GCSE Maths – Number

Four Operations

Worksheet

WORKED SOLUTIONS

This worksheet will show you how to work out different types of questions on the four operations. Each section contains a worked example, a question with hints and then questions for you to work through on your own.

Section A – Integers

Worked Example 1

Work out $456 + 346$

Step 1: Put the numbers into columns.

```
    4    5    6
+   3    4    6
  _____
```

Step 2: Starting with the right, add 6 onto 6. This gives us 12 which is equal or above 10, meaning we have to carry the 1 into the tens column, leaving a 2 in the units column.

```
    4    5    6
+   3    4    6
  _____
              2
```

Step 3: In the tens column, we add 4 onto 5, giving 9 (representing 40+50=90). But, since we have carried an 'extra' 10 from the previous column, we get 10 (representing 100). Again, we must carry this into the hundreds column and leave a 0 in the tens column.

```
    4    5    6
+   3    4    6
  _____
         0    2
```

Step 4: Finally, in the leftmost column, add the 3 onto the 4 to get 7 (representing 300+400 = 700). Since we carried an 'extra' 100 from the previous column we get 8 (representing 800).

```
    4    5    6
+   3    4    6
  _____
    8    0    2
```

Hence, we have that $456 + 346 = 802.$

Guided Example 1

Work out 782 − 234

Step 1: Put the numbers into columns. Here, make sure the smaller number is placed underneath the larger number.

$$
\begin{array}{ccc}
7 & 8 & 2 \\
-\ 2 & 3 & 4 \\
\hline
\end{array}
$$

Step 2: Starting from the rightmost column, calculate the difference between the two numbers in each column, deciding whether or not you need to 'borrow' a ten from the next column along. Do this for all three columns.

$$
\begin{array}{ccc}
7 & \overset{7}{\cancel{8}} & {}^{1}2 \\
-\ 2 & 3 & 4 \\
\hline
5 & 4 & 8 \\
7-2 & 7-3 & 12-4
\end{array}
$$

2 − 4 is negative so 'borrow' a 10 from the 8.

Step 3: Deduce the final answer.

$$782 - 234 = 548$$

Worked Example 2

Calculate 42×56

Step 1: Put the numbers into a grid:

×	40	2
50		
6		

Step 2: Multiple each of the numbers in the top row with each of the numbers in the leftmost column, filling in the grid.

×	40	2
50	2000	100
6	240	12

Step 3: Next, sum up all the numbers on the inside of the grid.

In this case we want $2000 + 100 + 240 + 12$. *This can be done mentally or by using the column method.*

$$2000 + 100 + 240 + 12 = 2352$$

Hence, $42 \times 56 = 2352$.

Guided Example 2

Calculate 13×27

Step 1: Put the numbers into a grid

$27 = 2$ tens
7 units $\rightarrow$

$13 = 1$ ten
3 units $\leftarrow$

×	10	3
20		
7		

Step 2: Multiple each of the numbers in the top row with each of the numbers in the leftmost column, filling in the grid

×	10	3
20	200	60
7	70	21

Step 3: Add up all the numbers on the inside of the grid to find the total.

$$200 + 60 + 70 + 21 = 351$$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

1. Work out

$7 + 4 = 11$ so carry the 1

a) $78 + 341$

```
    7 8
+  ₁3 4 1
   4 1 9
```
$= 419$

b) $590 - 233$

$0 - 3$ is negative so 'borrow' a 10 from 90

```
  5 ⁸9̸ ¹0
-   2 3 3
  3 5 7
```
$= 357$

c) 12×45

×	40	5
10	400	50
2	80	10

$400 + 50 + 80 + 10 = 540$

d) $564 \div 3$

3 goes into 5 once, with 2 left over

```
    1 8 8
3 | 5 ²6 ²4
```
$= 188$

e) 75×9

×	70	5
9	630	45

$630 + 45 = 675$

f) $844 - 261$

```
  7 8̸ ¹4 4
-   2 6 1
  5 8 3
```
$= 583$

g) $1472 \div 64$

```
        0 0 2 3
64 | 1 ¹4 ¹⁴7 ¹⁹2
```
$= 23$

64 doesn't go into 14 so the remainder

Section B - Fractions

Worked Example

Work out $\dfrac{4}{3} + \dfrac{7}{4}$

Step 1: Identify a common denominator for the two fractions.

