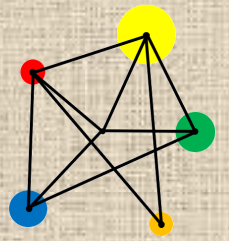
Error Intervals



Review rounding

Construct error intervals

Vocabulary

Interval
A section of the number line, between two points.

Bound
The upper and lower limits of a set of values.

Truncate
To cut short.

Review of Rounding

a) Round 3.244 to 2 decimal places

b) Round 3.245 to 2 decimal places

c) Round 16.555 to 3 significant figures

d) Truncate 6.89 after 1 decimal place

e) Round 26.843 to 2 decimal places

f) Round 26.843 to 3 significant figures

g) Round 0.055155 to 3 significant figures

h) Round 128 945 to 3 significant figures

Solutions

a) Round 3.244 to 2 decimal places **3.24**

b) Round 3.245 to 2 decimal places **3.25**

c) Round 16.555 to 3 significant figures **16.6**

d) Truncate 6.89 after 1 decimal place **6.8**

e) Round 26.843 to 2 decimal places **26.84**

f) Round 26.843 to 3 significant figures **26.8**

g) Round 0.055155 to 3 significant figures **0.0552**

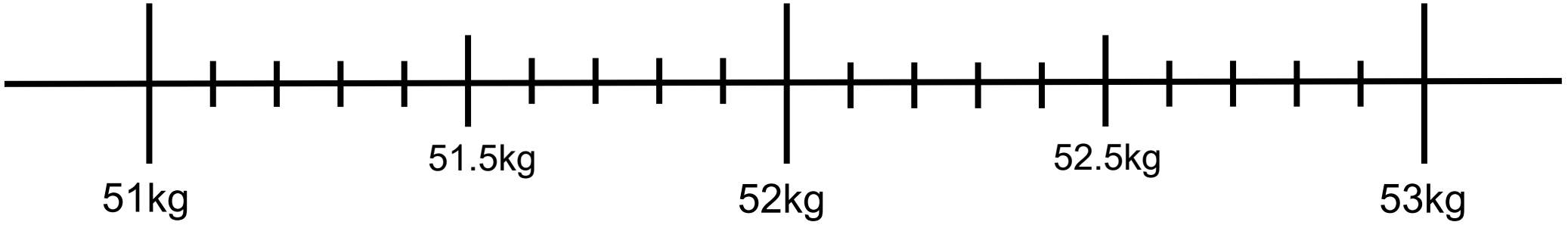
h) Round 128 945 to 3 significant figures **129 000**

Upper & Lower Bounds : Example

The weight of a man is 52kg correct to the nearest kg

a) Write down the lower bound of the weight of the man.

b) Write down the upper bound of the weight of the man.

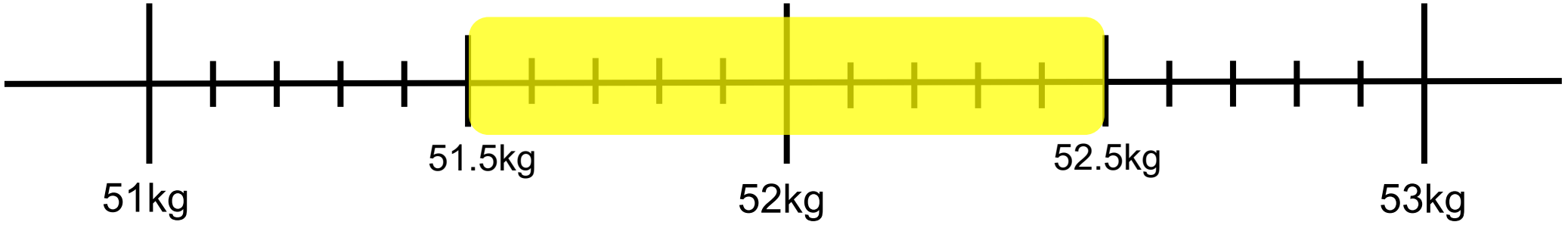


Solutions

The weight of a man is 52kg correct to the nearest kg

a) Write down the lower bound of the weight of the man. **51.5kg**

b) Write down the upper bound of the weight of the man. **52.5kg**



Exercise

Each value has been rounded to the accuracy stated.
Find the upper and lower bound for each value

12m (Nearest m)

6kg (Nearest kg)

