Functional Skills
Maths

Level 1

Add, subtract, multiply and divide whole numbers using a range of strategies

v1.0

Functional Skills Maths:
Level 1

Skill Standard:
2

Coverage and Range:

Add, subtract, multiply and divide whole numbers using a range of mental methods.

- Multiply and divide whole numbers by 10 and 100 using mental arithmetic.
- Understand place value to two decimal places, for example 3 divided by 100.[1]

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1 QCA Functional Skills guidance: amplification of the standards June 2008 QCA/08/3700

Explain the Skill

Addition and Subtraction

When faced with a problem that involves adding or subtracting numbers you could use a calculator. However, with practise you will become proficient with addition and subtraction techniques and may find that some problems can be completed mentally and others completed just as quickly if written, as if a calculator had been used.

Words that mean add:
Sum, total, combined, more, increased by, plus, increase, altogether

Words that mean subtract:
Minus, deduct, withdraw, take away, reduced by, difference between, decrease, less

Adding and subtraction are opposite calculations. Always check your answer using the opposite process.   ie. 400 <u>add</u> 25 = 425   425 <u>minus</u> 25 = 400

Method - Formal Written

When you are adding and subtracting in columns, it is very important to line the numbers up correctly, keeping the place value.   Organised and neat work will reduce any errors.

Examples

Addition

```
    128             369            6582
+   253          + 144          + 7257
    381             513           13839
     1               11            1 1
```

Subtraction

```
                   4 1                     1                 0 9 9 1                 1  1  1
    187           452          452         1003             1003
-    46         -  34    or  -  34     -  866      or    -  866
    141           418           4             137             9 7
                              418                             137
```

To solve a practical problem you will need to identify if an addition or subtraction operation is required. Look for the key words in the question to help you decide.

Examples

A nursing home had 32 male and 41 female residents.

Question: How many residents are in the nursing home altogether?

The key word is "altogether", this means add

$$
\begin{array}{r}
32 \\
+41 \\
\hline
73
\end{array}
$$

Answer: There are 73 residents in the nursing home altogether.

Question: How many more female than male residents are there?

The key words in this question are "How many more" this means the same as "difference between" so it is a subtraction problem.

$$
\begin{array}{r}
4^{1}1 \\
-\ 3\ 2 \\
\hline
9
\end{array}
$$

Answer: There are 9 more female residents than male.

Explain the Skill

Addition and Subtraction

Method - Partitioning

Partitioning can be done instead of writing numbers in columns. It involves splitting large numbers into smaller numbers. Partitioning is simply splitting a number into hundreds, tens and units to make it easier to deal with.

Example
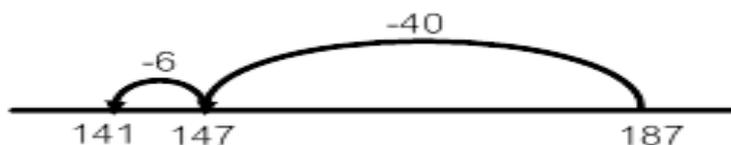
128 + 253

When using a number line, start at the biggest number 253, partition the smaller number into hundreds tens and units, add on the hundreds (1), then the tens (2) and finally the units (8) to 381.

For subtraction we do the same but move in the opposite direction on the number line.

187 – 46

To check if our answer is correct we can carry out the inverse operation:

If 187 - 46 = 141, and 141 + 46 = 187, we can be confident that we have the right answers.

Practise the Skill

1)   Complete this exercise using a method which works best for you.

Addition

941+ 38   12,349 + 603   58,394 + 827

_____   _____   _____

Subtraction

744 - 97   2065 – 1734   5298 -3239

_____   _____   _____

2)   A coffee shop sold 1627 espressos, 2741 cappuccinos and 4226 lattes. How many cups of coffee were sold in total?

_____

3)   A factory employs 3 full time workers and 6 part time workers, the amount earned by each is:

        £36,000 for the production supervisor;
        £27,000 for the machine operator;
        £21,000 for the general assistant;
        A total of £50,000 for part-time staff.

a)   How much was the wage bill for the 3 full-time staff?

