

# Add and subtract numbers in standard form

1 Work out the totals. Write your answers as ordinary numbers.

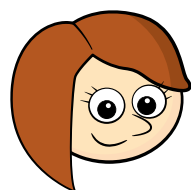
a)  $1,000 + 10 + 100,000 =$  101,010

b)  $20,000 + 700 + 300,000 =$  320,700

c)  $106 + 105 + 104 =$  315

d)  $103 + 106 + 105 =$  314

2 Rosie and Dora are adding numbers in standard form.



Rosie

I think  $(2 \times 10^7) + (3 \times 10^7) = 5 \times 10^7$

I disagree. I think  $(2 \times 10^7) + (3 \times 10^7) = 5 \times 10^8$

Dora



Do you agree with Rosie or Dora? Rosie

Explain your answer.

$2 \times 10^7 + 3 \times 10^7 = 20,000,000 + 30,000,000 = 50,000,000 = 5 \times 10^7$

Work out the calculations. Give your answers in standard form.

a)  $(4 \times 10^6) + (3 \times 10^6)$

$= 7 \times 10^6$

d)  $(6.2 \times 10^5) + (3.1 \times 10^5)$

$= 9.3 \times 10^5$

b)  $(6 \times 10^{-2}) + (3 \times 10^{-2})$

$= 9 \times 10^{-2}$

e)  $(8 \times 10^7) - (3 \times 10^7)$

$= 5 \times 10^7$

c)  $(8 \times 10^4) + 10^4$

$= 9 \times 10^4$

f)  $(7 \times 10^{-4}) - (3 \times 10^{-4})$

$= 4 \times 10^{-4}$

3 Amir is adding numbers in standard form.



$(4 \times 10^5) + (8 \times 10^5) = 12 \times 10^5$ , but that's not standard form.

Explain how you know  $12 \times 10^5 = 1.2 \times 10^6$

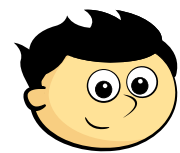
$12 \times 10^5 = 1.2 \times 10 \times 10^5 = 1.2 \times 10^6$

Find the answers to the additions.  
Give your answers in standard form.

a)  $(9 \times 10^6) + (8 \times 10^6) = \underline{1.7 \times 10^7}$     c)  $(9 \times 10^{-2}) + (8 \times 10^{-2}) = \underline{1.7 \times 10^{-1}}$

b)  $(8 \times 10^4) + (9 \times 10^4) = \underline{1.7 \times 10^5}$     d)  $(9 \times 10^{-5}) + (8 \times 10^{-5}) = \underline{1.7 \times 10^{-4}}$

4



To work out  $(3.4 \times 10^5) + (4.5 \times 10^4)$ , I'm going to change the numbers back to ordinary form.

Here are Jack's workings.

$$\begin{aligned} 3.4 \times 10^5 &= 340,000 \\ 4.5 \times 10^4 &= 45,000 \\ 340,000 \\ + 45,000 \\ \hline 790,000 &= 7.9 \times 10^5 \end{aligned}$$

- a) What mistake has Jack made?  
b) Find the correct answer to  $(3.4 \times 10^5) + (4.5 \times 10^4)$   
Give your answer in standard form.

$\underline{3.85 \times 10^5}$



5

Convert the numbers back to ordinary numbers to work out the calculations. Give your answers in standard form.

a)  $(2.5 \times 10^5) + (4.3 \times 10^4)$     b)  $(2.5 \times 10^5) + (3.4 \times 10^6)$

$= \underline{2.93 \times 10^5}$

$= \underline{3.65 \times 10^6}$

c)  $(1.7 \times 10^{-3}) + (2.7 \times 10^{-2})$

f)  $(6.3 \times 10^4) - (5.7 \times 10^3)$

$= \underline{2.87 \times 10^{-2}}$

$= \underline{5.73 \times 10^4}$

d)  $(6.8 \times 10^{-3}) + (7.9 \times 10^{-4})$

g)  $(6.3 \times 10^{-2}) - (5.7 \times 10^{-3})$

$= \underline{7.59 \times 10^{-3}}$

$= \underline{5.73 \times 10^{-2}}$

e)  $(2.5 \times 10^5) - (3.3 \times 10^4)$

h)  $(7.4 \times 10^{-4}) - (3.8 \times 10^{-5})$

$= \underline{2.17 \times 10^5}$

$= \underline{7.02 \times 10^{-4}}$

6

- a) The answer to  $(8 \times 10^5) + (4 \times 10^4)$  can be written in the form  $A \times 10^5$   
Circle the correct value of  $A$ .

