Rounding to significant figures and applying precision to calculations

Mana Maths

Te reo Māori terms

mati
digit
Open in Te Aka

mati whaiira
decimal place
Open in Te Aka

whakatau tata
estimate
Open in Te Aka

taupū
exponent
Open in Te Aka

Significant Figures - Counting

Key idea

Significant figures show how **precise** a number is.

How to count

1. Start at the first non-zero digit.
2. Count all digits after it (zeros included).
3. Trailing zeros after a decimal count too.

Examples

804 has **3** s.f. (middle zero counts).

0.450 has **3** s.f. (final zero shows precision).

Common mistake

Do not count leading zeros. In 0.0036 the zeros only place the decimal — it has **2** s.f.

= copy this into your book. Boxes without a pencil are just to read.

Round To Significant Figures

To 2 s.f.

Round 47.26 to 2 s.f.

Keep the first two: 4 and 7.
Next digit is 2 (< 5), so 7 stays.

Answer: 47.

With leading zeros

Round 0.00784 to 2 s.f.

First two s.f. are 7 and 8.
Next digit is 4 (< 5), so 8 stays.

Answer: 0.0078.

Common mistake

Keep the leading zeros as placeholders — they hold the decimal point but are not counted.

= copy this into your book. Boxes without a pencil are just to read.

Answer To The Right Precision

Key idea

An answer can be no more precise than the **least precise** value you used.

Example

Work out 3.41×2.0.

$3.41 \times 2.0 = 6.82$

But 2.0 has only 2 s.f., so round to 2 s.f.

Answer: 6.8.

Common mistake

Do not copy all the calculator digits. If the data has 2 s.f., the answer should too.

= copy this into your book. Boxes without a pencil are just to read.

