Expressing uncertainty in data

Education in Chemistry
July 2020
rsc.li/2Xfd61c

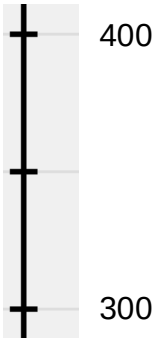
Practise handling significant figures, decimal places and uncertainty in measurements.

1. Rounding

a. Answer the questions using the number lines.

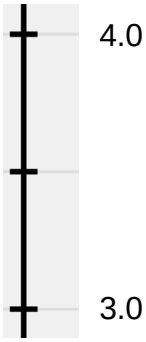
i. Draw an arrow to indicate where 367 is on this number line.

ii. What is 367 to the nearest hundred?



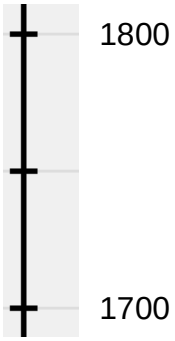
iii. Draw an arrow to indicate where 3.28 is on this number line.

iv. What is 3.28 to 1 decimal place?



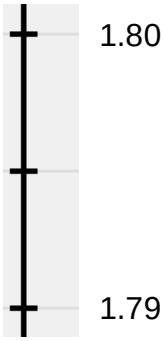
v. Draw an arrow to indicate where 1791 is on this number line.

vi. What is 1791 to the nearest hundred?



vii. Draw an arrow to indicate where 1.791 is on this number line.

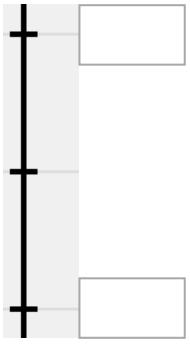
viii. What is 1.791 to 2 decimal places?



b. Fill in the blanks on the number lines and answer the questions.

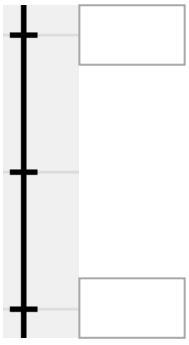
i. Draw an arrow to indicate where 203 is on a number line.

ii. What is 203 to the nearest hundred?



iii. Draw an arrow to indicate where 3.089 is on a number line.

iv. What is 3.089 to 2 decimal places?



c. Circle the number that is the nearest 1000, 100 and 10 to the number mentioned in each question and indicate whether it is rounded up or down.

i. 2527

	nearest 1000	nearest 100	nearest 10
	3000	2600	2530
	2000	2500	2520
up or down?			

ii. 4458

	nearest 1000	nearest 100	nearest 10
	5000	4500	4460
	4000	4400	4450
up or down?			

d. Circle the number that is the nearest integer, 0.1 and 0.01 and indicate whether it is rounded up or down.

iii. 2.527

	nearest integer	nearest 0.1	nearest 0.01
	3	2.6	2.53
	2	2.5	2.52
up or down?			

iv. 4.458

	nearest integer	nearest 0.1	nearest 0.01
	5	4.5	4.46
	4	4.4	4.45
up or down?			

e. Insert the missing numbers so that the table looks like the ones above. Then, circle the number that is the nearest integer, 0.1 and 0.01 and indicate whether it is rounded up or down.

i. 4.097

	nearest integer	nearest 0.1	nearest 0.01
		4.1	
			4.09
up or down?			

ii. 10.893

	nearest integer	nearest 0.1	nearest 0.01
		10.9	
			10.89
up or down?			

2. Significant figures

Circle the correct answer.

a. Round 34.59 to 1 significant figure				
A: 34	B: 30	C: 35	D: 3	E: 34.5

b. Round 35,683 to 1 significant figure				
A: 35683	B: 30000	C: 40000	D: 3	E: 4

c. Round 76.984 to 3 significant figures				
A: 77.0	B: 76.9	C: 76.984	D: 77	E: 76

d. Round 0.003865 to 1 significant figure				
A: 0	B: 0.003	C: 0.004	D: 0.00387	E: 1

f. Round 0.003865 to 3 significant figures				
A: 0.00	B: 0.003	C: 0.004	D: 0.00386	E: 0.00387

3. Chemistry contexts

a. Calculate the rate of reaction that produces 25.0 cm^3 of gas in 5.90 s.

b. Calculate the rate of reaction that produces 25 cm^3 of gas in 5.90 s.

c. Calculate the rate of reaction that produces 25.0 cm^3 of gas in 5.9 s.

d. Calculate the rate of reaction that produces 25 cm^3 of gas in 5.9 s.

e. Calculate the concentration of a sodium chloride solution when 9.80 g of solid was dissolved in 100 cm^3 water.

f. Calculate the concentration of a sodium chloride solution when 9.8 g of solid was dissolved in 100 cm^3 water.

g. Calculate the concentration of a sodium chloride solution when 0.98 g of solid was dissolved in 10 cm^3 water.

h. Calculate the concentration of a sodium chloride solution 0.98 g of solid was dissolved in 10.0 cm^3 water.