£ _____

b)   What is the total wage bill?

£ _____

c)   How much less in total, do the part-time staff earn than the full-time staff?

£ _____

4)   In an art exhibition there are a total of 121 paintings, of these 15 were portraits, 8 were still lifes, 18 were abstracts and the rest were landscapes. How many were landscapes?

_____

5)   Sales of crisps for one month:

    Prawn Cocktail   50,000
    Cheese and Onion   20,000
    Salt and Vinegar   40,000

    a) How many packets of crisps were sold altogether?

_____

    b) How many more packets of prawn cocktail crisps were sold than salt and vinegar?

_____

6)   The numbers of rounds played on a golf course are:

Year 1	Year 2	Year 3	Year 4	Year 5
325	482	635	793	864

    a) How many rounds were played altogether?

_____

    c) How many more rounds were played in Year 4 than in Year 3?

_____

    d) What is the total increase from Year 1 to Year 5?

_____

7)   Amanda is making up the welcome packs for 128 delegates coming to the conference. She has 89 packs already and needs to order 29 more to have sufficient for the conference.

    Has she calculated correctly?

_____

Explain the Skill

Multiplication

Multiplying and dividing are opposite calculations. Always check your answer using the opposite process.   ie. 4 times 25 = 100   100 divided by 25 = 4

Words that mean multiply:
multiplied by, product of, times, double, triple

Short Multiplication

Written methods of calculating short multiplication.

Example 1 – **Standard Method**   364 × 3

Step 1) Multiply the units.

$$\begin{array}{r} 36\mathbf{4} \\ \times\quad 3 \\ \hline \mathbf{2} \\ {\scriptstyle 1} \end{array}$$

(4 × 3 = 12)
Remember to carry 1 into the tens column.

Step 2) Multiply the tens.

$$\begin{array}{r} 3\mathbf{6}4 \\ \times\quad 3 \\ \hline \mathbf{9}2 \\ {\scriptstyle 1} \end{array}$$

(6 × 3 = 18)
Remember to add the 1 carried (18 + 1 = 19).
Remember to carry 1 into the hundreds column.

Step 3) Multiply the hundreds.

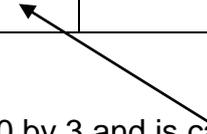$$\begin{array}{r} \mathbf{3}64 \\ \times\quad 3 \\ \hline \mathbf{10}92 \end{array}$$

(3 × 3 = 9)
 Remember to add the 1 carried (9 + 1 = 10).

Example 2 – **Grid Method**   364 × 3

Step 1) Partition the number into hundreds, tens and units.   (364 becomes)

×	**300**	**60**	**4**	
3	900	180	12	**= 1092**

Step 2) Multiply each part-product.
        900 comes from multiplying 300 by 3 and is called a part-product.
        180 comes from multiplying 60 by 3
        12 comes from multiplying 4 by 3

Step 3) Total each part-product to find the answer.

        900 + 180 + 12 = **1092**

Explain the Skill

Multiples

Being able to recall the first 12 multiples of the numbers 1 – 10 will be of great benefit when multiplying.

Multiples are multiplication tables.

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100
11	11	22	33	44	55	66	77	88	99	110
12	12	24	36	48	60	72	84	96	108	120

Remembering all these numbers is not as daunting as it first appears. There are several patterns within the table that can help us:

The multiples of two are all the even numbers:
 2, 4, 6 …..

The multiples of 5 end alternatively in 5 and 0:
 5, 10, 15, 20, 25……

Multiples of eleven are all double digits:
11, 22, 33, 44,……

The last digit of the multiples of 9 start at 9 and count down and the tens digit starts at zero and counts up.
09, 18, 27 …..

The last digit of the multiples of 8 are the even numbers counting down and repeating when they reach 0.
8, 16, 24, 32, 40, 48………

The multiples of ten all end in zero.
10, 20, 30 …….

Practise the Skill

1) Complete this exercise using a method which works best for you.

7, 14, 21, 28 are the first 3 multiples of 7. What are the next 2 multiples?

