

Examples

Workout



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**Question 1:** The first 4 numbers in the Fibonacci sequence are 1, 1, 2, 3, ...

- (a) What is the 5<sup>th</sup> term of the Fibonacci sequence?
- (b) What is the 6<sup>th</sup> term of the Fibonacci sequence?
- (c) Describe the rule for continuing the Fibonacci sequence.

**Question 2:** Find the next three terms of the following Fibonacci-style sequences

- |   |   |   |
|---|---|---|
| (a) 2, 4, 6, 10, ...  | (b) 3, 6, 9, 15, ...  | (c) 4, 8, 12, 20, ...   |
| (d) 15, 23, 38, 62, ...   | (e) 5, 12, 17, 29, ...  | (f) -3, 5, 2, 7, ...  |
| (g) 35, 60, 95, 155, ...  | (h) -1, -3, -4, -7, ...   | (i) 1.2, 2.7, 3.9, 6.6, ...                                       |
| (j) 0.11, 2.32, 2.43, 4.75, ...                                     | (k) -5.1, 1.1, -4, -2.9, ...                                      | (l) -0.5, -0.7, -1.2, -1.9, ...                                   |
| (m) $\frac{1}{11}, \frac{3}{11}, \frac{4}{11}, \frac{7}{11}, \dots$ | (n) $\frac{5}{6}, \frac{11}{12}, \frac{7}{4}, \frac{8}{3}, \dots$ | (o) $-\frac{1}{5}, \frac{1}{2}, \frac{3}{10}, \frac{4}{5}, \dots$ |

**Question 3:** Find the missing term in each of the Fibonacci-style sequences below.

- |                                     |   |   |
|-------------------------------------|---|---|
| (a) $\square, 13, 20, 33, \dots$    | (b) $11, \square, 26, 41, \dots$        | (c) $\square, 69, 109, 178, \dots$                    |
| (d) $\square, 3.7, 4.9, 8.6, \dots$ | (e) $26.3, \square, 64.4, 102.5, \dots$ | (f) $10.25, \square, 25.75, 41.25, \dots$             |
| (g) $6, \square, 4, 2, \dots$       | (h) $-12, \square, -4, 4, \dots$        | (i) $\square, -\frac{5}{4}, -2, -\frac{13}{4}, \dots$ |

Apply

**Question 1:** For each of the following Fibonacci-style sequences, find the next 4 terms.

- |                                       |  |
|---------------------------------------|--|
| (a) $a, 4a, 5a, 9a, \dots$            | (b) $3x, 3x + y, 6x + y, 9x + 2y, \dots$ |
| (c) $6a, -2a, 4a, 2a, \dots$          | (d) $2y, y + z, 3y + z, \dots$           |
| (e) $4x - 5y, 2x - y, 6x - 6y, \dots$ | (f) $-x, x + y, y, \dots$                |

# Fibonacci Sequences

Video 287a on [www.corbettmaths.com](http://www.corbettmaths.com)

**Question 2:** Beth wants to generate a Fibonacci style sequence.  
The first term is 3 and the second term is 4.

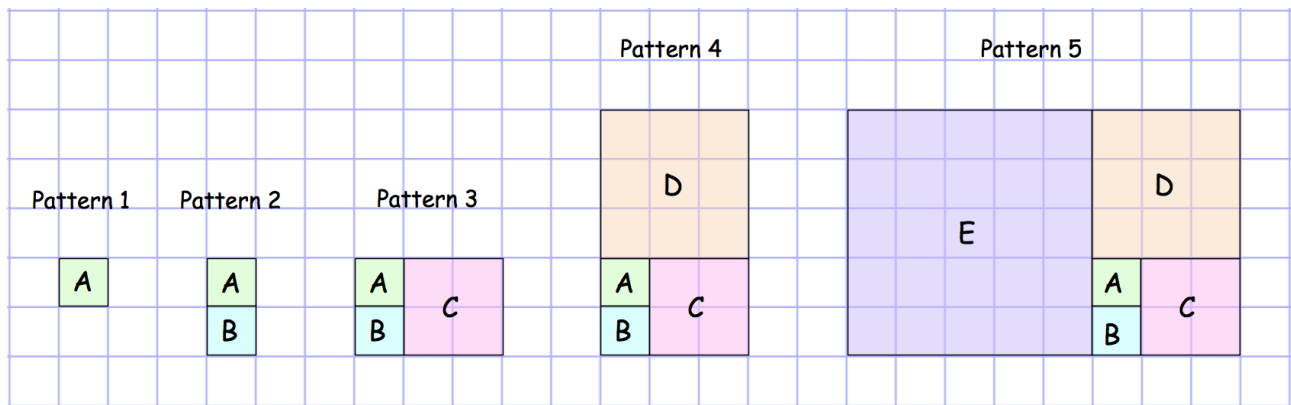
- (a) Find the 3rd term.
- (b) Find the 4th term.

Beth thinks that the sum of the first ten terms is equal to 11 times the 7th term of her sequence.

- (c) Show that Beth is correct.

**Question 3:** Using the first term of  $x$  and the second term of  $y$ , prove your answer to Question 2 (c).

**Question 4:** Ethan generates the pattern below



- (a) Draw Pattern 6
- (b) What is the length of each side of square F?
- (c) What is the length of each side of square G?
- (d) What is the length of each side of square H?
- (e) What do you notice about your answers to (b), (c) and (d)?

**Question 5:** Dylan is researching what happens when a term in the Fibonacci sequence is divided by the term before it.

