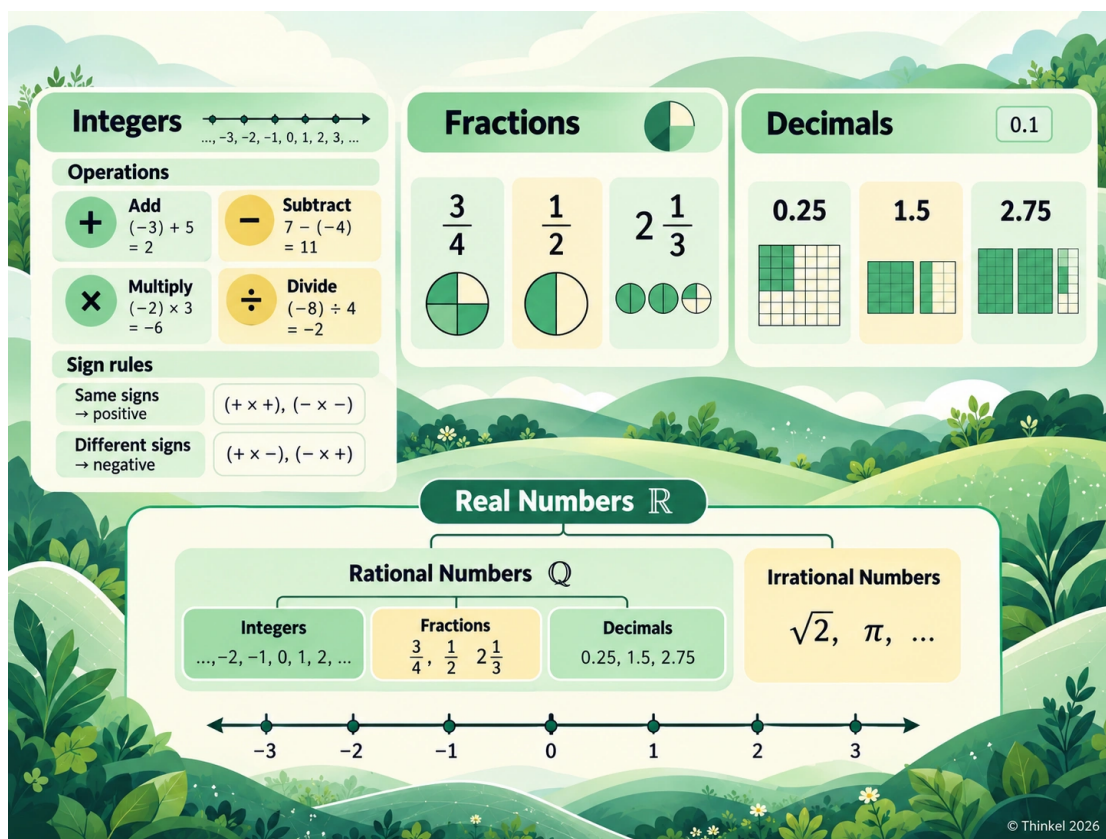


Integer Operations, Fractions, Decimals and Real Numbers

Printable teaching notes and original practice questions for the second half of Chapter 2.



How to use this PDF

Use this as a classroom handout after students have learnt negative numbers and basic add/minus with integers. The questions are original and arranged from guided practice to mixed review.

Topics: multiplication and division with negative integers, combined operations, fractions and mixed numbers, decimals, rational numbers, irrational numbers and real numbers.

Learning goals

1. Integer operations
Multiply and divide negative integers using sign rules.

2. Combined operations
Apply operation order when negatives, brackets and powers appear together.

3. Number types
Classify integers, fractions, decimals, rational numbers, irrational numbers and real numbers.

1. Multiplication and division of negative integers

For multiplication and division, the sign of the answer depends on the signs of the numbers being multiplied or divided.

Signs	Result	Example
positive $\times$ positive	positive	$6 \times 3 = 18$
positive $\times$ negative	negative	$6 \times (-3) = -18$
negative $\times$ positive	negative	$(-6) \times 3 = -18$
negative $\times$ negative	positive	$(-6) \times (-3) = 18$

Teacher note

A useful shortcut is: same signs give a positive answer; different signs give a negative answer. Apply this only to multiplication and division, not to addition and minus.

2. Combined operations

Students should follow the order of operations carefully. Do not simply work from left to right unless the operations have the same priority.

Step	What to do	Example reminder
1	Brackets	Work inside brackets first.
2	Powers and roots	Evaluate squares, cubes, square roots and cube roots.
3	Multiplication and division	Work from left to right.
4	Addition and minus	Work from left to right.

Worked example

Evaluate $12 - 3 \times (-4)$.

Multiplication first: $3 \times (-4) = -12$.

So, $12 - 3 \times (-4) = 12 - (-12) = 24$.

3. Fractions, mixed numbers and decimals

The sign rules for multiplication and division still apply when working with fractions, mixed numbers and decimals.

Type	Key idea	Example
Fractions	Use common denominators for add/minus; multiply numerators and denominators for multiplication.	$-3/4 + 1/2 = -1/4$
Mixed numbers	Convert to improper fractions for multiplication or division.	$2 \frac{1}{3} = 7/3$
Decimals	Line up decimal points for add/minus; check signs carefully.	$-1.5 + 0.8 = -0.7$

4. Rational, irrational and real numbers

Real numbers are numbers that can be placed on the number line. Rational and irrational numbers are both real numbers.

