Exercise walk-through

1.1 Ordering, four operations, factors and indices

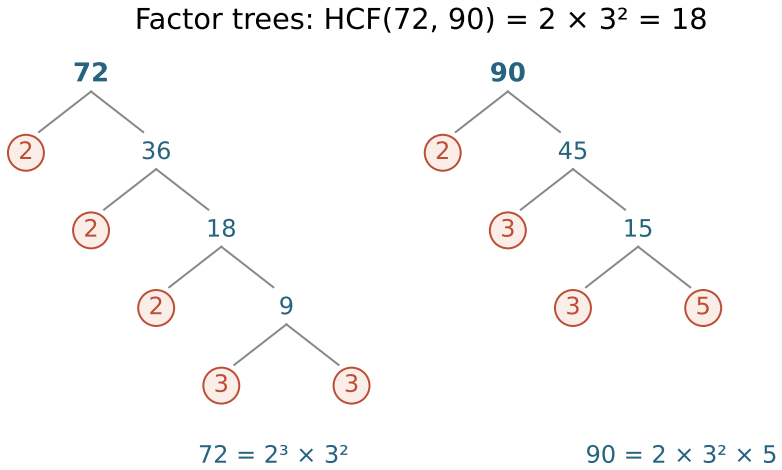
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Ordering and the four operations

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

Indices, roots and surds

- The minus sign turns the fraction upside down: $\left(\frac{81}{16}\right)^{3/4}$.
- The **denominator** 4 of the power means a fourth root: $\sqrt[4]{\frac{81}{16}} = \frac{3}{2}$.
- The **numerator** 3 means cube: $\left(\frac{3}{2}\right)^3 = \frac{27}{8}$.

$$\sqrt{50} - \sqrt{18} + \sqrt{8} = 5\sqrt{2} - 3\sqrt{2} + 2\sqrt{2} = 4\sqrt{2}$$

Exercises 2.1·2.2

2.1 Write these numbers in order of size. Start with the smallest. [2]

0.65 $\frac{5}{8}$ 0.6 $\frac{2}{3}$

2.2 Work out the two calculations without a calculator. [2]

$-7 + 3 \times (-4)$ $(-24) \div (-6) - 5$

Exercises 2.1·2.2

2.1 Write these numbers in order of size. Start with the smallest. [2]

0.65 $\frac{5}{8}$ 0.6 $\frac{2}{3}$

2.1

- $0.65,\ 0.625,\ 0.6,\ 0.667$
- $0.6,\ \frac{5}{8},\ 0.65,\ \frac{2}{3}$

2.2 Work out the two calculations without a calculator. [2]

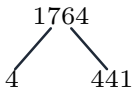
$-7 + 3 \times (-4)$ $(-24) \div (-6) - 5$

2.2

- $-7 + (-12) = \mathbf{-19}$
- $4 - 5 = \mathbf{-1}$

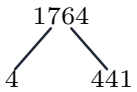
Exercise 3.1

3.1 Write 1764 as a product of prime factors in index form. Use your answer to find $\sqrt{1764}$. [3]



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3.1

- repeated division by primes
- $1764 = 2^2 \times 3^2 \times 7^2$
- $\sqrt{1764} = 2 \times 3 \times 7 = \mathbf{42}$

Exercise 3.2 (a)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(a) Write 12, 18 and 30 as products of prime factors. [2]

route	first bus	then every
A	07:00	12 min
B	07:00	18 min
C	07:00	30 min

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(a) Write 12, 18 and 30 as products of prime factors. [2]

route	first bus	then every
A	07:00	12 min
B	07:00	18 min
C	07:00	30 min

(a) $12 = 2^2 \times 3$, $18 = 2 \times 3^2$, $30 = 2 \times 3 \times 5$

Exercise 3.2 (b)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(b) At what time do Route A and Route B next leave together? [3]

Exercise 3.2 (b)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(b) At what time do Route A and Route B next leave together? [3]

(b) LCM of 12 and 18 = 36; **07:36**

Exercise 3.2 (c)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(c) At what time do all three routes next leave together? [4]

Exercise 3.2 (c)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(c) At what time do all three routes next leave together? [4]

(c) $2^2 \times 3^2 \times 5 = 180$ minutes; 180 minutes $= 3$ hours; **10**:**00**

Exercise 3.2 (d)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(d) The office has 84 Route A tickets and 126 Route B tickets. They are put into packs. All packs are the same size and each pack has only one route. Find the largest possible pack size and the number of packs. [5]

Exercise 3.2 (d)

3.2 Three bus routes leave the same bus station at 07:00. Route A leaves every 12 minutes, Route B every 18 minutes and Route C every 30 minutes.

(d) The office has 84 Route A tickets and 126 Route B tickets. They are put into packs. All packs are the same size and each pack has only one route. Find the largest possible pack size and the number of packs. [5]

(d) $84 = 2^2 \times 3 \times 7$ and $126 = 2 \times 3^2 \times 7$; HCF $= 2 \times 3 \times 7 = \mathbf{42}$; $2 + 3 = \mathbf{5}$ packs