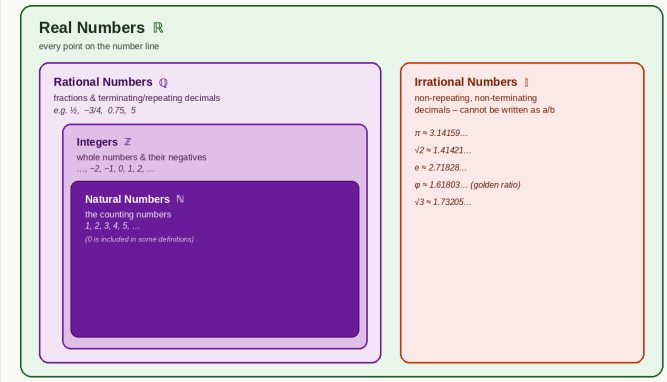
Helping Your Child with Integers, Rationals & Percentages

Number · Year 7 to Year 10 · Australian Curriculum Mathematics

In Years 7–10, your child extends their understanding of numbers well beyond whole numbers. They work with **integers** (positive and negative whole numbers), **rational numbers** (any number that can be written as a fraction), **percentages**, and eventually **irrational numbers** (like $\sqrt{2}$ or π, which cannot be written as fractions). Percentages appear in every financial context — discounts, GST, interest, wages — making this topic very relevant to everyday life.

Year	What your child learns	What this looks like at home
Year 7	**Integers, rational numbers and percentages** **integer** — any whole number, positive, negative or zero: …−3, −2, −1, 0, 1, 2, 3… **rational number** — any number expressible as a fraction: $\frac{3}{4}$, 0.25, −2, 40% Your child adds and subtracts integers: $-3 + 7 = 4$, $5 - 8 = -3$ They convert between fractions, decimals and percentages: $\frac{3}{4} = 0.75 = 75\%$ They apply percentages to real problems: 20% of \$85 = 0.20 × \$85 = \$17 They round decimals to required accuracy.	**Temperature: 'It was −3°C overnight and rose 7°. What temperature is it now?'** (-3+7=+4°C) **'A shirt costs \$60. There's a 25% discount. How much do you save?'** (0.25 × 60 = \$15 saving) **'Convert $\frac{3}{5}$ to a percentage.'** ($\frac{3}{5}$ × 100 = 60%)
Year 8	**Irrational numbers and operations with all rational numbers** **irrational number** — cannot be written as a fraction: $\sqrt{2}$ = 1.41421… (never ends, never repeats) π = 3.14159… (never ends, never repeats) **terminating decimal** — ends after a set number of digits: $\frac{1}{4} = 0.25$ **recurring decimal** — repeats forever: $\frac{1}{3} = 0.333\ldots$ (written $0.\dot{3}$) Your child uses all four operations with positive and negative fractions, decimals and percentages. Example: $-\frac{1}{2} + \frac{3}{4} = \frac{1}{4}$, $-2 \times -3 = 6$ (negative × negative = positive)	**'Is $\sqrt{9}$ rational or irrational?'** ($\sqrt{9}$ = 3, so rational — it's a whole number!) **'Is $\sqrt{2}$ rational or irrational?'** (Irrational — 1.41421… goes on forever) **'1 ÷ 3 = 0.333… — does it terminate or recur?'** (it recurs)
Year 9	**The real number system** **real number** — all numbers on the number line: rationals + irrationals combined The real number system:  **Irrational numbers ($\sqrt{2}$, π) also belong to the real numbers** Your child uses digital tools to work with all real numbers and solves problems involving irrational numbers: Area = $\pi \times r^2$ uses π (irrational) but gives a real answer	**'Where does −7 sit on the number line?'** **'Is 0.5 rational or irrational? What about 0.5050050005…?'** **'Use a calculator to find $\sqrt{7}$. Is the answer exact?'** (Discuss: the calculator shows a rounded version — the true value keeps going.) *Year 10 on next page.*

	Year 10	**Approximation and its effects** **exact value** — the precise answer, e.g. $\sqrt{2}$ or π **approximate value** — a rounded version, e.g. 1.414 or 3.14 Your child explores how rounding early in a chain of calculations can cause the final answer to be significantly wrong: **Exact: $\sqrt{2} \times \sqrt{2} = 2$ (exactly)** **Rounded: 1.414 × 1.414 = 1.999396 (close, but not 2)** **After 10 multiplications the error becomes significant.** In financial and scientific contexts, this matters a great deal. To be 'exact' we often write answers in terms of π $A = \pi \times 3^2 = 9\pi$ sq units	Use a calculator: multiply 1.414 × 1.414. **'Is that exactly 2? What went wrong?'** **'When should you keep the exact value ($\sqrt{2}$) and when is rounding OK?'** (Discuss: banking software uses exact values — rounding costs money!)

★ Fraction, decimal and percentage — three ways to write the same number

Fraction	Decimal	Percentage		Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%		$\frac{3}{4}$	0.75	75%
$\frac{1}{4}$	0.25	25%		$\frac{1}{5}$	0.2	20%

Tip for percentages: *"Per cent" means per 100. So 35% = $\frac{35}{100}$ = 0.35. To find a percentage of an amount: multiply by the decimal. e.g. 35% of $200 = 0.35 × $200 = $70.*

Negative numbers rule: *negative × negative = positive | negative × positive = negative | positive + negative = depends on size*

Helping at Home — Integers, Rationals & Percentages

Worked examples and questions to ask · Year 7 to Year 10

How it works — worked examples

Year 7 — Percentage discount

A jacket costs $120. It is 30% off. What is the sale price?

