Exercise walk-through

1.2 Indices, surds, standard form and sets

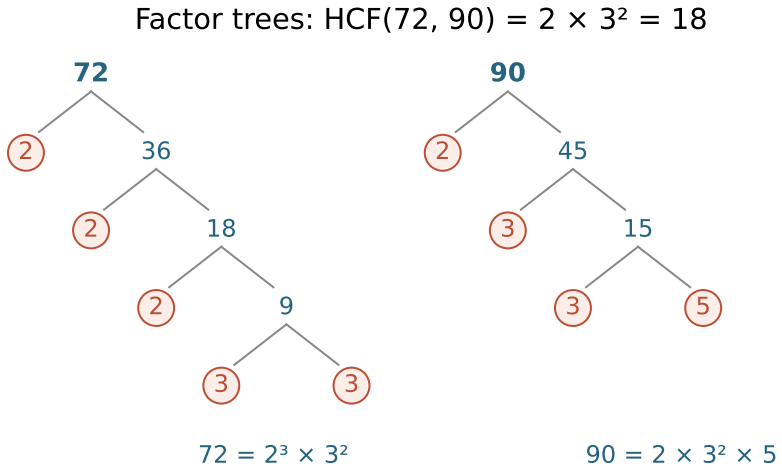
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Ordering and the four operations

- An **integer** is a whole number: positive, negative or zero.
- Order integers, decimals and fractions on a **number line** using the symbols $=$, $\neq$, $<$ and $>$.
- To compare different forms, change them to the same form first: $\frac{3}{5} = 0.6$, so $\frac{3}{5} < 0.62$.
- To add or subtract fractions, use a common **denominator**.

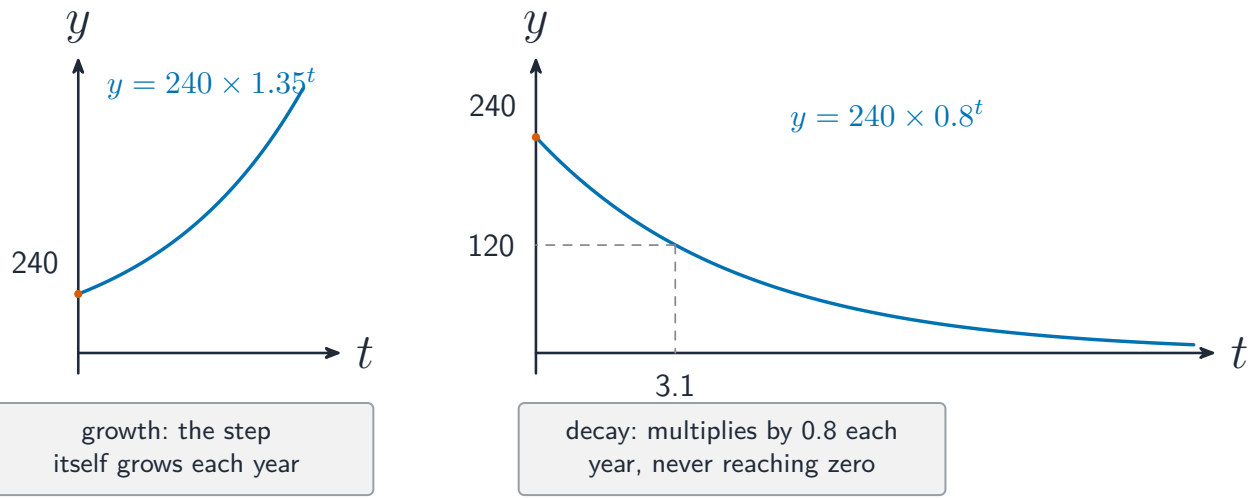
$$2\tfrac{1}{3} + 1\tfrac{1}{4} = \tfrac{7}{3} + \tfrac{5}{4} = \tfrac{28}{12} + \tfrac{15}{12} = \tfrac{43}{12} = 3\tfrac{7}{12}$$

