



eClassroom

GCSE Mathematics

Rounding & Estimation

Questions

Pearson Edexcel GCSE & iGCSE Mathematics



Section A — Foundation

Worked Examples

[Fluency]

Round 52 486 to 3 significant figures.

The 3rd significant figure is the digit 4 (in the hundreds place).

The next digit is $8 \geq 5$, so round up:

$$52\,486 \rightarrow \mathbf{52\,500}$$

[Reasoning]

Sara estimates 47.2×5.8 by rounding to 1 significant figure. She gets 250. Is her estimate sensible?

$$47.2 \rightarrow 50 \quad 5.8 \rightarrow 6 \quad 50 \times 6 = 300$$

Sara rounded 5.8 to 6 correctly, but she should have rounded 47.2 to 50, not 50 giving 250. The correct estimate is **300**.

Actual = 273.76, so 300 is the better estimate.

[Problem Solving]

A rectangular field is 38.6 m long and 14.7 m wide. Estimate the area of the field.

Round each measurement to 1 s.f.:

$$38.6 \rightarrow 40 \quad 14.7 \rightarrow 15$$

$$\text{Area} \approx 40 \times 15 = \mathbf{600 \text{ m}^2}$$

(Actual = 567.42 m²)

[Fluency]

1. Round 4738 to the nearest hundred.

(1 mark)

[Fluency]

2. Round 3.467 to 2 decimal places.

(1 mark)

[Fluency]

3. Round 0.08452 to 2 significant figures.

(1 mark)

[Fluency]

4. Round 67 850 to 3 significant figures.

(1 mark)



**[Fluency]**

5. Round 0.004673 to 1 significant figure.

(1 mark)

[Reasoning]

6.

Use approximations to estimate the value of:

$$38.2 \times 5.9$$

(2 marks)

[Reasoning]

7.

Use approximations to estimate the value of:

$$\frac{\sqrt{97.3}}{4.8}$$

(2 marks)

[Reasoning]

8.

Use approximations to estimate the value of:

$$\frac{289 \times 0.048}{5.1}$$

(3 marks)

[Problem Solving]

9. A circle has radius 7.3 cm.

(a) By rounding the radius to 1 significant figure, estimate the area of the circle. (2)

(b) Use your calculator to find the actual area to 1 decimal place. (1)

(c) How many cm² is your estimate out by? (1)

(4 marks)

[Problem Solving]

10. A school needs to buy 48 textbooks. Each book costs £3.85.

(a) Use approximations to estimate the total cost. Show your rounding clearly. (2)

(b) Work out the exact total cost and find the percentage error in your estimate. (3)

(5 marks)



Section B — Higher

Worked Examples

[Fluency]

Round **0.036 057** to 3 significant figures.

The first significant figure is 3 (the leading zeros are not significant).

Count 3 sig. figs: 3, 6, 0 — the next digit is 5, so round up:

$$0.036\ 057 \rightarrow \mathbf{0.0361}$$

[Reasoning]

Estimate, showing all rounding:

$$\frac{(6.83 + 3.19)^2}{(2.04 \times 4.98)}$$

Round: 6.83 → 7, 3.19 → 3, 2.04 → 2, 4.98 → 5

$$\frac{(7 + 3)^2}{2 \times 5} = \frac{100}{10} = 10$$

[Problem Solving]

The distance d metres fallen by a stone is $d = 4.9t^2$, where t is in seconds. $t = 3.2$ s (2 s.f.).

Find the upper bound of d .

$$t \in [3.15, 3.25)$$

$$\text{Upper bound of } d = 4.9 \times 3.25^2 = 4.9 \times 10.5625 = \mathbf{51.76\ m}$$

[Fluency]

1. Round 1.0954 to 3 significant figures.

(1 mark)

[Fluency]

2. Round 0.009050 to 2 significant figures.

(1 mark)

[Fluency]

3.

Use approximations to 1 significant figure to estimate:

$$\frac{(5.82 + 3.14)^2}{2.03 \times 4.97}$$

(3 marks)

**[Reasoning]**

4.

Use approximations to estimate, showing your rounding clearly:

$$\frac{3.87 \times 10^3}{0.214 \times 10^2}$$

(2 marks)

[Reasoning]

5.

Work out the exact value of:

$$6.94 \times 8.13$$

- (a) Write down an estimate for the calculation, showing your rounding. (1)
(b) Calculate the percentage error in your estimate, to 2 significant figures. (3)

(4 marks)

[Reasoning]

6. Jake rounds 2.45 to 1 decimal place and writes 2.4.

Explain why Jake is incorrect and write down the correct rounded value.

(2 marks)

[Problem Solving]7. $x = 3.6$ and $y = 2.4$, both given to 1 decimal place.

- (a) Estimate the value of $x^2 + y^2$, rounding each value to 1 significant figure. (2)
(b) Find the upper bound of $x^2 + y^2$. (3)
(c) Find the lower bound of $x^2 + y^2$. (2)

(7 marks)

[Problem Solving]

8. A car travels at 130 km/h, rounded to 3 significant figures.

It travels for 2.4 hours, rounded to 2 significant figures.

Distance = Speed \times Time

- (a) Find the upper bound of the distance. (3)
(b) Find the lower bound of the distance. (2)

(5 marks)

[Problem Solving]9. $n = 5.3 \times 10^{-3}$, given to 2 significant figures.

- (a) Write down the error interval for n . (1)
(b) Using $n \approx 5 \times 10^{-3}$, estimate the value of n^2 , giving your answer in standard form. (2)

(3 marks)

**[Problem Solving]**

10. A number x , when rounded to 1 decimal place, gives 4.7.

A number y , when truncated to 1 decimal place, gives 4.7.

- (a)** Write the error interval for x . (1)
- (b)** Write the error interval for y . (1)
- (c)** Explain the key difference between the two intervals and state which rounding method produces a smaller maximum error. (2)

(4 marks)