



Opportunity Class Sample Resources



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OC Mathematics

Name: _____

Date: _____

Subtraction algorithms

In the subtraction algorithms, we work from right to left. We subtract the digits one column at a time. Here are two different subtraction algorithms.

Trading or decomposition

'Trading' is based on the idea that 10 ones is the same as 1 ten; that 10 tens is the same as 1 hundred; and so on.

	Hundreds	Tens	Ones
	3	4	12
–	1	5	9
			3

Start in the ones column. There are not enough ones to take 9 away.

Trade 1 ten for 10 ones in the top number. Cross out the 4 and write a 3 to show that there are 3 tens left. Write a 1 to the left of the 2 to show that there are now 12 ones.

12 ones take away 9 ones = 3 ones.

	Hundreds	Tens	Ones
	3	13 4	12
–	1	5	9
		8	3

Now work in the tens column.

There are not enough tens to take 5 tens away. Trade 1 hundred for 10 tens. Cross out the 3 and write a 2 to show that there are 2 hundreds left. Now write a 1 in the tens column to show that there are now 13 tens.

13 tens take away 5 tens = 8 tens.

	Hundreds	Tens	Ones
	2 3	13 4	12
–	1	5	9
	1	8	3

Now for the hundreds column.

2 hundreds take away
1 hundred = 1 hundred.

$$342 - 159 = 183$$

Equal addition (borrow and pay back)

This uses the idea that if you add the same amount to two numbers, the difference between them the numbers remains the same.

For example, find the difference between 342 and 159.

	Hundreds	Tens	Ones
	3	4	2
–	1	5 ₁	9
			3

Start with the ones digits. There are not enough ones to take 9 away.

Add 10 to both numbers by adding 10 ones to the 2 in the ones column and 1 ten to the 5 in the tens column.

12 ones take away 9 ones = 3 ones.

	Hundreds	Tens	Ones
	3	14	12
–	1 ₁	5 ₁	9
		8	3

Now work in the tens column.

There are not enough tens to take 5 + 1 = 6 tens away.

Add 100 to both numbers by adding 10 tens to the 4 in the tens column and 1 hundred to the 1 in the hundreds column.

14 tens take away 6 tens = 8 tens.

	Hundreds	Tens	Ones
	3	14	12
–	1 ₁	5 ₁	9
	1	8	3

Now work in the hundreds column.

3 hundreds take away 2 hundreds (1 + the 1 added before) = 1 hundred.

$$342 - 159 = 183$$

Example 8

Find the difference between 6043 and 2796.

Solution

Trading

$$6043 - 2796$$

$$\begin{array}{r} \overset{5}{\cancel{6}} \overset{9}{0} \overset{13}{4} \overset{1}{3} \\ - 2796 \\ \hline 3247 \end{array}$$

Equal addition

$$6043 - 2796$$

$$\begin{array}{r} 6 \overset{10}{0} \overset{14}{4} \overset{13}{3} \\ - 2 \overset{1}{7} \overset{1}{9} \overset{1}{6} \\ \hline 3247 \end{array}$$

Whole class

- 1** Work in pairs. Person 1 does subtractions **a–d** and Person 2 checks the answers. Then Person 2 does subtractions **e–h** and Person 1 checks the answers.

a $7383 - 4269$

b $3801 - 2567$

c $5321 - 3784$

d $7004 - 3855$

e $8733 - 4629$

f $8310 - 5627$

g $5132 - 4873$

h $4007 - 3585$

i $7214 - 5836$

- 2** Use the digits in your postcode to set your partner five different 4- or 5-digit subtractions. You can use any of the digits more than once. Check your partner's answers.

3 Henry's one hundred thousand

Work in a group. Take turns to roll four dice to get a 4-digit number. For example, if Henry rolled 2, 4, 6 and 3, two of the numbers he could make are 6342 and 2634.

Each person starts with 100 000 points and takes turns to subtract the number from their total. The first person below 50 000 points wins the game.

Individual

1 Calculate these subtractions.

a $834 - 475$

b $711 - 487$

c $904 - 266$

d $632 - 348$

e $712 - 287$

f $936 - 788$

g $700 - 343$

h $942 - 558$

2 Work out the answers to these.

a $8021 - 2583$

b $3666 - 2257$

c $5444 - 2748$

d $5007 - 2398$

e $7002 - 3206$

f $8020 - 6434$

g $6203 - 4097$

h $5320 - 3927$

i $6134 - 897$

3 Calculate these subtractions.

a $7024 - 4222$

b $4831 - 2875$

c $2222 - 1999$

d $8335 - 7858$

e $5340 - 887$

f $2107 - 1099$

4 The Orange Company took 8435 cases of oranges to the market. They sold 3768 cases of oranges. How many cases were left?

5 Orchard Point School library has 5043 fiction books and 2706 non-fiction books. How many more fiction books are there than non-fiction books?

6 The Lovely Egg Company normally sells 9750 eggs each week. They have already sold 7995 eggs this week. How many more eggs do they need to sell?

7 Mr McDuff earned \$56 044 last year. He saved \$8675. How much did he spend?

8 There are 7746 sheep on Helen's farm. Helen sells 4975 sheep. How many are left?

9 Adams' Apples have a contract to supply 9250 apples to the supermarket. They have already picked 3878 apples. How many more do they need to pick?

