

Primary Number System

Question Paper, Set 04

Time: 1 hour 30 minutes

Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. Write the smallest natural number and the smallest whole number. [1 mark]
2. Is 2508 even or odd? Give reason. [1 mark]
3. Write the multiples of 19 between 150 and 250. [3 marks]
4. Find the factors of 35. [2 marks]
5. Find all the divisors of 126 and say how many there are. [5 marks]
6. What is a constant? Give two examples. [1 mark]
7. Write $-6 \times c$ in short form. [1 mark]
8. Simplify: (i) $2t + 6t + 9t$ (ii) $10t - 3t$ [2 marks]
9. Write in short form: (i) $z + z + z + z + z$ (ii) $z \times z \times z \times z \times z$ [2 marks]
10. Find 53^2 . [2 marks]
11. Find the value of 12^3 . [3 marks]
12. Express 2401 in the exponential form (i) with base 7 (ii) with base 49. [5 marks]
13. Is 40759 divisible by 2? Give reason. [1 mark]
14. Is 88571 divisible by 3? Justify your answer. [2 marks]
15. Find the smallest 4-digit number that is divisible by 3. [3 marks]
16. Is 46290 divisible by 4? Justify your answer. [2 marks]
17. Is 25051 divisible by 5? Give reason. [1 mark]
18. Is 50412 divisible by 6? Justify your answer. [3 marks]
19. Using the divisibility rule for 7, check whether 499, 252 and 663 are divisible by 7. [5 marks]
20. Using the divisibility rules, check whether 70328 is divisible by 2, 3, 4, 5 and 6. [5 marks]

Key sheet

Q	Answer
1	Smallest natural number = 1; smallest whole number = 0
2	Even (remainder 0 when divided by 2)
3	152, 171, 190, 209, 228, 247
4	1, 5, 7, 35
5	1, 2, 3, 6, 7, 9, 14, 18, 21, 42, 63, 126 (12 divisors)
6	A symbol which has a fixed value; e.g. 5, 8
7	$-6c$
8	(i) $17t$ (ii) $7t$
9	(i) $5z$ (ii) z^5
10	2809
11	1728
12	(i) 7^4 (ii) 49^2
13	No, the unit digit is 9
14	No, the sum of the digits is 29
15	1002
16	No, the last two digits 90 are not divisible by 4
17	No, the unit digit is 1
18	Yes, it is divisible by both 2 and 3
19	252 is divisible by 7; 499 and 663 are not.
20	Divisible by 2 and 4; not by 3, 5, 6

Solutions

1. Write the smallest natural number and the smallest whole number. [1]

Natural numbers are the counting numbers 1, 2, 3, 4, ..., so the smallest natural number is 1.

Whole numbers are the natural numbers along with 0: 0, 1, 2, 3, ..., so the smallest whole number is 0.

Ans: Smallest natural number = 1; smallest whole number = 0

2. Is 2508 even or odd? Give reason. [1]

$$2508 = 2 \times 1254 + 0$$

Remainder is 0, so 2508 is an even number.

Ans: Even (remainder 0 when divided by 2)

3. Write the multiples of 19 between 150 and 250. [3]

Multiples of 19: $19 \times 1, 19 \times 2, 19 \times 3, \dots$

$19 \times 7 = 133$ is less than 150

$19 \times 8 = 152, 19 \times 9 = 171, 19 \times 10 = 190$

$19 \times 11 = 209, 19 \times 12 = 228, 19 \times 13 = 247$

$19 \times 14 = 266$ is more than 250

Multiples of 19 between 150 and 250: 152, 171, 190, 209, 228, 247

Ans: 152, 171, 190, 209, 228, 247

4. Find the factors of 35. [2]

$$35 = 1 \times 35$$

$$= 5 \times 7$$

$\therefore$ Factors of 35 are 1, 5, 7, 35

Ans: 1, 5, 7, 35

5. Find all the divisors of 126 and say how many there are. [5]

$$126 = 1 \times 126$$

$$= 2 \times 63$$

$$= 3 \times 42$$

$$= 6 \times 21$$

$$= 7 \times 18$$

$$= 9 \times 14$$

4, 5, 8, 10, 11 do not divide 126 (they leave a remainder).

$\therefore$ Divisors of 126 are 1, 2, 3, 6, 7, 9, 14, 18, 21, 42, 63, 126

Number of divisors = 12

Ans: 1, 2, 3, 6, 7, 9, 14, 18, 21, 42, 63, 126 (12 divisors)

6. What is a constant? Give two examples. [1]

A symbol which has a fixed value is called a constant.

