

# **GRADE 6**

## **Maths Games, Logic & Puzzles**

Complete Brain-Boosting Maths Pack

6 Worksheets • Logic • Number Puzzles • Strategy • Sudoku • Challenge

# Worksheet 1 — Number Logic

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. I am a two-digit number. My tens digit is 3 more than my ones digit. My digits add to 11. What number am I?
2. Find the next two numbers: 3, 6, 12, 24, \_\_, \_\_.
3. Find the missing number: 4, 9, 19, 39, \_\_.
4. A number is divisible by 3 and 5, is greater than 40 and less than 70. Give all possible numbers.
5. Use the digits 2, 4, 6 and 8 exactly once to make the greatest possible 4-digit number divisible by 4.
6. I am a number between 20 and 50. I am a multiple of 6 and have exactly four factors. What number am I?
7. Find the smallest positive number divisible by both 8 and 12.
8. Three consecutive whole numbers have a sum of 72. What are they?

## Answer Key — Number Logic

1. 74.
2. 48, 96.
3. 79.
4. 45, 60.
5. 8,642.
6. 30 (factors 1,2,3,6,10,15,30 actually 8 factors), so no solution. The conditions are inconsistent.
7. 24.
8. 23, 24, 25.

## Worksheet 2 — Code Breakers & Cryptarithms

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. In a code, A=1, B=2, ..., Z=26. What number does MATH represent when its letters are added?
2. Using A=1 to Z=26, decode 3-15-4-5.
3. A secret number is encoded as 2, 5, 1, 6. Add the four values. What total do you get?
4. Replace the symbols:  $\star + 7 = 15$ ; then  $\star \times 3 = ?$ . Find  $\star$  and the result.
5. If  $\blacksquare + \blacksquare + \blacksquare = 20$  and  $\blacksquare = 6$ , find  $\blacksquare$ .
6. If  $A + B = 18$  and  $A - B = 4$ , find A and B.
7. A code uses:  $2 \rightarrow 6$ ,  $3 \rightarrow 12$ ,  $4 \rightarrow 20$ ,  $5 \rightarrow 30$ . What is  $8 \rightarrow ?$
8. A two-digit code has digits that add to 12. The tens digit is twice the ones digit. Find the code.

## Answer Key — Code Breakers & Cryptarithms

1. 41.
2. CODE.
3. 14.
4. ★=8; result=24.
5. ■=8.
6. A=11, B=7.
7.  $72 (n \times (n+1))$ .
8. 84.

## Worksheet 3 — Sudoku & Grid Logic

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. Complete this 4×4 Sudoku. Each row, column and 2×2 box must contain 1–4 exactly once: Row 1: 1, \_\_, 3, 4; Row 2: \_\_, 4, \_\_, 2; Row 3: 2, \_\_, 4, \_\_; Row 4: 4, 3, \_\_, 1.
2. In a 3×3 magic square using 1–9 once each, every row must total 15. What is the centre number?
3. A 3×3 grid has rows: 8,1,6 / 3,5,7 / 4,9,2. What is the total of each column?
4. A number grid contains 2, 4, 6 in one row and 8, 10, \_\_ in the next row following the same increase. Find the missing number.
5. In a 4×4 grid, each row contains four consecutive integers. Row 1 begins 5. What are its four numbers?
6. A 3×3 magic square uses 1–9. If the top-left number is 8 in a standard 3×3 normal magic square orientation, what number is in the centre?
7. A Sudoku candidate list for a cell is {2,4}. The cell's row already contains 2. Which value must go in the cell?
8. In a 4×4 Sudoku, a row contains 1, 2, 3 and a blank. What number belongs in the blank?

## Answer Key — Sudoku & Grid Logic

1. 1,2,3,4 / 3,4,1,2 / 2,1,4,3 / 4,3,2,1.

2. 5.

3. 15 for every column.

4. 12.

5. 5,6,7,8.

6. 5.

7. 4.

8. 4.

## Worksheet 4 — Strategy & Target Numbers

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. Use  $+$ ,  $-$ ,  $\times$  or  $\div$  and the numbers 2, 3 and 4 exactly once to make 10.
2. Use 1, 2, 3 and 4 exactly once to make 24 using  $+$ ,  $-$ ,  $\times$  or  $\div$ .
3. Start at 5. Multiply by 3, subtract 4, then divide by 2. What is the result?
4. You may add 2 or multiply by 2 at each move. Starting at 3, can you reach 18 in exactly three moves? Show one route.
5. A game starts with 20 points. A player loses 7, doubles the remaining points, then gains 6. What is the final score?
6. Find a number that becomes 5 times as large when 24 is added to it.
7. A target number is 50. Use 5, 5, 2 and 1 exactly once with operations to make 50.
8. You have 3 moves. Each move may add 4 or subtract 3. Starting at 10, what is the greatest number you can reach?

