

**Year 7**  
**Mathematics**  
**Unit 3**



**Name:** \_\_\_\_\_

**Class:** \_\_\_\_\_

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# 1 Fractions

# Notation

Numerator



3



Fraction Bar  
(Vinculum)



4



Denominator

# 1.1 Equivalent Fractions

In this section you will look at equivalent fractions.

Equivalent fractions are two or more fractions that have the same value, even though they have different numerators and denominators.

## Worked Example

Multiply these fractions so they have a denominator of 8:

a)  $\frac{1}{2}$

b)  $\frac{3}{4}$

## Your Turn

Multiply these fractions so they have a denominator of 12:

a)  $\frac{1}{2}$

b)  $\frac{3}{4}$

## 1.2 Simplifying Fractions

In this section you will look at simplifying fractions.

## Worked Example

Simplify:

a)  $\frac{6}{20}$

b)  $\frac{12}{20}$

## Your Turn

Simplify:

a)  $\frac{6}{18}$

b)  $\frac{12}{18}$



## Worked Example

Express 50p as a fraction of £4.  
Give your answer in its simplest form.

## Your Turn

Express 20p as a fraction of £10.  
Give your answer in its simplest form.

## 1.3 Improper Fractions and Mixed Numbers

In this section you will look at converting between improper fractions and mixed numbers.

# Frayer Model – Improper Fraction

Definition

Characteristics

Examples

Non-Examples

# Frayer Model – Mixed Number

Definition

Characteristics

Examples

Non-Examples

## Worked Example

Convert  $\frac{6}{5}$  into a mixed number

## Your Turn

Convert  $\frac{13}{5}$  into a mixed number

## Worked Example

Convert  $2\frac{1}{3}$  into an improper fraction

## Your Turn

Convert  $4\frac{1}{3}$  into an improper fraction

## 1.4 Adding and Subtracting Fractions

In this section you will look at adding and subtracting fractions.

Fractions with the same denominators can be added (or subtracted) by adding (or subtracting) the numerators.

If two fractions do not have the same denominator, then find a common denominator by making equivalent fractions.

## Which Denominator?

$$\frac{2}{3} - \frac{1}{3} = \text{---} - \text{---} - \text{---}$$

$$\frac{2}{3} - \frac{1}{6} = \text{---} - \text{---} - \text{---}$$

$$\frac{2}{3} + \frac{1}{6} = \text{---} - \text{---} - \text{---}$$

$$\frac{2}{9} + \frac{1}{6} = \text{---} - \text{---} - \text{---}$$

$$\frac{2}{9} + \frac{1}{5} = \text{---} - \text{---} - \text{---}$$



## Worked Example

Calculate:

a)  $\frac{2}{5} + \frac{1}{3}$

b)  $\frac{2}{5} - \frac{1}{3}$

## Your Turn

Calculate:

a)  $\frac{2}{3} + \frac{1}{5}$

b)  $\frac{2}{3} - \frac{1}{5}$

# Fill in the Gaps

Question	With a Common Denominator	Unsimplified Answer	Simplified Answer (where possible)
$\frac{1}{3} + \frac{1}{6}$	$\frac{2}{6} + \frac{1}{6}$	$\frac{3}{6}$	$\frac{\square}{\square}$
$\frac{1}{4} + \frac{2}{3}$	$\frac{3}{12} + \frac{\square}{12}$	$\frac{\square}{12}$	$\frac{\square}{12}$
$\frac{2}{5} + \frac{1}{4}$	$\frac{\square}{20} + \frac{\square}{20}$	$\frac{\square}{20}$	$\frac{\square}{20}$
$\frac{5}{6} - \frac{1}{2}$	$\frac{\square}{6} - \frac{\square}{6}$	$\frac{\square}{6}$	$\frac{\square}{\square}$
$\frac{7}{8} - \frac{2}{3}$	$\frac{21}{\square} - \frac{16}{\square}$	$\frac{\square}{\square}$	$\frac{\square}{\square}$
$\frac{7}{9} - \frac{3}{4}$	$\frac{\square}{\square} - \frac{\square}{\square}$	$\frac{\square}{\square}$	$\frac{\square}{\square}$
$\frac{\square}{\square} + \frac{\square}{\square}$	$\frac{\square}{35} + \frac{14}{35}$	$\frac{24}{35}$	$\frac{24}{35}$
$\frac{\square}{\square} - \frac{\square}{\square}$	$\frac{\square}{\square} - \frac{5}{\square}$	$\frac{6}{20}$	$\frac{\square}{\square}$
$\frac{\square}{\square} + \frac{\square}{\square}$	$\frac{\square}{\square} + \frac{7}{24}$	$\frac{\square}{\square}$	$\frac{2}{3}$
$\frac{13}{15} - \frac{\square}{\square}$	$\frac{26}{\square} - \frac{\square}{\square}$	$\frac{\square}{\square}$	$\frac{7}{10}$
$\frac{3}{10} + \frac{\square}{\square} + \frac{\square}{\square}$	$\frac{\square}{\square} + \frac{5}{20} + \frac{\square}{\square}$	$\frac{\square}{\square}$	$\frac{9}{10}$
$\frac{\square}{\square} + \frac{\square}{\square} - \frac{\square}{\square}$	$\frac{5}{\square} + \frac{\square}{\square} - \frac{8}{\square}$	$\frac{\square}{36}$	$\frac{2}{3}$