12

1.2

84

8.4

- b) The answer to  $(6 \times 10^8) - (3 \times 10^7)$  can be written in the form  $5.7 \times 10^n$   
Circle the correct value of  $n$ .

1

7

8

15



# Multiply and divide numbers in standard form

- 1 a) Circle the correct answer to  $3 \times (2 \times 10^6)$
- $6 \times 10^6$      $6 \times 10^{12}$      $32 \times 10^6$      $32 \times 10^{12}$
- b) Circle the correct answer to  $(9 \times 10^5) \times 10$
- $9 \times 10^5$      $9 \times 10^6$      $9 \times 10^{50}$      $90 \times 10^{50}$
- c) Circle the correct answer to  $(8 \times 10^6) \div 2$
- $4 \times 10^3$      $4 \times 10^6$      $6 \times 10^6$      $8 \times 10^3$
- d) Circle the correct answer to  $(5 \times 10^7) \div 10$
- $0.5 \times 10^{-3}$      $5 \times 10^{-3}$      $0.5 \times 10^6$      $5 \times 10^6$

- 2 Here is how Dani and Tom work out  $(3 \times 10^4) \times (2 \times 10^5)$ .

Dani's method

$$\begin{aligned} (3 \times 10^4) \times (2 \times 10^5) \\ = 3 \times 2 \times 10^4 \times 10^5 \\ = 6 \times 10^9 \end{aligned}$$

Tom's method

$$\begin{aligned} (3 \times 10^4) \times (2 \times 10^5) \\ = 30,000 \times 200,000 \\ = 6,000,000,000 \\ = 6 \times 10^9 \end{aligned}$$

Whose method do you prefer? Various answers

Explain your answer.

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- 3 Work out the multiplications. Give your answers in standard form.

a)  $(2 \times 10^6) \times (4 \times 10^5) = \underline{8 \times 10^{11}}$     c)  $(3 \times 10^5) \times (3 \times 10^{-2}) = \underline{9 \times 10^3}$

b)  $(3 \times 10^5) \times (2 \times 10^7) = \underline{6 \times 10^{12}}$     d)  $(4.1 \times 10^{-3}) \times (2 \times 10^6) = \underline{8.2 \times 10^3}$

- 4 Work out the multiplications. Make sure your answers are in correct standard form.

a)  $(5 \times 10^4) \times (3 \times 10^5) = \underline{1.5 \times 10^{10}}$

b)  $(8 \times 10^4) \times (6 \times 10^7) = \underline{4.8 \times 10^{12}}$

c)  $(6.2 \times 10^6) \times (2 \times 10^5) = \underline{1.24 \times 10^{12}}$

d)  $(8 \times 10^5) \times (4 \times 10^{-2}) = \underline{3.2 \times 10^4}$

- 5 Dani and Tom are now working out  $(8 \times 10^6) \div (2 \times 10^4)$ .

Dani's method

$$\begin{aligned} (8 \times 10^6) \div (2 \times 10^4) \\ = (8 \div 2) \times (10^6 \div 10^4) \\ = 4 \times 10^2 \end{aligned}$$

Tom's method

$$\begin{aligned} (8 \times 10^6) \div (2 \times 10^4) \\ = \frac{8,000,000}{20,000} \\ = \frac{800}{2} \\ = 400 \\ = 4 \times 10^2 \end{aligned}$$

Whose method do you prefer this time? Various answers

Explain your answer.

