

Algebraic Fractions: Starters

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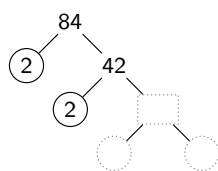
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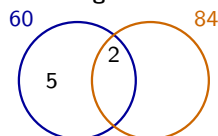
Starter 1: Prime Factors & HCF

1. Simplify $\sqrt{20}$.
2. Work out 2^{-1} and $9^{\frac{1}{2}}$.

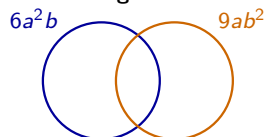
Factor tree



Venn diagram A



Venn diagram B

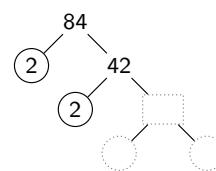


3. Complete the factor tree. Write 84 as a product of prime factors in index form.
4. $60 = 2^2 \times 3 \times 5$. Complete Venn diagram A for 60 and 84, then find the HCF and the LCM of 60 and 84.
5. Simplify $\frac{60}{84}$ by dividing by the HCF. Which numbers in Venn diagram A are not in the HCF?
6. Simplify $\frac{x^5}{x^2}$ by writing out the xs and cancelling.
7. (Challenge) Complete Venn diagram B for $6a^2b$ and $9ab^2$. Use it to simplify $\frac{6a^2b}{9ab^2}$.

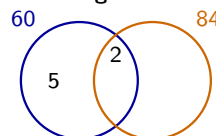
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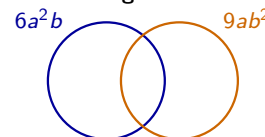
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Venn diagram B

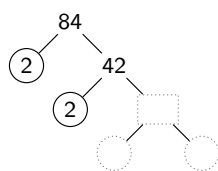


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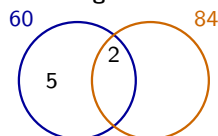
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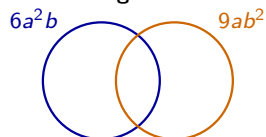
Factor tree



Venn diagram A



Venn diagram B

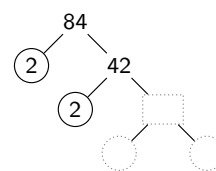


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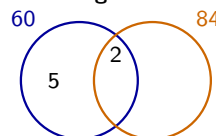
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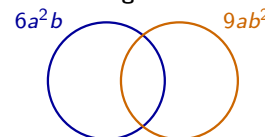
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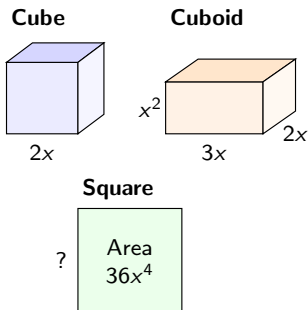


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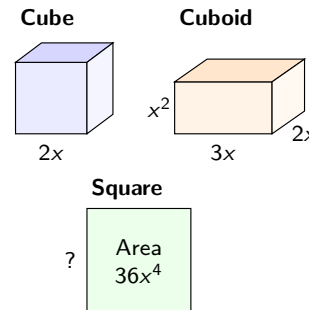
Starter 2: Index Laws



- Write 72 as a product of prime factors in index form.
- Simplify $\sqrt{8} + \sqrt{18}$.
- Simplify $x^4 \times x^3$ and $y^8 \div y^2$.
- Write 2^{-3} and x^{-2} as fractions.
- Find the volume of the cube. Is it $2x^3$ or $8x^3$?
- Find the volume of the cuboid.
- The square has area $36x^4$, so its side length is $(36x^4)^{\frac{1}{2}}$. Simplify this.
- (Extension) Complete the working.

$$8^{-\frac{2}{3}} = \frac{1}{8^{\frac{2}{3}}} = \frac{1}{(\sqrt[3]{8})^2} = \frac{1}{\square^2} = \square$$
- (Challenge) Divide the volume of the cube by the volume of the cuboid. Write the answer as a fraction in its simplest form.

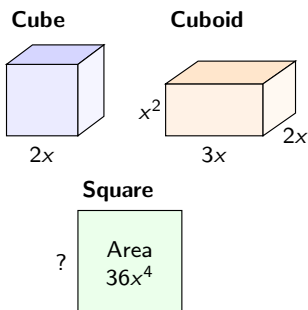
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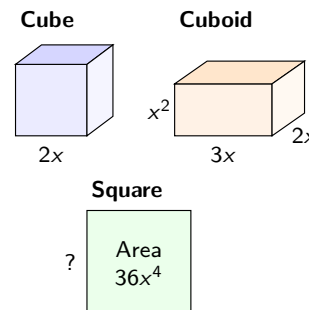
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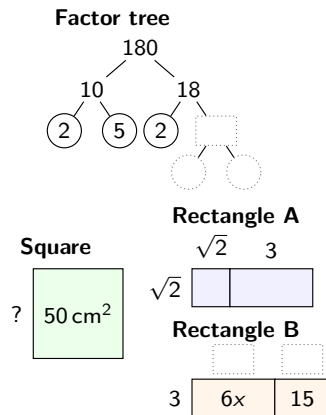
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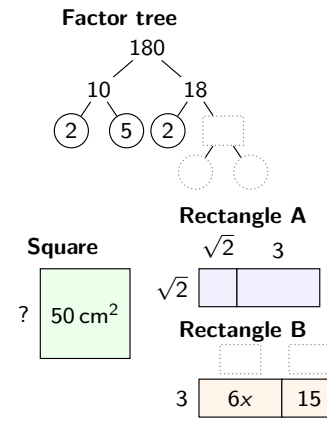
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Starter 3: Surds & Single Brackets



