

# Year 9 Mathematics: Basics Consolidation

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## Instructions

Complete the following sets to consolidate your understanding of key mathematical terms. Read the **Worked Example** carefully before starting the questions.

## Glossary of Terms

Term	Definition	Picture/Example
<b>BEDMAS</b>	The order of operations used to solve equations.	Brackets, Exponents, Division, Multiplication, Addition, Subtraction. $\dots - 3, -2, -1, 0, 1, 2, 3\dots$
<b>Integers</b>	All whole numbers, including positive, negative, and zero.	
<b>Multiple</b>	The result of multiplying a number by an integer.	Multiples of <b>5</b> : 5, 10, 15, 20...
<b>Factor</b>	A number that divides into another number exactly (without a remainder).	Factors of <b>10</b> : 1, 2, 5, 10.
<b>Power</b>	The product of multiplying a number by itself several times.	$2^3$ (which is $2 \times 2 \times 2 = 8$ ).
<b>Exponent</b>	The small number written above a base that tells you how many times to use the base in a multiplication.	In $5^2$ , the <b>2</b> is the exponent.
<b>Index</b>	Another name for an exponent or power. (The plural is “Indices”).	$x^4$ — the <b>4</b> is the index.
<b>Square root</b>	A number that, when multiplied by itself, gives the original number.	$\sqrt{25} = 5$ (because $5 \times 5 = 25$ ).
<b>Numerator</b>	The top number in a fraction. It shows how many parts you have.	In $\frac{3}{4}$ , the <b>3</b> is the numerator.
<b>Denominator</b>	The bottom number in a fraction. It shows how many equal parts the whole is divided into.	In $\frac{3}{4}$ , the <b>4</b> is the denominator.
<b>Mixed fraction</b>	A number consisting of an integer and a proper fraction.	$2\frac{1}{2}$
<b>Improper fraction</b>	A fraction where the numerator is larger than (or equal to) the denominator.	$\frac{5}{2}$

Term	Definition	Picture/Example
<b>Equivalent fraction</b>	Fractions that look different but have the same value.	$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$
<b>Place value</b>	The value of a digit based on its position in a number.	In 342, the 4 is in the ‘tens’ place (value = 40).
<b>Decimal place</b>	The position of a digit to the right of a decimal point.	In 3.14, the 4 is in the second decimal place (hundredths).
<b>Scientific Notation</b>	A way of writing very large or very small numbers using a number between 1 and 10 multiplied by a power of 10.	$3 \times 10^8$
<b>Recurring Decimal</b>	A decimal number that has digits that repeat forever.	0.333... or $0.\dot{3}$

## Set 1: Decimal Places

**Concept:** A **Decimal place** refers to the position of a digit to the right of the decimal point.

### Worked Example

**Question:** How many **decimal places** are in the number 3.14? **Answer:** There are two digits after the point (1 and 4), so there are **2 decimal places**.

### Questions

- How many **decimal places** are in the number 4.5?
- How many **decimal places** are in the number 10.123?
- Identify the digit in the first **decimal place** in 0.75.
- Identify the digit in the second **decimal place** in 12.89.
- Round 4.56 to one **decimal place**.
- Round 3.333 to two **decimal places**.
- Which number has more **decimal places**: 5.1 or 5.01?
- Write the number  $\frac{1}{2}$  as a number with one **decimal place**.
- Write the number  $\frac{1}{4}$  as a number with two **decimal places**.
- If you add 1.2 and 0.05, how many **decimal places** will the answer have?

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## Set 2: Integers

**Concept:** **Integers** are whole numbers. They can be positive, negative, or zero. When ordering them, remember that larger negative numbers are “colder” (further to the left on the number line).

