

**Age 11+ Level ★
Worksheet 1 - Solutions****1. Product 100**

The four integers add to 18 ($1 + 2 + 5 + 10 = 18$)

rich.maths.org/7132/solution

2. Prime Order

None

rich.maths.org/4947/solution

3. Producing Zeros

Two zeros

rich.maths.org/5754/solution

4. Almost a Million

(d) One million minus four (999 996) is the only multiple of 6

rich.maths.org/10122/solution

5. Multiple Years

2016

rich.maths.org/11628/solution

6. Multiplication Table Puzzle

$A + B + C + D + E = 6 + 25 + 48 + 40 + 42 = 161$

rich.maths.org/11682/solution

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

**Age 11+ Level ★
Worksheet 2 - Solutions****1. What's on the Back?**

2 – Odd

5 – Divisible by 7

7 – Greater than 100

12 – Prime

rich.maths.org/11708/solution**2. Divisible Digits**

The last two digits were 40 (the number was 9540)

rich.maths.org/12789/solution**3. Pairing Up**

36

rich.maths.org/5759/solution**4. Tricky Customer**

He can choose from 27 houses

rich.maths.org/10154/solution**5. Calculation 2000**

4 000 000

rich.maths.org/2930/solution**6. Reversible Primes**

There are 9 two-digit reversible primes:

11, 13, 17, 31, 37, 71, 73, 79 and 97

rich.maths.org/12584/solution

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



Age 11+ Level ★★
Worksheet 1 - Solutions

1. Find from Factors

105

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2. One Short

The remainder is 3 ($59 \div 7 = 8$ remainder 3)

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3. Grandma's Cake

If we assume that all the pieces are the same size, 30 slices.

Otherwise, 10 slices

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4. Ones, Twos and Threes

The smallest integer is 1112233

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5. Red Card Blue Card

5 5 1 3 3 6 2 4 4 or its mirror image 4 4 2 6 3 3 1 5 5

rich.maths.org/12808/solution

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



Age 11+ Level ★★
Worksheet 2 - Solutions

1. Smallest Abundant Number

12 is the smallest abundant number

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2. Jenny's Logic

Jenny's cards add to 12 ($2 + 4 + 6 = 12$)

rich.maths.org/6753/solution

3. Adjacent Factors

The longest list could have 9 numbers

rich.maths.org/7152/solution

4. Back of the Queue

The remainder is 3

rich.maths.org/2929/solution

5. Cakes and Bun

Helen must have bought 9 cakes and 7 buns

rich.maths.org/4986/solution

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



Age 11+ Level ★★★
Worksheet 1 - Solutions

1. Colossal Sum

The units digit will be 0
nrich.maths.org/12577

2. Seven from Nine

12 ways
nrich.maths.org/2513

3. 17s and 23s

9 numbers
nrich.maths.org/6785

4. Cinema Costs

£91
nrich.maths.org/6741

5. Missing Digit

The missing digit is 9 (since 12349678 is a multiple of 11)
nrich.maths.org/4990

6. Big Blackboard

504 numbers are underlined exactly twice
nrich.maths.org/12566

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



Age 11+ Level ★★★
Worksheet 2 - Solutions

1. Leap Monday

2044 will be the next leap year

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2. Factor Sum

Paul's answer can never be 5

nrich.maths.org/10152

3. Powerful Finale

The last digit is 7

nrich.maths.org/11691

4. Common Remainder

n is 19

nrich.maths.org/11715

5. HCF Expression

The largest possible value is 45 (when $p=3$ and $q=5$)

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6. Trailing Zeros

50! Has 12 zeros at the end

nrich.maths.org/6241

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



Age 14+ Level ★
Worksheet 1 - Solutions

1. Flora the Florist

6 identical bunches (each with 4 white, 6 yellow & 7 red roses)

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2. Essential Supplies

170 boxes (165 large and 5 small)

rich.maths.org/4948

3. Punky Fish

The ratio of male fish to female fish is 3:2

rich.maths.org/5755

4. Threes and Fours

3444 is the smallest integer

rich.maths.org/11642

5. Peter's Primes

There will be no primes

rich.maths.org/11690

6. End of a Prime

6 digits (1, 2, 3, 5, 7 & 9)

rich.maths.org/11635

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



Age 14+ Level ★★
Worksheet 1 - Solutions

1. Triangular Algebra

$$x + y = 13 + 2 = 15$$

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2. Last-but-one

The last-but-one digit is 0

rich.maths.org/11607

3. Powerful Zeros

6 zeros

rich.maths.org/4983

4. Coin Collection

15 coins remain

rich.maths.org/5014

5. Added Power

For only 1 prime (when $p=2$)

rich.maths.org/10181

6. Square Sum

d) 148

rich.maths.org/5686

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

**Age 14+ Level ★★
Worksheet 2 – Solutions****1. Divisible Palindrome**

The sum of its digits is 24

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2. Sticky Fingers

She has 763 stickers left

rich.maths.org/7154/solution

3. Eight Factors Only

The sum of the factors is 192 ($1 + 3 + 5 + 7 + 15 + 21 + 35 + 105$)

rich.maths.org/12560/solution

4. Times and Square

The last two digits are 00

rich.maths.org/12558/solution

5. Relative Time

The clocks will next agree at 21:00 (when they will show 05:00)

rich.maths.org/10121/solution

6. Long List

My list could have just 4 numbers (e.g. 1, 2, 3, 64)

rich.maths.org/11726/solution

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



Age 14+ Level ★★★
Worksheet 1 - Solutions

1. Three Primes

Only 1 set satisfies the condition (2, 5 & 7)

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2. Factorised Factorial

$n = 16$

rich.maths.org/6774/solution

3. Factor List

Tina could have chosen 2 values for N (180 or 405)

rich.maths.org/7142/solution

4. Primes and Six

Proof that $pq + 1$ is divisible by 36 if p and q are prime, and $q = p+2$

rich.maths.org/10149/solution

5. Leftovers

There are 9 different remainders (0, 1, 2, 3, 4, 5, 6, 7 & 16)

rich.maths.org/5774/solution

6. Square Product

The smallest integer is 8

rich.maths.org/7158/solution

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**Age 14+ Level ★★★
Worksheet 2 - Solutions****1. Adding a Square to a Cube**

n could be 3, 8, 15, 24, 35, 48, 63, 80 or 99

rich.maths.org/12478/solution

2. Fortunate Inflation

The smallest possible value of n is 13

rich.maths.org/12594/solution

3. Rational Integer

There are 6 possible integer values for n (-3, -1, 0, 2, 3, 5)

rich.maths.org/2053/solution

4. Square LCM

2 of the five numbers are square numbers: $\frac{n}{3}$ and $\frac{m}{4}$

rich.maths.org/6763/solution

5. Cancelling Fractions

$\frac{m}{n}$ could be $\frac{2}{422}$ or $\frac{2}{842}$ or $\frac{2}{1262}$ or $\frac{2}{1682}$ or $\frac{2}{2102}$...

rich.maths.org/12587/solution

6. Super Computer

The units digit is 8

rich.maths.org/10124/solution

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