Examples: 5, 8

Ans: A symbol which has a fixed value; e.g. 5, 8

7. Write $-6 \times c$ in short form. [1]

As $-2 \times a = -2a$:

$$-6 \times c = -6c$$

Ans: $-6c$

8. Simplify: (i) $2t + 6t + 9t$ (ii) $10t - 3t$ [2]

(i) $2t + 6t + 9t = (2 + 6 + 9)t = 17t$

(ii) $10t - 3t = (10 - 3)t = 7t$

Ans: (i) $17t$ (ii) $7t$

9. Write in short form: (i) $z + z + z + z + z$ (ii) $z \times z \times z \times z \times z$ [2]

(i) $z + z + z + z + z$ is z added 5 times: $z + z + z + z + z = 5z$

(ii) $z \times z \times z \times z \times z$ is z multiplied 5 times: $z \times z \times z \times z \times z = z^5$

Ans: (i) $5z$ (ii) z^5

10. Find 53^2 . [2]

$$53^2 = 53 \times 53$$

$$53 \times 3 = 159$$

$$53 \times 5 = 265, \text{ written one place to the left: } 2650$$

$$159 + 2650 = 2809$$

$$\therefore 53^2 = 2809$$

Ans: 2809

11. Find the value of 12^3 . [3]

$$12^3 = 12 \times 12 \times 12$$

$$12 \times 12 = 144, 144 \times 12 = 1728$$

$$\therefore 12^3 = 1728$$

Ans: 1728

12. Express 2401 in the exponential form (i) with base 7 (ii) with base 49. [5]

(i) Divide by 7 again and again:

$$2401 \div 7 = 343, 343 \div 7 = 49, 49 \div 7 = 7$$

$$2401 = 7 \times 7 \times 7 \times 7 = 7^4$$

(ii) Divide by 49 again and again:

$$2401 \div 49 = 49$$

$$2401 = 49 \times 49 = 49^2$$

Ans: (i) 7^4 (ii) 49^2

13. Is 40759 divisible by 2? Give reason. [1]

A number is divisible by 2 if the digit at its unit place is 0, 2, 4, 6 or 8.

The digit at the unit place of 40759 is 9, so 40759 is not divisible by 2.

Ans: No, the unit digit is 9

14. Is 88571 divisible by 3? Justify your answer. [2]

A number is divisible by 3 if the sum of all its digits is divisible by 3.

Sum of the digits of 88571: $8 + 8 + 5 + 7 + 1 = 29$

29 is not divisible by 3 ($29 = 3 \times 9 + 2$), so 88571 is not divisible by 3.

Ans: No, the sum of the digits is 29

15. Find the smallest 4-digit number that is divisible by 3. [3]

A number is divisible by 3 if the sum of all its digits is divisible by 3.

1000: $1 + 0 + 0 + 0 = 1$, not divisible by 3

1001: $1 + 0 + 0 + 1 = 2$, not divisible by 3

1002: $1 + 0 + 0 + 2 = 3$, divisible by 3

$\therefore$ The smallest 4-digit number divisible by 3 is 1002.

Ans: 1002

16. Is 46290 divisible by 4? Justify your answer. [2]

A number is divisible by 4 if its last two digits together are divisible by 4.

Last two digits of 46290 together: 90; $90 = 4 \times 22 + 2$, so 46290 is not divisible by 4.

Ans: No, the last two digits 90 are not divisible by 4

17. Is 25051 divisible by 5? Give reason. [1]

A number is divisible by 5 if the digit at its unit place is 0 or 5.

The digit at the unit place of 25051 is 1, so 25051 is not divisible by 5.

Ans: No, the unit digit is 1

18. Is 50412 divisible by 6? Justify your answer. [3]

A number is divisible by 6 if it is divisible by both 2 and 3.

The digit at the unit place of 50412 is 2, so 50412 is divisible by 2.

Sum of the digits of 50412: $5 + 0 + 4 + 1 + 2 = 12$

12 is divisible by 3 ($12 = 3 \times 4$), so 50412 is divisible by 3.

$\therefore$ 50412 is divisible by 6.

Ans: Yes, it is divisible by both 2 and 3

19. Using the divisibility rule for 7, check whether 499, 252 and 663 are divisible by 7. [5]

A number is divisible by 7 if the remaining part minus twice the unit digit is a multiple of 7 (or 0).

499: $49 - 9(2) = 49 - 18 = 31$; $31 = 7 \times 4 + 3$, not a multiple of 7, so 499 is not divisible by 7.

252: $25 - 2(2) = 25 - 4 = 21$; $21 = 7 \times 3$, a multiple of 7, so 252 is divisible by 7.

663: $66 - 3(2) = 66 - 6 = 60$; $60 = 7 \times 8 + 4$, not a multiple of 7, so 663 is not divisible by 7.

Ans: 252 is divisible by 7; 499 and 663 are not.

20. Using the divisibility rules, check whether 70328 is divisible by 2, 3, 4, 5 and 6. [5]

By 2: The digit at the unit place of 70328 is 8, so 70328 is divisible by 2.

By 3: Sum of the digits of 70328: $7 + 0 + 3 + 2 + 8 = 20$; 20 is not divisible by 3 ($20 = 3 \times 6 + 2$), so 70328 is not divisible by 3.

By 4: Last two digits of 70328 together: 28; $28 = 4 \times 7$, so 70328 is divisible by 4.

By 5: The digit at the unit place of 70328 is 8, so 70328 is not divisible by 5.

By 6: 70328 is not divisible by both 2 and 3, so it is not divisible by 6.

$\therefore$ 70328 is divisible by 2 and 4.

Ans: Divisible by 2 and 4; not by 3, 5, 6