### Worked Example

**Question:** Arrange the following **integers** from smallest to largest: 3, -5, 0, -2, 7 **Answer:** -5, -2, 0, 3, 7

## Questions

1. List the **integers** in this set:  $\{4.5, -2, 10, \frac{1}{2}, 0\}$
  2. Arrange these **integers** from smallest to largest:  $-7, 4, -1, 0, 9$
  3. Arrange these **integers** from smallest to largest:  $-10, -15, 2, -2, 5$
  4. Write the **integer** that is 5 less than 2.
  5. Write the **integer** that is 3 more than -5.
  6. Which **integer** represents a colder temperature:  $-4^{\circ}\text{C}$  or  $-12^{\circ}\text{C}$ ?
  7. Calculate the new **integer**:  $5 - 8$
  8. Calculate the new **integer**:  $-3 + 7$
  9. Insert  $<$  or  $>$  between these **integers**:  $-5 \underline{\hspace{1cm}} -2$
  10. Insert  $<$  or  $>$  between these **integers**:  $0 \underline{\hspace{1cm}} -8$
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## Set 3: Place Value

**Concept:** The **Place value** of a digit tells you its value based on its position (e.g., Hundreds, Tens, Units).

### Worked Example

**Question:** What is the **place value** of the digit 6 in the number 462? **Answer:** The 6 is in the **Tens** column. Its **place value** is **60**.

## Questions

1. What is the **place value** of the 7 in 725?
  2. What is the **place value** of the 3 in 139?
  3. What is the **place value** of the 1 in 1,200?
  4. Which digit has a **place value** of 40 in 445?
  5. Write the number: Five hundreds, zero tens, and six units.
  6. What is the **place value** of the 9 in 90?
  7. In the number 3,456, which digit is in the thousands place?
  8. Multiply 45 by 10. How does the **place value** of the 4 change?
  9. Divide 320 by 10.
  10. How many tens are there in the number 140?
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## Set 4: Factors

**Concept:** **Factors** are **Few**. They are whole numbers that fit exactly *inside* another number (no remainder).

### Worked Example

**Question:** List all **factors** of 12. **Answer:**  $1 \times 12 = 12$ ,  $2 \times 6 = 12$ ,  $3 \times 4 = 12$ . **Factors:** 1, 2, 3, 4, 6, 12

## Questions

1. List all **factors** of 6.
  2. List all **factors** of 10.
  3. List all **factors** of 15.
  4. List all **factors** of 20.
  5. Is 5 a **factor** of 25?
  6. Is 4 a **factor** of 14?
  7. What is the largest **factor** of 8 (excluding 8 itself)?
  8. True or False: 1 is a **factor** of every number.
  9. Find a number that has exactly two **factors** (a prime number) between 1 and 10.
  10. Circle the **factors** of 18 in this list: 2, 4, 6, 8, 9, 10.
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## Set 5: Multiples

**Concept:** **Multiples** are **Many**. They are the result of multiplying a number by an integer. They go up like times tables.

### Worked Example

**Question:** List the first four **multiples** of 5. **Answer:**  $5 \times 1 = 5$ ,  $5 \times 2 = 10$ ,  $5 \times 3 = 15$ ,  $5 \times 4 = 20$ .  
**Multiples:** 5, 10, 15, 20

## Questions

1. List the first four **multiples** of 2.
  2. List the first four **multiples** of 3.
  3. List the first four **multiples** of 10.
  4. What is the 5th **multiple** of 4?
  5. Is 24 a **multiple** of 6?
  6. Is 25 a **multiple** of 4?
  7. List a common **multiple** of 2 and 3.
  8. True or False: **Multiples** can be smaller than the original number.
  9. What is the **multiple** of 7 that comes after 21?
  10. Circle the **multiples** of 8 in this list: 4, 8, 12, 16, 20, 24.
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## Set 6: Powers, Exponents & Indices

**Concept:** An **Exponent** (or **Index**) tells you how many times to multiply the base by itself to create a **Power**.

### Worked Example

**Question:** Identify the **exponent** in  $4^3$  and calculate the **power**. **Answer:** The **exponent** (or **index**) is 3. Expanded:  $4 \times 4 \times 4 = 64$ .