## Worked Example

Calculate:

a)  $2\frac{1}{2} + 3\frac{2}{5}$

b)  $2\frac{1}{2} - 1\frac{2}{5}$

## Your Turn

Calculate:

a)  $2\frac{1}{3} + 3\frac{2}{5}$

b)  $2\frac{1}{3} - 1\frac{2}{5}$

# Fill in the Gaps

Question	Write as Improper Fractions	Convert to Common Denominator	Answer as Improper Fraction	Answer as Mixed Number
$1\frac{1}{3} + 2\frac{1}{2}$	$4\frac{5}{3} + \frac{5}{2}$	$\frac{8}{6} + \frac{15}{6}$	$\frac{23}{6}$	
$3\frac{2}{3} + 1\frac{1}{4}$	$\frac{11}{3} + \frac{5}{4}$	$\frac{44}{12} + \frac{15}{12}$		
$4\frac{1}{2} - 3\frac{2}{5}$	$\frac{9}{2} - \frac{17}{5}$	$\frac{\square}{10} - \frac{\square}{10}$		
$2\frac{3}{4} + 1\frac{5}{6}$	$\frac{11}{4} + \frac{11}{6}$			
$5\frac{1}{3} - 3\frac{2}{5}$				
$4\frac{3}{4} - 2\frac{5}{7}$				
$2\frac{8}{9} + 3\frac{3}{5}$				
$2\frac{13}{20} - \frac{7}{8}$				
	$\frac{7}{4} + \frac{12}{5}$			
	$\frac{\square}{9} - \frac{\square}{4}$	$\frac{100}{36} - \frac{45}{36}$		
	$\frac{3}{2} + \frac{\square}{\square}$		$\frac{29}{10}$	
$\square\frac{\square}{\square} - 2\frac{1}{6}$				$3\frac{7}{30}$

## 1.5 Multiplying Fractions

In this section you will look at multiplying fractions.

When multiplying fractions, multiply the numerators together and multiply the denominators together, then simplify, or it is sometimes easier to simplify first.

## Worked Example

Calculate:

$$\frac{2}{3} \times \frac{1}{6}$$

## Your Turn

Calculate:

$$\frac{2}{3} \times \frac{5}{6}$$

## Worked Example

Calculate  $2 \times \frac{1}{5}$

## Your Turn

Calculate  $\frac{3}{5} \times 2$

## Worked Example

Calculate:

$$1\frac{1}{3} \times \frac{2}{5}$$

## Your Turn

Calculate:

