2.15 Logic and Puzzle Problems: 30-minute Pack

GL ASSESSMENT GL11-MATHS-LOGIC · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 In a number code, a letter's value is found using 2n+1, where n is its position in the alphabet (A=1, B=2, ...). For example, the word CAB has value 7+3+5=15.

(a) Find the total code value of the word FED. **(2)**

.....

(b) A three-letter word has the form C _ T. Its first letter has value 7, its last letter has value 41, and the total code value of the whole word is 79. Find the missing middle letter. **(3)**

.....

2 Five children are different heights. Fatima is shorter than Aisha. Oliver is shorter than Megan. Aisha is shorter than Oliver. Fatima is taller than Sienna. Who is the tallest?

- ☐ A) Megan
- ☐ B) Fatima
- ☐ C) Aisha
- ☐ D) Sienna
- ☐ E) Oliver

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3 Five children are different heights. Oliver is shorter than Jack. Jack is shorter than Sienna. Mei is taller than Sienna. Mei is shorter than Tom. Who is the shortest?

- [ ] A) Jack
- [ ] B) Tom
- [ ] C) Sienna
- [ ] D) Mei
- [ ] E) Oliver

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4 Five children are different heights. Jack is taller than Priya. Oliver is shorter than Priya. Megan is taller than Dylan. Oliver is taller than Megan. Who is in the middle (third tallest)?

- [ ] A) Dylan
- [ ] B) Oliver
- [ ] C) Jack
- [ ] D) Priya
- [ ] E) Megan

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5 Five children are different heights. Fatima is taller than Oliver. Callum is taller than Ravi. Fatima is shorter than Ravi. Callum is shorter than Tom. Who is the shortest?

- [ ] A) Ravi
- [ ] B) Fatima
- [ ] C) Oliver
- [ ] D) Tom
- [ ] E) Callum

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6 Five children are different heights. Ravi is shorter than Dylan. Callum is shorter than Ravi. Callum is taller than Sienna. Tom is shorter than Sienna. Who is the second tallest?

- [ ] A) Callum
- [ ] B) Ravi
- [ ] C) Tom
- [ ] D) Sienna
- [ ] E) Dylan

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7 Five children are different heights. Dylan is shorter than Mei. Tom is shorter than Priya. Mei is shorter than Tom. Dylan is taller than Oliver. Who is the second tallest?

- [ ] A) Dylan
- [ ] B) Oliver
- [ ] C) Priya
- [ ] D) Mei
- [ ] E) Tom

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8 Five children are different heights. Fatima is shorter than Jack. Callum is shorter than Oliver. Sienna is shorter than Fatima. Callum is taller than Jack. Who is in the middle (third tallest)?

- [ ] A) Fatima
- [ ] B) Oliver
- [ ] C) Callum
- [ ] D) Jack
- [ ] E) Sienna

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9 Five children are different heights. Oliver is taller than Priya. Tom is shorter than Mei. Ravi is shorter than Tom. Oliver is shorter than Ravi. Who is the shortest?

- [ ] A) Priya
- [ ] B) Mei
- [ ] C) Tom
- [ ] D) Ravi
- [ ] E) Oliver

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10 Five children are different heights. Jack is taller than Ravi. Aisha is shorter than Dylan. Mei is shorter than Aisha. Ravi is taller than Dylan. Who is the shortest?

- [ ] A) Aisha
- [ ] B) Ravi
- [ ] C) Mei
- [ ] D) Jack
- [ ] E) Dylan

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11 Five children are different heights. Priya is shorter than Megan. Megan is shorter than Sienna. Tom is taller than Sienna. Callum is taller than Tom. Who is in the middle (third tallest)?

- [ ] A) Megan
- [ ] B) Tom
- [ ] C) Callum
- [ ] D) Priya
- [ ] E) Sienna

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12 Five children are different heights. Mei is shorter than Aisha. Ravi is shorter than Mei. Dylan is shorter than Ravi. Aisha is shorter than Callum. Who is the shortest?

- [ ] A) Ravi
- [ ] B) Callum
- [ ] C) Dylan
- [ ] D) Aisha
- [ ] E) Mei

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13 Five children are different heights. Priya is taller than Dylan. Jack is shorter than Dylan. Jack is taller than Sienna. Megan is shorter than Sienna. Who is the tallest?

