GCSE Mathematics – Unit 4: Fractions, Decimals and Percentages

Name:……..

Topic/Skill	Definition/Tips	Example	Your Turn
Fraction	A mathematical expression representing the **division** of one integer by another. Fractions are written as **two numbers separated by a horizontal line**.	$\frac{2}{7}$ is a 'proper' fraction. $\frac{7}{4}$ is an 'improper' or 'top-heavy' fraction. It is greater than one. It can also be written as $1\frac{3}{4}$ 	Write whether each number is an integer, a proper fraction, an improper fraction or a mixed number. $\frac{2}{3}$: 5: $3\frac{2}{3}$: $\frac{10}{3}$:
Numerator	The **top** number of a fraction.	In the fraction $\frac{3}{5}$, 3 is the numerator.	In the fraction $\frac{2}{5}$, the numerator is ___
Denominator	The **bottom** number of a fraction.	In the fraction $\frac{3}{5}$, 5 is the denominator.	In the fraction $\frac{5}{8}$, the denominator is ___
Unit Fraction	A fraction where the **numerator is one** and the denominator is a positive integer.	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ *etc.* are examples of unit fractions.	Circle the unit fraction $\frac{2}{3}, \frac{1}{30}, \frac{3}{4}$
Converting Mixed Numbers and Improper Fractions	To convert a mixed number into an improper fraction, multiply the integer by the denominator and add that to the numerator To convert a top heavy fraction into a mixed number, divide the numerator by the denominator. **The remainder is the new numerator**.	$3\frac{2}{5}$ $\frac{17}{5}$ $3 \times 5 + 2$ $\frac{17}{5}$ $3\frac{2}{5}$ $17 \div 5 = 3$ (**r2**)	Convert to an improper fraction: $2\frac{1}{2} =$ $4\frac{2}{4} =$ Convert to a mixed number: $\frac{15}{2} =$

			$\frac{13}{5} =$
Reciprocal	The reciprocal of a number is **1 divided by the number**. The reciprocal of x is $\frac{1}{x}$ **When we multiply a number by its reciprocal, we get 1**. This is called the 'multiplicative inverse'.	The reciprocal of 5 is $\frac{1}{5}$ The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$, because $\frac{2}{3} \times \frac{3}{2} = 1$	Find the reciprocal of each: $\frac{1}{4} =$ $\frac{3}{4} =$ $1\frac{1}{2} =$ $0.5 =$
Simplifying Fractions	**Divide the numerator and denominator by the highest common factor**.	$\frac{20}{45} = \frac{4}{9}$	$\frac{60}{90} =$
Equivalent Fractions	Fractions that represent the **same value**.	$\frac{2}{5} = \frac{4}{10} = \frac{20}{50} = \frac{60}{150}$ $etc.$	Circle the equivalent fractions: $\frac{4}{5}, \frac{5}{6}, \frac{16}{20}, \frac{12}{15}, \frac{14}{15}$
Comparing Fractions Order Fractions	To compare fractions, they each need to be rewritten so that they have a **common denominator**. **Ascending** means **smallest to biggest**. **Descending** means **biggest to smallest**.	$\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$ Write equivalents with the same denominator: $\frac{9}{12}, \frac{8}{12}, \frac{10}{12}, \frac{6}{12}$ Use the equivalents to write the originals in the correct order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$	$\frac{3}{5}, \frac{3}{4}, \frac{7}{10}, \frac{1}{2}$
Fraction of an Amount	**Divide** by the **bottom**, **multiply** by the **top**	Find $\frac{2}{5}$ of £60 $60 \div 5 = 12$ $12 \times 2 = 24$	Find $\frac{4}{7}$ of 28 Find $2\frac{3}{4}$ of 8