_____ , _____

2) Which of the following are multiples of 5?
Circle your answer.

2   15   22   25   30   34   55   70   83

3) If Marius buys 3 books each week, how many books will he buy in a full year?
(52 weeks in a year)

_____

4) If one lorry has 8 tyres, how many tyres will 63 lorries have?

_____

5) Leo is organising the transport for 60 students to go on a college visit. A minibus
will hold 12 people. Leo has provisionally booked 4 buses. Will this be enough?
Circle your answer.

Yes / No

6) Gemma is offered employment. The job pays £9 an hour. She would be required
to work 35 hours a week.
How much would she earn in a week?

_____

7) Five people buy a train ticket costing £25. How much have they spent altogether?

_____

8) There are 12 paper cups in each pack. How many in 8 packs?

_____

Explain the Skill

Squares

When a number is multiplied by itself, it is known as a square number.
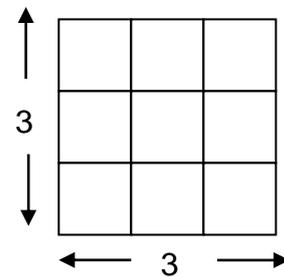
Rather than writing 3 x 3 it is normal to write 3^2.

When you see a number with the superscript 2 it means multiply the number by itself.

Examples

$3 \times 3 = 9$

$3^2 = 9$

Practice the Skill

1) Which of the following are square numbers?
    Circle your answers.

        9   16   7   14   25   20

2) Complete the following table:

Number	Square number
4	
	36
8	
	225
20	

3) Circle all the square numbers.

        36   400   16   44   22   81   64   57

4)   a) You are using 24 square tiles to form a square pattern in your bathroom.
            Can you make a square pattern that uses all the tiles?
            Circle your answer.

                                                                    Yes / No

        b) If you made a square pattern using the maximum amount of tiles, how many
            tiles would you have left?

                                                            _____

        c) What is the minimum number of extra tiles you would need to buy to be
            able to make a square pattern using all the tiles?

                                                            _____

5)   A chess board is 8 squares long by 8 squares wide.

        a) How many squares are on a chess board?

                                                            _____

        b) Is your answer a square number?

                                                                    Yes / No

Explain the Skill

Long Multiplication

Video

Practise the Skill

1)   Complete this exercise using a method which works best for you.

45 × 69	43 × 31	125 × 21
_____	_____	_____
362 × 34	3941 × 36	7298 × 52
_____	_____	_____

2)   There are 1760 yards in a mile. A marathon is approximately 26 miles how many yards is this?

_____ yards

3)   An airline owns 26 aircraft, each aircraft can accommodate 324 passengers. If every seat was occupied on each aircraft, what is the total number of passengers?

_____

4)   Each passenger can have 1 suitcase with a maximum weight of 24 kg in the hold of the aircraft. If on one flight there are 276 passengers on board, what is the maximum weight of luggage in the hold?

_____ kg

5)   Angela needs to cut 149 strips of ribbon for table decorations at her daughter's wedding. The strips need to be 36 cm long; how much ribbon in total does she need to buy?

_____ cm

6)   In a rugby tournament there are 16 teams invited to participate. Each team comprises of a squad of 25 players. Souvenir medallions are to be presented to each player. How many medallions will need to be ordered?

Explain the Skill

Short Division

Dividing is sharing something equally between a numbers of things or subtracting the same value a number of times. It can be thought of as the opposite or inverse of multiplication. Short division and long division are very similar. Short division is for dividing by numbers up to 9, and long division is for dividing by numbers greater than 9. Sometimes with division, there are numbers left over. These are called remainders.

Words that mean divide:
divided by, share, half

Written method of calculating short division.

<div align="center">

Example 1 - **Short Division**   762 ÷ 6

</div>

Step 1)   Divide 7 by 6

$$6\,\overline{)\,7\ \ ^{1}6\ \ 2}$$ with **1** above the 7

(7 ÷ 6 = **1 r 1**)
 Put the 1 above the 7 and carry the remaining 1 to the next digit.