10 The Fabulous Fish Farm had 12 125 small fish in a large pond. They sold 5850 of their fish. How many were left?

11 Complete **BLM 2** 'Addition and subtraction grids'.

Working with larger numbers

Both the addition and subtraction algorithms can be extended to larger numbers. You are only ever dealing with one column of single digits at a time.

Addition

Start at the right-hand side and add each column in turn, moving from the right to the left. Remember to record any carry numbers in the next column.

Example 9

Find the sum of 53 482, 48 677, 21 953 and 30 945.

Solution

$$\begin{array}{r} 53\ 482 \\ 48\ 677 \\ 21\ 953 \\ +\ 30\ 945 \\ \hline 155\ 057 \end{array}$$

To add whole numbers of different lengths, line them up according to their place value. The order you write them in does not matter. As long as the digits and the carry numbers are in the correct column, and your addition is accurate, you will get the right answer.

Example 10

Find the sum of 7, 43 468, 62, 6504 and 793.

Solution

$$\begin{array}{r} 43\ 468 \\ 6\ 504 \\ 793 \\ 62 \\ +\ 1\ 1\ 2\ 2\ 7 \\ \hline 50\ 834 \end{array}$$

Subtraction

Write the numbers one under the other, according to their place value. The number to be subtracted goes underneath. Start at the right-hand side and subtract each column in turn, moving from the right to the left. Trade wherever needed.

Example 11

Find the difference between 70204 and 31627.

Solution

Use trading or equal addition to find $70204 - 31627$.

Trading

$$\begin{array}{r} 70204 - 31627 \\ \begin{array}{cccccc} \overset{6}{7} & \overset{9}{0} & \overset{11}{2} & \overset{9}{0} & \overset{1}{4} \\ - & 3 & 1 & 6 & 2 & 7 \\ \hline 3 & 8 & 5 & 7 & 7 \end{array} \end{array}$$

Equal addition

$$\begin{array}{r} 70204 - 31627 \\ \begin{array}{cccccc} 7 & \overset{10}{0} & \overset{12}{2} & \overset{10}{0} & \overset{14}{4} \\ - & 3_1 & 1_1 & 6_1 & 2_1 & 7 \\ \hline 3 & 8 & 5 & 7 & 7 \end{array} \end{array}$$

The difference between 70204 and 31627 is 38577.

Individual

1 Calculate:

- a** $32\,264 + 25\,308$ **b** $17\,755 + 26\,426$ **c** $29\,216 + 13\,278$
d $45\,623 - 32\,458$ **e** $66\,009 - 35\,228$ **f** $91\,334 - 48\,675$

2 Complete these additions.

- a** $43\,600 + 65 + 6897 + 378$ **b** $3801 + 66\,224 + 89$
c $55\,214 + 899$ **d** $276 + 88 + 46\,354 + 4683$
e $3009 + 41\,355 + 274 + 67$

3 Calculate these subtractions.

- a** $36\,221 - 18\,365$ **b** $40\,832 - 26\,338$ **c** $54\,361 - 28\,979$
d $17\,055 - 9648$ **e** $29\,342 - 4366$

4 Use the algorithms to calculate these money amounts.

- a** $\$3266.75 + \2845.65 **b** $\$5504.30 + \4385.85
c $\$4423.20 - \1758.95 **d** $\$8000.00 - \3365.55

5 In the 2006 census, the population of these Australian cities was as follows.

City	State or territory	Population
Albany	WA	31 981
Alice Springs	NT	28 178
Bendigo	VIC	93 073
Dubbo	NSW	39 277
Launceston	TAS	60 833
Mount Isa	QLD	21 755
Whyalla	SA	24 152

- a** How many more people lived in Launceston than Alice Springs?
b What was the difference in population between Mount Isa and Bendigo?
c What was the total number of people living in Albany, Dubbo and Whyalla in 2006?
d How many fewer people lived in Whyalla than in Dubbo?
e What was the total population of all the towns listed in the table in 2006?
f How many short of 300 000 is your answer to part **e**?

- 6 a** Take 19 748 from 33 925.
- b** Subtract 45 968 from 100 000.
- c** Find the difference between 1 795 936 and 3 857 339.
- d** Write the number that is 142 587 937 more than 372 959 475.
- e** What is the sum of 38 576 and 28 843?
- f** What number is added to 49 596 to get 239 448?
- g** What number is 395 886 less than 3 145 712?
- 7** Add ten thousand four hundred and fifty-six to twenty-three thousand and eighty-eight.
- 8** Find the sum of 28 726, 365, 39 248 and 5867.
- 9** Tamara's brother has exactly fifty thousand dollars in his bank account. If he buys a new car for \$36 895 and pays for it out of his bank account, how much will be left in his account?
- 10** In 1975, George's father paid \$28 895 for a flat. In 2000, the flat was valued at \$397 000. How much did the flat go up in value during the 25 years?
- 11** The Mathsy Theatre has 13 seats in the first row, 15 seats in the second row, 17 seats in the third row, and so on. How many seats are in the theatre if there are 15 rows in all?
- 12** A spider caught 175 flies in her web in one week. Each day she caught 7 more flies than she did the day before. How many flies did the spider catch on each individual day?
- 13** For which numbers between 1 and 209 do the digits of the number add to 8?