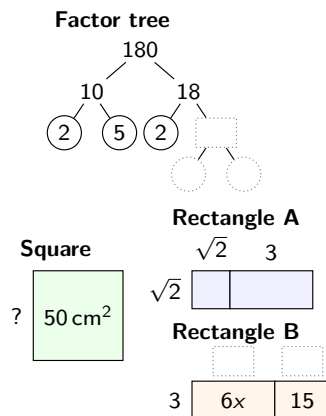
- Find the HCF of 18 and 24.
- Work out $16^{\frac{1}{2}}$ and $16^{-\frac{1}{2}}$.
- Complete the factor tree. Write 180 as a product of prime factors in index form.
- Use the prime factors to simplify $\sqrt{180}$.
- The square has area 50 cm^2 . Find its side length as a simplified surd, and its perimeter.
- Complete rectangle A to expand $\sqrt{2}(\sqrt{2} + 3)$.
- Complete rectangle B to factorise $6x + 15$. Then simplify $\frac{6x + 15}{3}$.
- (Challenge) Sam says $\frac{6 + \sqrt{18}}{3} = 2 + \sqrt{18}$. Explain Sam's mistake, then simplify it correctly.

Starter 3: Surds & Single Brackets



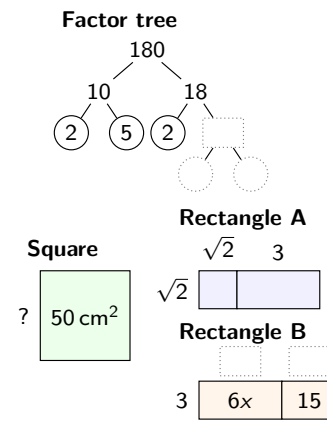
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Starter 4: Double Brackets

Grid A

	x	5
x	x^2	
2		

Grid B

	x	
x	x^2	
		12

Area = $x^2 + 7x + 12$

- Is 3^{-2} equal to -9 , -6 or $\frac{1}{9}$?
- Simplify $\sqrt{50} - \sqrt{8}$. Is it $\sqrt{42}$?
- Complete grid A to expand $(x + 2)(x + 5)$.
- Write 12 as a product of prime factors, then list its factor pairs. Which pair adds to 7?
- Complete grid B to factorise $x^2 + 7x + 12$.
- A rectangle has area $x^2 + 7x + 12$ and width $x + 3$. Find its length. Use this to simplify $\frac{x^2 + 7x + 12}{x + 3}$.
- Factorise $x^2 - 9$. Use the difference of two squares to expand $(3 + \sqrt{2})(3 - \sqrt{2})$.
- (Challenge) $391 = 20^2 - 3^2$. Use this to write 391 as a product of prime factors.

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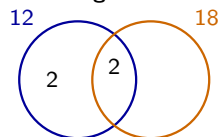
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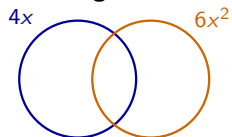
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Starter 5: LCM & Fractions

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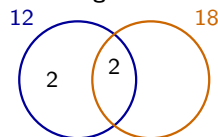
Venn diagram B



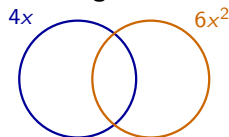
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2. Work out $\sqrt{8} \times \sqrt{2}$.
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4. Complete: $\frac{5}{12} + \frac{7}{18} = \frac{\square}{36} + \frac{\square}{36} = \frac{\square}{36}$
5. Write $\frac{x}{12} - \frac{x}{18}$ as a single fraction.
6. Work out $\frac{3}{4} \times \frac{8}{9}$. Then simplify $\frac{3x}{4} \div \frac{9x}{10}$.
7. $4x = 2 \times 2 \times x$ and $6x^2 = 2 \times 3 \times x \times x$. Complete Venn diagram B, then find the LCM of $4x$ and $6x^2$.
8. (Challenge) Write $\frac{5}{4x} + \frac{1}{6x^2}$ as a single fraction.

Starter 5: LCM & Fractions

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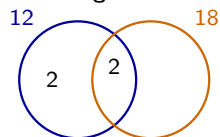
Venn diagram B



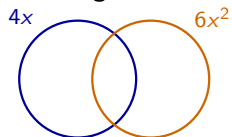
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Starter 5: LCM & Fractions

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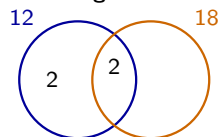
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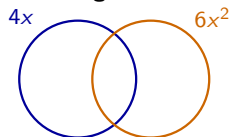
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Venn diagram B



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