Age 11+ Level ★
Worksheet 1 - Solutions

1. Reverse Subtraction

c = 3

nrich.maths.org/4951/solution

2. Bus Route

600m

nrich.maths.org/6246/solution

3. Debasing the Coinage

240g lighter

nrich.maths.org/6247/solution

4. Fly Away

A = 2
F = 8
L = 7
W = 6
Y = 5

$$\begin{array}{r} 875 \\ +\ 875 \\ \underline{875} \\ 2625 \end{array}$$

nrich.maths.org/5001/solution

5. Hot Dogs

She ate 4 hot dogs on the first day

nrich.maths.org/12868/solution

6. 2014 Even Numbers

The difference between the two sums is 2014

nrich.maths.org/12924/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★
Worksheet 2 - Solutions

1. Down and Along

J = 1
M = 9
C = 8
nrich.maths.org/10198/solution

```
  11
+ 99
  88
 198
```

2. 354972

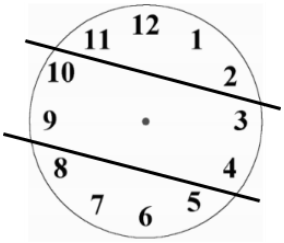
The remainder is 2
nrich.maths.org/11668/solution

3. Subtracting to 2008

P = 6 Q = 1 R = 9 S = 0
So P + Q + R + S = 16
nrich.maths.org/10150/solution

```
 8100
- 6092
 2008
```

4. Split Clock face



nrich.maths.org/12831/solution

5. 50, 50, 50 and 50

He will be 56 on his next birthday
nrich.maths.org/11687/solution

6. Missing Digits

K = 1 L = 0 M = 2
N = 5 P = 6
nrich.maths.org/12864/solution

```
 102564
x     4
 410256
```

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★
Worksheet 3 - Solutions

1. Identical Digit Multiplication
77 x 55 = 4235
so the product is 4235
nrich.maths.org/12877/solution

2. In Sum-mary
The product of all three numbers is 0
nrich.maths.org/7162/solution

3. Carry Over
M = 0, so M has the lowest value
nrich.maths.org/6253/solution

$$\begin{array}{r} 98 \\ +\ 4 \\ \hline 102 \end{array}$$

4. Magic Error
13 and 15 need to be swapped to create a Magic Square
Their sum is 28
nrich.maths.org/10108/solution

5. Walk or Run?
Walking both ways would take him 56 minutes
nrich.maths.org/12567/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★★
Worksheet 1 - Solutions

1. Jam and Egg Sandwich

E = 2 G = 8 J = 5
A = 7 M = 6

$$\begin{array}{r} 288 \\ \times \quad 2 \\ \hline 576 \end{array}$$

nrich.maths.org/7186/solution

2. So Many Sums

$$\begin{array}{r} 36 \\ +\ 2987 \\ \hline 3023 \end{array} \quad \text{or} \quad \begin{array}{r} 37 \\ +\ 2986 \\ \hline 3023 \end{array}$$

Therefore $Y \times O = 6 \times 7$ (or 7×6) $= 42$

nrich.maths.org/5031/solution

3. Rolling Along the Trail

The scores were 10, 15, 9, 20, 12

nrich.maths.org/7183/solution

4. Kangaroo Subtraction

The largest possible value of 'KAN' is 864

$$\begin{array}{r} 864 \\ -\ 765 \\ \hline 99 \end{array}$$

nrich.maths.org/6756/solution

5. Operational Decision

$1 \times 2 \times (3 \times 4 + 5) \times (6 \times 7 + 8 + 9) = 2006$

so × should replace ⊕

nrich.maths.org/10140/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★★
Worksheet 2 - Solutions

1. Multiple Choice

She answered 62 questions correctly

nrich.maths.org/12882/solution

2. Adding Tricky Fractions

They add to 1

nrich.maths.org/12913/solution

3. See Axes

X = 7

$$\begin{array}{r} 899 \\ +\ 899 \\ \hline 1798 \end{array}$$

nrich.maths.org/13138/solution

4. ABC Addition

abc = 367

$$\begin{array}{r} 367 \\ +\ 376 \\ \hline 743 \end{array}$$

nrich.maths.org/13140/solution

5. Palindromic Milometer

His greatest possible average speed was $\frac{211}{3} = 70\frac{1}{3}$ miles per hour

nrich.maths.org/12865/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★★
Worksheet 3 - Solutions

