NEO MATHEMATICS · FOUNDATIONS

SUPPORTING ADULT GUIDANCE

Lesson 1: Which Digits Matter?

Guidance for protecting learner thinking, agency and regulation during rounding to significant figures.

Lesson purpose at a glance

This Foundations lesson develops conceptual and procedural understanding of rounding to significant figures. The learner uses a Precision Lens to identify retained and deciding digits, then a Boundary Explorer to connect the rule to closeness.

> **Driving Question**
> How can we make a number easier to use while keeping it close to its original value?

The learner is developing:

- recognition of the first significant digit;
- accurate counting of significant figures across integers and decimals;
- use of the deciding digit;
- preservation of place value and visible precision;
- explanation of rounding as a decision about closeness.

The supporting adult's role

Protect thinking, agency and regulation rather than taking over. You do not need to be a mathematics specialist or supply the quickest method.

- Offer one short question at a time and allow processing time.
- Let the learner control the interactive, cursor, calculator and Scratchpad.
- Recognise predictions, revisions and explanations as evidence.
- Use the graduated support pathway before supplying additional explanation.
- Treat pauses and alternative representations as legitimate choices.

Before the lesson

Essential preparation is minimal: a working browser and a calm route into the lesson. Paper and a calculator may be helpful but are not compulsory.

- Reduce unnecessary visual or auditory distraction where possible.
- Allow the learner to choose screen, paper, speech or drawing.
- Remind them that suggested timings are invitations, not deadlines.
- Agree how the learner can ask for space, a pause or support.

Possible Reconnection Route

If place-value columns, tenths or hundredths are insecure, use the Scratchpad's place-value background briefly. Return to the live number as soon as the needed connection is available.

Supporting the Cornerstone rhythm

Phase	Helpful adult support
Connect	Invite comparison between the original and rounded value. Ask what information remains useful.
Move	Allow the learner to operate the Precision Lens. Encourage prediction before reveal.
Reflect / Create	Use the Boundary Explorer and invite the learner to explain closeness in their own representation.
Rest / Nourish	Treat pausing, changing position and retrieving find–keep–decide as part of the lesson.
Evidence	Invite a Precision Explainer through written, drawn, typed or spoken reasoning.

Every Cornerstone is referenced honestly. Reflection is primary for this lesson; Movement supports the lens and zoom; Connection links the rule to place value and closeness. Creativity appears in the learner's Precision Explainer. Nutrition is intellectual nourishment: attention to magnitude, confidence and sensible precision.

Questions that preserve thinking

- “Where does the useful information begin?”
- “How many digits are you keeping?”
- “Which digit makes the decision?”
- “What place value must your answer keep?”
- “Which rounded landmark is nearer?”
- “What changed after you used the lens?”

Processing time

Ask one question, then wait. Avoid turning the prompts into a rapid sequence or answering your own question.

The mathematics in plain language

Significant figures begin at the first non-zero digit because that is where a number first communicates its scale. Count from that digit until the required number of significant figures has been reached. The next digit is the deciding digit.

- If the deciding digit is 0, 1, 2, 3 or 4, the final kept digit remains unchanged.
- If the deciding digit is 5, 6, 7, 8 or 9, the final kept digit increases by one.
- Later whole-number places become zeros so the number retains its magnitude.
- Later decimal digits are removed unless zeros are needed to show the required precision.

Why boundaries matter

A rounding rule is a compact way of choosing the nearer of two possible rounded landmarks. The halfway point explains why 5 triggers rounding up.

Understanding zeros

Zeros can have different roles:

- Leading zeros before the first non-zero digit locate the decimal point and are not significant.
- A zero between significant digits is significant.
- Trailing zeros after a decimal point may communicate precision; for example, 4.00 displays three significant figures.
- Placeholder zeros in a rounded whole number preserve place value; for example, 5,847 to two significant figures is 5,800.

Common misconceptions and supportive responses

The learner may count leading zeros. Ask: Which digit first tells us that the number is not zero?

The learner may delete digits without restoring place value. Ask: Is the original number in the thousands, hundreds or ones? Is your answer still about that size?

The learner may round every following digit in sequence. Ask: Which single digit is allowed to make the decision?

The learner may write 4 instead of 4.00 when three significant figures are requested. Acknowledge that the value is equal, then ask how the written answer can communicate the requested precision.

Practice Companion support pathway

The six questions include whole numbers, decimals, leading zeros, internal zeros, cascading rounding and visible precision.

Universal worked-solution release rule

For every question independently: Socratic prompt used + Hint used + two non-empty answers entered and checked = Worked solution released.

1. Allow time to think, sketch or begin independently.
2. Invite the learner to open the Socratic prompt.
3. Support a first genuine answer and use Check.
4. Invite the learner to open the Hint.
5. Support a revised second answer and use Check again.
6. Allow the interface to release the Worked solution.
7. If opened, compare the worked route with the learner's attempts.

Protect the safeguard

Do not provide the complete worked solution verbally while the interface keeps it locked. This is not a withdrawal of help: the learner already has a visible, predictable sequence of graduated support.

Responding to attempts

- “That gives us something useful to inspect.”
- “Which part are you most confident about?”
- “What stayed the same after the prompt?”
- “Can the hint help you revise one decision?”
- “Does the size of the answer fit the original number?”

Avoid “That is easy”, “You should know this”, immediate correction, taking control of the input, or treating support use as failure.

Regulation, access and re-engagement

Possible signs of overload include repeated guessing, rapid clicking, silence, restarting, blank fields or strong frustration with zeros.

Helpful responses include:

- reduce spoken language and visual demands;
- offer one clear next action;
- allow silence and processing time;
- switch from screen to paper or spoken reasoning;
- return to one familiar whole-number example;
- pause without presenting the pause as a consequence;
- finish at a point that preserves willingness to return.

Accessibility choices

The lesson does not rely on colour alone. Labels, position and border treatments identify kept, deciding and later digits. Keyboard, touch and pointer input are supported, and reduced-motion preferences are respected.

Using the Scratchpad

The Scratchpad is optional. Its place-value and number-line backgrounds persist when learner ink is erased. It supports pen, line, colour, width, eraser, undo, redo, sticky note, local save and image export.

Browser storage and image export are local conveniences, not guaranteed permanent evidence storage. Paper, a physical whiteboard or another recording method remains valid.

Re-engagement choices

- Return to the last number the learner understood.
- Use only one significant figure before increasing the precision.
- Cover later digits physically or on paper.
- Use the Boundary Explorer after the procedural decision, not before, if it reduces load.

Evidence and mastery

The Final Portfolio Task is a Precision Explainer using one whole number and one decimal. Evidence may be written, drawn, typed, spoken or combined.

- Emerging: identifies the first significant digit with support.
- Developing: rounds familiar values using the next digit.
- Secure: rounds varied integers and decimals accurately while preserving place value.
- Mastering: explains precision, zeros and boundary decisions clearly and transfers the reasoning to an unfamiliar value.

Attend to explanation, self-correction and useful support choices as well as final accuracy.

After the lesson

- “What helped you find the first significant digit?”
- “Which kind of zero still needs attention?”
- “Did the lens or boundary view make the decision clearer?”
- “What would be a helpful next connection?”
- “Is there any evidence you would like to keep?”

A valid finishing point

Some questions may remain incomplete. Record the most useful reconnection point rather than treating unfinished volume as failure.

Observation and reconnection notes