Adding or Subtracting Fractions	Find the **Lowest Common Multiple of the denominators** to find a common denominator. Use equivalent fractions to change each fraction to the **common denominator**. Then just **add or subtract the numerators** and keep the **denominator the same**.	$\frac{2}{3} + \frac{4}{5}$ Multiples of 3: 3, 6, 9, 12, **15**.. Multiples of 5: 5, 10, **15**.. LCM of 3 and 5 = 15 $\frac{2}{3} = \frac{10}{15}$ $\frac{4}{5} = \frac{12}{15}$ $\frac{10}{15} + \frac{12}{15} = \frac{22}{15} = 1\frac{7}{15}$	$\frac{3}{4} + \frac{5}{6}$
Multiplying Fractions	**Multiply** the **numerators** together and **multiply** the **denominators** together. Simplify if you can.	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ $\frac{3}{8} \times \frac{2}{9} = \frac{6}{72} = \frac{1}{12}$	$\frac{1}{3} \times \frac{1}{3} =$ $\frac{5}{6} \times \frac{3}{10} =$
Dividing Fractions	**Multiply by the reciprocal** Keep the first fraction the same Flip the second fraction upside down Change the divide to a multiply Multiply by the reciprocal of the second fraction.	$\frac{1}{2} \div \frac{1}{2} = \frac{1}{2} \times \frac{2}{1} = \frac{2}{2} = 1$ $\frac{3}{4} \div \frac{5}{6} = \frac{3}{4} \times \frac{6}{5} = \frac{18}{20} =$	$\frac{1}{3} \div \frac{1}{3} =$ $\frac{2}{15} \div \frac{4}{5} =$

Converting Fractions Decimals and Percentages

Fraction, Decimal and Percentage Conversion		
Fractions to Decimals	numerator ÷ denominator	1/4 = 1÷4 = 0.25
Fractions to Percentages	numerator ÷ denominator x 100	1/4 = 1÷4 = 0.25 0.25 x 100 = 25%
Decimals to Fractions	-write decimal as a fraction over 1 -multiply numerator and denominator by 10 for each decimal digit -simplify	0.25 = 0.25/1 0.25/1 = 25/100 25/100 = 1/4
Decimals to Percentages	x 100	0.25 x 100 = 25%
Percentages to Fractions	-write as a fraction over 100 -simplify	25% = 25/100 25/100 = 1/4
Percentages to Decimals	÷ 100	25% ÷ 100 = 0.25

Convert $\frac{17}{40}$ into a decimal

Convert $\frac{19}{40}$ into a percentages

Convert 0.625 into a fraction

Convert 0.375 into a percentage

Convert 32% into a fraction

Convert 17.5% into a decimal

Percentage of an Amount	There are lots of different methods **Divide by 100, multiply by the percentage** (Works every time) OR **Find 10% or 1% and then add as many as you need** (Good if you are finding it difficult) OR **Simplify the percentage into an easy fraction and find that fraction of the amount** (Easy to do in your head if it is with simple numbers)	Find 20% of 6000 $6000 \div 100 = 60$ $60 \times 20 = 1200$ $10\%\ of\ 6000 = 600$ $10\% + 10\% = 20\%$ $600 + 600 = 1200$ $20\%\ is\ the\ same\ as \frac{1}{5}$ $\frac{1}{5}\ of\ 6000\ is\ 1200$	Try three times, one with each method: Find 30% of 200
Increase or Decrease by a Percentage	Non-calculator: **Find the percentage** and **add** to or **subtract** from the **original** amount.	<u>Increase 500 by 20% (Non Calc):</u> 10% of 500 = 50 so 20% of 500 = 100 500 + 100 = 600	Increase 700 by 30% without a calculator

	Calculator: Find the **percentage multiplier** and multiply.	<u>Decrease 800 by 17% (Calc):</u> 100%-17%=83% 83% ÷ 100 = 0.83 0.83 × 800 = 664	Increase 900 by 13% using a calculator (show your method)
Percentage Multiplier	The **number** you **multiply** a quantity by to **increase or decrease** it by a **percentage**.	The multiplier for increasing by 12% is 1.12 The multiplier for decreasing by 12% is 0.88 The multiplier for increasing by 100% is 2.	What is the multiplier used to… Increase a number by 13%? Decrease a number by 27%? Increase by 150%?
Reverse Percentage	Find the **correct percentage given in the question**, then work backwards to **find 100%** Look out for words like '**before**' or '**original**'	A jumper was priced at £48.60 after a 10% reduction. Find its original price. 100% - 10% = 90% 90% = £48.60 1% = £0.54 100% = £54	10% of x is 13, what is x? m was increased by 20% to get 240. What is m? a was reduced by 0.5% to get 804. What is a?