

# What air is made of and why it presses

Grade 7 science (Year 8 · Class 7) · Lab answers

The sample results give about 0.60 g of air per stroke, which matches 0.50 L at 1.2 g per litre. Use these model answers to check your calculations and compare the gradient of your own graph.

**Level:** Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-ESS2-5

## Question 1 Total gain

$416.3 - 392.4 = \mathbf{23.9\text{ g}}$ .

## Question 2 Mass per stroke

$23.9 \div 40 = 0.5975$ , so **about 0.60 g per stroke**.

## Question 3 The graph

The points lie close to a straight line, so the mass added is proportional to the number of strokes. The gradient is  $23.9 \div 40 = \mathbf{0.60\text{ g per stroke}}$ .

## Question 4 Volume of one stroke

$V = m \div \rho = 0.60 \div 1.2 = \mathbf{0.50\text{ L}}$ .

## Question 5 Prediction

Mass =  $392.4 + 60 \times 0.60 = 392.4 + 36.0 = \mathbf{428.4\text{ g}}$  (about 428 g).

## Question 6 Sources of error

Some air escapes while the pump is disconnected, and the pump may not push out its full volume at each stroke. **Leaks and incomplete strokes.**

## Question 7 Conclusion

The mass of the ball rose steadily as air was added, so **air has mass**.

## Question 8 Better method

Fit a one-way valve so no air escapes when the pump is removed, then repeat the whole run three times and average the gradients. **Stop leaks and repeat.**