

# Playing with Numbers

Mathematics · Class 8 · Topic-wise Practice Worksheet

|                    |                 |                   |                        |
|--------------------|-----------------|-------------------|------------------------|
| TIME<br>45 minutes | QUESTIONS<br>18 | TOTAL MARKS<br>24 | MAX. SCORE<br>___ / 24 |
|--------------------|-----------------|-------------------|------------------------|

Name: \_\_\_\_\_ Class/Sec: \_\_\_\_\_ Date: \_\_\_\_\_

## INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- In every puzzle, different letters stand for different digits and no number begins with 0.

## Section A — Mathematical Reasoning

Q1–Q8 · 1 mark each

- A two-digit number with tens digit  $a$  and units digit  $b$  can be written in general form as \_\_\_\_\_.  
 (A)  $a + b$  (B)  $ab$   
 (C)  $10b + a$  (D)  $10a + b$
- A number is divisible by 9 if \_\_\_\_\_.  
 (A) The sum of its digits is divisible by 9 (B) Its last digit is 9  
 (C) It is an odd number (D) Its last two digits are divisible by 9
- A number is divisible by 10 if and only if its units digit is \_\_\_\_\_.  
 (A) 5 (B) 0  
 (C) 0 or 5 (D) Even
- A number is divisible by 6 if it is divisible by \_\_\_\_\_.  
 (A) 2 only (B) 3 only  
 (C) Either 2 or 3 (D) Both 2 and 3
- The sum of a two-digit number and the number obtained by reversing its digits is always divisible by \_\_\_\_\_.  
 (A) 9 (B) 11  
 (C) 10 (D) 7
- The difference between a two-digit number and the number obtained by reversing its digits is always divisible by \_\_\_\_\_.  
 (A) 7 (B) 9  
 (C) 11 (D) 13
- A number is divisible by 4 if \_\_\_\_\_.  
 (A) The number formed by its last two digits is divisible by 4 (B) Its last digit is 4  
 (C) The sum of its digits is divisible by 4 (D) It is an even number

8. For the number 21B to be divisible by 5, the digit B must be \_\_\_\_\_.

(A) 0 only

(B) 0 or 5

(C) 5 only

(D) Any even digit

**Section B — Everyday Mathematics and Reasoning**

Q9–Q15 · 1 mark each

9. In the addition puzzle below, each letter stands for a single digit. Find the values of A and B.

$$\begin{array}{r} 3 \ A \\ + \ 2 \ 5 \\ \hline B \ 2 \end{array}$$

Fig. 9.1 — Addition puzzle

(A) A = 3, B = 6

(B) A = 6, B = 7

(C) A = 7, B = 5

(D) A = 7, B = 6

10. If the number 31z5 is divisible by 9, the **smallest** possible value of z is \_\_\_\_\_.

(A) 0

(B) 3

(C) 6

(D) 9

11. If the three-digit number 3A5 is divisible by 3, which of the following can **not** be the value of A?

(A) 1

(B) 4

(C) 5

(D) 7

12. Which of the following numbers is divisible by **both** 4 and 9?

(A) 1236

(B) 2346

(C) 5439

(D) 7128

13. A number is divisible by both 4 and 6. Must it also be divisible by 24?

(A) No — for example 12 is divisible by 4 and 6 but not by 24

(B) Yes, always

(C) Yes, but only for even numbers

(D) Only if the number is a multiple of 10

14. In the two-digit number  $10a + b$ , if  $a = b$ , then the number is always divisible by \_\_\_\_\_.

(A) 9

(B) 10

(C) 11

(D) 2

15. If the three-digit number  $4y3$  is divisible by 11, then  $y =$  \_\_\_\_\_.

(A) 3

(B) 5

(C) 7

(D) 9

**Achievers Section**

Q16–Q18 · 3 marks each

16. Consider the following statements.

(i) If a number is divisible by 8, it is divisible by 4.

(ii) If a number is divisible by 3 and by 5, it is divisible by 15.

(iii) Every number divisible by 2 is divisible by 6.

Which of the statements is/are correct?

(A) (i) and (ii) only

(B) (ii) and (iii) only

(C) (i) and (iii) only

(D) All three

17. The three-digit number  $24A$  is divisible by 6. Which of the following gives **all** the possible values of  $A$ ?
- (A) 0, 3, 6 and 9  
(B) 0 and 6  
(C) 2, 4, 6 and 8  
(D) 6 only
18. When a two-digit number is subtracted from the number formed by reversing its digits, the result is 36. What is the difference between the two digits?
- (A) 2  
(B) 3  
(C) 4  
(D) 6

# Answer Key

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|    |   |    |   |    |   |    |   |    |   |
|----|---|----|---|----|---|----|---|----|---|
| 1  | D | 2  | A | 3  | B | 4  | D | 5  | B |
| 6  | B | 7  | A | 8  | B | 9  | D | 10 | A |
| 11 | C | 12 | D | 13 | A | 14 | C | 15 | C |
| 16 | A | 17 | B | 18 | C |    |   |    |   |

## Solutions

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**1. Answer: (D)**  $10a + b$

The tens digit stands for a lots of ten and the units digit for  $b$  ones, so the number is  **$10a + b$** . For example,  $47 = 10(4) + 7$ .