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6 Work out the divisions. Give your answers in standard form.

a)  $(9 \times 10^6) \div (3 \times 10^4) = \underline{3 \times 10^2}$

b)  $(8 \times 10^6) \div (4 \times 10^{12}) = \underline{2 \times 10^{-6}}$

c)  $(9 \times 10^{12}) \div (2 \times 10^5) = \underline{4.5 \times 10^7}$

d)  $(6 \times 10^{-8}) \div (2 \times 10^2) = \underline{3 \times 10^{-10}}$

7 Circle the number  $0.5 \times 10^8$  written in correct standard form.

$\frac{1}{2} \times 10^8$        $5 \times 10^7$        $5 \times 10^9$        $5 \times 10^4$

8 Work out the divisions.

Make sure your answers are in correct standard form.

a)  $(2 \times 10^9) \div (4 \times 10^2) = \underline{5 \times 10^6}$       c)  $(3 \times 10^{-2}) \div (6 \times 10^4) = \underline{5 \times 10^{-7}}$

b)  $(2 \times 10^{12}) \div (8 \times 10^4) = \underline{2.5 \times 10^7}$       d)  $(3 \times 10^{-3}) \div (4 \times 10^5) = \underline{7.5 \times 10^{-9}}$

9 Work out the calculations and write  $>$ ,  $<$  or  $=$  to make the statements correct.

a)  $(8 \times 10^4) \times (6 \times 10^5)$   $\bigcirc$   $(8 \times 10^{12}) \div (2 \times 10^3)$

b)  $(5 \times 10^4) \times (6 \times 10^{-2})$   $\bigcirc$   $(9 \times 10^9) \div (3 \times 10^3)$

c)  $(6 \times 10^2) \div (4 \times 10^5)$   $\bigcirc$   $(3 \times 10^{-8}) \times (5 \times 10^7)$

10 1 trillion = 1,000 billion

There are about 40 trillion cells in the human body.

Each cell consists of about 100 trillion atoms.

About how many atoms are there in the human body altogether?

Give your answer in standard form.

$4 \times 10^{27}$

# Represent data in two-way tables

- 1 20 students were asked whether they had a pet.

The results are shown in the table.

Name	Year	Yes/No	Name	Year	Yes/No
Maria	Y7	Yes	Tim	Y7	Yes
Nancy	Y7	Yes	Graeme	Y7	Yes
Amy	Y7	Yes	Jeff	Y8	No
Aisha	Y8	No	Harry	Y7	No
Dominique	Y7	No	Hassan	Y8	No
Lucy	Y8	Yes	Marcus	Y7	No
Hannah	Y8	No	Theo	Y7	No
Zoe	Y7	Yes	William	Y7	Yes
Millie	Y8	No	Fred	Y7	No
Nima	Y8	No	Mika	Y8	Yes

- a) Use tallies to complete the two-way table.

	Owns a pet	Does not own a pet	Total
Year 7			
Year 8			
Total			

- b) Now complete the table of frequencies.

	Owns a pet	Does not own a pet	Total
Year 7	7	5	12
Year 8	2	6	8
Total	9	11	20

- 2 The masses of 25 melons and pumpkins are shown.

## Melons

11.6 kg   8.8 kg   9.5 kg   10.5 kg   7.8 kg   9.2 kg   12.8 kg  
7.2 kg   10.9 kg   11.0 kg   9.9 kg   10.2 kg   10.0 kg   6.8 kg

## Pumpkins

16.4 kg   18.2 kg   10.5 kg   9.5 kg   12.8 kg   14.2 kg   15.0 kg  
17.2 kg   11.5 kg   11 kg   10.7 kg

- a) Complete the two-way table.

	10 kg or lighter than 10 kg	Heavier than 10 kg	Total
Melon	8	6	14
Pumpkin	1	10	11
Total	9	16	25

- b) Write two things that you can see from the two-way table.

Various answers.

- c) How can you tell from the table how many pumpkins were weighed in total?

Look at the total of the row for pumpkin.

- 3 The table shows information about 200 people who were in a gym at a particular time.

	60 years old or younger	Over 60 years old	Total
Males	22	45	67
Females	19	114	133
Total	41	159	200

- a) Complete the table.
- b) How many males over 60 years were in the gym?

45

- c) How many males in total were in the gym?

67

- d) How many females were in the gym?

133

- e) How many females over 60 years were in the gym?

114

- f) What time of the day do you think this data was collected?

Give reasons for your answer.

7  
Various answers with correct justification.

- 4 The two-way table shows the number of children in a school who have school lunch.

Complete the two-way table.

	Year 4	Year 5	Year 6	Total
School lunch	12	24	22	58
No school lunch	18	8	6	32
Total	30	32	28	90

- 5 40 people take part in a show.

The show is made up of singers, dancers and actors.

Here is some information.

- There are 22 males in the show.
- 15 of the males are dancers.
- There are 8 female singers.
- Of the 7 actors, 2 are male.

