Adding and subtracting integers

Adding a **negative** number **or** subtracting a **positive** number will have the **same result**.

$3 + -5 = -2$

$3 - +5 = -2$

Go down by 5.

Use a number line to visualise the answer.

Adding a positive number **or** subtracting a negative number will have the **same result**.

$-1 + +4 = +3$

$-1 - -4 = +3$

Go up by 4.

Adding a negative number means subtract.

Subtracting a negative number means add.

+ +	means	+
+ −	means	−
− +	means	−
− −	means	+

Multiplying and dividing integers

Look at these examples.

Multiplying a negative number by a positive number always gives a negative answer.

$-5 \times +3 = -15$

$+5 \times -3 = -15$

Multiplying two positive numbers **or** multiplying two negative numbers always gives a positive answer.

$+4 \times +3 = +12$

$-4 \times -3 = +12$

The same rules work for division.

$+10 \div -5 = -2$

$-10 \div -5 = +2$

This table summarises the rules:

+	× or ÷	+	=	+
+	× or ÷	−	=	−
−	× or ÷	+	=	−
−	× or ÷	−	=	+

A positive number multiplied by a negative number gives a negative answer.

A negative number multiplied by a negative number gives a positive answer.

KEYWORDS

Integer ➤ An integer is a whole number; it can be positive, negative or zero.

Positive ➤ A number above zero.

Negative ➤ A number below zero.

Use of symbols

Look at the following symbols and their meanings.

Symbol	Meaning	Examples
$>$	Greater than	$5 > 3$ (5 is greater than 3)
$<$	Less than	$-4 < -1$ (–4 is less than –1)
$\geqslant$	Greater than or equal to	$x \geqslant 2$ (x can be 2 or higher)
$\leqslant$	Less than or equal to	$x \leqslant -3$ (x can be –3 or lower)
$=$	Equal to	$2 + +3 = 2 - -3$
$\neq$	Not equal to	$4^2 \neq 4 \times 2$ (16 is not equal to 8)

Place value

Look at this example.

Given that $23 \times 47 = 1081$, work out 2.3×4.7

The answer to 2.3×4.7 must have the digits 1 0 8 1 ← Do a quick estimate to find where the decimal point goes.

2.3 is about 2 and 4.7 is about 5. Since $2 \times 5 = 10$, the answer must be about 10.

Therefore $2.3 \times 4.7 = 10.81$

Write the following symbols and numbers on separate pieces of paper.

+	–	×	÷	=	0

+2	–2	+4	–4	+8	–8

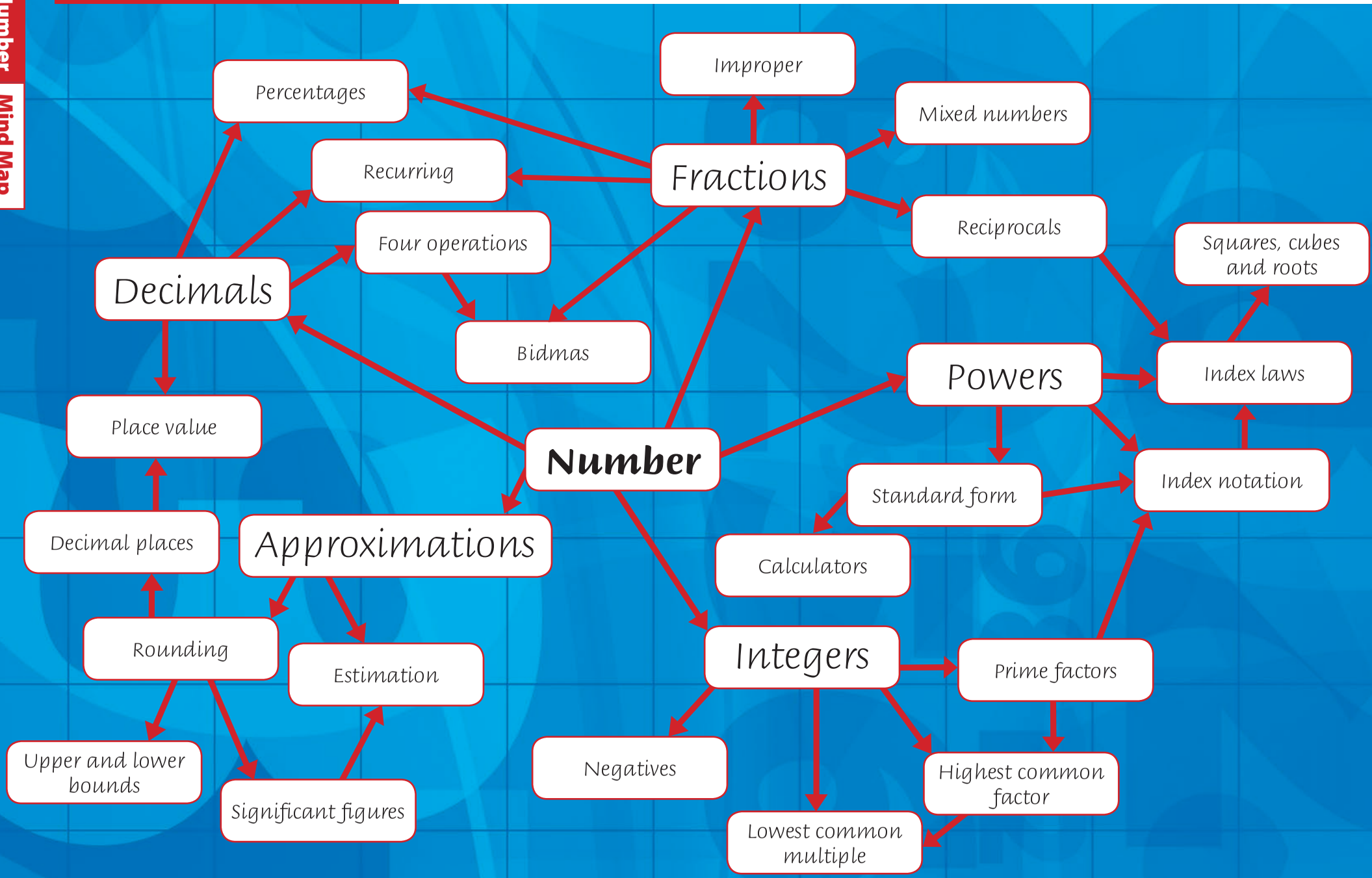
Arrange them to form a correct calculation.