Looking at the denominators 3 and 4, we see that they share the common multiple of 12 ($3 \times 4 = 12$ and $4 \times 3 = 12$).

Step 2: Put both fractions over the common denominator you identified.

With $\frac{4}{3}$, if we wish to change the denominator into 12, we multiply it by 4. This means we must also multiply the numerator by 4 otherwise the fraction will not be equivalent to the original one. Hence,

$$\frac{4}{3} = \frac{4}{3} \times \frac{4}{4} = \frac{16}{12}$$

Similarly, with $\frac{7}{4}$, we multiply the top and bottom by 3:

$$\frac{7}{4} = \frac{7}{4} \times \frac{3}{3} = \frac{21}{12}$$

Step 3: Now simply add the numerators of the fraction.

$$\frac{4}{3} + \frac{7}{4} = \frac{16}{12} + \frac{21}{12} = \frac{16 + 21}{12} = \frac{37}{12}$$

Guided Example

Work out $\dfrac{7}{9} \div \dfrac{4}{3}$

Step 1: Flip the second fraction in the question around so that the numerator becomes the denominator, and the denominator becomes the numerator.

$$^4/_3 \rightarrow {}^3/_4$$

Step 2: Now, you can change the divide sign to a multiply sign. Then, multiply the two fractions together.

$$\frac{7}{9} \times \frac{3}{4} = \frac{7 \times 3}{9 \times 4} = \frac{21}{36}$$

Step 3: Simplify your answer by finding any common factors between the numerator and denominator.

$$\frac{21}{36} = \frac{7}{12} \leftarrow \text{divide top and bottom by 3.}$$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

2. Work out:

a) $\frac{1}{2} + \frac{5}{6}$ ×3

$\frac{1}{2} = \frac{3}{6}$ ×3

$\frac{3}{6} + \frac{5}{6} = \frac{3+5}{6} = \frac{8}{6} = \boxed{\frac{4}{3}}$ ÷2 to simplify ÷2

b) $\frac{6}{7} + \frac{8}{21}$ ×3

$\frac{6}{7} = \frac{18}{21}$ ×3

$\frac{18}{21} + \frac{8}{21} = \frac{18+8}{21} = \boxed{\frac{26}{21}}$

c) $\frac{3}{2} + 9$

$9 = \frac{9}{1} = \frac{18}{2}$ ×2

$\frac{3}{2} + \frac{18}{2} = \frac{3+18}{2} = \boxed{\frac{21}{2}}$

d) $\frac{8}{3} + 2\frac{4}{7}$ 21 is LCM of 3 and 7

$\frac{8}{3} = \frac{56}{21}$ ×7

$2\frac{4}{7} = \frac{14}{7} + \frac{4}{7} = \frac{18}{7} = \frac{54}{21}$ ×3

$\frac{56}{21} + \frac{54}{21} = \boxed{\frac{110}{21}}$

e) $\frac{7}{9} - \frac{2}{3}$ ×3

$\frac{2}{3} = \frac{6}{9}$ ×3

$\frac{7}{9} - \frac{6}{9} = \frac{7-6}{9} = \boxed{\frac{1}{9}}$

f) $\frac{9}{11} - \frac{1}{14}$ LCM of 11 and 14 is 154.

$\frac{9}{11} = \frac{126}{154}$ ×14

$\frac{1}{14} = \frac{11}{154}$ ×11

$\frac{126}{154} - \frac{11}{154} = \frac{126-11}{154} = \boxed{\frac{115}{154}}$

g) $\frac{3}{7} - \frac{2}{5}$ ×7

$\frac{2}{5} = \frac{14}{35}$ ×7

$\frac{3}{7} = \frac{15}{35}$ ×5

$\frac{15}{35} - \frac{14}{35} = \boxed{\frac{1}{35}}$

h) $\frac{7}{11} - 1\frac{4}{3}$

$\frac{7}{11} = \frac{21}{33}$ ×3

$1\frac{4}{3} = \frac{3}{3} + \frac{4}{3} = \frac{7}{3}$

$\frac{7}{3} = \frac{77}{33}$ ×11

$\frac{21}{33} - \frac{77}{33} = \frac{21-77}{33} = \boxed{\frac{-56}{33}}$

i) $\frac{9}{3} \div \frac{3}{2}$ flip second fraction $\frac{3}{2} \rightarrow \frac{2}{3}$

