

Rounding and Estimation

GCSE MATHS

Name: _____

Teacher: _____

Learning objectives

By the end this pack you will be able to:

1. –Round a number to a given number of decimal places or significant figures
2. Estimate calculations using rounding

Rounding to decimal places

Remember: The first decimal place is the first number after the decimal point

5 or more goes up $7.68 \rightarrow 7.6|8 \rightarrow 7.7$ (to 1 d.p.)

4 or less stays same $9.143 \rightarrow 9.1|43 \rightarrow 9.1$ (to 1 d.p.)

Round to 1 decimal place (1 d.p.)

Number	Identify 1 st d.p.	Possible answers	Draw line	Up or stay	Answer
7.196	7. <u>1</u> 96	7.1 or 7.2	7.1 96	Up	7.2
4.312					
28.29					
17.912					
0.85					
7.188					
14.954					
7.001					
4.961					
0.06					
12.949					
19.976					

Round to 2 decimal places (2 d.p.)

Number	Identify 2 nd d.p.	Possible answers	Draw line	Up or stay	Answer
8.114	8.1 <u>1</u> 4	8.11 or 8.12	8.11 4	Stay	8.11
12.456					
9.2386					
0.124					
5.0372					
0.008					
7.001					

Significant figures

Remember: The first significant figure is the first number that is not zero
 5 or more goes up $458 \rightarrow 4|58 \rightarrow 500$ (to 1 s.f.)
 4 or less stays same $436 \rightarrow 4|36 \rightarrow 400$ (to 1 s.f.)

Round to 1 significant figure (1 s.f.)

Number	Identify sig. fig.	Possible answers	Draw line	Up or stay	Answer
5605	5605	5000 or 6000	5 605	Up	6000
9301					
7842					
856					
12					
98					
0.0821	0.0821	0.08 or 0.09	0.08 21	Stay	0.08
0.0372					
0.0067					
0.2118					
0.035					
0.096					

Round to 2 significant figures (2 s.f.)

Number	Identify sig. fig.	Possible answers	Draw line	Up or stay	Answer
638	638	630 or 640	63 8	Up	640
5892					
7106					
0.0157					
0.5622					
12.61					
3.274					

Estimate answers to calculations

Remember: Round all the numbers to 1 significant figure
 Use the rounded numbers for your estimate

Calculation	Calculation to 1 sig. fig.	Estimated answer
514×29	500×30	15,000
19×34		
91×5.14		
83×399		
$945 \div 8.91$		
$1502 \div 350$		
$28.19 \div 6.33$		
$41 \div 7.89$		
$94 \div 0.32661$		
5.412^2		
$15.21 - 3.84^2$		
$\begin{array}{r} 19.41 \times 3.499 \\ \hline 23.02 \end{array}$		
$\begin{array}{r} 5.88^2 \\ \hline 3.5 \times 2.5 \end{array}$		

ROUNDING

Write each number to the given degree of accuracy.

- | | | |
|-----------------------|------------------------|-------------------------|
| 1. 128 (nearest 10) | 2. 329 (nearest 100) | 3. 691 (nearest 100) |
| 4. 135 (nearest 10) | 5. 750 (nearest 100) | 6. 8350 (nearest 1000) |
| 7. 725 (nearest 100) | 8. 8500 (nearest 1000) | 9. 790 (nearest 1000) |
| 10. 5692 (nearest 10) | 11. 5692 (nearest 100) | 12. 5692 (nearest 1000) |

DECIMAL PLACES

1. Write each number correct to 1 decimal place

- | | | | | |
|---------|----------|---------|----------|----------|
| a) 7.92 | b) 16.67 | c) 2.35 | d) 8.251 | e) 12.85 |
|---------|----------|---------|----------|----------|

2. Use a calculator to work out the answers and write them down correct to 1 decimal place.

- | | | | | |
|---------------------|--------------------|--------------------|---------------------|-----------------------|
| a) 2.2×8.1 | b) 5.25×7 | c) 9.12×9 | d) 9.5×7.3 | e) 9.13×7.75 |
|---------------------|--------------------|--------------------|---------------------|-----------------------|

3. Write each number correct to 2 decimal places

- | | | | | |
|----------|----------|----------|----------|----------|
| a) 5.622 | b) 9.456 | c) 3.126 | d) 3.121 | e) 9.455 |
|----------|----------|----------|----------|----------|

EXAM QUESTIONS

1. The populations of three towns are given below.

Arton 15 748 **Barton** 9682 **Carton** 12 403

- (a) Write the number 15 748 to the nearest thousand.
2. The number of spectators at a football match is 12 584.
- (a) Write the number 12 584 in words.
- (b) In the number 12 584, write down the value of
- (i) the figure 8,
- (ii) the figure 2.
- (c) Write 12 584 to the nearest 100.
- 3.
- (a) Write seven million in figures.
- (b) Write seven thousand and eighty-four in figures.
- (c) Write 8736 to the nearest 10.
- 4.
- Round 723 to the nearest ten.

