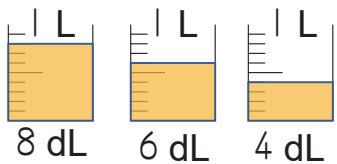


9 - 1

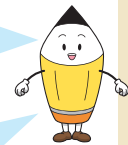
Average

Meaning of Average

Example 1 The juices are in a container. Divide them so that the three juices are equal.



You can equalize the amount of juice by pouring a large amount of juice into a small amount of juice.



You can also find this by bringing everything together and then dividing it. Let's calculate with this method!

1 What is the total quantity of juice in the three containers?

Math sentence $8 + 6 + 4 = 18$

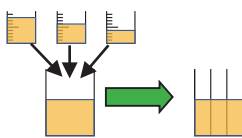
Answer 18 dL

2 If you divide all the juice into three equal parts, how many deciliters do you get?

Math sentence $18 \div 3 = 6$

Answer 6 dL

3 Find the math sentence and answer for the case where the juice in the three containers is the same. (In other words, find the average of three containers.)



Math sentence $(8 + 6 + 4) \div 3 = 6$

Total quantity of juices

Number of juices

Average

When you take several quantities and equalize them all to the same quantity, the quantity you get is called the **average**.

The following table shows the number of books that a girl read from September to December. What is the average number of books she read in one month?

Month	September	October	November	December
Number of books	2	3	2	5



1 What is the total number of books she read in the four months?

Math sentence

Answer

2 If you divide all the books read into four months, how many books per month did she read?

Math sentence

Answer

3 Find the math sentence and answer for the case where the books in the four months is the same.

Math sentence $(\square + \square + \square + \square) \div \square = \square$

Answer

9 - 2

Average

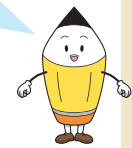
Calculation of average

Example 1 Every morning we run and here is a table showing how many times A and B ran round the school grounds last week. B was ill and had to take a day off, so he only ran for four days.

Who did the best job?

Day	Day 1	Day 2	Day 3	Day 4	Day 5
A	5	3	5	4	2
B	5	4	7	4	

We cannot compare the total number because B is absent for 1 day. So let's compare the average to find who did best job.



1 Calculate the average of A.

Math sentence

$$(5 + 3 + 5 + 4 + 2) \div 5 = 3.8$$

Total quantity ÷ Number of days

Answer 3.8 times

2 Calculate the average of B.

Math sentence $(5 + 4 + 7 + 4) \div 4 = 5$

Total quantity ÷ Number of days

Sometimes averages can be expressed as decimals.



Answer 5 times

3 Who did the best job? Answer B

We can compare the average even total number is not same!



The following table shows the math test scores for group 1 and group 2.

Math test score group 1

※ Maximum score is 100

Person	A	B	C
Score (point)	90	67	71

Math test score group 2

Person	D	E	F	G
Score (point)	88	62	78	74

1 Calculate the average of math test score of group 1.

Math sentence

Answer _____

2 Calculate the average of math test score of group 2.

Math sentence

Answer _____

3 Which group has better math test score?

Answer _____

9 - 3

Average

Provisional average

Example I weighed 6 potatoes. The table and graph show the results. The calculation can be complicated, so we take the smallest, 144, as base weight (Provisional average) to make it easier to calculate the average number.

- Find the difference of weight of each potato from base weight.

Number	(a)	(b)	(c)	(d)	(e)	(f)
Weight (g)	144	153	156	151	147	149
	$- 144$					
Difference (g)	0	9	12	7	3	5

- Calculate the average of difference of the weights determined above.

Math sentence $(0 + 9 + 12 + 7 + 3 + 5) \div 6 = 6$

Answer (Average of difference of the weights) 6 g

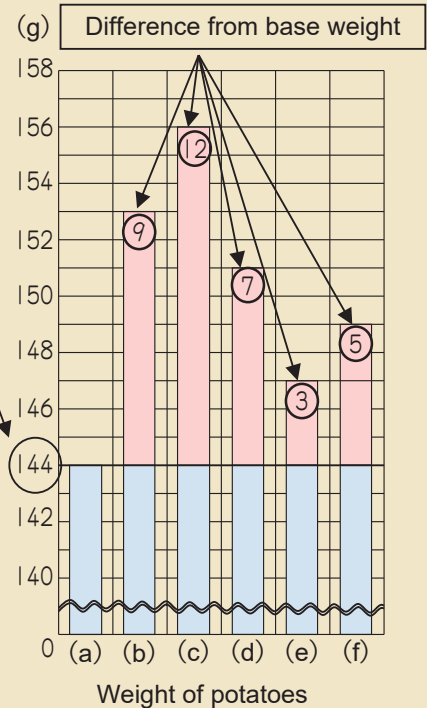
- Calculating the average of weights by adding average of difference to the provisional average.

You can find the average by adding the average of difference to the base average.

Math sentence $144 + 6 = 150$

Base weight + Difference = Average

Answer (Average of the weight) 150 g



I weighed 7 people and the table and graph show the results. We take the smallest, 37, as base weight (provisional average).

- Find the difference of weight of each student from base weight.

