

Exercise walk-through

1.8

Rounding, bounds, estimation and standard form

Pearson Edexcel · International GCSE · Mathematics A

1. Topic 1 at a glance

Topic 1 at a glance

Foundation 1.1-1.11: integers and the four rules, fractions, decimals, indices, sets, percentages, ratio, bounds, standard form, everyday number. Higher adds recurring decimals, surds, algebraic sets, repeated percentage change and bound problems.

Must-know: multipliers $1 \pm r/100$ with reverse division; bounds $v \pm$ half the accuracy unit; standard form $a \times 10^n$ with $1 \leq a < 10$; share by parts over total.

9. Bounds, estimation, standard form

Bounds, estimation, standard form

Rounding to s.f. and d.p.; a value carries bounds $v \pm$ half the accuracy unit: 19.5 nearest whole spans 19.45-19.55; 1.5 to 1 d.p. spans 1.45-1.55.

June 2024 2HR Q19: distance UB = $19.5 \times 1.55 = 30.2$ km (3 s.f.). Estimation by 1 s.f.: $4.12 \times 29.8 / 0.187$ is about $4 \times 30 / 0.2 = 600$. Standard form: $604000 = 6.04 \times 10^5$; $0.00007 = 7 \times 10^{-5}$ (2HR Q9).

Check yourself

Check yourself

Directed numbers and BIDMAS; fractions with common denominators and reciprocals; FDP conversions including recurring decimals by algebra.

Indices, prime factorisation, HCF and LCM from Venns; surds simplified and rationalised; sets with complements and counts; percentages with multipliers, reverse and compound; ratio sharing and proportion; bounds chosen per question; standard form; units and calculator discipline.

Exercises 2.1·2.3

2.1 Round 3.4617 to 2 significant figures and to 2 decimal places. [2]

2.2 A length is 250 m correct to the nearest 10 m. Write down the upper and lower bounds. [2]

2.3 Estimate $\frac{4.12 \times 29.8}{0.187}$ [3]

Exercises 2.1·2.3

2.1 Round 3.4617 to 2 significant figures and to 2 decimal places. [2]

2.1 3.5; 3.46.

2.2 A length is 250 m correct to the nearest 10 m. Write down the upper and lower bounds. [2]

2.2 LB 245 m; UB 255 m.

2.3 Estimate $\frac{4.12 \times 29.8}{0.187}$ [3]

2.3 $\frac{4 \times 30}{0.2} = 600$.

Exercises 2.4·3.1

2.4 Write 604000 in standard form [1]

2.5 Write 0.00007 in standard form [1]

3.1 (*Edexcel 4MA1 2HR June 2024 Q19, adapted.*) Aviv cycles with average speed 19 km/h correct to the nearest whole number, for 1.5 hours correct to one decimal place. Work out the upper bound for the distance travelled, to 3 significant figures. [3]

Exercises 2.4·3.1

2.4 Write 604000 in standard form [1]

2.4 6.04×10^5 .

2.5 Write 0.00007 in standard form [1]

2.5 7×10^{-5} .

3.1 (*Edexcel 4MA1 2HR June 2024 Q19, adapted.*) Aviv cycles with average speed 19 km/h correct to the nearest whole number, for 1.5 hours correct to one decimal place. Work out the upper bound for the distance travelled, to 3 significant figures. [3]

3.1 Speed UB 19.5; time UB 1.55: $19.5 \times 1.55 = 30.225 = 30.2$ km (3 s.f.).

Exercises 3.2·3.3

3.2 (*Edexcel 4MA1 2HR June 2024 Q9 family, adapted.*) (a) Write 604000 in standard form. (b) Write 0.00007 in standard form. (c) Work out $(3 \times 10^4) \times (2 \times 10^6)$, giving the answer in standard form. [4]

3.3 (*Original.*) A rectangular room is 4.2 m by 3.6 m, each to the nearest 0.1 m. (a) Write the bounds of each length. (b) Work out the upper bound of the area. (c) Why does the lower bound of the area multiply the two lower bounds? [4]

Exercises 3.2·3.3

3.2 (*Edexcel 4MA1 2HR June 2024 Q9 family, adapted.*) (a) Write 604000 in standard form. (b) Write 0.00007 in standard form. (c) Work out $(3 \times 10^4) \times (2 \times 10^6)$, giving the answer in standard form. [4]

3.2 (a) 6.04×10^5 . (b) 7×10^{-5} . (c) $3 \times 2 = 6$ and $10^4 \times 10^6 = 10^{10}$: 6×10^{10} .

3.3 (*Original.*) A rectangular room is 4.2 m by 3.6 m, each to the nearest 0.1 m. (a) Write the bounds of each length. (b) Work out the upper bound of the area. (c) Why does the lower bound of the area multiply the two lower bounds? [4]

3.3 (a) 4.2 m spans 4.15–4.25; 3.6 m spans 3.55–3.65. (b) $4.25 \times 3.65 = 15.5125 \text{ m}^2$. (c) Both factors are positive, so the product is smallest when each factor takes its lower bound: 4.15×3.55 .

Local review guidance: bounds written before combining; answers to the accuracy asked; bound problems justify WHICH extreme each part needs. This is authored classroom guidance.