## Questions

1. Write  $2^3$  in expanded form. What is the **exponent**?
  2. Write  $5 \times 5$  as a **power** using an **index**.
  3. Calculate the value of the **power**  $3^2$ .
  4. What is the **index** in the expression  $y^4$ ?
  5. Calculate the value of  $10^2$ .
  6. Calculate the value of  $1^5$ .
  7. In the expression  $x^6$ , what is the base and what is the **exponent**?
  8. Write “six to the **power** of two” in math notation.
  9. Calculate  $5^2 + 2^2$ .
  10. If the **index** is 1, what does the number equal?
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## Set 7: Square Roots

**Concept:** The **Square root** asks “Which number times itself equals this?” It is the opposite of squaring a number.

### Worked Example

**Question:** Find the **square root** of 49 ( $\sqrt{49}$ ). **Answer:** Since  $7 \times 7 = 49$ , the **square root** is **7**.

## Questions

1. Find the **square root** of 9.
  2. Find the **square root** of 16.
  3. Find the **square root** of 25.
  4. Find the **square root** of 64.
  5. Find the **square root** of 81.
  6. Find the **square root** of 100.
  7. Find the **square root** of 1.
  8. Find the **square root** of 144.
  9. True or False: The **square root** of 36 is 18.
  10. Calculate  $\sqrt{4} + \sqrt{9}$ .
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## Set 8: BEDMAS

**Concept:** **BEDMAS** is the order of operations: Brackets, Exponents, Division/Multiplication, Addition/Subtraction.

### Worked Example

**Question:** Use **BEDMAS** to solve  $3 + 4 \times 2$ . **Answer:** Multiplication first ( $4 \times 2 = 8$ ). Then Addition ( $3 + 8 = 11$ ). **Answer:** **11**.

## Questions

1. Using **BEDMAS**, solve:  $2 + 3 \times 4$
  2. Using **BEDMAS**, solve:  $10 - 2 \times 3$
  3. Solve:  $(5 + 5) \times 2$
  4. Solve:  $20 \div 2 + 3$
  5. Solve:  $3 \times 3 + 2 \times 4$
  6. Solve:  $10 - 3^2$
  7. Solve:  $2 \times (10 - 5)$
  8. Solve:  $4 + 4 \div 4$
  9. Solve:  $5^2 - 10$
  10. Solve:  $(2 + 3)^2$
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## Set 9: Numerator & Denominator

**Concept:** Numerator is North (Up). Denominator is Down.

### Worked Example

**Question:** Identify the **numerator** and **denominator** in  $\frac{3}{5}$ . **Answer:** Numerator = 3, Denominator = 5.

## Questions

1. What is the **numerator** in  $\frac{1}{2}$ ?
  2. What is the **denominator** in  $\frac{4}{9}$ ?
  3. Which number is the **denominator** in  $\frac{7}{8}$ ?
  4. Which number is the **numerator** in  $\frac{2}{3}$ ?
  5. Write a fraction with **numerator** 2 and **denominator** 3.
  6. Write the fraction: Three quarters. Identify the **denominator**.
  7. In  $\frac{1}{4}$ , does the **denominator** tell you the number of parts shaded or the total parts?
  8. If the **denominator** is 10 and the **numerator** is 7, write the fraction.
  9. What fraction of a shape is shaded if 2 out of 5 pieces are colored?
  10. True or False: The **denominator** can never be 0.
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## Set 10: Improper & Mixed Fractions

**Concept:** An **Improper fraction** is “top-heavy”. A **Mixed fraction** has a whole number part and a fraction part.

### Worked Example

**Question:** Convert the **improper fraction**  $\frac{5}{2}$  to a **mixed fraction**. **Answer:** How many 2s go into 5? (2 whole times, remainder 1). Answer:  $2\frac{1}{2}$ .

## Questions

1. Is  $\frac{4}{3}$  an **improper fraction** or a **mixed fraction**?
  2. Is  $1\frac{1}{2}$  an **improper fraction** or a **mixed fraction**?
  3. Convert  $\frac{3}{2}$  to a **mixed fraction**.
  4. Convert  $\frac{5}{2}$  to a **mixed fraction**.
  5. Convert  $\frac{7}{4}$  to a **mixed fraction**.
  6. Convert the **mixed fraction**  $1\frac{1}{4}$  to an **improper fraction**.
  7. Convert the **mixed fraction**  $2\frac{1}{2}$  to an **improper fraction**.
  8. Which is larger: the **improper fraction**  $\frac{3}{2}$  or the number 1?
  9. Write “two and a half” as a **mixed fraction**.
  10. Write “three halves” as an **improper fraction**.
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## Set 11: Equivalent Fractions

**Concept:** **Equivalent fractions** have the same value but different numbers. Multiply or divide the top and bottom by the same number.

