

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

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

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

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°C or -12°C ?
 7. Calculate the new **integer**: $5 - 8$
 8. Calculate the new **integer**: $-3 + 7$
 9. Insert $<$ or $>$ between these **integers**: -5 ____ -2
 10. Insert $<$ or $>$ between these **integers**: 0 ____ -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 5×5 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: **B**rackets, **E**xponents, **D**ivision/**M**ultiplication, **A**ddition/**S**ubtraction.

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**: $\frac{1}{2} = \frac{?}{6}$
 3. Find the **equivalent fraction**: $\frac{3}{4} = \frac{?}{8}$
 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: 4.5×10^3 .

Questions

1. Write 3000 in **scientific notation**.
 2. Write 2,500,000 in **scientific notation**.
 3. Write 5×10^2 as a standard number.
 4. Write 1.2×10^3 as a standard number.
 5. In 3.4×10^5 , which number is the base?
 6. In 3.4×10^5 , which number is the **exponent**?
 7. Write 0.004 in **scientific notation** (remember negative **exponents** for small numbers).
 8. Write 2×10^{-2} as a decimal.
 9. Which is larger: 1×10^4 or 9×10^3 ?
 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... 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...? (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 $0.\dot{3}$.