Solutions

Marking: **M1** a correct method, **A1** the correct answer.

Each answer shows the steps, then the **result**.

2.1

- split 90 until every factor is prime

$$90 = 2 \times 3^2 \times 5$$

2.2

- $\sqrt{9} = 3$ and $\frac{2}{3}$ can be written as fractions, so they are rational
- the two irrationals are $\boldsymbol{\pi}$ and $\boldsymbol{\sqrt{5}}$

2.3

- $24 = 2^3 \times 3$, $36 = 2^2 \times 3^2$
- HCF takes the lowest power of each shared prime

$$\text{HCF} = 2^2 \times 3 = \mathbf{12}$$

2.4

- 21, 22, 24, 25, 26, 27, 28 are not prime: **23**, **29**, **31**

2.5

(a) squares: **1**, **4**, **9**, **36**

(b) cubes: **1**, **27**

3.1

(a)

- HCF: lowest power of each shared prime

$$2^1 \times 3 \times 5 = \mathbf{30}$$

(b)

- LCM: highest power of every prime

$$2^2 \times 3^2 \times 5 = \mathbf{180}$$

3.2

- $18 = 2 \times 3^2$, $24 = 2^3 \times 3$

$$\text{LCM} = 2^3 \times 3^2 = \mathbf{72}$$

3.3

- the next common time is the LCM of 12 and 20: $12 = 2^2 \times 3$, $20 = 2^2 \times 5$
- LCM $= 2^2 \times 3 \times 5 = \mathbf{60}$ minutes

3.4

- the tile side must divide both lengths, so take the HCF: $84 = 2^2 \times 3 \times 7$, $126 = 2 \times 3^2 \times 7$
- HCF $= 2 \times 3 \times 7 = \mathbf{42}$ cm
- tiles: $(84 \div 42) \times (126 \div 42) = 2 \times 3 = \mathbf{6}$

3.5

- a square has every prime to an even power; 2^3 needs one more 2 and 3^1 needs one more 3
- $k = 2 \times 3 = \mathbf{6}$
- $nk = 2^4 \times 3^2 \times 5^2$, so $\sqrt{nk} = 2^2 \times 3 \times 5 = \mathbf{60}$