Rounding to Significant Figures

Grade 9 – 10 science · measurement

Name: Date: Score: / 26

Rounding is a claim about precision

Rounding a measurement is not tidying it up. It is a statement about how much of the number you are prepared to stand behind. Writing 24.1 says the 1 is the last digit you trust; writing 24.0725 says you trust all six.

That is why the digits after the cut simply go. A common habit is to round in stages — 2.449 becomes 2.45 becomes 2.5 — and it is wrong, because the 9 was never evidence about the tenths place. Look at one digit, the first one you are dropping, and stop.

It is also why trailing zeros stay. If a calculation justifies three figures and the third is a zero, writing 2.1 instead of 2.10 throws away a digit you earned.

The rules

- Count significant figures from the **first non-zero digit**.
- Look at the **next digit only**. 5 or more rounds up, less than 5 leaves the last kept digit alone.
- Never round in stages: 2.449 to 2 s.f. is **2.4**, not 2.5.
- Keep a **trailing zero** if the count needs it: 2.0999 to 3 s.f. is 2.10, not 2.1.
- If rounding up carries all the way, the **place value shifts**: 9.99 to 2 s.f. is 10.
- **Decimal places** are counted after the point; significant figures are counted from the first non-zero digit. They are not the same.

Part A — Round to 3 significant figures (8 marks)

24.0725 ☐	**0.0045621** ☐	**3453528** ☐	**9.9949** ☐
0.0099 ☐	**45678** ☐	**2.0999** ☐	**0.0070404** ☐

Part B — Round as stated (8 marks)

Round this	Which digit did you look at?	Answer
2648 to 3 s.f.		
2648 to 2 s.f.		
0.004562 to 2 s.f.		
18.996 to 4 s.f.		

0.08351 to 2 s.f.		
999.6 to 2 s.f.		
1.0449 to 3 s.f.		
67890 to 1 s.f.		

Part C — Figures or decimal places? give both (6 marks)

Number	To 3 significant figures	To 3 decimal places
3.14159		
0.04567		
12.0506		

Part D — Think it through (4 marks)

1. A student rounds 2.449 to 2 significant figures by first rounding to 2.45 and then to 2.5. Explain what is wrong with this and give the correct answer.

2. A calculation gives 2.0999 and the answer is allowed 3 significant figures. Explain why writing 2.1 would lose a mark.

Rounding to Significant Figures — Answer Key

Grade 9 – 10 science · measurement

Part A — Round to 3 significant figures

1. 24.0725 → **24.1**
2. 0.0045621 → **0.00456**
3. 3453528 → **3450000**
4. 9.9949 → **9.99**
5. 0.0099 → **0.00990**
6. 45678 → **45700**
7. 2.0999 → **2.10**
8. 0.0070404 → **0.00704**

Part B — Round as stated

1. 2648 to 3 s.f. → **2650**
2. 2648 to 2 s.f. → **2600**
3. 0.004562 to 2 s.f. → **0.0046**
4. 18.996 to 4 s.f. → **19.00**
5. 0.08351 to 2 s.f. → **0.084**
6. 999.6 to 2 s.f. → **1000**
7. 1.0449 to 3 s.f. → **1.04**
8. 67890 to 1 s.f. → **70000**

Part C — Figures or decimal places?

1. 3.14159 → **3.14** to 3 s.f., **3.142** to 3 d.p.
2. 0.04567 → **0.0457** to 3 s.f., **0.046** to 3 d.p.
3. 12.0506 → **12.1** to 3 s.f., **12.051** to 3 d.p.

Part D — Think it through

1. **Rounding in stages is wrong. 2.449 to 2 s.f. is 2.4.**
   Only the first dropped digit decides, and here that is the 4 in the hundredths place, which is below 5. The 9 at the end is evidence about the thousandths place and says nothing about the tenths.
2. **2.10 and 2.1 claim different things.**
   2.10 has three significant figures and says the hundredths digit is known to be zero. 2.1 has two and makes no claim about the hundredths at all, so it reports less than the calculation justified.