$$= \frac{9}{3} \times \frac{2}{3} = \frac{9 \times 2}{3 \times 3} = \frac{18}{9} = \boxed{2}$$

j) $\frac{8}{5} \times \frac{3}{9}$

$$\frac{8}{5} \times \frac{3}{9} = \frac{8 \times 3}{5 \times 9} = \frac{24}{45} \overset{\div 3}{\underset{\div 3}{=}} \boxed{\frac{8}{15}}$$

k) $\frac{6}{11} \times \frac{2}{7}$

$$\frac{6}{11} \times \frac{2}{7} = \frac{6 \times 2}{11 \times 7} = \boxed{\frac{12}{77}}$$

l) $\frac{9}{5} \div \frac{6}{13}$

$$= \frac{9}{5} \times \frac{13}{6} = \frac{9 \times 13}{5 \times 6} = \frac{117}{30} \overset{\div 3}{\underset{\div 3}{=}} \boxed{\frac{39}{10}}$$

m) $\frac{3}{10} \times \frac{20}{9}$

$$\frac{3}{10} \times \frac{20}{9} = \frac{60}{90} \overset{\div 30}{\underset{\div 30}{=}} \boxed{\frac{2}{3}}$$

n) $\frac{8}{5} \times \frac{3}{9}$

$$\frac{8}{5} \times \frac{3}{9} = \frac{8 \times 3}{5 \times 9} = \frac{24}{45} \overset{\div 3}{\underset{\div 3}{=}} \boxed{\frac{8}{15}}$$

o) $1\frac{3}{4} \times \frac{9}{2}$

$$1\frac{3}{4} = \frac{4}{4} + \frac{3}{4} = \frac{7}{4}$$

$$\frac{7}{4} \times \frac{9}{2} = \frac{7 \times 9}{4 \times 2} = \boxed{\frac{63}{8}}$$

Section C – Decimals

Worked Example 1

Work out $1.234 + 4.321$

Step 1: Put the numbers, and decimal place, into columns.

```
      1  .  2  3  4
  +   4  .  3  2  1
  _____
```

Step 2: Proceed as normal with column addition.

```
      1  .  2  3  4
  +   4  .  3  2  1
  _____
      5  .  5  5  5
```

Hence, $1.234 + 4.321 = \mathbf{5.555}$

Guided Example 1

Work out $9.540 - 4.348$

Step 1: Remove the decimal place and proceed with 9540 – 4348. The decimal place can be removed by multiplying each number by a certain power of 10.
Use any method of subtraction, such as column subtraction to do the calculation.

$9.540 \times 1000 = 9540 \ (10^2)$
$4.348 \times 1000 = 4348 \ (10^2)$

$$
\begin{array}{r}
9\ ^4\cancel{5}\ ^{1}3\cancel{4}\ ^1 0 \\
-\ 4\ 3\ 4\ 8 \\
\hline
5\ 1\ 9\ 2
\end{array}
$$
← using column method

Step 2: Put the decimal back in to the correct place by dividing your answer to Step 2 by how many powers of 10 you multiplied by in Step 1.

$5192 \div 1000 = 5.192$
(10^2)

$9.540 - 4.348 = \boxed{5.192}$

Worked Example 2

Work out 4.5×8.9

Step 1: Identify the number of decimal places in the final answer.

Combined, there are two decimal places in these numbers, therefore the answer will have two.

Step 2: Using the grid method, or otherwise, multiply the numbers together, ignoring the decimal places.

$$45 \times 89 = 4005$$

Step 3: Insert the decimal point back into the final answer.

