carrying out an Earth and Space Science investigation

Name: _____ Date: _____

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

Practice

1. Three repeats give crater diameters of 8.2 cm, 8.6 cm and 8.4 cm. Find the mean.

2. Purpose: to find out how the slope angle of a sand tray affects the mass of sand washed off by 500 mL of water. Name the independent and the dependent variable.

3. Repeats at 80 cm are 7.0 cm, 7.2 cm and 9.6 cm, and the third marble hit an old crater. Find the mean you should report.

4. A 20 g marble is dropped from 0.50 m. Calculate its gravitational potential energy (g = 9.8 N/kg).

5. Which change to a method makes the data more reliable?

6. Explain why the crater widths rise by less with each extra 20 cm of drop height.

Fix the mistake

7. Correct this statement: "My results are reliable because I was careful."

8. Correct this statement: "I put every result in the mean, even the one that bounced."

9. Correct this statement: "I joined my points dot to dot and drew the line through zero."

10. Correct this statement: "My science section explains what a crater is."

Answer key (for parents and tutors)

1. Three repeats give crater diameters of 8.2 cm, 8.6 cm and 8.4 cm. Find the mean.
   (8.2 + 8.6 + 8.4) ÷ 3 = 8.4 cm.
2. Purpose: to find out how the slope angle of a sand tray affects the mass of sand washed off by 500 mL of water. Name the independent and the dependent variable.
   Independent: the slope angle; dependent: the mass of sand washed off.
3. Repeats at 80 cm are 7.0 cm, 7.2 cm and 9.6 cm, and the third marble hit an old crater. Find the mean you should report.
   Leave out 9.6 cm and record why: (7.0 + 7.2) ÷ 2 = 7.1 cm.
4. A 20 g marble is dropped from 0.50 m. Calculate its gravitational potential energy (g = 9.8 N/kg).
   Ep = mgh = 0.020 × 9.8 × 0.50 = 0.098 J.
5. Which change to a method makes the data more reliable?
   Doing three or more repeats at each value and checking they agree closely, with one person measuring the same way each time.
6. Explain why the crater widths rise by less with each extra 20 cm of drop height.
   The energy rises in proportion to the height, but it has to move a bowl of flour whose volume grows much faster than its width, so each extra bit of energy widens the crater less.
7. Correct this statement: "My results are reliable because I was careful."
   Reliable means repeats closely agree; quote the spread, such as all repeats within 0.2 cm, and say what in the method made that happen.
8. Correct this statement: "I put every result in the mean, even the one that bounced."
   If a result breaks the method and you can say how, leave it out of the mean and record the reason, or redo that drop.
9. Correct this statement: "I joined my points dot to dot and drew the line through zero."
   Draw a smooth curve or straight line of best fit through the means, and only through (0, 0) if the science says it must pass there.
10. Correct this statement: "My science section explains what a crater is."
    The science must explain your results: why your trend has the shape it has, using ideas such as Ep = mgh and energy spreading into the flour.