

Solutions

2.1

Known: a bracket is multiplied before the subtraction.

$$V = 18 - 3(4 - 7) = 18 - 3(-3)$$

$$V = 18 - (-9) = 27$$

Final result 27.

2.2

Use a common denominator of 20.

$$F = \frac{3}{4} - \frac{2}{5} = \frac{15}{20} - \frac{8}{20}$$

$$F = \frac{15 - 8}{20} = \frac{7}{20}$$

Final fraction 7/20.

2.3

Prime factors give the common and combined powers.

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

$$\text{HCF} = 2 \times 3 = 6$$

HCF 6.

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

LCM 72.

2.4

The change is 30, but the two bases differ.

$$r_{up} = \frac{P_{new} - P_{old}}{P_{old}} \times 100\%$$

$$r_{up} = \frac{150 - 120}{120} \times 100\% = 25\%$$

Increase 25%.

$$r_{down} = \frac{P_{old} - P_{new}}{P_{old}} \times 100\%$$

$$r_{down} = \frac{150 - 120}{150} \times 100\% = 20\%$$

Required decrease 20%.

3.1

(a) Simultaneous ringing repeats after the LCM.

$$12 = 2^2 \times 3, \quad 18 = 2 \times 3^2$$

$$t = \text{LCM}(12, 18) = 2^2 \times 3^2 = 36 \text{ min}$$

36 minutes. Next time 09:36.

(b) Divide cost by pen count.

$$u = \frac{C}{n}$$

$$u_A = \frac{36}{48} = 0.75, \quad u_B = \frac{42}{60} = 0.70$$

Both unit prices correct. The 60-pen offer is lower per pen; its total outlay is nevertheless higher.

3.2

(a) Discount multiplier is 0.90.

$$P_{sale} = 0.90P_{marked}$$

$$P_{marked} = \frac{P_{sale}}{0.90}$$

$$P_{marked} = \frac{72}{0.90} = 80$$

Marked price 80.

(b) Apply the 15% multiplier before adding delivery.

$$C = 0.85P_{marked} + D$$

$$C = 0.85(80) + 4 = 68 + 4 = 72$$

Discounted item price 68. Delivered total 72.

(c) Totals are equal under the stated delivery assumptions. Adding 10% to the sale price uses 72 rather than the original base 80.

$$P' = 72(1 + 10/100) = 79.2 \neq 80$$

The numerical check or a clear inverse-multiplier explanation earns the final point.