



EP.M110 Divisibility Rules and Number Property Puzzles

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Which of these numbers is divisible by 3?

- ☐ A) 248
- ☐ B) 249
- ☐ C) 350
- ☐ D) 253
- ☐ E) 257

(Total for Question 1 is 1 mark)

2 Which of these numbers is divisible by 4?

- ☐ A) 123
- ☐ B) 124
- ☐ C) 125
- ☐ D) 126
- ☐ E) 127

(Total for Question 2 is 1 mark)

3 Which of these numbers is divisible by 9?

- ☐ A) 234
- ☐ B) 235
- ☐ C) 236
- ☐ D) 238
- ☐ E) 239

(Total for Question 3 is 1 mark)

4 Which of these numbers is divisible by 11?

- ☐ A) 352
- ☐ B) 342
- ☐ C) 309
- ☐ D) 276
- ☐ E) 430

(Total for Question 4 is 1 mark)

5 What is the smallest three-digit number that is divisible by 6, by 8 and by 9?

(Total for Question 5 is 2 marks)

6 Is it possible for a number to be divisible by 3 and by 4 but not divisible by 2? Give a reason for your answer.

(Total for Question 6 is 1 mark)

7 Priya thinks of a number n . She finds that n leaves remainder 1 when divided by 3, remainder 2 when divided by 4, and remainder 3 when divided by 5. Work out the smallest positive value of n .

(Total for Question 7 is 2 marks)

8 Which of the following is a prime number?

- ☐ A) 49
- ☐ B) 51
- ☐ C) 53
- ☐ D) 55
- ☐ E) 57

(Total for Question 8 is 1 mark)

- 9** Is there a digit x (0 to 9) that can be placed in $2x9$ to make the three-digit number divisible by both 3 and 4? Explain your answer.

(Total for Question 9 is 1 mark)

- 10** Find the number between 200 and 300 that is divisible by 7, whose digits add to 10, and which is an odd number.

(Total for Question 10 is 2 marks)

- 11** Which of these numbers is divisible by 8?

- ☐ A) 1235
- ☐ B) 1232
- ☐ C) 1237
- ☐ D) 1239
- ☐ E) 1243

(Total for Question 11 is 1 mark)

- 12** A four-digit number has digits 2, 3, 1 and d . The number is divisible by 9. Find d .

(Total for Question 12 is 1 mark)

- 13** Find the smallest positive integer greater than 10 that leaves remainder 2 when divided by both 4 and 6.

(Total for Question 13 is 1 mark)

- 14** Find a three-digit descending-consecutive digit number (digits like 7,6,5) that is divisible by 3 and by 5.

(Total for Question 14 is 1 mark)

15 Which of these numbers is divisible by both 2 and 3?

- ☐ A) 143
- ☐ B) 154
- ☐ C) 156
- ☐ D) 158
- ☐ E) 160

(Total for Question 15 is 1 mark)

16 Find the largest integer less than 100 that has exactly the three distinct prime factors 2, 3 and 5 (so the number is of the form $2^a * 3^b * 5^c$ with $a, b, c \geq 1$).

(Total for Question 16 is 2 marks)

17 Which of these four-digit numbers is divisible by 11?

- ☐ A) 3080
- ☐ B) 2745
- ☐ C) 4516
- ☐ D) 3928
- ☐ E) 6601

(Total for Question 17 is 1 mark)

18 Find the smallest number greater than 70 that ends with digit 1 and is divisible by 7.

(Total for Question 18 is 1 mark)

19 What is the smallest three-digit number that is divisible by 2, 3, 5 and 7?

(Total for Question 19 is 1 mark)

20 Find all two-digit numbers ab (a and b are non-zero digits and $a \neq b$) such that the number ab is divisible by 4 and the reversed number ba is divisible by 3.

(Total for Question 20 is 3 marks)

Mark scheme · EP.M110 Divisibility Rules and Number Property Puzzles

Question 1

- **B1** correct option B (249) cao
- **Answer: B) 249 is divisible by 3 ($2 + 4 + 9 = 15$, which is a multiple of 3). (Answer: B) 249.)**

Question 2

- **B1** correct option B (124) cao
- **Answer: B) 124 (last two digits 24, and 24 is divisible by 4).**

Question 3

- **B1** correct option A (234) cao
- **Answer: A) 234 ($2 + 3 + 4 = 9$, which is divisible by 9).**

Question 4

- **B1** correct option A (352) cao
- **Answer: A) 352 (alternating sum $3 - 5 + 2 = 0$, which is divisible by 11).**

Question 5

- **M1** LCM of 6, 8 and 9 found or implied (LCM = 72) oe
- **A1** 144 cao
- **Answer: 144**

Question 6

- **B1** No, because divisible by 4 implies the number is even (divisible by 2), so it cannot be not divisible by 2 cao
- **Answer: No. If a number is divisible by 4 it is even, so it must be divisible by 2.**

Question 7

- **M1** Use of congruences or systematic search to show $n = 20m + 18$ or equivalent CRT working
- **A1** 58 cao
- **Answer: 58**

Question 8

- **B1** correct option C (53) cao
- **Answer: C) 53 (53 has no divisors other than 1 and 53).**

Question 9

- **B1** No; divisible by 4 requires last two digits $x9$ to be divisible by 4, but any number ending in 9 is odd so cannot be divisible by 4 cao
- **Answer: No. A number ending in 9 is odd so cannot be divisible by 4; therefore no digit x makes $2x9$ divisible by 4 (hence not by 12).**

Question 10

- **M1** Show a candidate multiple of 7 in the 200s with digit sum 10 (eg 217) or systematic check of 7-multiples
- **A1** 217 cao
- **Answer: 217**

Question 11

- **B1** correct option B (1232) cao
- **Answer: B) 1232 (last three digits 232, and $232 \div 8 = 29$).**

Question 12

- **B1** $d = 3$ cao
- **Answer: 3**

Question 13

- **B1** 14 cao
- **Answer: 14**

Question 14

- **B1** any correct example, e.g. 765 or 210 oe
- **Answer: 765 (or 210)**

Question 15

- **B1** correct option C (156) cao
- **Answer: C) 156 (156 is even and $1 + 5 + 6 = 12$, divisible by 3, so divisible by 6).**

Question 16

- **M1** Consider multiples of $2 \times 3 \times 5 = 30$ and multiply by powers until < 100
- **A1** 90 cao
- **Answer: 90**

Question 17

- **B1** correct option A (3080) cao
- **Answer: A) 3080 ($3 - 0 + 8 - 0 = 11$, divisible by 11).**

Question 18

- **B1** 91 cao
- **Answer: 91**

Question 19

- **B1** 210 cao
- **Answer: 210**

Question 20

- **M1** Realise conditions: $10a + b = 0 \pmod{4}$ and $a + b = 0 \pmod{3}$ (or equivalently $10b + a$ divisible by 3) shown
- **M1** Explain search or reason to reduce possibilities (consider two-digit multiples of 4 with non-zero digits)
- **A1** List: 12, 24, 36, 48, 72, 84, 96 cao
- **Answer: 12, 24, 36, 48, 72, 84, 96**