



## Rounding and estimation

- Rounding numbers appropriately for the question
- Writing numbers to a given number of significant figures
- Using rounding to make estimates

Keywords

You should know

explanation 1a

explanation 1b

**1** Round each number to the degree of accuracy given.

- a** 342 (nearest 10)      **b** 5387 (nearest 100)      **c** 4098 (nearest 10)  
**d** 86495 (nearest 1000)      **e** 5000 (nearest 10 000)      **f** 398 999 (nearest 10)

**2** Copy and complete this table of world population data.

Always work with the original population numbers.

Country	Rounded to nearest 1000	Rounded to nearest 100 000	Rounded to nearest 1 000 000
Australia 21 007 310			
Canada 33 212 696			
France 64 057 792			
India 1 147 995 904			
World 6 706 993 152			

**3** Glenn had these number cards.

3

5

7

0

2

8

- a** What is the closest number that he could make to 570 000 using all the cards?
- b** Glenn made the number 275 308. He rounded it to 275 000.  
What degree of accuracy might he have used in his rounding?
- c** Glenn was given another card: **5**. He made the number 5 275 308.  
He said that he had made a number just bigger than five million.  
What degree of accuracy was he using?

**4** Round these decimals to the nearest whole number.

- |                   |                   |                  |                     |
|-------------------|-------------------|------------------|---------------------|
| <b>a</b> 34.8     | <b>b</b> 103.2    | <b>c</b> 134.62  | <b>d</b> 1005.56    |
| <b>e</b> 4419.652 | <b>f</b> 4805.993 | <b>g</b> 2989.57 | <b>h</b> 369 999.56 |

**5** When Vicky checked her online bank statement she had these totals in her different accounts.

Cheque £132.56      Savings £1084.37      Visa statement £245.86

Round each amount to the nearest pound sterling (£).

**6** The cost of a twin pack of tennis balls is £6, rounded to the nearest pound.

- a** What is the smallest amount of money that the twin pack could cost?
- b** What is the largest amount?



explanation 2a

explanation 2b

explanation 2c

**7** Round each number to the degree of accuracy given.

- |                               |                            |                             |
|-------------------------------|----------------------------|-----------------------------|
| <b>a</b> 24.35 (1 d.p.)       | <b>b</b> 609.604 (2 d.p.)  | <b>c</b> 90.899 (2 d.p.)    |
| <b>d</b> 207.806 (1 d.p.)     | <b>e</b> 0.0877 (3 d.p.)   | <b>f</b> 9.035 63 (4 d.p.)  |
| <b>g</b> 455.987 (1 d.p.)     | <b>h</b> 340.4704 (3 d.p.) | <b>i</b> 1.000 654 (4 d.p.) |
| <b>j</b> 3.333 33... (3 d.p.) | <b>k</b> 67.6767 (2 d.p.)  | <b>l</b> 0.999 (1 d.p.)     |

**8** Use a calculator to work these out.

Round each answer to the number of decimal places given.

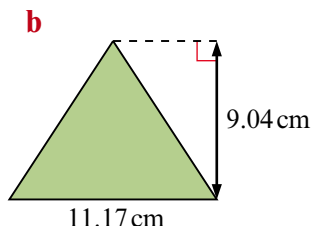
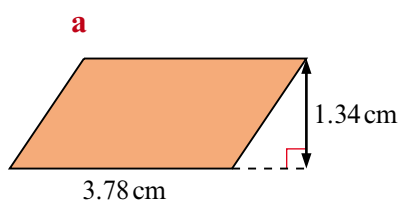
- |   |                                      |
|---|--------------------------------------|
| <b>a</b> $82 \div 11$ (1 d.p.)                | <b>b</b> $2.7 \div 31$ (2 d.p.)      |
| <b>c</b> $1.8 \times 2.6 \times 1.3$ (1 d.p.) | <b>d</b> $84.3 \times 3.67$ (1 d.p.) |
| <b>e</b> $0.23 \times 4.6 \div 0.4$ (1 d.p.)  | <b>f</b> $52.7 \div 2.6$ (2 d.p.)    |

**9** The value of the number pi ( $\pi$ ) to 10 d.p. is 3.141 592 653 5.

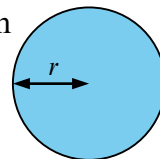
Round this number to these numbers of decimal places.