- [ ] A) Jack
- [ ] B) Sienna
- [ ] C) Megan
- [ ] D) Priya
- [ ] E) Dylan

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14 Five children are different heights. Tom is shorter than Megan. Jack is shorter than Dylan. Megan is shorter than Priya. Priya is shorter than Jack. Who is in the middle (third tallest)?

- [ ] A) Tom
- [ ] B) Priya
- [ ] C) Megan
- [ ] D) Jack
- [ ] E) Dylan

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15 Six years ago, Grace was three times as old as her brother Leo. In four years' time, Grace will be twice as old as Leo. Show that Grace is currently 36 years old.

(4)

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16 A sequence is formed using the rule 'multiply by 2, then subtract 3', starting at 5: 5, 7, 11, 19, ...

(a) Find the next two terms of the sequence. **(2)**

(b) Explain why every term in this sequence will always be an odd number. **(2)**

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17 Look at this group of numbers: 12, 18, 24, 30, 35, 42. Which number is the odd one out? Give a reason for your answer.

- ☐ A) 12
- ☐ B) 18
- ☐ C) 30
- ☐ D) 35
- ☐ E) 42

18 There are 9 identical-looking marbles, one of which is heavier than the rest. You have a balance scale and may use it only twice.

(4)

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Mark scheme · 2.15 Logic and Puzzle Problems: 30-minute Pack

Question 1

(a) F=13, E=11, D=9 (oe) **M1**

(a) 33 cao **A1**

(a) Answer: 33

(b) 79-7-41=31 (oe) **M1**

(b) solve 2n+1=31 to get n=15 (oe) **M1**

(b) O cao **A1**

(b) Answer: O (the word is COT)

Question 2

correct option A (Megan) cao **B1**

Answer: A) Megan

Question 3

correct option E (Oliver) cao **B1**

Answer: E) Oliver

Question 4

correct option B (Oliver) cao **B1**

Answer: B) Oliver

Question 5

correct option C (Oliver) cao **B1**

Answer: C) Oliver

Question 6

correct option B (Ravi) cao **B1**

Answer: B) Ravi

Question 7

correct option E (Tom) cao **B1**

Answer: E) Tom

Question 8

correct option D (Jack) cao **B1**

Answer: D) Jack

Question 9

correct option A (Priya) cao **B1**

Answer: A) Priya

Question 10

correct option C (Mei) cao **B1**

Answer: C) Mei

Question 11

correct option E (Sienna) cao **B1**

Answer: E) Sienna

Question 12

correct option C (Dylan) cao **B1**

Answer: C) Dylan

Question 13

correct option D (Priya) cao **B1**

Answer: D) Priya

Question 14

correct option B (Priya) cao **B1**

Answer: B) Priya

Question 15

form equation G-6=3(L-6) (oe) **M1**

form equation G+4=2(L+4) (oe) **M1**

solve simultaneously to find L=16 (oe) **M1**

cso G=36, with both original conditions checked **A1**

Answer: Grace is currently 36 (Leo is 16)

Question 16

(a) 35 cao **B1**

(a) 67 cao **B1**

(a) Answer: 35, 67

(b) recognise that doubling any whole number always gives an even number (oe) **B1**

(b) recognise that subtracting 3 from an even number always gives an odd number, so every new term must be odd (oe) **B1**

(b) Answer: Doubling any number gives an even result; subtracting 3 from an even number always gives an odd number, so every term after the first is odd (and the first term, 5, is also odd)

Question 17

35 identified (cao) **B1**

valid reason given, e.g. 35 is not a multiple of 6, or 35 is the only odd number (oe) **B1**

Answer: 35, because it is not a multiple of 6 (the others are 6 x 2, 6 x 3, 6 x 4, 6 x 5, 6 x 7)

Question 18

split the marbles into three groups of 3 (oe) **B1**

weigh any two of the groups against each other; if they balance, the heavier marble is in the third group; if not, take the heavier group (oe) **B1**

take the identified group of 3 and weigh 2 of its marbles against each other (oe) **B1**

correct conclusion in both branches: if that pair balances the untested marble is heaviest, otherwise the heavier one shown is heaviest (oe) **B1**

Answer: Split into three groups of 3. Weigh two groups against each other: if balanced, the heavier marble is in the untested group; if not, keep the heavier group. Take that group of 3 and weigh 2 of its marbles against each other: if balanced, the third marble is heaviest; if not, the heavier one shown is heaviest

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