Name

Date

Unit 3 · Place value and rounding — teaching slides

12 slides, formatted for printing.

3.1 Multiplying and dividing by powers of 10

Powers of 10

- A power of 10 is 10 multiplied by itself a number of times.
- The small raised number is the **index**.
- The index also tells you how many zeros the number has.

$10^1 = 10$
$10^2 = 100$
$10^3 = 1000$
$10^6 = 1\ 000\ 000$

Multiplying by a power of 10

- Multiplying makes a number **bigger**.
- Every digit moves to the **left**.
- The number of places is the index.
- Fill any gaps with zeros.

3.7×10^3 → digits move 3 left → 3700
0.39×10^5 → digits move 5 left → 39 000

Dividing by a power of 10

- Dividing makes a number **smaller**.
- Every digit moves to the **right**.
- Again, the number of places is the index.

$80\ 000 \div 10^4$ → digits move 4 right → 8
$45.6 \div 10^2$ → digits move 2 right → 0.456

Careful with 'crossing off zeros'

- Some people delete zeros instead of moving the digits.
- That works only when the number ends in enough zeros.
- Moving the digits always works.

```
80 000 ÷ 10⁴ = 8 ✓ four zeros to remove
45 ÷ 10⁴ = 0.0045 ✗ no zeros to remove
2 350 000 ÷ 10⁵ = 23.5 ✗ only four zeros, index is 5
```

Working backwards

- Multiplying and dividing by 10^n are inverse operations.
- If you know the answer, undo the move to find the start.

```
? × 10³ = 4500 → 4500 ÷ 10³ = 4.5
? ÷ 10⁴ = 0.007 → 0.007 × 10⁴ = 70
```

Why this matters

- Every metric conversion is a power of 10.
- So is every change between millions, thousands and units.
- Get this right and unit conversion becomes automatic.

```
25 kg = 25 × 10³ g = 25 000 g
8460 m = 8460 ÷ 10³ km = 8.46 km
7.2 m = 7.2 × 10² cm = 720 cm
```

3.2 Rounding

Why round at all?

- Measurements and divisions often give more digits than anyone needs.
- The **degree of accuracy** says how precise the answer should be.
- Rounding gives a simpler number that is still close enough.

```
8.46 ÷ 7 = 1.2085714285714…
To 2 decimal places that is 1.21
Close enough for almost any purpose
```

The one rule

- Find the digit in the rounding position.
- Look at the digit **immediately to its right**.
- 5 or more → round the digit up by 1.
- Less than 5 → leave the digit as it is.
- Then drop everything after it.

```
4.27 to 1 d.p. → look at 7 → round up → 4.3
8.53 to 1 d.p. → look at 3 → leave it → 8.5
```

Decimal places

- Decimal places are counted **after** the decimal point.
- 1 d.p. means one digit after the point; 2 d.p. means two.
- Keep the zeros you need: 6.895 to 2 d.p. is 6.90, not 6.9, if the accuracy is being stated.

```
3.146 to 2 d.p. → 3.15
0.0752 to 2 d.p. → 0.08
14.203 to 2 d.p. → 14.20
```

When rounding up carries

- Rounding a 9 up makes it 10, so the carry moves along.
- Sometimes every digit changes.
- Do not panic — just add 1 in the rounding position and carry.

```
9.999 to 2 d.p. → 10
19.99 to 1 d.p. → 20
99.7 to the nearest whole number → 100
```

Rounding a division

- Work the division out to **one more place** than you need.
- Then round that answer.
- Work to one extra place, then round. Never round twice.

```
8.46 ÷ 7 to 2 d.p.
Work to 3 d.p.: 1.208…
Round: 1.21
```

Two warnings

- Round **once**, from the original number. Rounding in stages can push an answer the wrong way.
- A rounded answer is an approximation — say so, using “≈” or “to 2 d.p.”.

```
2.4499 → 1 d.p. directly → 2.4 ✓
2.4499 → 2.45 → 2.5 ✗ wrong
8.46 ÷ 7 ≈ 1.21 (2 d.p.)
```