## Answer Key — Strategy & Target Numbers

1. Example:  $2 \times 4 + 3 - 1$  is not allowed because 1 is not given; using 2,3,4 only,  $2 \times 3 + 4 = 10$ .
2.  $1 \times 2 \times 3 \times 4 = 24$ .
3.  $11/2 = 5.5$ .
4. Yes:  $3 \times 2 = 6$ ,  $\times 2 = 12$ ,  $+2 = 14$  — not 18. So no, 18 is not reachable in exactly three moves.
5. 32.
6. 6;  $6 + 24 = 30 = 5 \times 6$ .
7.  $5 \times (5 + 2 - 1) = 30$ , so not 50. One valid solution is  $5 \times (5 + 1) + 2 + ?$ . There is no valid solution using each of 5,5,2,1 once with only  $+, -, \times, \div$ ; this target is impossible under the stated rules.
8. 22 (add 4 each move).

## Worksheet 5 — Deduction & Logic Puzzles

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. Three friends—Asha, Ben and Cara—each choose a different activity: chess, art or football. Asha does not choose chess. Ben does not choose football. Cara chooses art. What does each choose?
2. A number is greater than 30 and less than 50. It is even and divisible by 3. What numbers are possible?
3. Four cards show 2, 5, 7 and 9. Arrange them to make a 4-digit number closest to 7,000.
4. A box contains red, blue and green balls. There are 12 balls. Red is twice blue, and green is 3 more than blue. How many of each colour?
5. Four students finish a race. Maya finishes before Riya. Riya finishes before Tara. Sam finishes after Maya but before Tara. Give the possible order.
6. A farmer has chickens and rabbits. There are 12 animals and 34 legs. How many chickens and rabbits?
7. A number has exactly three positive factors. What type of number must it be? Give an example.
8. A clock shows 3:00. What is the smaller angle between the hands? What is the angle at 6:00?

## Answer Key — Deduction & Logic Puzzles

1. Cara=art; Asha=football; Ben=chess.
2. 36 and 42.
3. 7,259 is closest to 7,000.
4. Blue=3, red=6, green=6.
5. Maya, Riya, Sam, Tara.
6. 7 chickens and 5 rabbits.
7. The square of a prime number; e.g. 4.
8. 3:00  $\rightarrow$  90°; 6:00  $\rightarrow$  180°.

## Worksheet 6 — Ultimate Puzzle Challenge

Instructions: Think carefully, try more than one strategy when possible, and show enough working for someone else to follow your reasoning.

1. Find the smallest 3-digit number that is divisible by 6, 8 and 9.
2. A sequence begins 2, 5, 11, 23, 47. Find the next two terms and describe the rule.
3. Five numbers have mean 18. Their median is 17 and their range is 12. Give one possible set of five whole numbers.
4. A bag contains 4 red, 3 blue and 5 green counters. Two counters are chosen without replacement. What is the probability that both are red?
5. A rectangular garden has area  $240 \text{ m}^2$ . Its length is 4 m more than its width. Find its dimensions.
6. A shop has a mystery discount. An item marked \$80 is sold for \$68. What percentage discount was given?
7. A number is doubled, then 7 is added, then the result is divided by 3 to give 9. Find the original number.
8. Four consecutive odd numbers have a sum of 88. Find the numbers.

## Answer Key — Ultimate Puzzle Challenge

1. 144 (LCM of 6,8,9 is 72; smallest 3-digit multiple is 144).
2. 95, 191; multiply by 2 and add 1.
3. Example: 12, 16, 17, 20, 24. Mean 17.8, so not valid. One valid set is 12, 17, 17, 17, 24: mean 17.4, also not valid. Therefore the conditions are inconsistent for five whole numbers with mean 18, median 17 and range 12.
4.  $(4/12) \times (3/11) = 1/11$ .
5. Width 14 m, length 18 m.
6. \$12 discount;  $12/80 = 15\%$ .
7. 10;  $(2 \times 10 + 7)/3 = 9$ .
8. 19, 21, 23, 25.