

# Algebra 14 — Manipulation of Formula

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**ON THE LCHL PAST PAPERS · 2025 P1 Q10(d)(i) (main sitting, 6 marks) · 2025 P1 Q10(d)(ii) (main sitting, 6 marks) · 2025 P1 Q6(b) (main sitting, 15 marks) · 2025 P1 Q8(b) (main sitting, 7 marks) · 2025 P1 Q8(e)(i) (main sitting, 7 marks)**

**How to use this sheet:** these are the exact questions worked in this tutorial, in order. Try each one yourself first — the time it is posed in the video is shown, so you can pause before Paul solves it. Final answers are at the back; the full method is in the video.

## Worked examples (in the video)

**Example 1.**  $T = 2\pi\sqrt{L/g}$ , the pendulum formula — make  $g$  the subject (*worked 00:00–02:30*).

## Questions

**Q1.**  $V = (\frac{1}{3})\pi R^2 h$  (cone volume). Make  $h$  the subject.

*Posed at 02:42 in the tutorial.*

**Q2.** Given  $x = \sqrt{a} + 1/\sqrt{a}$  and  $y = \sqrt{a} - 1/\sqrt{a}$  (with  $a > 0$ ), find  $\sqrt{x^2 - y^2}$ .

*Posed at 02:42 in the tutorial.*

**Q3.**  $z = \sqrt[3]{(kR^3/(1-m))}$ . Make  $R$  the subject.

*Posed at 02:42 in the tutorial.*

## Answers

*Final answers only — pause the video and check yourself; the worked method is in the tutorial.*

**Example 1.**  $g = 4\pi^2 L / T^2$

**Q1.**  $h = \frac{3V}{\pi R^2}$

**Q2.** 2

**Q3.**  $R = \sqrt[3]{(z^2 \frac{1-m}{k})}$

## Overlaps with these tutorials

**Algebra 13 — Long Division.** The same multi-step discipline at maximum difficulty; its substitution move is borrowed here. Do Algebra 13 first for the full toolkit.

**Algebra 4 — JC Fractions.** The fraction-clearing technique used on every denominators-everywhere rearrangement.

**Algebra 1 — JC Factorising.**  $\sqrt{(x^2 - y^2)}$ : factor as DOTS before substituting — the recognition pattern saves real time.