Figure: Ordering and the four operations



- $72 = 2^3 \times 3^2$ and $90 = 2 \times 3^2 \times 5$
- $\text{HCF} = 2 \times 3^2 = 18$

Figure: Exponential growth and decay

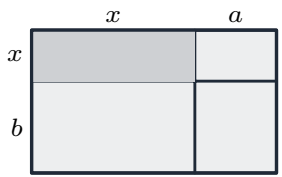


- Growth: $y = 240 \times 1.35^t$ rises ever faster
- Decay: $y = 240 \times 0.8^t$ falls towards zero

Exercises 2.1·2.2

2.1 Work out $27^{1/3}$ and $8^{2/3}$ [2]

2.2 Simplify $\sqrt{50} - \sqrt{18} + \sqrt{8}$ [3]

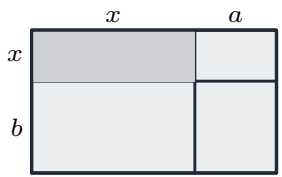


Exercises 2.1·2.2

2.1 Work out $27^{1/3}$ and $8^{2/3}$ [2]

2.1 3 and 4.

2.2 Simplify $\sqrt{50} - \sqrt{18} + \sqrt{8}$ [3]



2.2 $5\sqrt{2} - 3\sqrt{2} + 2\sqrt{2} = 4\sqrt{2}$.

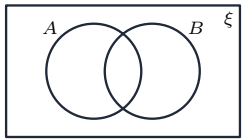
Exercise 2.3

2.3 Rationalise $\dfrac{5}{3-\sqrt{2}}$ [3]



2.4 Write 0.00047 in standard form [1]

2.5 For $A = \{1, 2, 3, 4, 5\}$, $B = \{4, 5, 6, 7\}$: find $n(A \cup B)$ [2]



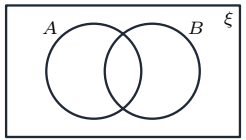
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2.3 Multiply by the conjugate: $\dfrac{5(3+\sqrt{2})}{9-2} = \dfrac{5(3+\sqrt{2})}{7}$.

2.4 4.7×10^{-4}.

2.5 $A \cup B = \{1, \ldots, 7\}$, so $n(A \cup B) = 7$.

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Exercises 3.1–3.3

3.1 *(Original, 1E surd family.)* Show that $\dfrac{12}{\sqrt{2}} + \sqrt{18}$ can be written in the form $c\sqrt{2}$, and find c. [3]

3.2 *(Original.)* Work out $(3 \times 10^{5}) \times (4 \times 10^{-3})$, giving the answer in standard form. [2]

3.3 *(Original, specification line not sampled by the specimens: fractional powers.)* Work out $\left(\dfrac{16}{25}\right)^{1/2}$ and $\left(\dfrac{8}{27}\right)^{2/3}$. [4]



Exercises 3.1·3.3

3.1 *(Original, 1E surd family.)* Show that $\dfrac{12}{\sqrt{2}} + \sqrt{18}$ can be written in the form $c\sqrt{2}$, and find c. [3]

3.1 $\dfrac{12}{\sqrt{2}} = \dfrac{12\sqrt{2}}{2} = 6\sqrt{2}$ and $\sqrt{18} = 3\sqrt{2}$, so the total is $9\sqrt{2}$: $c = 9$.

3.2 *(Original.)* Work out $(3 \times 10^5) \times (4 \times 10^{-3})$, giving the answer in standard form. [2]

3.2 $12 \times 10^2 = 1.2 \times 10^3$.

3.3 *(Original, specification line not sampled by the specimens: fractional powers.)* Work out $\left(\dfrac{16}{25}\right)^{1/2}$ and $\left(\dfrac{8}{27}\right)^{2/3}$. [4]



3.3 $\sqrt{\frac{16}{25}} = \frac{4}{5}$. For the second, take the cube root first: $\left(\frac{8}{27}\right)^{1/3} = \frac{2}{3}$, then square: $\frac{4}{9}$.

Local review guidance: roots before powers in fractional indices; exact surd forms; set answers give the count, not the list. This is authored classroom guidance.

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