### Worked Example

**Question:** Find the **equivalent fraction**:  $\frac{1}{2} = \frac{?}{8}$  **Answer:** To get from 2 to 8, we multiply by 4. So we multiply the top by 4 as well.  $1 \times 4 = 4$ . Answer:  $\frac{4}{8}$ .

## Questions

1. Find the **equivalent fraction**:  $\frac{1}{2} = \frac{?}{4}$
  2. Find the **equivalent fraction**:  $\frac{1}{3} = \frac{?}{6}$
  3. Find the **equivalent fraction**:  $\frac{2}{5} = \frac{?}{4}$
  4. Find the **equivalent fraction**:  $\frac{3}{4} = \frac{?}{8}$
  5. Simplify  $\frac{2}{4}$  to find the simplest **equivalent fraction**.
  6. Simplify  $\frac{5}{10}$  to find the simplest **equivalent fraction**.
  7. Find an **equivalent fraction** for  $\frac{6}{8}$  by dividing top and bottom by 2.
  8. Are  $\frac{1}{2}$  and  $\frac{5}{10}$  **equivalent fractions**?
  9. Are  $\frac{2}{3}$  and  $\frac{4}{5}$  **equivalent fractions**?
  10. Fill in the blank:  $\frac{10}{20} = \frac{1}{?}$
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## Set 12: Scientific Notation

**Concept:** **Scientific Notation** is a way to write numbers as  $a \times 10^n$ , where  $1 \leq a < 10$  and  $n$  is an **integer**.

### Worked Example

**Question:** Write 4500 in **scientific notation**. **Answer:** Move the decimal point to get a number between 1 and 10 (4.5). Count how many places it moved (3 places). Answer:  $4.5 \times 10^3$ .

## Questions

1. Write 3000 in **scientific notation**.
  2. Write 2,500,000 in **scientific notation**.
  3. Write  $5 \times 10^2$  as a standard number.
  4. Write  $1.2 \times 10^3$  as a standard number.
  5. In  $3.4 \times 10^5$ , which number is the base?
  6. In  $3.4 \times 10^5$ , which number is the **exponent**?
  7. Write 0.004 in **scientific notation** (remember negative **exponents** for small numbers).
  8. Write  $2 \times 10^{-2}$  as a decimal.
  9. Which is larger:  $1 \times 10^4$  or  $9 \times 10^3$ ?
  10. True or False: In **scientific notation**, the first number must be between 1 and 10.
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## Set 13: Recurring Decimals

**Concept:** A **Recurring decimal** has a digit (or group of digits) that repeats forever. We use a dot (or a bar) over the repeating part.

### Worked Example

**Question:** Write the fraction  $\frac{1}{3}$  as a **recurring decimal**. **Answer:**  $1 \div 3 = 0.3333\dots$  which is written as  $0.\dot{3}$ .

## Questions

1. What does the dot in  $0.\dot{5}$  mean?
2. Write  $0.666\dots$  using dot notation.
3. Write the fraction  $\frac{2}{3}$  as a **recurring decimal**.
4. Is  $0.5$  a **recurring decimal**?
5. Write  $0.\dot{1}$  as a decimal with three digits showing.
6. Convert  $\frac{1}{9}$  to a **recurring decimal** ( $1 \div 9$ ).
7. True or False:  $0.\dot{9}$  is equal to 1.
8. Which notation represents  $0.121212\dots$ ? (A)  $0.\dot{1}\dot{2}$  or (B)  $0.1\dot{2}$ ?
9. Does  $\frac{1}{2}$  result in a **recurring decimal**?
10. Write the number that is exactly double  $0.\dot{3}$ .