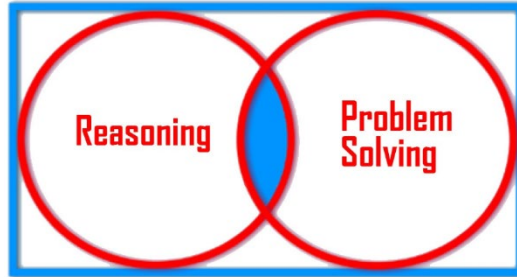


GCSE Foundation (5 – 1)



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Mathematical Reasoning Questions

(Sequences) – Set 1

Solutions

The questions are repeated here for your convenience

1	<p>Choose the expression for the Nth term of the sequence below 19, 16, 13, 10, ...</p> <p>a) $3n + 19$ b) $19 - 3n$ c) $22 - 3n$ d) $3n + 22$</p> <p>Correct Answer: C [1mark]</p>
2	<p>The Nth term of a sequence is given as $1.5n + 3$ Circle all the terms which are not in this sequence</p> <p>a) 5.5 b) 6.0 c) 7.5 d) 8.0</p> <p style="text-align: center;"><u>Solution</u></p> <p>$1.5n + 3$ is the Nth term expression, so list the terms from $n = 1$ to whichever term is at least equal to 8.</p> <p>$1.5(1) + 3 = 4.5$ $1.5(2) + 3 = 6$ $1.5(3) + 3 = 7.5$ $1.5(4) + 3 = 9$</p> <p>Therefore, 5.5 and 8 are not in the sequence</p> <p>Correct Answers: A and D [2marks]</p>
3	<p>The Nth term of a sequence is given as $5n - c$ Circle all the terms which are in the sequence</p> <p>a) $5 - c$ b) $5 + c$ c) $15 + c$ d) $15 - c$</p> <p style="text-align: center;"><u>Solution</u></p> <p>a) $5(1) - c = 5 - c$: this is the first term of the sequence b) $5 + c$: is not a term in the sequence, since $+c$ is not in the expression c) $5(3) + c = 15 + c$: not in the sequence d) $5(3) - c = 15 - c$: this is the 3rd term in the Sequence</p> <p>Correct Answers: A and D [2marks]</p>

4	<p>The Nth term of a sequence is given as $20 - 3n$ Answer True or False to the following statements</p> <p>a) All the terms in the sequence will be less than zero: False b) None of the terms is greater than 20: True c) The first term in the sequence is 23: False</p> <p style="text-align: right;">[3marks]</p>
5	<p>Here is part of a geometric sequence</p> <p style="text-align: center;">$5, \quad p, \quad 45, \quad 135$</p> <p>One of the values of p is 3. Find the other value of p.</p> <p style="text-align: center;"><u>Solution</u></p> <p>$5 \times 3 = 15$ $15 \times 3 = 45$ $45 \times 3 = 135$</p> <p>But we could also have $5 \times -3 = -15$ $-15 \times -3 = 45$. Therefore, p could also be -3 [1mark]</p>
6	<p>Some of the terms of a certain linear sequence are shown below</p> <p style="text-align: center;">$\dots, \quad 13, \quad \dots, \quad 3,$</p> <p>a) Find the first term of the sequence b) Find the Nth term of the sequence</p> <p style="text-align: center;"><u>Solution</u></p> <p>a) It's a linear sequence so the difference between the terms will be the same. So, the difference between each term is $\frac{3-13}{2} = \frac{-10}{2} = -5$</p> <p>So, the first term will be $13 + 5 = 18$ [2marks]</p> <p>b) The first 4 terms of the sequence will be as follows: 18, 13, 8, 3,...</p> <p>The sequence is going down by 5. Therefore, the term-term difference is -5. The term before the first term will be $18 + 5 = 23$ Therefore, the Nth term of the sequence is $-5n + 23$ [2marks]</p>

7



The first and second terms of a sequence are 1 and x respectively. After the first two terms, all the other terms in the sequence are obtained by adding the previous two terms.

The 6th term of the sequence is 43.

Find the value of x .

Solution

Add the previous 2 terms together till we reach the 6th term

1, x , $1 + x$, $1 + 2x$, $2 + 3x$, $3 + 5x \dots$ **[1mark]**

Therefore 6th term will be $3 + 5x = 43$ {subtract 3 from both sides} **[1mark]**

$5x = 40$ {divide both sides by 5}

Therefore, $x = 8$ **[1mark]**

8

The N^{th} term of a sequence is $3an + 2a$

a) Find the first 3 terms of the sequence

b) The 10th term in the sequence is 70. Find the value of a

Solution

a) The first 3 terms will be:

$$3a(1) + 2a = 5a \text{ {substitute 1,2 and 3 for } n \text{}}$$

$$3a(2) + 2a = 8a$$

$$3a(3) + 2a = 11a$$

Therefore, $5a$, $8a$, $11a$ are the first 3 terms in the sequence

[3marks]

b) Substitute 10 for n in the n th term formula

$$3a(10) + 2a = 32a$$

Therefore, $32a = 70$ {Divide both sides by 32} **[1mark]**

$$\text{Therefore, } a = \frac{70}{32} = \frac{35}{16} \quad \text{[1mark]}$$

- 9 The first term of a sequence is 750. Each new term in the sequence is obtained by dividing the previous term by 2 and then subtracting 15. What is the 5th term?
- a) 67.5
 - b) 18.75
 - c) -5.625
 - d) -17.8125

Solution

Start with 750, divide by 2 and subtract 15, repeat this till we get to the 5th term. That is 750, 360, 165, 67.5, 18.75...

Therefore, the 5th term is 18.75,

Correct Answer: B **[1mark]**

- 10 The Nth term of a quadratic sequence is $an^2 + an - a$



Where a is a constant

- a) The first term of the sequence is

i) $3a^2$

ii) a

iii) $2a$

iv) $2a^2$

- b) The 6th term of the sequence is 82. Find the value of a

- c) Calculate the 10th term of the sequence

Solution

- a) The first term can be found by substituting 1 for n in the formula.

$$a(1)^2 + a(1) - a$$

$$= a + a - a$$

$$= a \quad \text{[1mark]}$$

Correct Answer: II

- b) The 6th term can be found by substituting 6 for n in the formula.

$$a(6)^2 + a(6) - a$$

$$= 36a + 6a - a$$

$$= 41a$$

Therefore, $41a = 82$ {divide both sides by 41}

$$a = 2 \quad \text{[2marks]}$$

Therefore, the nth term will be $2n^2 + 2n - 2$

- c) The 10th term can be found by substituting 10 for n in the formula.

$$2(10)^2 + 2(10) - 2 = 218 \quad \text{[2marks]}$$

The 10th term of the sequence is 218