

Exercise walk-through

C1.9

Estimation

IGCSE Mathematics

You must be able to

- Round to a stated decimal place or significant figure
- Estimate a calculation before checking it
- Round discrete quantities in the direction required by context

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The method

Method — Key knowledge: Estimation

For decimal places, count digits after the point. For significant figures, start at the first nonzero digit. Inspect the next digit: 5 or more rounds up. Estimate by rounding each input, usually to one significant figure, before calculating. Keep full values for an accurate calculation and round only its final result. Context can require rounding up, such as the number of buses needed.

Exercises 2.1-2.3

2.1 Round 8634 to the nearest thousand.

[2]

2.2 Round 4.276 to two decimal places.

[2]

2.3 Round 0.006739 to two significant figures.

[2]

Exercises 2.1·2.3

2.1 Round 8634 to the nearest thousand.

[2]

2.1

- The hundreds digit is 6, so round up: **9000**.

2.2 Round 4.276 to two decimal places.

[2]

2.2

- The third decimal digit is 6, so **4.28**.

2.3 Round 0.006739 to two significant figures.

[2]

2.3

- The significant digits begin at 6; the next after 7 is 3, so **0.0067**.

Exercise 2.4

2.4 Estimate $48.1 \div 9.7$ using one significant figure for each number.

[2]

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[2]

2.4

- $Q \approx 50/10 = \mathbf{5}$.

Exercise 3.1 (a)

3.1 Apply the estimation methods below. Show working and include units where appropriate.

(a) Estimate $19.6 \times 5.12 \div 0.49$ using one significant figure for each number. [2]

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(a)

- $Q \approx (20 \times 5)/0.5 = \mathbf{200}.$

Exercise 3.1 (b)

3.1 Apply the estimation methods below. Show working and include units where appropriate.

(b) Calculate its accurate value to three significant figures.

[2]

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(b) Calculate its accurate value to three significant figures. [2]

(b)

- $Q = (19.6 \times 5.12)/0.49 = 204.8$, so **205** to three significant figures.

Exercise 3.1 (c)

3.1 Apply the estimation methods below. Show working and include units where appropriate.

(c) A bus holds 48 people. Find the minimum number of buses needed for 205 people.[2]

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(c)

- $B = 205/48 = 4.2708\dots$; round up to **5 buses**, because four carry only 192.

Exercise 3.2 (a)

3.2 A floor has area 18.7 m^2 . Each box covers 0.48 m^2 and costs 31.60 yuan.

(a) Estimate the box count using 20 m^2 and 0.5 m^2 . Then find the minimum whole number of boxes actually needed. [3]

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(a) Estimate the box count using 20 m^2 and 0.5 m^2 . Then find the minimum whole number of boxes actually needed. [3]

(a)

- Estimate $N_e = 20/0.5 = \mathbf{40}$ boxes.
- Actual $N = 18.7/0.48 \approx 38.9583$, so buy **39 boxes**.

Exercise 3.2 (b)

3.2 A floor has area 18.7 m^2 . Each box covers 0.48 m^2 and costs 31.60 yuan.

(b) Find the actual total cost and explain why buying only 38 boxes would be insufficient. [3]

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(b) Find the actual total cost and explain why buying only 38 boxes would be insufficient. [3]

(b)

- Use $C = Nc = 39(31.60)$, giving $C = \mathbf{1232.40}$ yuan.
- Only 38 boxes cover $A = 38(0.48) = 18.24 \text{ m}^2$, less than 18.7 m^2 , so 38 are insufficient.