2.57-5 Number Puzzles and Logic Set E: 30-minute Pack

GL ASSESSMENT GL · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 How many three-digit numbers greater than 500 can be made using the digits 1, 4, 5 and 9, if each digit can be used at most once per number?

(3)

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2 Priya's purse contains only 10p, 20p and 50p coins. She has twice as many 10p coins as 50p coins, and 3 more 20p coins than 50p coins. Altogether the coins are worth £4.20. How many of each coin does she have?

(4)

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3 Four pupils - Kai, Lily, Mo and Nadia - each play a different musical instrument (piano, violin, flute or drums) and each has lessons on a different day (Monday, Tuesday, Wednesday or Thursday).

1. The pupil who plays drums has lessons on Wednesday.
2. Kai does not play piano or violin.
3. Lily has lessons on Monday.
4. Mo plays flute.
5. Nadia does not have lessons on Wednesday.
6. The violin player has lessons on Thursday.

Work out each pupil's instrument and lesson day.

(4)

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4 Three bus routes stop at the same bus stop. Route A stops every 12 minutes, Route B stops every 18 minutes, and Route C stops every 30 minutes. All three routes stop together at 09:00. What is the next time all three routes stop together?

(4)

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5 In a group of 40 pupils, 24 attend the coding club, 19 attend the chess club, and 9 attend neither club. How many pupils attend both clubs?

(3)

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6 A four-digit number is formed using the digits 2, 3, 5 and 8, each digit used exactly once. There are 24 different arrangements of these four digits. How many of these 24 arrangements give a number divisible by 3? Explain your reasoning without listing all 24 numbers.

(4)

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7 Using the digits 1, 2, 3, 4 and 5, with each digit used at most once, how many three-digit numbers greater than 300 can be formed that are multiples of 5?

(4)

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8 Mia has 6 twenty-pence coins and £3 coins in her purse. How much money does she have in total? Give your answer in pounds.

(2)

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9 List all the two-digit numbers that can be made by choosing two different digits from 2, 5 and 8 (no digit repeated within a number) that are even.

(2)

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10 In 7 years' time, Ayesha will be three times as old as she was 5 years ago. How old is Ayesha now?

(3)

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Mark scheme · 2.57-5 Number Puzzles and Logic Set E: 30-minute Pack

Question 1

identifies that the hundreds digit must be 5 or 9 for the number to exceed 500 (2 choices) oe	**M1**
correctly counts 6 arrangements for each choice of hundreds digit (3 x 2 for the remaining two positions) oe	**M1**
12 cao	**A1**

Answer: 12

Question 2

lets the number of 50p coins be x, so 10p coins = 2x and 20p coins = x + 3	**M1**
forms the value equation 10(2x) + 20(x + 3) + 50x = 420, i.e. 90x + 60 = 420 oe	**M1**
solves to x = 4 oe	**M1**
8 ten-pence coins, 7 twenty-pence coins and 4 fifty-pence coins cao	**A1**

Answer: 8 ten-pence coins, 7 twenty-pence coins, 4 fifty-pence coins

Question 3

Kai - drums, Wednesday cao (deduced: Kai cannot play piano or violin, and flute is Mo's, so Kai must play drums; the drums player has lessons on Wednesday)	**B1**
Lily - piano, Monday cao (Lily's day is given as Monday; since the violin player has Thursday, Lily cannot play violin, so she plays piano)	**B1**
Nadia - violin, Thursday cao (the remaining instrument, confirmed by clue 6 and consistent with clue 5)	**B1**
Mo - flute, Tuesday cao (deduced by elimination, the only day left once Monday, Wednesday and Thursday are taken)	**B1**

Answer: Kai - drums, Wednesday; Lily - piano, Monday; Mo - flute, Tuesday; Nadia - violin, Thursday

Question 4

recognises this is a lowest common multiple problem and finds prime factors: $12 = 2^2 \times 3$, $18 = 2 \times 3^2$, $30 = 2 \times 3 \times 5$ oe	**M1**
LCM = $2^2 \times 3^2 \times 5 = 180$ oe	**M1**
converts 180 minutes to 3 hours oe	**M1**
12:00 cao	**A1**

Answer: 12:00

Question 5

pupils attending at least one club = 40 - 9 = 31 oe	**M1**
forms the equation 24 + 19 - both = 31 oe	**M1**
12 cao	**A1**

Answer: 12

Question 6

finds the digit sum = 2 + 3 + 5 + 8 = 18 oe	**M1**
recognises that a number is divisible by 3 exactly when its digit sum is divisible by 3, and rearranging the digits does not change this digit sum	**M1**
18 is divisible by 3 (18 = 3 x 6), so this digit sum condition is met regardless of the order of the digits	**A1**
24 (all of the arrangements) cao	**A1**

Answer: 24 (all of the arrangements); the digit sum 2+3+5+8 = 18 is divisible by 3, and rearranging digits never changes the digit sum, so every arrangement is divisible by 3

Question 7

identifies the units digit must be 5, since 5 is the only available digit that is a multiple of 5	**M1**
identifies the hundreds digit must be 3 or 4 for the number to exceed 300 (2 choices, since 5 is already used) oe	**M1**
the tens digit is then chosen from the remaining 3 digits (3 choices) oe	**M1**
6 cao	**A1**

Answer: 6

Question 8

6 x 20 + 3 x 100 = 120 + 300 = 420 (pence) oe	**M1**
£4.20 cao	**A1**

Answer: £4.20

Question 9

at least 2 of the 4 correct numbers listed, with no repeats or invalid digits	**B1**
all four correct numbers listed: 28, 52, 58, 82 cao	**B1**

Answer: 28, 52, 58, 82

Question 10

sets up the equation x + 7 = 3(x - 5), where x is Ayesha's age now; accept an equivalent route to the same value without algebra, such as trial and improvement	**M1**
correctly expands and rearranges: x + 7 = 3x - 15, so 22 = 2x oe	**M1**
11 cao	**A1**

Answer: 11

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