- a) Draw a two-way table to show this information.

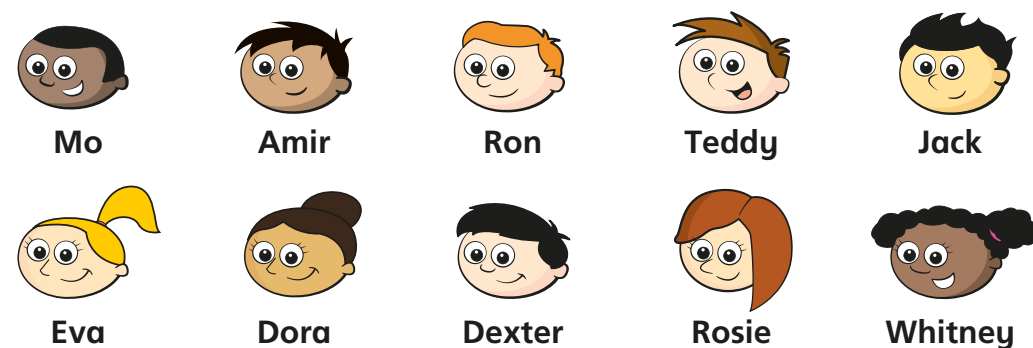
	Singers	Dancers	Actors	Total
Male	5	15	2	22
Female	8	5	5	18
Total	13	20	7	40

- b) How many dancers are in the show?

20

# Find probabilities from two-way tables

- 1 a) Complete the two-way table for these students.



	Name has fewer than five letters	Name has five letters or more	Total
Light hair	2	2	4
Dark hair	4	2	6
Total	6	4	10

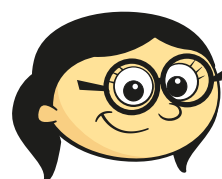
- b) A student is selected at random.

Fill in the missing information.

$$P(\text{dark hair}) = \frac{3}{5}$$

$$P(\text{light hair and name has five or more letters}) = \frac{1}{5}$$

- c) Annie is going to the cinema with one of the students above.



I am going to the cinema with a person who has dark hair.

What is the probability that the student has fewer than five letters in their name?

$$\frac{2}{3}$$

- 2 a) Complete the two-way table for these numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

	Factor of 30	Not a factor of 30	Total
Multiple of 3	3	3	6
Not a multiple of 3	4	10	14
Total	7	13	20

- b) Discuss with a partner the strategies you used to complete the table.

- c) A card is selected at random.

Fill in the missing information.

$$P(\text{multiple of 3}) = \frac{3}{10}$$

$$P(\text{not a factor of 30}) = \frac{13}{20}$$

$$P(\text{multiple of 3 but not a factor of 30}) = \frac{3}{20}$$

- d) Alex has selected a multiple of 3

What is the probability that it is also a factor of 30?

$$\frac{1}{2}$$



3 120 students were asked if they play sport and if they play an instrument.

a) Complete the missing values in the two-way table.

	Plays an instrument	Does not play an instrument	Total
Plays sport	47	25	72
Does not play sport	28	20	48
Total	75	45	120

A student is selected at random.

b) Work out the probability that the student plays a sport and plays an instrument.

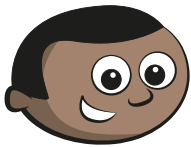
$$\frac{47}{120}$$

c) What is the probability that the student plays sport and does not play an instrument?

$$\frac{25}{120}$$

d) Work out  $P(\text{plays an instrument but does not play sport})$ .

$$\frac{28}{120}$$



Most people play sport and play an instrument.

e) Is Mo correct? NO

Explain your answer.

$$\frac{47}{120} < \frac{1}{2}$$

4 This two-way table shows information about books in a library.

	Fiction	Non-fiction	Total
Hardback	50	150	200
Paperback	480	320	800
Total	530	470	1,000

a) Use the information below to complete the table.

The ratio of hardback books to paperback books is 1 : 4

$P(\text{non-fiction paperback}) = 0.32$

If you select a paperback, there is a 60% chance it is fiction.

b) A book is selected at random.

Work out the probability that it is a fiction paperback.

Give your answer in its simplest form.

$$\frac{12}{25}$$

c) A non-fiction book is selected at random.

Work out the probability that it is a hardback.

Give your answer in its simplest form.

$$\frac{15}{47}$$