Averages & Range

Practice Worksheet (Foundation · Target Grade 5)

I Do

Here are the masses, in kilograms, of 7 parcels.

4.2 5.8 3.5 5.8 6.1 4.9 5.4

(a) Find the range of the masses.

.....kg *(1 mark)*

(b) Find the median mass.

.....kg *(2 marks)*

(Total for Question is 3 marks)

We Do

Here are the masses, in kilograms, of 7 suitcases.

14.6 12.3 16.8 13.5 16.8 15.1 14.2

(a) Find the range of the masses.

.....kg *(1 mark)*

(b) Find the median mass.

.....kg *(2 marks)*

(Total for Question is 3 marks)

You Do 1

Here are the lengths, in metres, of 7 pieces of timber.

$$2.8 \quad 1.9 \quad 3.4 \quad 2.5 \quad 3.1 \quad 1.9 \quad 2.7$$

(a) Find the range of the lengths.

.....m *(1 mark)*

(b) Find the median length.

.....m *(2 marks)*

(Total for Question is 3 marks)

You Do 2

Here are the times, in seconds, recorded by 8 athletes in a 100 m sprint.

$$11.4 \quad 10.9 \quad 11.8 \quad 11.2 \quad 12.1 \quad 11.5 \quad 10.9 \quad 11.6$$

(a) Find the range of the times.

.....s *(1 mark)*

(b) Find the median time.

.....s *(2 marks)*

(Total for Question is 3 marks)

You Do 3

Here are the temperatures, in °C, recorded at dawn on 8 winter mornings.

$$-2.4 \qquad 1.5 \qquad -0.8 \qquad 3.2 \qquad -1.6 \qquad 0.4 \qquad 2.1 \qquad -0.8$$

(a) Find the range of the temperatures.

.....°C *(1 mark)*

(b) Find the median temperature.

.....°C *(2 marks)*

(Total for Question is 3 marks)

Challenge 1

The masses, in kilograms, of 6 parcels are written in order from smallest to largest.

$$3.2 \qquad 4.5 \qquad x \qquad 6.2 \qquad 7.4 \qquad y$$

The median mass of the 6 parcels is 5.8 kg.
The range of the masses of the 6 parcels is 5.7 kg.

Work out the value of x and the value of y.
Show all of your working clearly.

$x =$ ..... $y =$ .....

(Total for Question is 4 marks)

Challenge 2

There are 5 parcels in a delivery van.
The mean mass of the 5 parcels is 6.4 kg.

Two more parcels are loaded into the van.
The mean mass of all 7 parcels is now 7.0 kg.

Given that the difference in mass between the two new parcels is 1.8 kg, work out the mass of each of the two new parcels.
Show all of your working clearly.

.....kg and .....kg

(Total for Question is 4 marks)

Extreme Challenge

Five parcels have masses, in kilograms, written in ascending order:

$$a \quad b \quad c \quad d \quad e$$

The following information is known about the 5 masses:

- The mode is 4.5 kg.
- The median is 6.0 kg.
- The range is 5.5 kg.
- The mean is 6.4 kg.
- Exactly two of the parcels have the same mass.

Work out the mass of each of the 5 parcels.
You must show all of your working clearly.

....., ..., ..., ..., ...kg

(Total for Question is 5 marks)

Worked Answers

I Do
Order the masses from smallest to largest: $3.5,\ 4.2,\ 4.9,\ 5.4,\ 5.8,\ 5.8,\ 6.1$.
(a) Range $= 6.1 - 3.5 =$ **2.6 kg**.
(b) The middle (4th) value is **5.4 kg**.

We Do
Ordered: $12.3,\ 13.5,\ 14.2,\ 14.6,\ 15.1,\ 16.8,\ 16.8$.
(a) Range $= 16.8 - 12.3 =$ **4.5 kg**.
(b) The 4th value is **14.6 kg**.

You Do 1
Ordered: $1.9,\ 1.9,\ 2.5,\ 2.7,\ 2.8,\ 3.1,\ 3.4$.
(a) Range $= 3.4 - 1.9 =$ **1.5 m**.
(b) The 4th value is **2.7 m**.

You Do 2
Ordered: $10.9,\ 10.9,\ 11.2,\ 11.4,\ 11.5,\ 11.6,\ 11.8,\ 12.1$.
(a) Range $= 12.1 - 10.9 =$ **1.2 s**.
(b) Median is halfway between the 4th (11.4) and 5th (11.5) values:
$\dfrac{11.4 + 11.5}{2} =$ **11.45 s**.

You Do 3
Ordered: $-2.4,\ -1.6,\ -0.8,\ -0.8,\ 0.4,\ 1.5,\ 2.1,\ 3.2$.
(a) Range $= 3.2 - (-2.4) = 3.2 + 2.4 =$ **5.6**°C.
(b) Median is halfway between the 4th (-0.8) and 5th (0.4) values:
$\dfrac{-0.8 + 0.4}{2} = \dfrac{-0.4}{2} =$ **−0.2**°C.

Challenge 1

1. The median of 6 ordered values is the midpoint of the 3rd and 4th values:
$\frac{x + 6.2}{2} = 5.8 \implies x + 6.2 = 11.6 \implies$ **x** $=$ **5.4**.
2. The range is the largest value minus the smallest value:
$y - 3.2 = 5.7 \implies$ **y** $=$ **8.9**.

Challenge 2

1. Total mass of the original 5 parcels $= 5 \times 6.4 = 32$ kg.
2. Total mass of all 7 parcels $= 7 \times 7.0 = 49$ kg.
3. Combined mass of the 2 new parcels $= 49 - 32 = 17$ kg.
4. Let the masses of the two new parcels be p and q, with $p + q = 17$ and $p - q = 1.8$.
Add the two equations: $2p = 18.8 \implies p = 9.4$ kg.
Find the lighter parcel: $q = 17 - 9.4 = 7.6$ kg.
Answer: 7.6 kg and 9.4 kg.

Extreme Challenge

1. The median is the 3rd value, so $c = 6.0$.
2. Since the mode is 4.5 (which is less than the median 6.0) and exactly two parcels share this mass, the two smallest values must both be 4.5:
$a = 4.5$ and $b = 4.5$.
3. Use the range to find the largest mass e:
$e - a = 5.5 \implies e - 4.5 = 5.5 \implies e = 10.0$.
4. Use the mean to find the total mass of all 5 parcels:
Total mass $= 5 \times 6.4 = 32.0$ kg.
5. Subtract the four known masses from the total to find d:
$d = 32.0 - (4.5 + 4.5 + 6.0 + 10.0) = 32.0 - 25.0 = 7.0$.
Answer: 4.5, **4.5**, **6.0**, **7.0**, **10.0 kg**.