Step 2)   Divide 16 by 6

$$6\,\overline{)\,7\ \ ^{1}6\ \ ^{4}2}$$ with **1 2** above

(16 ÷ 6 = **2 r 4**)
Put the 2 above the ^{1}6 and carry the remaining 4 to the next digit.

Step 3)   Divide 42 by 6

$$6\,\overline{)\,7\ \ ^{1}6\ \ ^{4}2}$$ with **1 2 7** above

(42 ÷ 6 = **7**)
Put the 7 above the ^{4}**2**.

Practise the Skill

1) Complete this exercise using a method which works best for you.

        256 ÷ 4   207 ÷ 9   441 ÷ 7

         _____   _____   _____

        1485 ÷ 5   2568 ÷ 8   3483 ÷ 3

         _____   _____   _____

2) Joshua has 7 different varieties of tulips in his garden.

    a) If he has 385 tulip plants in total and equal numbers of each variety, how many of each tulip variety does he have?

                                                     _____

    b) How could you check that this is correct?
       Circle your answer.

                                 385 x 7 / 385 + 55 / 55 x 7

3) Tom is preparing the school hall ready for the 112 students sitting the exam.

    a) If there is room for 8 desks in each row, how many rows will he need to ensure all exam candidates have a desk?

                                                     _____

    b) What calculation would you carry out to check your answer?
       Circle your answer.

                                 112 x 8 / 112 ÷ 8 / 8 x 14

4) You completed a journey of 252 miles in six hours. On average how far did you travel in one hour?

                                                     _____

5) There are 840 students in a school and the school is divided into 4 houses. There are an equal number of students in each house.

a) How many students will be in each house?

_____

b) The headmaster has said that there is to be 1 teacher for every 30 assigned to each house. How many staff members will there be in each house?

_____

6) Adrian sells his jars of honey in packs of 4. He has 128 jars to get ready to sell. How many packs can he make altogether?

_____

Explain the Skill

Long Division

Written methods of calculating long division.

Example 1 - **Long Division**   345 ÷ 15

Step 1)   Divide 3 by 15

```
        0
15 | 3  4  5
```
(3 ÷ 15 = **0**)
Put the **0** above the **3**.

Step 2)   Divide 34 by 15

```
        0  2
15 | 3  4  5
  -   3  0  ↓
         4  5
```
(34 ÷ 15 = **2** r 4)
Put the **2** above the 4 and the
actual sum underneath. 2 × 15 = 30
Take 30 from 34 and bring down the 5.

Step 3)   Divide 45 by 15

```
        0  2  3
15 | 3  4  5
  -   3  0
         4  5
  -      4  5
         0  0
```
(45 ÷ 15 = 3)
Put the **3** above the **5** and the actual
sum underneath.   3 × 15 = 45
Take 45 from 45.

Example 2 - **Long Division**   7320 ÷ 24

Step 1)   Divide 7 by 24

$$\begin{array}{r} 0 \\ 24\,\overline{)7\ 3\ 2\ 0} \end{array}$$

(7 ÷ 24 = **0**)
Put the **0** above the **7**.

Step 2)   Divide 73 by 24

$$\begin{array}{r} 0\ 3 \\ 24\,\overline{)7\ 3\ 2\ 0} \\ -\ \underline{7\ 2}\ \downarrow \\ 1\ 2 \end{array}$$

(73 ÷ 24 = **3** r 1)
Put the **3** above the 3 and the actual
sum underneath.   3 × 24 = 72
Take 72 from 73 and bring down the 2.

Step 3)   Divide 12 by 24

$$\begin{array}{r} 0\ 3\ 0 \\ 24\,\overline{)7\ 3\ 2\ 0} \\ -\ \underline{7\ 2}\ \ \downarrow \\ 1\ 2\ 0 \end{array}$$

(12 ÷ 24 = 0)
Put the **0** above the **2** and bring down
the 0.

Step 4)   Divide 120 by 24

$$\begin{array}{r} 0\ 3\ 0\ 5 \\ 24\,\overline{)7\ 3\ 2\ 0} \\ -\ \underline{7\ 2} \\ 1\ 2\ 0 \\ \underline{1\ 2\ 0} \\ 0\ 0\ 0 \end{array}$$

(120 ÷ 24 = 5)
Put the 5 above the 0 and the actual
sum underneath.   5 × 24 = 120
Take 120 from 120.