Find 30%	30% of $120 = 0.30 × $120 = $36 (the discount)
Sale price	$120 − $36 = $84
OR in one step	**70% of $120 = 0.70 × $120 = $84 (you pay 70% of original)**

Year 7 — Adding and subtracting integers

Townsville's temperature is 38°C. Darwin is 2°C cooler than Townsville. Alice Springs is 5°C colder than Darwin. What is the temperature is Alice Springs?

Darwin	38 − 2 = 36°C (2 degrees cooler than 38)
Alice Springs	36 − 5 = 31°C (5 degrees colder than Darwin)
Number line	**38 → 36 (−2) → 31 (−5) Answer: Alice Springs is 31°C**

Year 8 — Terminating and recurring decimals

Convert these fractions to decimals and classify them:

	Decimal	Type
$\frac{1}{4}$	**0.25**	Terminating — stops after 2 decimal places
$\frac{1}{3}$	**0.333... = $0.\dot{3}$**	Recurring — the 3 repeats forever
$\frac{1}{6}$	**0.1666... = $0.1\dot{6}$**	Recurring — the 6 repeats (1 is not part of the cycle)

Year 9 — Exact and approximate area (circles)

A circular pond has a radius of 4 m. Find its exact area, then a decimal approximation.

Exact area	Area = π × 4^2 = 16π m^2 (an exact answer — no rounding)
Decimal approx.	16π ≈ 50.27 m^2 (rounded to 2 decimal places)
Why it matters	Both are correct — one is exact, the other is a practical, rounded estimate.

Questions to ask your child

You don't need to solve these. Ask them and let your child explain their thinking!

7 Year 7

→ The temperature is −4°C and drops 6 more degrees. What is the temperature now?

→ A TV costs $800. It's 15% off. How much is the discount? What's the sale price?

→ Convert $\frac{3}{5}$ to a decimal and then to a percentage.

→ Order from smallest to largest: −3, 0.5, −0.7, 2, $-1\frac{1}{2}$

8 Year 8

→ Is 0.4 terminating or recurring? What fraction is it?

→ Is $\sqrt{5}$ rational or irrational? Why?

→ What is $-\frac{3}{4}+\frac{1}{2}$? (Convert to same denominator first.)

→ Calculate −3 × −4. What rule applies?

9 Year 9

→ Where does π sit on the number line — between which two whole numbers?

→ Is every integer a rational number? Why?

→ Give an example of a real number that is NOT rational.

→ Use a calculator to find $\sqrt{10}$. Is that answer exact?

Year 10 on next page.

Year 10 — Exact vs rounded values

Compare using the exact value of $\sqrt{2}$ with using a rounded (approximate) version in a calculation.

Exact	$\sqrt{2} \times \sqrt{2} = 2$ (exactly — using the exact value throughout)
Rounded	$1.414 \times 1.414 = 1.999396$ (close, but not exactly 2)
Why it matters	In finance and science, rounding too early can cause errors to build up over many calculations.

10 Year 10

→ Multiply 1.732×1.732. Is the answer exactly 3? Why not?
→ When is it better to keep the exact value (like $\sqrt{3}$) rather than rounding?
→ If you round π to 3.14 and use it 5 times in a calculation, how large might the error be?
→ Find a real-life context where rounding too early causes a real problem.

Things to try at home

Year 7: Check sale prices together when shopping. 'If this is 20% off, what's the original price? What do we actually pay?'	**Year 7:** Read a bank statement or electricity bill together. Point out negative numbers. 'What does −$15 mean here?'
Year 8: Ask: 'Is 1 ÷ 7 terminating or recurring?' Use the calculator to check. Count the decimal places together.	**Year 8:** Discuss GST: 'If a price is $44 including 10% GST, what was the price before GST?' (÷ by 1.1)
Year 9: Look up current interest rates. 'If we borrow $10,000 at 5.5% per year, how much interest is that per year?'	**Year 9:** Use a calculator to find $\sqrt{2}$, $\sqrt{3}$ and $\sqrt{5}$. Notice the decimals never end or repeat — that's what makes them irrational!
Year 10: Budget challenge: plan a family meal for $50. Calculate percentages spent on each food type.	**Year 10:** Round π to 3.14 and use it to estimate the circumference of a round table or plate ($C = \pi d$). Then try 3.14159 — how much does the answer change?

Key words to learn together

integer: any whole number, positive, negative or zero: …−3, −2, −1, 0, 1, 2, 3…	**rational number:** any number that can be written as a fraction (ratio of two integers): $\frac{3}{4}$, −2, 0.5, 40%
irrational number: a number that CANNOT be written as a fraction: $\sqrt{2}$, $\sqrt{3}$, π (go on forever, never repeating)	**real number:** all numbers on the number line: rationals AND irrationals combined
percentage: a number out of 100: $35\% = \frac{35}{100} = 0.35$	**terminating decimal:** a decimal that ends: $\frac{1}{4} = 0.25$ (terminates after 2 places)
recurring decimal: a decimal that repeats forever: $\frac{1}{3} = 0.333\ldots$ — shown as $0.\dot{3}$	**discount:** a reduction in price, often expressed as a percentage
GST: Goods and Services Tax — an extra 10% added to prices in Australia	**approximate value:** a rounded version of a number, e.g. $\pi \approx 3.14$
exact value: the precise value with no rounding, e.g. π or $\sqrt{2}$	**square root:** a number that when multiplied by itself gives the original number: $\sqrt{9} = 3$ (because $3 \times 3 = 9$)

Integers — 7-10 Mathematics
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