$$\frac{1}{3} \times 1\frac{2}{5}$$



# Fill in the Gaps

Question	Write as Improper Fractions	Multiply Numerators/ Denominators	Simplify (where possible)	Answer as Mixed Number
$1\frac{2}{3} \times 1\frac{1}{2}$	$\frac{5}{3} \times \frac{3}{2}$	$\frac{15}{6}$	$\frac{5}{2}$	
$2\frac{2}{5} \times 1\frac{1}{3}$	$\frac{12}{5} \times \frac{4}{3}$	$\frac{48}{15}$		
$3\frac{1}{2} \times 3\frac{1}{3}$	$\frac{7}{2} \times \frac{10}{3}$			
$1\frac{3}{4} \times 2\frac{5}{7}$				
$2\frac{4}{5} \times \frac{6}{7}$				
$2\frac{3}{10} \times 2\frac{2}{9}$				
$5\frac{2}{3} \times 1\frac{3}{4}$				
$3\frac{7}{10} \times 1\frac{3}{7}$				
$5\frac{1}{2} \times 2\frac{3}{4}$				
	$\frac{9}{5} \times \frac{10}{3}$			
	$\frac{\square}{\square} \times \frac{5}{3}$	$\frac{75}{12}$		
$\square \frac{\square}{\square} \times 2\frac{2}{5}$		$\frac{132}{20}$		

## Worked Example

Calculate:

a)  $\frac{2}{5} \times \frac{25}{18}$

b)  $4\frac{1}{5} \times 5\frac{5}{7}$

## Your Turn

Calculate:

a)  $\frac{2}{5} \times \frac{25}{16}$

b)  $4\frac{1}{5} \times 6\frac{3}{7}$

## 1.6 Square and Square Root Fractions

In this section you will look at how to square and square root fractions.

## Worked Example

Calculate:

a)  $\left(\frac{5}{8}\right)^2$

b)  $\sqrt{\frac{16}{81}}$

## Your Turn

Calculate:

a)  $\left(\frac{3}{7}\right)^2$

b)  $\sqrt{\frac{49}{81}}$

## 1.7 Reciprocals

In this section you will look at reciprocals.

The reciprocal of a number is the number you would have to multiply it by to get the answer 1.

## Worked Example

Write the reciprocals of:

a) 6

b)  $\frac{1}{6}$

c)  $\frac{5}{6}$

## Your Turn

Write the reciprocals of:

a) 7

b)  $\frac{1}{7}$

c)  $\frac{2}{7}$

## 1.8 Dividing Fractions

In this section you will look at dividing fractions.

## Worked Example

Calculate:

$$\frac{1}{5} \div \frac{1}{3}$$

## Your Turn

Calculate:

$$\frac{1}{5} \div \frac{2}{3}$$



## Worked Example

Calculate:

a)  $\frac{1}{5} \div 2$

b)  $2 \div \frac{1}{5}$

## Your Turn

Calculate:

a)  $\frac{2}{5} \div 2$

b)  $2 \div \frac{2}{5}$

# Fill in the Gaps

Division	Equivalent Multiplication	Unsimplified Answer	Simplified Answer (where possible)
$\frac{2}{3} \div 6$	$\frac{2}{3} \times \frac{1}{6}$	$\frac{2}{18}$	<input type="text"/> <input type="text"/>
$\frac{2}{5} \div 4$	$\frac{2}{5} \times \frac{1}{4}$	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
$\frac{5}{8} \div 10$	<input type="text"/> <input type="text"/> $\times$ <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
$\frac{7}{10} \div \frac{3}{4}$	$\frac{7}{10} \times \frac{4}{3}$	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
$\frac{6}{11} \div \frac{2}{3}$	<input type="text"/> <input type="text"/> $\times$ <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
$\frac{1}{10} \div \frac{4}{5}$	<input type="text"/> <input type="text"/> $\times$ <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
$\frac{7}{10} \div \frac{3}{4}$	<input type="text"/> <input type="text"/> $\times$ <input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
<input type="text"/> <input type="text"/> $\div$ <input type="text"/> <input type="text"/>	$\frac{2}{9} \times \frac{6}{5}$	<input type="text"/> <input type="text"/>	<input type="text"/> <input type="text"/>
<input type="text"/> <input type="text"/> $\div$ <input type="text"/> <input type="text"/>	$\frac{3}{8} \times$ <input type="text"/> <input type="text"/>	$\frac{12}{24}$	<input type="text"/> <input type="text"/>
<input type="text"/> <input type="text"/> $\div$ $\frac{2}{5}$	<input type="text"/> <input type="text"/> $\times$ <input type="text"/> <input type="text"/>	$\frac{15}{20}$	<input type="text"/> <input type="text"/>
<input type="text"/> <input type="text"/> $\div$ <input type="text"/> <input type="text"/>	$\frac{5}{12} \times$ <input type="text"/> <input type="text"/>	$\frac{10}{12}$	<input type="text"/> <input type="text"/>
<input type="text"/> <input type="text"/> $\div$ <input type="text"/>	<input type="text"/> <input type="text"/> $\times$ $\frac{1}{3}$	<input type="text"/> <input type="text"/>	$\frac{3}{10}$

