


2 Round each number below to:

- | | | | | | |
|----------|-----------------|----------|------------------|----------|-------------------|
| | i 1 s.f. | | ii 2 s.f. | | iii 3 s.f. |
| a | 428.3 | b | 6238 | c | 7.819 |
| d | 0.5273 | e | 53 689 | | |
| f | 725 600 | g | 0.039 26 | h | 0.005 072 |
| | | i | 6103 | j | 2005 |

EXAMPLE 3

Write each of the following correct to 3 significant figures.

- a** 249 700 **b** 629.51 **c** 0.001 896 **d** 6.998

| | Solve | Think | Apply |
|----------|--------------------------------|--|--|
| a | $249\,700 \approx 250\,000$ | The third significant figure is 9 in the 1000s column. So we round to the nearest 1000. $249\,700 \approx 250\,000$ correct to 3 s.f. | Find the n th significant figure and determine the place value of the digit in this column (hundreds, tens, 2 decimal places). Round to this place value. <i>In parts c and d the zeros at the end are there to indicate the level of accuracy of the answer.</i>  |
| b | $629.51 \approx 630$ | The third significant figure is 9 in the units column. So we round to the nearest whole number. $629.51 \approx 630$ correct to 3 s.f. | |
| c | $0.001\,896 \approx 0.001\,90$ | The third significant figure is 9 in the fifth place after the decimal point. So we round to 5 decimal places. $0.001\,896 \approx 0.001\,90$ correct to 3 s.f. | |
| d | $6.998 \approx 7.00$ | The third significant figure is 9 in the second place after the decimal point. So we round to 2 decimal places. $6.998 \approx 7.00$ correct to 3 s.f. | |

3 Write each of the following correct to 3 significant figures.

- | | | | | | | | | | |
|----------|---------|----------|----------|----------|-----------|----------|-----------|----------|---------|
| a | 369 800 | b | 239.6 | c | 0.005 798 | d | 8.997 | e | 299 700 |
| f | 499.7 | g | 0.039 98 | h | 0.299 9 | i | 0.001 999 | j | 999 900 |



EXAMPLE 4

When a number was rounded to 2 significant figures, the answer was:

a 430

b 3.7

- i** What is the smallest the number could have been?
- ii** What is the largest the number could have been?
- iii** Write a mathematical statement that shows the range of possible numbers.

| | Solve | Think | Apply |
|----------|---|--|---|
| a | i 425 | The second significant figure is in the tens column, hence the number has been rounded to the nearest 10. Although 425 is halfway between 420 and 430, it is rounded up to 430. This is the smallest the number could have been. | Find the place value of the n th significant figure. This indicates how the number has been rounded (to the nearest 100, 10, ..., 2 decimal places). Complete as for Example 7 in Section 4E. |
| | ii <435 | We cannot specify the largest number, but we know that it has to be less than 435, as 435 would be rounded up to 440. | |
| | iii $425 \leq \text{number} < 435$ | The number could be equal to 425 or between 425 and 435. | |
| b | i 3.65 | The second significant figure is in the first column after the decimal point, hence the number has been rounded to 1 decimal place. Although 3.65 is halfway between 3.6 and 3.7, it is rounded to 3.7. This is the smallest the number could have been. | |
| | ii <3.75 | We cannot specify the largest number, but we do know that it has to be less than 3.75, as 3.75 would be rounded up to 3.8. | |
| | iii $3.65 \leq \text{number} < 3.75$ | The number could be equal to 3.65 or between 3.65 and 3.75. | |

4 When a number was rounded to 2 significant figures the answer was:

a 560

b 8.2

c 48

d 0.72

e 37 000

f 0.084

- i** What is the smallest the number could have been?
- ii** What is the largest the number could have been?
- iii** Write a mathematical statement that shows the range of possible numbers.

5 When a number was rounded to 3 significant figures the answer was:

a 483

b 3.86

c 14 500

d 0.128

e 56.9

f 3210

Write a mathematical statement that shows the range of possible numbers in each case.