Number type	Meaning	Examples
Integers	Whole numbers, zero and negative whole numbers.	$-3, -2, -1, 0, 1, 2$
Rational numbers	Numbers that can be written as a fraction.	$7, -2, 3/4, 0.25, -1.5$
Irrational numbers	Numbers that cannot be written exactly as a fraction.	$\sqrt{2}, \sqrt{5}, \pi$
Real numbers	Numbers that can be placed on the number line.	All examples above

Practice Set 2C: Integer operations and combined operations

Attempt these questions without a calculator first unless your teacher says otherwise.

1.	Evaluate: $7 \times (-4)$
2.	Evaluate: $(-8) \times 6$
3.	Evaluate: $(-9) \times (-5)$
4.	Evaluate: $36 \div (-6)$
5.	Evaluate: $(-42) \div 7$
6.	Evaluate: $(-56) \div (-8)$
7.	Evaluate: $(-3) \times 5 \times (-2)$
8.	Evaluate: $4 \times (-6) \div 3$
9.	Evaluate: $18 - 4 \times (-3)$
10.	Evaluate: $5 + (-2) \times 7$
11.	Evaluate: $24 \div (-3) - 6$
12.	Evaluate: $6 - 2 \times (-5) + 3$
13.	Evaluate: $(-4)^2$
14.	Evaluate: -4^2 . Explain how it is different from $(-4)^2$.
15.	Evaluate: $3 \times [2 - (-5)]$
16.	Evaluate: $20 - [6 + (-3) \times 4]$

Practice Set 2D: Fractions, decimals and real numbers

1.	Evaluate: $-\frac{3}{4} + \frac{1}{2}$
2.	Evaluate: $\frac{5}{6} - \frac{1}{3}$
3.	Evaluate: $-\frac{2}{5} - \frac{3}{10}$
4.	Evaluate: $(-\frac{3}{4}) \times 8$
5.	Evaluate: $(-\frac{2}{3}) \times (-\frac{9}{4})$
6.	Evaluate: $(-\frac{5}{6}) \div (-\frac{10}{3})$
7.	Convert $2\frac{1}{3}$ to an improper fraction.
8.	Evaluate: $-1.5 + 0.8$
9.	Evaluate: $2.4 - 3.7$
10.	Evaluate: $(-0.6) \times 5$
11.	Evaluate: $(-3.6) \div (-0.9)$
12.	Write 0.25 as a fraction.
13.	State whether -7 is an integer, rational number and real number.
14.	State whether $\frac{3}{5}$ is an integer, rational number and real number.
15.	State whether $\sqrt{2}$ is rational or irrational.
16.	Give one example of a real number that is not rational.

Mixed practice

1.	Evaluate: $-5 + 3 \times (-4)$
2.	Evaluate: $16 \div (-2) + 7$
3.	Evaluate: $2 - [5 \times (-3)]$
4.	Evaluate: $(-2) \times (-3) \times (-4)$
5.	Evaluate: $-0.8 + 1.3 - 2.1$
6.	Evaluate: $(-1/2) \times 6 + 2$
7.	Arrange in ascending order: $-2.5, 0.25, -1, 3/4, -3$.
8.	Classify each as rational or irrational: $0.6, \sqrt{3}, -4, \pi, 2/7$.
9.	A lift is at Level -2 . It goes up 7 floors, then down 4 floors. Where does it stop?
10.	A temperature is -3°C at night. It rises by 8°C , then drops by 6°C . What is the final temperature?

Answers

Practice Set 2C answers

1. -28	2. -48
3. 45	4. -6
5. -6	6. 7
7. 30	8. -8
9. 30	10. -9
11. -14	12. 19
13. 16	14. -16. In -4^2 , the square applies to 4 first, then the negative sign remains.
15. 21	16. 26

Practice Set 2D answers

1. $-1/4$	2. $1/2$
3. $-7/10$	4. -6
5. $3/2$	6. $1/4$
7. $7/3$	8. -0.7
9. -1.3	10. -3
11. 4	12. $1/4$
13. Integer: yes; Rational: yes; Real: yes	14. Integer: no; Rational: yes; Real: yes
15. Irrational	16. Example: $\sqrt{2}$ or π

Mixed practice answers

1. -17	2. -1
3. 17	4. -24
5. -1.6	6. -1
7. -3, -2.5, -1, 0.25, $3/4$	8. 0.6 rational; $\sqrt{3}$ irrational; -4 rational; π irrational; $2/7$ rational
9. Level 1	10. -1°C

Teacher notes

Common issue	Teaching response
Students apply multiplication sign rules to addition.	Separate examples clearly: $-3 + (-4) = -7$, but $(-3) \times (-4) = 12$.
Students forget operation order.	Ask them to underline multiplication/division before doing add/minus.
Students think every decimal is rational.	Clarify: terminating and recurring decimals are rational; non-terminating, non-recurring decimals are irrational.
Students are unsure how integers fit inside rational numbers.	Show that any integer can be written over 1, such as $-4 = -4/1$.

Suggested classroom flow

1. Begin with sign rules for multiplication and division.
2. Move to combined operations with brackets and signs.
3. Extend to fractions, mixed numbers and decimals.
4. Finish by classifying numbers into rational, irrational and real numbers.