Practise the Skill

1) Complete this exercise using a method which works best for you.

   494 ÷ 26   1020 ÷ 15   1095 ÷ 15

   _____   _____   _____

   2868 ÷ 12   864 ÷ 32   9628 ÷ 29

   _____   _____   _____

2) 512 people are booked to travel on the 08:30 train from Edinburgh to Glasgow. There are 64 seats in each carriage.

   How many carriages are needed to ensure every passenger has a seat?

   _____

3) Robert is going to cut seedling support stakes from a piece of wood measuring 175 centimetres. Each support stake will be 12 centimetres in length.

   a) How many support stakes can Robert cut?

   _____

   b) Will there be any wood left over?

   Yes / No

4) You have to complete a journey of 336 miles. If you average a speed of 48 m/h, how long will the journey take?

   _____ hours

5) Riona has just passed her driving test. She wants to buy a car which costs £2700. Her dad is lending her the money.
She has agreed to pay him back monthly. Riona wants to have completely paid her dad back in 18 months.

She thinks to do this she will need to pay him £150 a month is she correct?
Circle your answer.

Yes / No

6) Claire receives a box of chocolates as a present. She decides to share them equally between herself and six friends. There are 42 chocolates in the box.

a) How many chocolates will each person get?

_____

b) If one of her friends tells her that she cannot eat chocolates, can the chocolates still be divided equally between Claire and her other friends? Circle your answer.

Yes / No

Explain the Skill

Multiply by 10, 100

To multiply by 1**0**, add **1** zero at the end of the whole number.
To multiply by 1**00**, add **2** zeros at the end of the whole number.

The number of zeros in 10/100 tells you how many zeros to add.
(1 digit for 10, 2 digits for 100).

Examples

59 x 10 = 590	59 x 100 = 5900
698 x 10 = 6980	698 x 100 = 69,800
67 x 100 = 6700	67 x 10 = 670
401 x 100 = 40,100	401 x 10 = 4010

Practise the Skill

1)   Complete this exercise using a method which works best for you.

82 × 100	7 × 10	136 × 100
_____	_____	_____
61 × 100	95 × 10	83 × 100
_____	_____	_____
888 × 10	3557 × 100	7438 × 10
_____	_____	_____

2)   There are 100 cm in a metre. How many cm are there in 5 m?

_____ cm

3)   You have 23, 10p pieces. How much is this in pounds and pence?

£ _____

4)   There are 10 chickens in a box weighing 3.2 kg each. What does the box of chickens weigh?

_____ kg

Explain the Skill

Divide by 10, 100

Division is an operation that is an opposite of multiplication. Mathematicians call this an "Inverse Operation".

When asked to divide a whole number by 10, 100 etc. we need to imagine that there is a decimal point after the units' digit.

To divide by 10, move the digits one place to the right.
To divide by 100, move the digits two places to the right.

Examples

$$361 \div 10 = 36.1$$
$$254 \div 100 = 2.54$$
$$650 \div 100 = 6.5$$
$$62 \div 100 = 0.62$$

Practise the Skill

1)   Complete this exercise using a method you are most happy with.

$76 \div 10$	$38 \div 100$	$423 \div 10$
_____	_____	_____
$8246 \div 100$	$6257 \div 10$	$9348 \div 1000$
_____	_____	_____

2)   One metre equals 100 cm. How many metres are there in 352 cm?

_____ m

3)   I have £345; it is all in 10p coins. How many coins do I have?

_____

4)   I have £367 and I want to buy 10 prizes all of equal value.

       How much can I spend on each prize?

£ _____

5)   240 trees are cut down to make 10 tons of newspaper.

       How many trees are cut down to make 1 ton of newspaper?

_____

6)   A school is encouraging the students to recycle cans. Every student recycling 100 cans receives a small prize. 24,300 cans are recycled.

       How many prizes are needed?