How many different calculations can you make? For example:

+2	–	–2	=	+4

1. Calculate the following:
   - **(a)** $-5 - -8$
   - **(b)** $-2 + -6$
   - **(c)** $-7 + -3 - -5$
2. Calculate the following:
   - **(a)** -12×-4
   - **(b)** $24 \div -3$
   - **(c)** $-3 \times -4 \times -5$
3. State whether these statements are true or false.
   - **(a)** $6 < 3$
   - **(b)** $-4 > -5$
   - **(c)** $2 + -3 = 2 - +3$
4. Given that $43 \times 57 = 2451$, calculate the following:
   - **(a)** 4.3×0.57
   - **(b)** 430×570
   - **(c)** $2451 \div 5.7$

Number Mind Map



1. Work out the following.

(a) 4×5.8 **[2]** **(b)** 2.3×42.7 **[3]**

(c) $24 \div 0.08$ **[2]** **(d)** $46.8 \div 3.6$ **[2]**

(e) $-3 + -4$ **[1]** **(f)** $-2 - -5 + -6$ **[1]**

(g) $45 \div -9$ **[1]** **(h)** $-4 \times -5 \times -7$ **[1]**

(i) $4 + 3^2 \times 7$ **[1]** **(j)** $(5 - 6^2) - (4 + \sqrt{25})$ **[2]**

2. (a) Write 36 as a product of its prime factors. Write your answer in index form. **[2]**

(b) Write 48 as a product of its prime factors. Write your answer in index form. **[2]**

(c) Find the highest common factor of 48 and 36. **[2]**

(d) Find the lowest common multiple of 48 and 36. **[2]**

3. (a) Work out the following.

$\frac{4}{3} \times \frac{5}{6}$

Write your answer as a mixed number in its simplest form. **[2]**

(b) The sum of three mixed numbers is $7\frac{11}{12}$. Two of the numbers are $2\frac{3}{4}$ and $3\frac{5}{6}$.

Find the third number and give your answer in its simplest form. **[3]**

(c) Calculate $3\frac{1}{5} \div 2\frac{1}{4}$.

Give your answer as a mixed number in its simplest form. **[3]**

4. Simplify the following.

(a) $5^3 \div 5^{-5}$ **[1]** **(b)** $\sqrt{98}$ **[1]** **(c)** $\sqrt{7}(4 - 3\sqrt{7})$ **[2]**

5. Evaluate the following.

(a) 2.3^0 **[1]** **(b)** $9^{-\frac{1}{2}}$ **[2]** **(c)** $27^{\frac{4}{3}}$ **[2]**

6. (a) Write the following numbers in standard form.

(i) 43 600 **[1]** **(ii)** 0.008 03 **[1]**

(b) Calculate the following, giving your answer in standard form.

$(1.2 \times 10^8) \div (3 \times 10^4)$ **[2]**

7. Prove the following. You must show your full working out.

(a) $0.\dot{4}\dot{8} = \frac{16}{33}$ **[2]** **(b)** $0.1\dot{2}\dot{3} = \frac{61}{495}$ **[2]**

8. Rationalise the following surds.

(a) $\frac{7}{\sqrt{5}}$ **[2]** **(b)** $\frac{3}{1+\sqrt{2}}$ **[2]**

9. Paul's garage measures 6m in length to the nearest metre. His new car measures 5.5m in length to 1 decimal place.

Is Paul's garage definitely long enough for his new car to fit in?
Show your working. **[3]**

10. $a = 4.3$ and $b = 2.6$ to 1 decimal place.

Find the minimum value of $\frac{a}{b}$ and give your answer to 3 decimal places. **[3]**