## Worked Example

Calculate:

$$2\frac{2}{3} \div \frac{1}{5}$$

## Your Turn

Calculate:

$$2\frac{2}{3} \div \frac{2}{5}$$

# Fill in the Gaps

Question	Write as Improper Fractions	Write as a Multiplication	Multiply and Simplify (where possible)	Answer as Mixed Number
$2\frac{2}{3} \div 1\frac{1}{2}$	$\frac{8}{3} \div \frac{3}{2}$	$\frac{8}{3} \times \frac{2}{3}$	$\frac{16}{9}$	
$5\frac{1}{2} \div 1\frac{3}{4}$	$\frac{11}{2} \div \frac{7}{4}$	$\frac{11}{2} \times \frac{4}{7}$	$\frac{44}{14} = \begin{array}{c} \square \\ \square \end{array}$	
$4\frac{3}{5} \div 2\frac{2}{3}$	$\frac{23}{5} \div \frac{8}{3}$	$\frac{23}{5} \times \frac{3}{8}$		
$7\frac{2}{3} \div 1\frac{1}{6}$	$\frac{23}{3} \div \frac{7}{6}$			
$3\frac{7}{8} \div \frac{3}{4}$				
$1\frac{4}{5} \div 2\frac{2}{3}$				
$4\frac{1}{6} \div 1\frac{5}{12}$				
$3\frac{3}{10} \div 1\frac{4}{5}$				
$5\frac{1}{2} \div 3\frac{2}{3}$				
	$\frac{19}{6} \div \frac{7}{5}$			
		$\frac{23}{9} \times \frac{3}{7}$		
$4\frac{1}{2} \div \begin{array}{c} \square \\ \square \end{array}$				$1\frac{7}{20}$

## 1.9 Fractions of Amounts

In this section you will look at calculating fractions of amounts.

When we find a fraction of an amount, we are working out how much that 'part' is worth within the whole.

## Worked Example

Calculate:

a)  $\frac{3}{4}$  of 24

b)  $\frac{7}{4}$  of 24

## Your Turn

Calculate:

a)  $\frac{2}{3}$  of 24

b)  $\frac{5}{3}$  of 24

## **1.10 Increasing or Decreasing by a Fraction**

In this section you will look at increasing or decreasing quantities by a fraction.

If asked to increase or decrease an amount by a fraction, make sure you add or subtract from the original amount at the end of the question!

## Worked Example

a) Increase 60 by  $\frac{1}{5}$

b) Decrease 100 by  $\frac{1}{5}$

## Your Turn

a) Increase 60 by  $\frac{4}{5}$

b) Decrease 200 by  $\frac{3}{5}$



## 1.11 Reverse Fractions of Amounts

In this section you will look at reverse fractions of amounts.

## Worked Example

Find the value of  $x$ :

a)  $\frac{2}{5}$  of  $x$  is 12

b)  $\frac{6}{5}$  of  $x$  is 12

## Your Turn

Find the value of  $x$ :

a)  $\frac{3}{4}$  of  $x$  is 15

b)  $\frac{5}{4}$  of  $x$  is 15

## 1.12 Fractional Order of Operations

In this section you will look at fractional order of operations.

## 2 Integer Arithmetic

## 2.1 Addition

In this section you will look at adding integers.

## 2.2 Subtraction

In this section you will look at subtracting integers.

## 2.3 Multiplication

In this section you will look at multiplying integers.

## Worked Example

Work out  $56 \times 7$

## Your Turn

Work out  $27 \times 9$



## Worked Example

Work out  $568 \times 7$

## Your Turn

Work out  $273 \times 9$

## Worked Example

Work out  $56 \times 73$

## Your Turn

Work out  $27 \times 72$

## Worked Example

Work out  $568 \times 73$

## Your Turn

Work out  $273 \times 72$

## 2.4 Division

In this section you will look at dividing integers.