- a** 1 d.p.      **b** 2 d.p.      **c** 3 d.p.      **d** 4 d.p.      **e** 5 d.p.

- 10** Calculate the area of each shape. Round each answer to two decimal places.



**c**  $A = \pi r^2$   
 $r = 2.6 \text{ cm}$



- 11** At the National Swimming Competition, Sally was recorded as swimming 100 m in 58.7 seconds, rounded to one decimal place.

What are her fastest and slowest possible times to get this result?

explanation 3a

explanation 3b

explanation 3c

- 12** How many significant figures does each of these numbers have?

**a** 628

**b** 0.0042

**c** 90.43

**d** 0.000 504

**e** 4.00

**f** 23.0302

**g** 34 066.04

**h** 1.000 000 03

- 13** Round these numbers to **i** one significant figure, **ii** two significant figures.

**a** 0.234

**b** 0.3615

**c** 0.4368

**d** 0.0288

**e** 0.005 62

**f** 0.020 54

**g** 0.604

**h** 0.000 455 5

**i** 563

**j** 3607

**k** 2005

**l** 5564

**m** 44 355

**n** 10 543

**o** 48 704

- 14** Round these numbers to three significant figures.

**a** 36.15

**b** 204.99

**c** 3.562

**d** 550.606

**e** 203.9

**f** 10.6505

**g** 56.037

**h** 40.943

**i** 45.606

**j** 67.988

- 15** Round these numbers to the degree of accuracy given.

**a** 0.210 23 (3 s.f.)

**b** 0.004 003 02 (4 s.f.)

**c** 450.43 (3 s.f.)

**d** 35.0055 (3 s.f.)

**e** 0.077 77 (2 s.f.)

**f** 0.000 0070 (2 s.f.)

- 16** The mass of a car and trailer is 1370.056 kg.

Round this mass to these numbers of significant figures.

**a** 1 s.f.

**b** 2 s.f.

**c** 3 s.f.

**d** 4 s.f.

**e** 5 s.f.



**17** Use your calculator to find the answers to these.

Round each answer to two significant figures.

**a**  $19 \div 6$

**b**  $4 \div 71$

**c**  $2600 \times 88$

**d**  $3 \div 21$

**e**  $0.0055 \div 0.18$

**f**  $\frac{2}{3}$  of 140

**g**  $1.25^2$

**h**  $2.34 \times 1.6 \div 8.4$

#### explanation 4

**18** Estimate the answers to these calculations. Do not use a calculator.

**a**  $684 \times 24$

**b**  $12\,403 \div 579$

**c**  $54.8 \times 18.6$

**d**  $923.03 \div 29.4$

**e**  $(23.2 + 43.8) \times 4.8$

**f**  $52.1 \div (3.2 + 1.92)$

**19** Estimate answers to these calculations. Do not use a calculator.

Show your working.

**a**  $\frac{147 + 54}{38 + 59}$

**b**  $\frac{62 \times 19}{9 \times 32}$

**c**  $\frac{18.9 + 11.42}{52.6 - 39.9}$

**d**  $\frac{29.05 \times 37.4}{101.2 \div 4.6}$

**20** Twelve customers spent these amounts at a local corner shop.

£12.45

£16.83

£21.52

£9.03

£14.67

£6.78

£7.86

£24.79

£32.81

£11.23

£3.77

£18.30

**a** Estimate the average amount spent per customer.

**b** On average, the shop has 863 customers each week.

About how much is spent in the shop each week?

**21** The population density (population/km<sup>2</sup>) of a region is found using this formula.

$$\frac{\text{Population}}{\text{Area of region (km}^2\text{)}}$$

Estimate the population density of the places listed in the table.

Country	Population	Area in km <sup>2</sup>
Austria	8 205 533	83 870
Germany	82 369 552	357 021
UK	60 943 912	244 820

**22** The surface area of a sphere is found using the formula  $A = 4\pi r^2$ .

$$\pi = 3.1416 \text{ (4 d.p.)}$$

Estimate the surface area of a sphere with each radius.

**a** 2.92 cm

**b** 9.43 cm

**c** 21.05 m

**d** 113.2 mm