1. Quiz Question
40 matches
nrich.maths.org/12575/solution

2. Sum of Ten
The largest possible integer is 55
nrich.maths.org/12568/solution

3. Filling Morecambe Bay
$6 \times 60 \times 24 \times 365 \times (2 \times 10^7)$ is approximately
$400 \times 20 \times 400 \times 2 \times 10^7 =$
$4 \times 2 \times 4 \times 2 \times 10^{12} = 6 \times 10^{13}$ litres (to 1 sig fig)
nrich.maths.org/11629/solution

4. Roses and Carnations
They can choose from 10 different possible bunches
nrich.maths.org/13237/solution

5. Bookshop
She bought 3 books and 8 magazines
nrich.maths.org/11698/solution

6. Product of Fractions

$$1\tfrac{2}{3} \times 1.8 \times 1\tfrac{1}{7} \times 1.75 \times 1\tfrac{5}{6} = 1\tfrac{2}{3} \times 1\tfrac{4}{5} \times 1\tfrac{1}{7} \times 1\tfrac{3}{4} \times 1\tfrac{5}{6} =$$

$$\tfrac{5}{3} \times \tfrac{9}{5} \times \tfrac{8}{7} \times \tfrac{7}{4} \times \tfrac{11}{6} = \frac{5 \times 9 \times 8 \times 7 \times 11}{3 \times 5 \times 7 \times 4 \times 6} =$$

$$\frac{5 \times (3 \times 3) \times (2 \times 4) \times 7 \times 11}{3 \times 5 \times 7 \times 4 \times (2 \times 3)} = \frac{5 \times 3 \times 3 \times 2 \times 4 \times 7 \times 11}{5 \times 3 \times 3 \times 2 \times 4 \times 7} = 11$$

nrich.maths.org/13227/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★★
Worksheet 4 – Solutions

1. Birthday Tables
The only possibility is using 2 rectangular tables and 4 circular ones
nrich.maths.org/11608/solution

2. Currency Exchange
The smallest number of coins that must change hands is 5:
Ann gives three 50p coins and receives two 20p coins
nrich.maths.org/6748/solution

3. Latin Multiplication
105 is the largest possible product (3 x 5 x 7)
nrich.maths.org/10176/solution

4. Product and Sum
Jim threw 23 dice in total (2, 3, 5 and twenty 1s)
nrich.maths.org/10155/solution

5. Anti-magic Square
The complete square, with the 1, 2, 8, 15 and 16, and the totals shaded, looks like this:
nrich.maths.org/2210/solution

				39
4	5	7	14	30
6	13	3	15	37
11	12	9	1	33
10	2	16	8	36
31	32	35	38	34

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.

Age 11+ Level ★★★
Worksheet 1 - Solutions

1. **Last Digit**
   The last digit is 1 + 6 = 7
   nrich.maths.org/12785/solution

2. **Sum of 1s**
   The last 5 digits of the sum will be 56566
   nrich.maths.org/12468/solution

3. **Squares and Cubes**
   36 numbers
   (the two digit numbers whose units digits are 1, 5, 6 or 0)
   nrich.maths.org/12591/solution

4. **Comparing Totals**
   n = 14 (1 + 2 + … + 13 + 14 = 15 + 16 + … + 19 + 20)
   nrich.maths.org/12538/solution

5. **Digit Deletion**
   She could have erased 746 numbers
   nrich.maths.org/6771/solution

6. **Sum One Special**
   6, -3 and -2
   nrich.maths.org/5008/solution

7. **Divisible by 55**
   22765910 is a multiple of 55, with ab = 10
   22765965 is a multiple of 55, with ab = 65
   nrich.maths.org/13222/solution

These problems are adapted from UKMT (ukmt.org.uk) and WMC (competition.ac) problems.