We know the answer will have two decimal places, so we put the decimal place such that two of the numbers in 4005 *are after it:*

$$4005 \rightarrow 40.05$$

Hence, $4.5 \times 8.9 = 40.05$

Guided Example 2

Calculate $14.8 \div 0.4$

Step 1: Convert the decimals into fractions.

$$\overset{\times 5}{\overbrace{\frac{14.8}{1}}} = \frac{74}{5} \qquad \overset{\times 5}{\overbrace{\frac{0.4}{1}}} = \frac{2}{5}$$
$$\underset{\times 5}{\underbrace{\phantom{\frac{14.8}{1}}}} \qquad \underset{\times 5}{\underbrace{\phantom{\frac{0.4}{1}}}}$$

use a multiplier that gets rid of the decimal place in the fraction.

Step 2: Calculate the division of the fractions, using the fraction division technique where the second fraction is flipped, and the division sign is changed to a multiplication sign.

$$\frac{74}{5} \div \frac{2}{5} = \frac{74}{5} \times \frac{5}{2} = \frac{370}{10}$$

flip this one

Step 3: Simplify the fraction if necessary.

$$\overset{\div 10}{\overbrace{\frac{370}{10}}} = \frac{37}{1} = \boxed{37}$$
$$\underset{\div 10}{\underbrace{\phantom{\frac{370}{10}}}}$$

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

3. Work out: *You can use any of the methods shown above.*

a) 0.436 + 0.761

```
  0 . 4 3 6
+ ₁0 . 7 6 1
─────────────
  1 . 1 9 7
```
= **1.197**

b) 9.372 + 0.66

← line up decimal points.

```
  0 . 6 6 0
+ ₁9 . ₁3 7 2
─────────────
 1 0 . 0 3 2
```
= **10.032**

c) 341.25 + 91

```
  9 1 . 0 0
+ ₁3 4 1 . 2 5
─────────────
  4 3 2 . 2 5
```
= **432.25**

d) 67.293 − 83.725

83.725 > 67.293
So find 83.725 − 67.293

```
 ⁷8̶¹3 . ⁶7̶ ¹2 5
−  6 7 . 2 9 3
──────────────
   1 6 . 4 3 2
```
= **−16.432**

↗ make this negative

e) 53.298 − 20

53.298 × 1000 = 53298
20 × 1000 = 20000

```
  5 3 2 9 8
− 2 0 0 0 0
───────────
  3 0 2 9 8
```

30298 ÷ 10000
= **30.298**

f) 0.4729 − 0.9911

0.9911 > 0.4729
so find the difference then make negative

```
  0 . 9 8̶9̶ ¹0̶ ¹1
− 0 . 4 7 2 9
──────────────
  0 . 5 1 8 2
```
= **−0.5182**

↗ make negative

g) 0.67792 − 3

3 > 0.67792
so find the difference then make negative

```
  ²3̶ . ¹0̶ ¹0̶ ¹0̶ ¹0̶ ¹0
−  0 . 6 7 7 9 2
────────────────
   2 . 4 2 3 0 8
```
= **−2.42308**

↗ make negative

h) 51.2 ÷ 6.4

×10 = 512   ×10 = 64

division is relative so

51.2 ÷ 6.4 = 512 ÷ 64

$$64 \overline{\smash{\big)}\, \overset{0\ \ \ 0\ \ \ 8}{\cancel{5}\ \ \cancel{5}\cancel{1}\ \ ^{51}2}}$$

= **8**

i) 9.8 × 6

×10 = 98

×	90	8
6	540	48

540 + 48 = 588

588 ÷ 10 = **58.8**

j) 4.2 × 9.5

×10 = 42   ×10 = 95

×	90	5
40	3600	200
2	180	10

```
  3600
   200
   180
+   10
  3990
```

we have multiplied by 10 twice, so divide by 10×10 (100)

3990 ÷ 100 = **39.9**

k) 63.7 ÷ 9.8

×10 = 637   ×10 = 98

if value does not fit into final digit, add decimal points to top and bottom and continue.

$$98 \overline{\smash{\big)}\, \overset{0\ \ \ 0\ \ \ 6\ \cdot\ 5}{6\ \ ^6\cancel{3}\ ^{63}7.^{49}0}}$$