Number	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Weight (g)	41	46	37	48	51	39	46
	$- 37$						
Difference (g)	4	9	0				

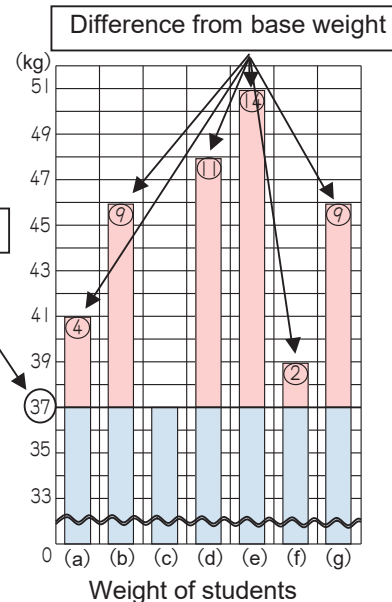
- Calculate the average of difference of the weights determined above.

Math sentence

- Calculating the average of weights by adding average of difference to the provisional average.

Math sentence

Answer (Average of the weight) _____



9 - 4

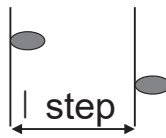
Average

Problem (1)

Example You want to measure the approximate length of Eastern school building using your friends' stride.

- 1 The table shows information on one of your friends. He took 10 steps 3 times. How many m is his stride? Find the average of 10 steps.

Trial	Distance of 10 steps
1	6.21 m
2	6.25 m
3	6.23 m



The length of one step is not always the same, so we take several steps and decide it as an average.



Math sentence

$$(6.21 + 6.25 + 6.23) \div 3 = 6.23$$

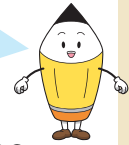
Answer 6.23 m

- 2 Find the length of one step.

Math sentence

$$6.23 \div 10 = 0.623$$

To find one step, you just take ten steps to one tenth!



Answer 0.623 m

- 3 He measured the length of eastern school building by his steps. It was 30 steps. Estimate the length of the building.

Math sentence

$$0.623 \times 30 = 18.69$$

Answer 18.69 m

The table shows the walking time of 1000 m of your friend.

- 1 What is her average record? Write the math sentence and find the answer.

Trial	Record (minutes)
1	13.6
2	13.4
3	20.4
4	13.8

Outlier (Failure)

When you want to get an average, you may want to exclude outliers from the calculation. Firstly, check why does the outlier come and if the cause was failure, you can exclude it.

Math sentence

$$(\square + \square + \square) \div \square = \square$$

Answer _____



- 2 Estimate your friend's record of 500 m.

Math sentence

Answer _____

- 3 If your friend will run 2000 m, estimate her record of 2000 m.

Math sentence

Answer _____

9 - 5

Average

Problem (2)

Example 1 Your sister finished a 140-page book in just eight days. How many pages did she read a day on average?

Math sentence

$$140 \div 8 = 17.5$$



Answer 17.5 pages

Example 2 A bus could carry a maximum of 55 passengers and up to 4500 kg. What is the maximum weight per person in kilograms? (Rounding down the answer to the nearest one.)

Math sentence

$$4500 \div 55 = 81.\overline{8}$$



Answer 81 kg

1 Your brother finished 260-page novel in just 13 days. How many pages did she read a day on average?

Math sentence



Answer _____

2 A ship could carry maximum of 98 passenger and up to 8500 kg. What is the maximum weight per person in kilograms? (Rounding down the answer to the nearest one.)

Math sentence




Answer _____

3 There is 48 g of sweets at total. We put the sweets in the bags and the average weight of the sweets in a bag is 1.6g. How many bags do we made?

Math sentence



Answer _____

4 If the apple weighs 200 g on average. How many apples are there in the box of apples which weigh 5 kg? 

Math sentence

Answer _____

9 - 6

Average

Review

1 The table below shows the number of children who were absent from your class on the last 5 days.

On average, how many students were absent each day?

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of students	5	2	1	3	4

Math sentence

Answer _____

2 My friend walked 700 steps around the school. If your friend's stride is about 0.65 m, about how many m do you think are around the school?

Math sentence

Answer _____

3 The table below shows one student's record of four long jumps. What is the average length of this student's record?

Trial	First	Second	Third	Fourth
Record	2.36 m	0.42 m	2.46 m	2.38 m

Math sentence

Answer _____

4 The children will be divided into two groups, A and B, to prepare their hospitality dishes. The number of people in each group and the total number of dishes they make are shown in the table below. Which group makes more food per person? Compare the average number of dishes made by each person.

Trial	Number of children	Number of dishes made
Group A	15	135
Group B	12	114

1 How many dishes will each person in Group A make?

Math sentence

Answer _____

2 How many dishes will each person in Group B make?

Math sentence

Answer _____

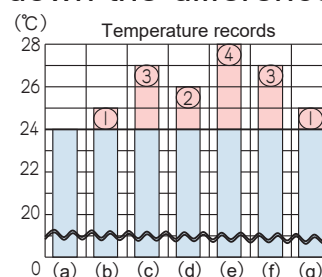
3 Which group will make more on average per person?

Answer _____

5 The table below shows the maximum temperatures recorded for one week. We take the smallest, 24, as base temperature (provisional average).

1 Find the average maximum temperature by writing down the difference from the provisional average.

Days	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Temperature (°C)	24	25	27	26	28	27	25
	↓	↓	↓	↓	↓	↓	↓
Difference (°C)	0						



2 Calculate the provisional average of maximum temperature determined above.

Math sentence

3 Calculate the average of maximum temperature by adding the provisional average.

Math sentence

Answer (Average of temperature) _____

6 If one small orange weighs 80 g on average,

1 How many kg does 100 small orange weight?

Math sentence



Answer _____

2 How many small oranges weigh 4 kg?

Math sentence

Answer _____

7 There is a 3000 g carton of potatoes. The average weight of the potatoes in the bag is 153 g. How many potatoes are there approximately in the bag? (Round the answer to the nearest one.)

Math sentence



Answer _____