

Exercise walk-through

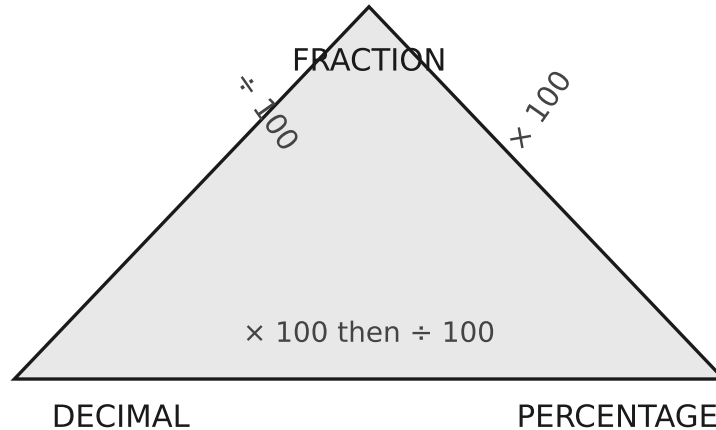
1.1.99

Independent transfer: Foundation then Higher

AQA · GCSE · Mathematics

Figure 15: Fractions, decimals

$\frac{1}{2} = 0.5 = 50\%$ — every vertex names the same number



Check the labelled values and conditions.

29. Exact arithmetic and estimation · Higher

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$72=2^3 \times 3^2$ and $90=2 \times 3^2 \times 5$. Their HCF is $2 \times 9=18$. Make 18 bags with 4 pencils and 5 pens each. Their LCM is $2^3 \times 3^2 \times 5=360$. A prime integer is greater than 1 and has exactly two positive factors. The number 1 is not prime; a composite positive integer greater than 1 has more than two positive factors. Every integer greater than 1 has a unique product of prime factors apart from their order. For example, $60=2^2 \times 3 \times 5$. A factor divides a number; a multiple is the result of multiplying it by an integer. HCF uses common smallest powers, while LCM uses largest powers.

40. Indices, surds and standard form · Higher

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$0.000072 = 7.2 \times 10^{-5}$. Also $16^{(3/4)} = (16^{(1/4)})^3 = 2^3 = 8$. Simplify $\sqrt{72} = 6\sqrt{2}$, then rationalise $1/\sqrt{2} = \sqrt{2}/2$. Useful powers include $3^3 = 27$, $4^3 = 64$, $5^3 = 125$, $15^2 = 225$ and $10^6 = 1,000,000$. Integer laws give $2^0 = 1$, $2^{-3} = 1/8$ and $(2^3)^2 = 2^6 = 64$. For standard-form multiplication, $(3 \times 10^5)(4 \times 10^{-3}) = 12 \times 10^2 = 1.2 \times 10^3$. Division gives $(6 \times 10^5)/(2 \times 10^2) = 3 \times 10^3$. For addition, first align exponents: $3 \times 10^4 + 2 \times 10^3 = 3.2 \times 10^4$. For a positive base, $a^{(m/n)} = (\text{the } n\text{th root of } a)^m$. Thus $27^{(2/3)} = 3^2 = 9$ and $16^{(-1/2)} = 1/4$.

Exercises 2.1·3.1

2.1 Foundation: A supplier has 84 pencils and 126 pens. Find the greatest number of identical packs using everything. State each pack's contents. A delivery charge of 18.60 CNY is shared equally among six buyers; find each share without rounding intermediate values.

3.1 Higher: A positive rectangle has recorded length 8.0 cm and width 3.0 cm, each to the nearest 0.1 cm. Give tight lower and upper bounds for area and for length divided by width. State endpoint inclusion.

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2.1 Foundation: A supplier has 84 pencils and 126 pens. Find the greatest number of identical packs using everything. State each pack's contents. A delivery charge of 18.60 CNY is shared equally among six buyers; find each share without rounding intermediate values.

2.1 $84 = 2^2 \cdot 3 \cdot 7$ and $126 = 2 \cdot 3^2 \cdot 7$, so the HCF is 42. Each of 42 packs has $84/42 = 2$

3.1 Higher: A positive rectangle has recorded length 8.0 cm and width 3.0 cm, each to the nearest 0.1 cm. Give tight lower and upper bounds for area and for length divided by width. State endpoint inclusion.

3.1 $7.95 \leq l < 8.05$ and $2.95 \leq w < 3.05$, in cm. Positivity makes product and quotient monotonic in the needed directions. Thus $23.4525 \leq A < 24.5525$ in square centimetres. For the dimensionless quotient, $7.95/3.05 < l/w < 8.05/2.95$, or $159/61 < l/w < 161/59$. Neither quotient endpoint is attained, since each requires one excluded upper measurement bound. The area lower bound is attained, since both lower bounds are allowed. Blindly using “upper over lower” without sign and endpoint checks is insufficient.

Local guidance: select and explain the relationship; calculate every requested result; check units, scope, conditions and completeness. These are authored classroom criteria.