eClassroom

GCSE Mathematics

Sequences

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation — Worked Solutions

[Fluency] Question 1

Add 3 each time: 17,20,23

∴ **17, 20, 23**

[Fluency] Question 2

d=4, a=3. nth term = a+(n-1)d = 3+4n-4 = 4n-1

∴ **4n−1**

[Fluency] Question 3

$$4(50) - 1 = 199$$

∴ **199**

[Fluency] Question 4

5n+2=75→5n=73→n=14.6. Not an integer.

∴ **No (n=14.6 is not an integer)**

[Fluency] Question 5

d=−3, a=10. nth term=10+(n−1)(−3)=10−3n+3=13−3n

∴ **13−3n**

[Reasoning] Question 6

2n+5=31 → 2n=26 → n=13

∴ **13th term**

[Reasoning] Question 7

4n−1 = 5n−3 → n=2. Check: A=7, B=7 ✓

But 4n-1=7 at n=2 and 5n-3=7 at n=2.

Actually: find n and m such that 4n-1=5m-3 → 4n=5m-2.

m=2: 4n=8→n=2: both=7 ✓

∴ **7**

[Reasoning] Question 8

n=1:2, n=2:5, n=3:10, n=4:17

(b) $n^2+1=50 \rightarrow n^2=49 \rightarrow n=7$. Yes, 50 is the 7th term.

∴ **(a) 2,5,10,17 (b) Yes, 7th term**

[Problem Solving] Question 9

Differences: 3,5,7 → next diff=9 → next term=19+9=28

(b) Not arithmetic — differences are not constant (3,5,7,...)

∴ **(a) 28 (b) Not arithmetic (differences not constant)**

[Problem Solving] Question 10

$a+4d=17$ and $a+9d=32$. Subtract: $5d=15 \rightarrow d=3$. $a=17-12=5$

∴ **a=5, d=3**

Section B — Higher — Worked Solutions

[Fluency] Question 1

2nd diff=2→a=1. 1+b+c=3→b+c=2. 4+2b+c=8→2b+c=4→b=2,c=0

∴ **n^2+2n**

[Fluency] Question 2

Diffs: 4,6,8,10. 2nd diff=2→a=1. 1+b+c=2→b+c=1. 4+2b+c=6→2b+c=2→b=1,c=0

∴ **n^2+n**

[Fluency] Question 3

$r = 3,\ \text{nth term} = 2 \times 3^{n-1}$

$7\text{th term} = 2 \times 3^6 = 2 \times 729 = 1458$

∴ **nth term=2×3^(n–1); 7th term=1458**

[Reasoning] Question 4

(a) 5,10,20,40,80

(b) nth term=5×2^(n-1)

(c) $S_8 = \frac{5(2^8-1)}{2-1} = 5 \times 255 = 1275$

∴ **(a) 5,10,20,40,80 (b) 5×2^(n–1) (c) 1275**

[Reasoning] Question 5

Diffs: 9,13,17,21. 2nd diff=4→a=2. 2+b+c=5→b+c=3. 8+2b+c=14→2b+c=6→b=3,c=0

∴ **$2n^2+3n$**

[Reasoning] Question 6

(a) n=1:0, n=2:3, n=3:10, n=4:21

(b) $2n^2-3n+1=100 \rightarrow 2n^2-3n-99=0 \rightarrow n=(3\pm\sqrt{(9+792)})/4=(3\pm\sqrt{801})/4$

$\sqrt{801}\approx28.3 \rightarrow n\approx7.8$, so n=8: 2(64)–24+1=105 or n=7: 2(49)–21+1=78

Closest to 100 is n=8 giving 105 (distance 5)

∴ **(a) 0,3,10,21 (b) n=8 gives 105 (closest)**

[Problem Solving] Question 7

$ar^2 = 12$ and $ar^5 = 96 \Rightarrow r^3 = 8 \Rightarrow r = 2$

$a = 12/4 = 3$

∴ **a=3, r=2**

[Problem Solving] Question 8

2nd diff=6→a=3. Let nth term=3n²+bn+c.

From 5th term: 75+5b+c=55→5b+c=–20

From 6th term: 108+6b+c=80→6b+c=–28. Subtract: b=–8,c=20

nth term=3n²–8n+20. Check: n=5: 75–40+20=55 ✓

∴ **3n²–8n+20**