6 Write a mathematical statement that shows the range of possible numbers if each of the following numbers was rounded to the given number of significant figures.

a 2 s.f. the answer is 300

b 2 s.f. the answer is 3000

c 3 s.f. the answer is 6000

d 3 s.f. the answer is 24 000

e 3 s.f. the answer is 500 000

f 2 s.f. the answer is 0.80

EXAMPLE 5

State the number of significant figures in each of the following numbers.

a 294

b 0.3

c 4.20

d 0.0017

e 56 000

| | Solve | Think | Apply |
|----------|------------------------|--|--|
| a | 3 | There are 3 digits in the number 294. | For decimal numbers, zeros in front of the first non-zero digit are not significant, zeros after the first non-zero digit are significant. For integers (whole numbers), zeros on the end of the number may or may not be significant. |
| b | 1 | The first significant figure in 0.3 is the first non-zero digit. Hence the first zero is not significant. | |
| c | 3 | The zero on the end of this number indicates it has been rounded to 2 decimal places. Hence the zero in 4.20 is significant. | |
| d | 2 | The first significant figure in 0.0017 is the first non-zero digit. Hence the first three zeros are not significant. | |
| e | Cannot tell precisely. | The zeros on the end may or may not be significant. 56 300 rounded to the nearest 1000 \approx 56 000. 55 970 rounded to the nearest 100 \approx 56 000. 56 003 rounded to the nearest 10 \approx 56 000. 55 999.6 rounded to the nearest whole number \approx 56 000. Hence there could be 2, 3, 4 or 5 significant figures. | |

7 How many significant figures are there in each of the following numbers?

a 38

b 0.49

c 2896

d 0.075

e 0.40

f 1.800

g 0.0053

h 0.060

i 400

j 7000

k 23 000

l 8 000 000

Check your answers

- 1 a** 2 **b** 5 **c** 1 **d** 7 **e** 8
- 2 a** **i** 400 **ii** 430 **iii** 428
b **i** 6000 **ii** 6200 **iii** 6240
c **i** 8 **ii** 7.8 **iii** 7.82
d **i** 0.5 **ii** 0.53 **iii** 0.527
e **i** 50 000 **ii** 54 000 **iii** 53 700
f **i** 700 000 **ii** 730 000 **iii** 726 000
g **i** 0.04 **ii** 0.039 **iii** 0.0393
h **i** 0.005 **ii** 0.0051 **iii** 0.005 07
i **i** 6000 **ii** 6100 **iii** 6100
j **i** 2000 **ii** 2000 **iii** 2010
- 3 a** 370 000 **b** 240 **c** 0.005 80 **d** 9.00
e 300 000 **f** 500 **g** 0.0400 **h** 0.300
i 0.002 00 **j** 1 000 000
- 4 a** **i** 555 **ii** <565
iii $555 \leq \text{number} < 565$
b **i** 8.15 **ii** <8.25
iii $8.15 \leq \text{number} < 8.25$
c **i** 47.5 **ii** <48.5
iii $47.5 \leq \text{number} < 48.5$
d **i** 0.715 **ii** <0.725
iii $0.715 \leq \text{number} < 0.725$
e **i** 36 500 **ii** <37 500
iii $36\,500 \leq \text{number} < 37\,500$
f **i** 0.0835 **ii** <0.0845
iii $0.0835 \leq \text{number} < 0.0845$
- 5 a** $482.5 \leq \text{number} < 483.5$
b $3.855 \leq \text{number} < 3.865$

- c** $14\,450 \leq \text{number} < 14\,550$
d $0.1275 \leq \text{number} < 0.1285$
e $56.85 \leq \text{number} < 56.95$
f $3205 \leq \text{number} < 3215$
- 6 a** $295 \leq \text{number} < 305$
b $2950 \leq \text{number} < 3050$
c $5995 \leq \text{number} < 6005$
d $23\,950 \leq \text{number} < 24\,050$
e $499\,500 \leq \text{number} < 500\,500$
f $0.795 \leq \text{number} < 0.805$
- 7 a** 2 **b** 2 **c** 4 **d** 2 **e** 2
f 4 **g** 2 **h** 2 **i** 1, 2 or 3
j 1, 2, 3 or 4 **k** 2, 3, 4 or 5 **l** 1, 2, 3, 4, 5, 6 or 7
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