Solutions

Award method and answer marks as indicated; accept equivalent correct methods.

2.1

- Place-value groups give **7000040**. The second number is **twenty thousand and nine**.

2.2

- 13 has only factors 1 and 13, so the prime is **13**. Since $2^3 = 8$, **8** is a cube (1 is also accepted).

2.3

- $\sqrt{25} = 5 = 5/1$ is **rational**; $\sqrt{7}$ is **irrational**. Inverting the nonzero fraction gives $8/3$.

2.4

- Divide by primes: $84 = 2 \times 42 = 2^2 \times 21 = \mathbf{2^2 \times 3 \times 7}$.

3.1

(a)

- $30 = 2 \times 3 \times 5$, $42 = 2 \times 3 \times 7$. Lowest common powers give HCF $= 2 \times 3 = \mathbf{6}$.

(b)

- Highest powers give LCM $= 2 \times 3 \times 5 \times 7 = \mathbf{210}$.

(c)

- Together again after the LCM: $t = 210$ s $= 3$ min 30 s. The time is **12:03:30**.

3.2

(a)

- Identical packs must divide both totals, so use the HCF.
- $N = \mathrm{HCF}(54, 72) = \mathbf{18}$ packs.
- Each has $r = 54/18 = \mathbf{3}$ red and $b = 72/18 = \mathbf{4}$ blue badges.

(b)

- The next shared event requires the LCM.
- $t = \mathrm{LCM}(18, 24) = \mathbf{72}$ min.
- Add 1 h 12 min to 09:15: the time is **10:27**.

3.3

(a)

- Divide by primes: $360 = 2 \times 180 = 2^2 \times 90 = 2^3 \times 45 = 2^3 \times 3^2 \times 5$.
- $360 = \mathbf{2^3 \times 3^2 \times 5}$.

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(b)

- In a square number every prime has an even power; 2^3 needs one more 2 and 5 needs one more 5.
- Multiply by $2 \times 5 = \mathbf{10}$, giving $3600 = 60^2$.

3.4

- The multiples of 7 between 40 and 60 are 42, 49 and 56.
- Only $56 = 55 + 1$ is one more than a multiple of 5, so the number is **56**.