= **6.5**

l) 5.6 × 2.3

×10 = 56   ×10 = 23

×	20	3
50	1000	150
6	120	18

```
  1000
   150
   120
+   18
  1288
```

1288 ÷ 100 = **12.88**

m) 82.73 × 0.761

×100 = 8273   ×1000 = 761

×	700	60	1
8000	5600000	480000	8000
200	140000	12000	200
70	49000	4200	70
3	2100	180	3

```
 5600000
  480000
  140000
   49000
   12000
    8000
    4200
    2100
     180
     200
      70
       3
 6295753
```

6295753 ÷ 100000 = **62.95763**

we did ×100 and ×1000 at the start, so we must divide by 100 × 1000 (100000)

Section D – Using BIDMAS

Worked Example

Calculate $5 \times (4 + 1)$

Step 1: Write down what each letter of BIDMAS stands for so you can work out the order of operations.

Brackets
Indices
Division
Multiplication
Addition
Subtraction

Step 2: Since brackets comes first in the BIDMAS order, we do the operation inside the brackets first.

$$(4 \times 1) = 5$$

Step 3: Write out the calculation but replace the $(4 + 1)$ brackets with the value 5 as you calculated this in Step 2.

$$5 \times (4 + 1) = 5 \times (5)$$

Step 4: There is only one operation left (multiplication), so multiply the two values together, giving you your final answer.

$$5 \times (5) = \mathbf{25}$$

Guided Example

Calculate $30 \times (64 \div 8)^2$

Step 1: Look at the BIDMAS order to identify the order of operations.

$\underline{B}_{①} \; \underline{I}_{②} \; D \; \underline{M}_{③} \; A \; S$ we do the brackets first, then the index, then the multiplication.

Step 2: Carry out the operations in the correct order.

$30 \times (64 \div 8)^2$ $64 \div 8 = 8$ (B)
$= 30 \times (8)^2$ $8^2 = 64$ (I)
$= 30 \times 64$
$= \boxed{1920}$ $30 \times 64 = 1920$ (M)

Now it's your turn!
If you get stuck, look back at the worked and guided examples.

4. Work out:

a) $16 \times (24 \div 4)$ = $16 \times (6)$ $24 \div 4 = 6$ Ⓑ
   B   = 96 $16 \times 6 = 96$ Ⓜ
   I
   D
   M
   A
   S

b) $42 + (54 \div 9) - (2 \times 7^3)$ = $42 + (6) - (2 \times 343)$ Ⓑ
   Ⓑ   = $42 + 6 - 686$ Ⓐ
   I
   D   *do inside*   = $48 - 686$ Ⓐ
   Ⓜ   *of bracket*   = -638 Ⓢ
   Ⓐ   *according*
   Ⓢ   *to BIDMAS*

c) $5^{(2+1)} \times (23 + 67) - (12 \div 4)$ = $5^{(3)} \times (90) - (3)$ Ⓑ
   Ⓑ   = $125 \times 90 - 3$ Ⓜ
   I
   D   = $11\,250 - 3$ Ⓜ
   Ⓜ
   A   = $11\,247$ Ⓢ
   Ⓢ

d)   Ⓑ
   $34 - (6 \times 7) \div 3$ = $34 - (42) \div 3$ Ⓓ
   Ⓑ   = $34 - 14$ Ⓢ
   I
   Ⓓ   = 20
   M
   A
   S

e)   Ⓑ
   $90 + 7 \times 5 - (45 \div 9)$ = $90 + 7 \times 5 - (5)$ Ⓜ
   Ⓑ   = $90 + 35 - 5$ Ⓐ
   I
   D   = $125 - 5$ Ⓢ
   Ⓜ
   Ⓐ   = 120
   Ⓢ

f)   B
   $2^{3 \times 2} - 6 \div 2 + 7 \times 3$ = $2^6 - 6 \div 2 + 7 \times 3$ Ⓘ
   Ⓑ   = $64 - 6 \div 2 + 7 \times 3$ Ⓓ
   Ⓘ
   D   = $64 - 3 + 7 \times 3$ Ⓜ
   M
   A   = $64 - 3 + 21$ Ⓜ
   S
                       = 82