

UNIT 8.1

Fractions, Decimals and Percentages

Revision slides: everything you need for the test, one idea per slide.

Key vocabulary (1 of 3)

Numerator: the number above the line in a fraction: how many parts you have

Denominator: the number below the line in a fraction: how many equal parts the whole is cut into

Equivalent fractions: fractions that name the same amount, e.g. $\frac{1}{2}$ and $\frac{3}{6}$

Highest common factor (HCF): the biggest number that divides exactly into two or more numbers

Lowest terms: a fraction written so that the numerator and denominator share no common factor except 1

Key vocabulary (2 of 3)

Improper fraction: a fraction whose numerator is at least as big as its denominator, e.g. $\frac{7}{4}$

Mixed numeral: a whole number and a fraction together, e.g. $1\frac{3}{4}$

Common denominator: a denominator shared by two or more fractions, so they can be compared, added or subtracted

Reciprocal: a fraction turned upside down: the reciprocal of $\frac{4}{5}$ is $\frac{5}{4}$

Per cent: per hundred: 75% means $\frac{75}{100}$

Key vocabulary (3 of 3)

Terminating decimal: a decimal that ends, e.g. $1/8 = 0.125$

Recurring decimal: a decimal with digits that repeat forever, e.g. $1/3 = 0.333...$

Multiplier: the number you multiply by to increase or decrease an amount by a percentage, e.g. $\times 1.2$ for a 20% increase

Forms of fractions

Equivalent: multiply or divide numerator and denominator by the same number: $1/2 = 3/6$.

Simplify: divide the numerator and denominator by the HCF: $12/18 = 2/3$.

Improper to mixed: $17 \div 5 = 3$ remainder 2, so $17/5 = 3 \frac{2}{5}$. **Mixed to improper:** $2 \frac{1}{3} = (3 \times 2 + 1)/3 = 7/3$.

Compare: common denominator first. $3/4 = 9/12 > 2/3 = 8/12$.

Why it works: you cut the pieces the same way everywhere, so the amount does not change.

Four operations with fractions

Add/subtract: common denominator, then add or subtract the numerators. $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$.

Never add the denominators: $\frac{1}{2} + \frac{1}{3}$ is not $\frac{2}{5}$.

Multiply: numerator $\times$ numerator, denominator $\times$ denominator (cancel first). $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$.

Divide: multiply by the reciprocal. $3 \div \frac{1}{4} = 3 \times 4 = 12$ (how many quarters fit in 3?).

Mixed numerals: change to improper first. $2 \frac{1}{2} \div \frac{5}{6} = \frac{5}{2} \times \frac{6}{5} = 3$.

Fractions, decimals and percentages

Fraction to decimal: divide numerator by denominator ($\frac{3}{4} = 0.75$). Decimal to percentage: $\times 100$. Percentage to decimal: $\div 100$. Percentage to fraction: over 100, then simplify.

Per cent means per hundred: $\frac{3}{4} = \frac{75}{100} = 0.75 = 75\%$.

Common ones: $\frac{1}{2} = 0.5 = 50\%$; $\frac{1}{4} = 0.25 = 25\%$; $\frac{1}{5} = 0.2 = 20\%$; $\frac{1}{10} = 0.1 = 10\%$; $\frac{1}{8} = 0.125 = 12.5\%$.

Terminating decimals end ($\frac{1}{8} = 0.125$); **recurring** decimals repeat ($\frac{1}{3} = 0.333\dots$). A fraction in lowest terms terminates only if its denominator has no prime factors except 2 and 5.

To order mixed forms, change them all to percentages.

Percentage increase and decrease

Multiplier = 1 + the rise, or 1 – the fall, as a decimal. +20% is $\times 1.2$; –15% is $\times 0.85$.

Why 1.2 and not 0.2? The original is 100%, and $100\% + 20\% = 120\%$.

45 francs up 20%: $45 \times 1.2 = 54$. 300 francs down 15%: $300 \times 0.85 = 255$.

Repeated change: multiply the multipliers. Up 20% then down 20% = $1.2 \times 0.8 = 0.96$, which is 4% less than the start (the second 20% is of a bigger amount).

Check by estimating: a 20% rise on 45 is about 9 more.

Common mistakes

✗ " $1/2 + 1/3 = 2/5$."

✓ Find a common denominator first: $3/6 + 2/6 = 5/6$.

✗ " $3 \div 1/4 = 3/4$."

✓ Dividing by $1/4$ multiplies by 4: $3 \times 4 = 12$.

✗ "A 20% rise is $\times 0.2$."

✓ It is $\times 1.2$, because the original stays (100% + 20%).

✗ "Up 20% then down 20% gets you back to the start."

✓ It gives 96% of the start: $1.2 \times 0.8 = 0.96$.

Common mistakes (continued)

✗ "Leave $12/18$ as it is."

✓ Simplify to lowest terms: $2/3$.