Rounding and estimating

Worked solutions

KS3 Maths topic practice

This topic online

1 Write the number 12.86 correct to 1 decimal place. (1 mark)

The digit after the first decimal place is 6

6 is 5 or more, so round up: 12.9

12.9

2 Write the number 3.472 correct to 2 decimal places. (1 mark)

The digit after the second decimal place is 2

2 is less than 5, so round down: 3.47

3.47

3 a. Write 7.0849 correct to 3 decimal places.

b. Mia rounds 2.4967 to 2 decimal places. She writes 2.5
Explain why Mia's answer is not fully correct. (2 marks)

a) Cut after 3 decimal places

7.084 | 9

9 is 5 or more, so round up

7.085

b) Cut after 2 decimal places

2.49 | 67

6 is 5 or more, so 2.49 rounds up to 2.50

2 decimal places means 2 digits after the point

2.50, not 2.5

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4 a. Write the number 4738 correct to 2 significant figures.

b. Write the number 0.05372 correct to 2 significant figures.

(2 marks)

Significant figures start at the first non-zero digit. Keep the requested number of digits and inspect the next digit to decide whether to round up. Leading zeros locate the decimal point; they do not count as significant figures

a) The first two significant figures are 4 and 7; the next digit is 3, so round down: 4700

b) The first two significant figures are 5 and 3; the next digit is 7, so round up: 0.054

5 Write each number correct to 3 significant figures.

a. 0.004078

b. 39 962

c. 6.996

(3 marks)

a) Start counting at the first non-zero digit

0.00407 | 8

8 rounds the 7 up

0.00408

b)

399 | 62

399 rounds up to 400, then fill with zeros

40 000

c)

6.99 | 6

6.99 rounds up to 7.00, keep both zeros

7.00

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6 By rounding each number to 1 significant figure, work out an estimate for

(587 + 214) ÷ 3.9

(2 marks)

Round to 1 significant figure

$587 \approx 600$

$214 \approx 200$

$3.9 \approx 4$

$(600 + 200) \div 4 = 800 \div 4$

$= 200$

200

7 Work out an estimate for the value of

$$\frac{48.7 \times 6.12}{0.216}$$

You must round each number to 1 significant figure.

(3 marks)

Round each number to 1 significant figure: 48.7 becomes 50, 6.12 becomes 6, 0.216 becomes 0.2

Numerator

$50 \times 6 = 300$

$300 / 0.2 = 3000 / 2 = 1500$

1500

8 The mass of a cat is 8.3 kg, correct to 1 decimal place.

Complete the error interval for the mass, w kg, of the cat.

..... ≤ w < .....

(2 marks)

Rounding to 1 decimal place means the true mass is within 0.05 kg of 8.3 kg

Lower bound

$8.3 - 0.05 = 8.25$. Upper bound: $8.3 + 0.05 = 8.35$

So $8.25 \leq w < 8.35$

Include the lower boundary because a value exactly halfway rounds up to the stated result. Exclude the upper boundary because that halfway value rounds up to the next result instead

$8.25 \leq w < 8.35$

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9 a. A number n is rounded to 1 significant figure. The result is 30
Write down the error interval for n.

b. Kai gives his age in whole years by truncating. He says he is 13
Write down the error interval for Kai's exact age, a years.

(2 marks)

a) 1 s.f. here means nearest 10, half of 10 is 5

$30 - 5 = 25$

$30 + 5 = 35$

$25 \leq n < 35$

b) Truncating chops off, it never rounds up

$13 \leq a < 14$

10 A number x is 470, correct to 2 significant figures.
Complete the error interval for x.

..... $\leq x <$ .....

(2 marks)

To 2 significant figures, 470 has been rounded to the nearest 10

Lower bound

$470 - 5 = 465$. Upper bound: $470 + 5 = 475$

So $465 \leq x < 475$

Include the lower boundary because a value exactly halfway rounds up to the stated result. Exclude the upper boundary because that halfway value rounds up to the next result instead

$465 \leq x < 475$

11 The height of a sunflower is 160 cm, correct to the nearest 10 cm.
Ollie says, "The sunflower could be 165 cm tall."
Is Ollie correct? Give a reason for your answer.

(2 marks)

Half of 10 is 5

$160 - 5 = 155$

$160 + 5 = 165$

$155 \leq h < 165$

165 rounds up to 170, so it is not allowed

No, 165 cm would round to 170 cm

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12 Marco is building a fence.

He buys 28 fence panels costing £19.75 each.

He also buys a tin of paint costing £41.80

By rounding each number to 1 significant figure, work out an estimate for the total amount Marco pays.

(4 marks)

Round each number to 1 significant figure: 28 becomes 30, 19.75 becomes 20, 41.80 becomes 40

Estimate for the panels

30 × 20 = 600 pounds

Add the paint

600 + 40 = 640 pounds

£640

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