Start Tasks

1. How many significant figures are in 7.2?

2. How many significant figures are in 53?

3. How many significant figures are in 804?

4. How many significant figures are in 0.45?

5. How many significant figures are in 6.08?

6. How many significant figures are in 0.0705?

7. Round 4.8 to 1 significant figure.

8. Round 7.3 to 1 significant figure.

9. Round 12 to 1 significant figure.

Start Tasks — Answers

1.
2

2.
2

3.
3

4.
2

5.
3

6.
3

7.
5

8.
7

9.
10

Start Tasks

10. Round 19 to 1 significant figure.

11. Round 64 to 1 significant figure.

12. Round 0.76 to 1 significant figure.

13. Round 0.34 to 1 significant figure.

14. Round 3.21 to 2 significant figures.

15. Round 5.67 to 2 significant figures.

16. Round 8.94 to 2 significant figures.

17. Round 12.6 to 2 significant figures.

18. Round 47.2 to 2 significant figures.

Start Tasks — Answers

10.
20

11.
60

12.
0.8

13.
0.3

14.
3.2

15.
5.7

16.
8.9

17.
13

18.
47

Start Tasks

19. Round 0.482 to 2 significant figures.

20. Round 0.956 to 2 significant figures.

21. Round 105 to 2 significant figures.

22. Round 3.046 to 2 significant figures.

23. Round 0.0705 to 2 significant figures.

24. Round 999 to 1 significant figure.

25. Round 999 to 2 significant figures.

26. Round 48.05 to 3 significant figures.

27. How many significant figures are in 0.0450?

Start Tasks — Answers

19.
0.48

20.
0.96

21.
110

22.
3.0

23.
0.071

24.
1000

25.
1000

26.
48.1

27.
3

Build Tasks

1. How many significant figures are in 0.00362?

2. How many significant figures are in 50.40?

3. How many significant figures are in 70.20?

4. How many significant figures are in 0.000809?

5. How many significant figures are in 6.020×10^5?

6. Round 326 to 2 significant figures.

7. Round 326 to 3 significant figures.

8. Round 0.006784 to 2 significant figures.

9. Round 0.006784 to 3 significant figures.

Build Tasks — Answers

1.
3

2.
4

3.
4

4.
3

5.
4

6.
330

7.
326

8.
0.0068

9.
0.00678

Build Tasks

10. Round $58{,}940$ to 3 significant figures.

11. Round $58{,}940$ to 2 significant figures.

12. Round 4.995 to 3 significant figures.

13. Round 9.949 to 3 significant figures.

14. Round 1.0096 to 4 significant figures.

15. Round 0.09995 to 3 significant figures.

16. Write $3{,}450{,}000$ in scientific notation to 3 significant figures.

17. Write 0.000672 in scientific notation to 2 significant figures.

18. Write 8.90×10^{3} as an ordinary number.

Build Tasks — Answers

10.
58,900

11.
59,000

12.
5.00

13.
9.95

14.
1.010

15.
0.100

16.
3.45×10^{6}

17.
6.7×10^{-4}

18.
8900

Build Tasks

19. Write 7.005×10^{-2} as an ordinary number.

20. Calculate $4.83 + 12.6$. Give the answer to 3 significant figures.

21. Calculate 3.41×2.0. Give the answer to 2 significant figures.

22. Calculate $18.6 \div 4.2$. Give the answer to 2 significant figures.

23. Calculate $7.25 + 0.381$. Give the answer to 3 significant figures.

24. Calculate 0.456×3.20. Give the answer to 3 significant figures.

25. Which is more precise: 2.4 m or 2.40 m? Write the more precise value.

26. Round 6.999 to 2 significant figures.

27. Round 9995 to 3 significant figures. Give the answer in scientific notation.

Build Tasks — Answers

19.
0.07005

20.
17.4

21.
6.8

22.
4.4

23.
7.63

24.
1.46

25.
2.40 m

26.
7.0

27.
1.00×10^4

Push Tasks

1. Round 0.00045678 to 3 significant figures.

2. Round 987654 to 4 significant figures.

3. Write 0.00004560 in scientific notation.

4. Write 6.300×10^{4} as an ordinary number.

5. Round 2.34×10^{5} to 2 significant figures.

6. Round 9.96×10^{-3} to 2 significant figures.

7. Calculate 4.62×3.1. Give the answer to 2 significant figures.

8. Calculate $18.75 \div 2.5$. Give the answer to 2 significant figures.

9. Calculate 0.00456×820.0. Give the answer to 3 significant figures.

Push Tasks — Answers

1.
0.000457

2.
987700

3.
4.560×10^{-5}

4.
63000

5.
2.3×10^{5}

6.
1.0×10^{-2}

7.
14

8.
7.5

9.
3.74

Push Tasks

10. Calculate $(6.20 \times 10^3) \times 4.1$. Give the answer to 2 significant figures.

11. Calculate $(7.2 \times 10^{-4}) \div (3.0 \times 10^{-2})$. Give the answer to 2 significant figures.

12. A rectangle is 8.45 m by 2.1 m. Give the area to 2 significant figures.

13. A car travels 125 km in 3.6 h. Give the speed to 2 significant figures.

14. Calculate density if mass $= 12.6$ g and volume $= 4.20$ cm^3. Give the answer to 3 significant figures.

15. Which is most precise: 0.8, 0.80, or 0.800? Write the most precise value.

16. A calculator gives $2.4 \times 6.5 = 15.6$. Report the product to the correct significant

17. Calculate $4.56 + 7.8 + 0.34$. Give the answer to 3 significant figures.

18. Calculate 0.0725×0.040. Give the answer to 2 significant figures.

Push Tasks — Answers

10.
2.5×10^{4}

11.
2.4×10^{-2}

12.
18 m^{2}

13.
35 km/h

14.
3.00 g/cm^{3}

15.
0.800

16.
16

17.
12.7

18.
0.0029

Push Tasks

19. Calculate $(3.06 \times 10^4) + (8.9 \times 10^3)$. Give the answer to 3 significant figures.

20. Calculate $(5.40 \times 10^{-2}) - (1.6 \times 10^{-2})$. Give the answer to 2 significant figures.

21. A mass is measured as 0.004820 kg. Round it to 3 significant figures.

22. A distance is measured as 99950 m. Round it to 3 significant figures. Give the answer in

23. Write $4{,}300{,}000$ to 2 significant figures in scientific notation.

24. Write 6.08×10^{-5} as an ordinary number.

25. Calculate $84.6 \div 2.35$. Give the answer to 3 significant figures.

26. Calculate $(1.250 \times 10^3) \times (3.2 \times 10^{-2})$. Give the answer to 2 significant figures.

27. A bottle label shows 1.995 L. Round this to 3 significant figures.

Push Tasks — Answers

19.
3.95×10^{4}

20.
3.8×10^{-2}

21.
0.00482 kg

22.
1.00×10^{5} **m**

23.
4.3×10^{6}

24.
0.0000608

25.
36.0

26.
4.0×10^{1}

27.
2.00 L