_____

7)   Aidan has been saving for 10 months for a deposit on a new house. He has £1350 in his account.

       How much does he need to save each month?

£ _____

Explain the Skill

Using Estimation to Check Results

Estimation is sometimes used to give an approximate answer to a calculation. This is useful when you need to do a rough estimate or when a sensible approximation figure would be adequate. When estimating, you need to round to an appropriate number. This may be to the nearest 5, 10 or 100.

Example

I have currently saved £800 for a holiday.

I see a 7 day beach holiday advertised for £600.

I think I will need £40 a day to spend while on holiday and it will cost £65 to travel to and

from the airport.

Have I saved enough?

The 7 day beach holiday will cost		£600
(7 x £40)	Daily expenses	£280
	Travel to airport	£65

Therefore, I will need about £945 in total for the holiday.

No, I haven't saved enough. I will need to save approximately £145 more.

Practise the Skill

1) Complete the following table:

Question	Estimate	Actual
e.g. 212 × 91	200 × 100 = 20000	212 × 91 = 19292
111 × 222	100 x 200 = 20,000	
301 × 709	300 x 700 = 210,0000	
589 × 216	600 x 200 = 120,000	
391 × 68	400 x100 = 40,000	
243 × 639	200 x 600 =120,000	

2) There are 65 people in the factory. Each person drinks 1 soft drink each day for 20-21 days per month. I have ordered 1200 soft drinks for next month.
Have I calculated correctly?

Circle your answer.

Yes / No

3) Lisa sells 380 bunches of flowers each week. She has estimated that she sells 182,000 bunches in a year.
If she works 48 weeks per year, is her estimation likely to be accurate?

Circle your answer.

Yes / No

4) Russ buys 3 items costing £48 each. The shop charges him £198.
Has the shop charged Russ too much?

Circle your answer.

Yes / No

5) Rob is starting a new job soon and needs to buy 5 shirts at £18 each. Rob calculates he can buy all 5 shirts for £100.
Is he correct?

Circle your answer.

Yes / No

Apply the Skill

1) Highcroft Park Village offers self-catering accommodation to 2400 students. The village comprises of blocks of flats. Each block has 30 flats and in each flat there are 10 bedrooms.
What is the minimum number of blocks of flats in the village?

_____

2) Ellie and three friends are at the same university. There are 30 660 students at the university, 26 143 of these are full time students. How many part time students are there?

_____

3) Ellie and her three friends decide to share a house together and start looking at properties on the internet.

Rooms to rent *(House 1)*

4 bedroom house. All rooms en suite. All bills included.
£1560 per month (4 weeks).

House to rent *(House 2)*

4 bedrooms. Bills not included. 20 minutes walk to shops.
£75 per week.

4 bedrooms to rent in large house *(House 3)*

Shared facilities. Bills and broadband included.
£92 per week per person.

Ellie estimates that they need a total of £240 per month (4 weeks) to pay for all the bills.

a) What is the least amount they can rent a room for a week including bills?

£ _____

The girls decide they would prefer to have en suite facilities and are willing to pay a bit more. Before the girls can move in the landlord wants a deposit of £375 and £1560 for a months' rent in advance.

b) How much does Ellie have to pay for her share of the deposit and rent?

£ _____

4) Ellie's parents travel down to see her and have a look at the property. When they start off the mileage on the car reads 46 817 when they return home it is 47 441.

How far away is Ellie's house from her parent's house?

_____ miles

5) Ellie and her friends go to the students union to see a band play. Tickets are £3 if purchased in advance or £5 if bought at the door. The total amount received from ticket sales was £11 500 and the amount received from tickets bought on the door was £3250.

How many tickets were sold altogether?

_____ tickets

6) Ellie is going on a geography field trip for a week to the Scottish Highlands. There will be 29 students and 3 lecturers going on the trip. All the university minibuses have been booked out and the department have to hire minibuses for the trip.

1 of the students uses a wheelchair and 2 of the seats will have to be removed to allow for wheelchair access.

What is the least amount the department will have to pay to ensure everyone can go on the trip?

£ _____