**2. Answer: (A)** The sum of its digits is divisible by 9

The test for 9 is that **the sum of the digits must be divisible by 9**. For example, 693 has digit sum  $6 + 9 + 3 = 18$ , which is divisible by 9, and indeed  $693 = 9 \times 77$ .

**3. Answer: (B)** 0

Multiples of 10 always end in **0**. Ending in 0 or 5 is the test for divisibility by 5, and ending in an even digit is the test for 2.

**4. Answer: (D)** Both 2 and 3

Since  $6 = 2 \times 3$  and 2 and 3 have no common factor, a number is divisible by 6 exactly when it is divisible by **both 2 and 3**.

**5. Answer: (B)** 11

$(10a + b) + (10b + a) = 11a + 11b = 11(a + b)$ , which is always a multiple of **11**. For example,  $47 + 74 = 121 = 11 \times 11$ .

**6. Answer: (B)** 9

$(10a + b) - (10b + a) = 9a - 9b = 9(a - b)$ , which is always a multiple of **9**. For example,  $74 - 47 = 27 = 9 \times 3$ .

**7. Answer: (A)** The number formed by its last two digits is divisible by 4

Since 100 is divisible by 4, only the last two digits matter. So the test is that **the number formed by the last two digits must be divisible by 4**. For example, 3516 works because 16 is divisible by 4.

**8. Answer: (B)** 0 or 5

A number is divisible by 5 exactly when it ends in 0 or 5, so  $B$  can be **0 or 5**, giving 210 or 215.

**9. Answer: (D)**  $A = 7$ ,  $B = 6$

**Units column:**  $A + 5$  must end in 2, so  $A + 5 = 12$  and  $A = 7$ , carrying 1 to the tens column.

**Tens column:**  $3 + 2 + 1$  (carried) = 6, so  $B = 6$ .

Hence  **$A = 7$ ,  $B = 6$** . Check:  $37 + 25 = 62$ . ✓

**10. Answer: (A)** 0

Digit sum =  $3 + 1 + z + 5 = 9 + z$ . For this to be a multiple of 9,  $z$  must be 0 or 9.

The smaller of these is **0**, giving  $3105 = 9 \times 345$ . ✓

**11. Answer: (C)** 5

Digit sum =  $3 + A + 5 = 8 + A$ , which must be divisible by 3. This gives  $A = 1$  (sum 9),  $A = 4$  (sum 12) or  $A = 7$  (sum 15).

With  $A = \mathbf{5}$  the sum is 13, which is not a multiple of 3.

**12. Answer: (D)** 7128

Apply the test for 9 (digit sum) first, since it eliminates most options.

1236:  $1 + 2 + 3 + 6 = 12$  — not a multiple of 9. ✗

2346:  $2 + 3 + 4 + 6 = 15$  — not a multiple of 9. ✗

5439:  $5 + 4 + 3 + 9 = 21$  — not a multiple of 9. ✗

7128:  $7 + 1 + 2 + 8 = 18$  — a multiple of 9. ✓

Now test 7128 for 4: the last two digits give 28, and  $28 \div 4 = 7$ . ✓

So the answer is **7128** ( $= 4 \times 9 \times 198$ ).

**13. Answer: (A)** No — for example 12 is divisible by 4 and 6 but not by 24

The rule 'divisible by  $m$  and  $n$  implies divisible by  $mn$ ' works only when  $m$  and  $n$  have no common factor. Here 4 and 6 share the factor 2, so the correct conclusion is divisibility by their LCM, which is 12, not 24. **12 itself is the counter-example:**  $12 \div 4 = 3$  and  $12 \div 6 = 2$ , but 12 is not a multiple of 24.

**14. Answer: (C)** 11

If  $a = b$  the number is  $10a + a = 11a$ , which is always a multiple of **11**. Examples: 11, 22, 33, ..., 99.

**15. Answer: (C)** 7

For divisibility by 11, take the digits alternately from the right and find the difference:

$$(3 + 4) - y = 7 - y.$$

This must be 0 or a multiple of 11. Since  $y$  is a single digit, the only possibility is  $7 - y = 0$ , giving  $y = 7$ .

Check:  $473 \div 11 = 43$ . ✓

**16. Answer: (A)** (i) and (ii) only

Statement (i) is true — 8 is itself a multiple of 4, so every multiple of 8 is a multiple of 4. Statement (ii) is true; 3 and 5 have no common factor, so a common multiple must be a multiple of  $3 \times 5 = 15$ . Statement (iii) is false; 4 is divisible by 2 but not by 6. Hence **(i) and (ii)**.

**17. Answer: (B)** 0 and 6

Divisibility by 6 requires divisibility by both 2 and 3.

**By 2:** A must be even, so A can be 0, 2, 4, 6 or 8.

**By 3:** the digit sum  $2 + 4 + A = 6 + A$  must be a multiple of 3, so A can be 0, 3, 6 or 9.

Taking the values that appear in both lists gives  $A = \mathbf{0 \text{ and } 6}$ , that is 240 and 246. Check:  $240 \div 6 = 40$  ✓ and  $246 \div 6 = 41$  ✓.

**18. Answer: (C)** 4

Let the original number be  $10a + b$ , so the reversed number is  $10b + a$ .

$$(10b + a) - (10a + b) = 9b - 9a = 9(b - a).$$

So  $9(b - a) = 36$ , giving  $b - a = \mathbf{4}$ .

For example, 15 and 51 differ by 36, and  $5 - 1 = 4$ . ✓