4 hours (Nearest hour)

8.4 km (1 decimal place)

6.49 mg (2 decimal places)

1900 mm (2 significant figures)

18s (nearest 2s)

$2\frac{1}{2}$ g (nearest $\frac{1}{2}g$)

Solutions

Each value has been rounded to the accuracy stated.
Find the upper and lower bound for each value

12m (Nearest m)

Upper : 12.5m
Lower : 11.5m

6kg (Nearest kg)

Upper : 6.5m
Lower : 5.5m

4 hours (Nearest hour)

Upper : 4h 30 min
Lower : 3h 30 min

8.4 km (1 decimal place)

Upper : 8.45km
Lower : 8.35m

6.49 mg (2 decimal places)

Upper : 6.495m
Lower : 6.485m

1900 mm (2 significant figures)

Upper : 1950 mg
Lower 1850 mg

18s (nearest 2s)

Upper : 19s
Lower 17s

$2\frac{1}{2}$ g (nearest $\frac{1}{2}g$)

Upper : 2.75m
Lower 2.25m

Example

A number, x is rounded to one decimal place.
The result is 2.3.

a) Write down the lower bound of x.

b) Write down the upper bound of x.

c) Write down the error interval for x.

Solutions

A number, x is rounded to one decimal place.
The result is 2.3.

a) Write down the lower bound of x. **2.25**

b) Write down the upper bound of x. **2.35**

c) Write down the error interval for x. **$2.25 \leq x < 2.35$**

Note the different signs.

You try ...

a) A number, x is rounded to two significant figures.
The result is 270
Write down an error interval for x.

b) A number, x is truncated after one decimal place.
The result is 11.7
Write down an error interval for x.

Solutions

a) A number, x is rounded to two significant figures.
The result is 270
Write down an error interval for x. **$265 \leq x < 275$**

b) A number, x is truncated after one decimal place.
The result is 11.7
Write down an error interval for x. **$11.7 \leq x < 11.8$**

Exercise

a) x is rounded to two significant figures.
The result is 350.

Write down an error interval for x.

b) k is rounded to one decimal place
The result is 16.4.

Write down an error interval for x.

c) y is rounded to one significant figure.
The result is 1000.

Write down an error interval for x.

d) t is truncated after the decimal point.
The result is 63.

Write down an error interval for x.

e) c is truncated after one decimal place.
The result is 18.1.

Write down an error interval for x.

f) p is rounded to two decimal places
The result is 3.14

Write down an error interval for x.

Exercise

a) x is rounded to two significant figures.
The result is 350.

Write down an error interval for x.

$345 \leq x < 355$

b) k is rounded to one decimal place
The result is 16.4.

Write down an error interval for x.

$16.35 \leq k < 16.45$

c) y is rounded to one significant figure.
The result is 1000.

Write down an error interval for x.

$500 \leq x < 1500$

d) t is truncated after the decimal point.
The result is 63.

Write down an error interval for x.

$63 \leq x < 64$

e) c is truncated after one decimal place.
The result is 18.1.

Write down an error interval for x.

$18.1 \leq x < 18.2$

f) p is rounded to two decimal places
The result is 3.14

Write down an error interval for x.

$3.135 \leq x < 3.145$

Extension

$$11.5 \leq x < 12.5$$

$$7.5 \leq y < 8.5$$

Write down the error interval for:

a) $x + y$

b) $x - y$

Solution

$$11.5 \leq x < 12.5$$

$$7.5 \leq y < 8.5$$

Write down the error interval for:

a) $x + y$ **$19 \leq x + y < 21$**

b) $x - y$ **$3 \leq x + y < 5$**

Exam Style Question

The length of a piece of wood is 5 metres to the nearest metre.

Complete the error interval for the length of the wood.

_____m $\leq$ length $<$ _____m

The length of a different piece of wood is 6 metres to the nearest metre.

Abi says

"The length of the two pieces of wood is 12 metres to the nearest metre."

Give an example to show that she could be correct.

Solution

The length of a piece of wood is 5 metres to the nearest metre.

Complete the error interval for the length of the wood.

4.5 m ≤ length < 5.5 m

The length of a different piece of wood is 6 metres to the nearest metre.

Abi says

"The length of the two pieces of wood is 12 metres to the nearest metre."

Give an example to show that she could be correct.

6.1m + 6.1m = 12.2m

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