## Worked Example

Work out  $78 \div 2$

## Your Turn

Work out  $96 \div 2$

## Worked Example

Work out  $73 \div 2$

## Your Turn

Work out  $91 \div 2$

## Worked Example

Work out  $185 \div 3$

## Your Turn

Work out  $372 \div 2$

## Worked Example

Work out  $333 \div 37$

## Your Turn

Work out  $216 \div 27$



# 3 Decimals

## 3.1 Adding Decimals

In this section you will look at adding decimals.

## Worked Example

Work out:  
 $481.4 + 35.23$

## Your Turn

Work out:  
 $369.5 + 47.68$

## 3.2 Subtracting Decimals

In this section you will look at subtracting decimals.

## Worked Example

Work out:

$$184.3 - 40.66$$

## Your Turn

Work out:

$$145.2 - 43.46$$

## 3.3 Related Calculations

In this section you will look at working out related calculations.

## Worked Example

$$93 \times 76 = 7068$$

- a) Calculate  $9.3 \times 7.6$
- b) Calculate  $0.93 \times 7.6$

## Your Turn

$$26 \times 89 = 2314$$

- a) Calculate  $2.6 \times 89$
- b) Calculate  $2.6 \times 0.89$

## 3.4 Multiplying Decimals

In this section you will look at multiplying decimals.



## Worked Example

Work out:  
 $2.724 \times 4$

## Your Turn

Work out:  
 $1.745 \times 7$

## Worked Example

Work out:  
 $386.6 \times 2.09$

## Your Turn

Work out:  
 $379.6 \times 4.23$

## 3.5 Dividing Decimals

In this section you will look at dividing decimals.

## Worked Example

Work out:  
 $1246.24 \div 8$

## Your Turn

Work out:  
 $1197.21 \div 7$

## Worked Example

Work out:  
 $0.9 \div 0.003$

## Your Turn

Work out:  
 $0.06 \div 0.002$

# 4 Ordering Numbers

## 4.1 Ordering Negative Numbers

In this section you will look at ordering negative numbers.

## Worked Example

Write in ascending order:  
 $-2, -1, 4, 3$

## Your Turn

Write in ascending order:  
 $-7, -8, 8, 7$



## 4.2 Ordering Decimals

In this section you will look at ordering decimals.

## Worked Example

Write in ascending order:  
0.5037, 0.5, 0.53, 0.503, 0.5007

## Your Turn

Write in ascending order:  
0.2089, 0.2, 0.28, 0.208, 0.2009

## 4.3 Ordering Fractions

In this section you will look at ordering fractions.

## Worked Example

Arrange the following fractions in ascending order:

a)  $\frac{3}{10}, \frac{5}{10}, \frac{1}{10}, \frac{4}{10}$

b)  $\frac{1}{2}, \frac{3}{5}, \frac{3}{4}, \frac{7}{10}$

## Your Turn

Arrange the following fractions in ascending order:

a)  $\frac{5}{8}, \frac{7}{8}, \frac{3}{8}, \frac{6}{8}$

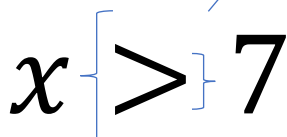
b)  $\frac{1}{2}, \frac{5}{6}, \frac{3}{4}, \frac{7}{8}$

## 4.4 Inequalities

In this section you will look at inequalities.

# Inequalities

Notice the symbol is taller on the side which is larger.



The diagram shows the inequality  $x > 7$ . The greater-than symbol ( $>$ ) is drawn with a taller left side and a shorter right side. Two blue arrows originate from the text above and point to the taller left side of the symbol, illustrating that the symbol is taller on the side which is larger.

Inequality	What It Means
$x > 7$	" $x$ is greater than 7" This doesn't include 7 Examples: 7.2, 10
$x \geq 7$	" $x$ is greater than or equal to 7" or " $x$ is at least 7" This does include 7 Examples: 7, 8, 100.5
$x < 10$	" $x$ is less than 10" Examples: $-3$ , 4, 9.2
$x \leq 8$	" $x$ is less than or equal to 8" or " $x$ is at most 8" Examples: 8, $-3$ , 4, 7.2

## Worked Example

Write an inequality in between the two numbers:

-4      - 5

## Your Turn

Write an inequality in between the two numbers:

4.1      4.05