ESTIMATING

Copy the lists below and match up the questions to the estimated answers. The first one has been done for you.

<u>QUESTIONS</u>	<u>ESTIMATED ANSWERS</u>
3.92 x 5.05	3
6.9 x 2.9	100
30.1 ÷ 9.91	11.4
$\sqrt{32}$	15
(8.8 + 11.11) x 4.9	40
50 ÷ 7.21	7
$\sqrt{103}$	8
4.05 x (6.9 + 2.9)	20
67 ÷ 8.12	12.2
$\sqrt{150}$	5.5

EXAM QUESTIONS

1. Kim buys 71 stamps which cost 19 pence each.

By using suitable approximations, **estimate** the total cost of the stamps.
You **must** show your working.

2. Estimate the cost of 20 meals at £2.97 each.

3. Liam wants to calculate $\frac{27.89 + 20.17}{3.91}$

- (a) Write each of the numbers in Liam's calculation to the nearest whole number.
(b) Use your numbers from part (a) to estimate the answer to Liam's calculation.

4. Find an approximate value of $\frac{2987}{21 \times 49}$

You **must** show all your working.

SIGNIFICANT FIGURES

1. Write each number correct to one significant figure.

- a) 27 b) 832 c) 8.12 d) 93 e) 77 f) 13.5 g) 95

2. Use a calculator to work out the answers and write them down correct to 1 significant figure.

- a) 50×23 b) 5.25×7 c) 910×12 d) 9.5×7.3 e) 93×77

3. Write each number correct to two significant figures.

- a) 275 b) 0.03451 c) 8.12 d) 0.956 e) 7.04 f) 7.05 g) 959

ESTIMATING CALCULATIONS

By approximating each number, estimate the answers to these calculations. You must show how you reached your estimate.

1.
$$\frac{4.9 + 15.21}{1.9}$$

2.
$$\frac{19.89 \times 5.2}{1.05 + 9.03}$$

3.
$$\sqrt{4.05 \times 4.9 \times 5.09}$$

EXAM QUESTIONS

1. Find an approximate value of $\frac{41 \times 197}{78}$

You **must** show all your working.

2. Calculate the value of

$$\frac{8.4 - 3.79}{11.62 - 15.89}$$

- (a) Write down the full calculator display.
(b) Give your answer to three significant figures.

3. Hannah, Gemma and Jo use their calculators to work out the value of

$$\frac{28.78}{4.31 \times 0.47}$$

Hannah gets 142.07, Gemma gets 14.207 and Jo gets 3.138

Use approximations to show which one of them is correct.
You **must** show your working.

ROUNDING IN CALCULATIONS

Give your final answer to each question correct to two decimal places.
Remember not to round during the intermediate steps of the calculation.

1.
$$\frac{6.2 + 3.09}{3.2 \times 8.91}$$

2.
$$\sqrt{\frac{4.9}{1.2 \times 3.8}}$$

3.
$$\frac{9}{2.17} + \frac{8.14}{0.515}$$

4.
$$\frac{9.054 - 0.973}{6.3 \times 0.00462}$$

5.
$$\frac{7.56^3}{\sqrt{3.9 \times 9.017}}$$

6.
$$5 + \sqrt{3.2^2 - 2.1 \times 9.2 \times 1.1}$$

HIGHEST AND LOWEST

1. The length of a pencil is given as 9cm to the nearest cm.
What is the minimum length that the pencil could be?

2. The height of a door is 210cm to the nearest 10cm.
What is the maximum height that the door could be?

3. The width of a piece of paper is given as 18.4cm correct to one decimal place.
a) What is the minimum width that the paper could be?
b) What is the maximum width that the paper could be?

EXAM QUESTIONS

1. (i) Calculate $\frac{9.8}{6.7 - 1.2}$

Answer

(ii) Give your answer to an appropriate degree of accuracy.

Answer

2. The scales at an airport weigh luggage to the nearest kilogram.
What are the greatest and least possible weights of a case showing 25 kg on the scale?

.....

Answer Greatest kg

Least kg

3. Calculate the value of

$$\frac{8.4 - 3.79}{11.62 - 15.89}$$

(a) Write down the full calculator display.

(b) Give your answer to three significant figures.