- (a) Find the missing answers
- (b) What do you notice?
- (c) Research the Golden Number.

$$\begin{aligned}
 1 \div 1 &= 1 \\
 2 \div 1 &= 2 \\
 3 \div 2 &= 1.5 \\
 5 \div 3 &= 1.666... \\
 8 \div 5 &= \\
 13 \div 8 &= \\
 21 \div 13 &=
 \end{aligned}$$

Answers



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Textbook 287a

Answers

1a) 5                      b) 8                      c) "to get the next term, add the previous 2"

2a) 16, 26, 42                      b) 24, 39, 63                      c) 32, 52, 84

d) 99, 160, 259                      e) 46, 75, 121                      f) 9, 16, 25

g) 250, 405, 655                      h) -11, -18, -29                      i) 10.5, 17.1, 27.6

j) 7.18, 11.93, 19.11                      k) -6.9, -9.8, -16.7                      l) -3.1, -5, -8.1

m)  $1, 1\frac{7}{11}, 2\frac{7}{11}$                       n)  $\frac{53}{12}, \frac{85}{12}, \frac{23}{2}$                       o)  $\frac{11}{10}, \frac{19}{10}, 3$

3a) 7                      b) 15                      c) 40

d) 1.2                      e) 38.1                      f) 15.5

g) -1.8                      h) 7.6                      i) -0.75

Apply

1a) 14a, 23a, 37a, 60a                      b)  $15x + 3y, 24x + 5y, 39x + 8y, 63x + 13y$

c) 6a, 8a, 14a, 22a                      d)  $4y + 2z, 7y + 3z, 11y + 5z, 18y + 8z$

e)  $8x - 7y, 14x - 13y, 22x - 20y, 36x - 33y$  f)  $x + 2y, x + 3y, 2x + 5y, 3x + 8y$

2a) 7                      b) 11

c) Sequence is 3, 4, 7, 11, 18, 29, 47, 76, 123, 199...

Sum of these first ten terms is 517

The seventh term is 47.

$47 \times 11 = 517$ , showing that Beth is correct

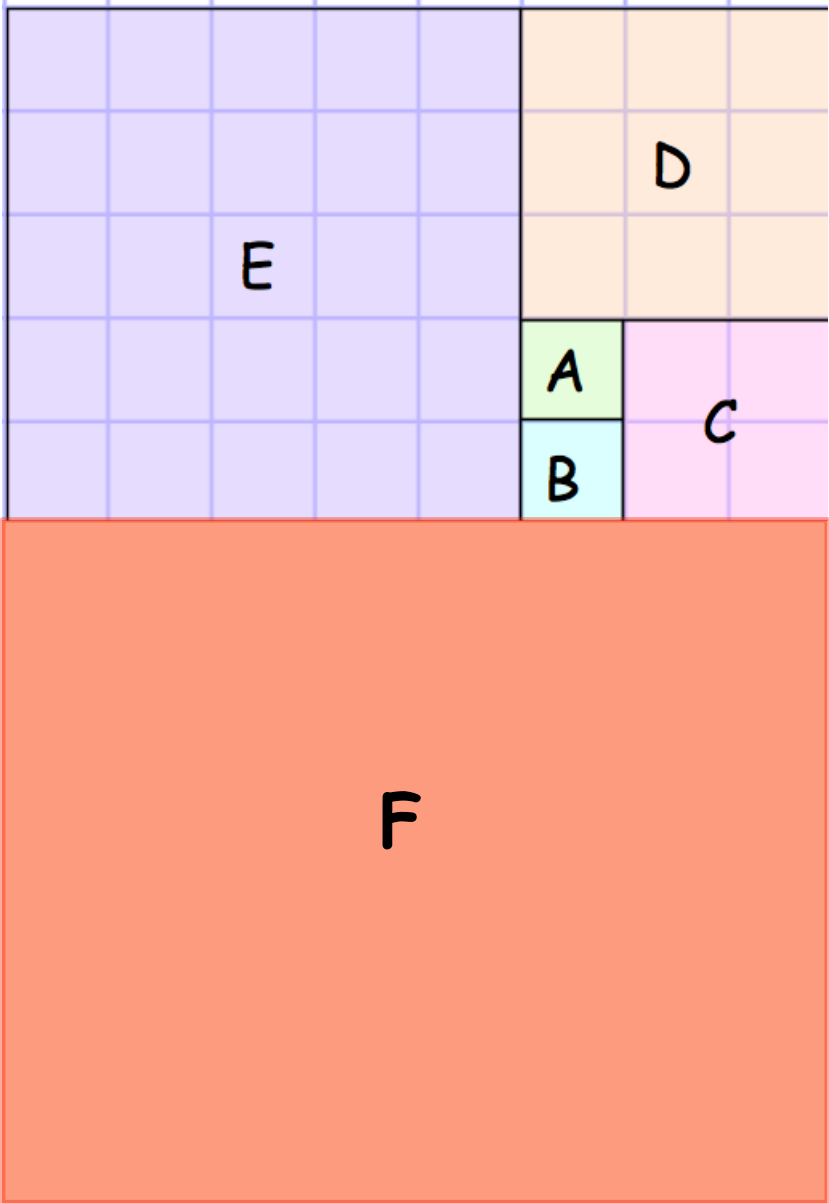
- 3) 1<sup>st</sup> Term:  $x$
- 2<sup>nd</sup> Term:  $y$
- 3<sup>rd</sup> Term:  $x + y$
- 4<sup>th</sup> Term:  $x + y + y = x + 2y$

The sequence continues:  $2x + 3y, 3x + 5y, 5x + 8y, 8x + 13y, 13x + 21y, 21x + 34y$

Sum of the first 10 terms =  $55x + 88y$

11 times the 7<sup>th</sup> term =  $11(5x + 8y) = 55x + 88y$

4)



- b) 8
- c) 13
- d) 21
- e) They are all part of the Fibonacci sequence, starting 1, 1, 2, 3,.....

5a)  $8 \div 5 = 1.6$                        $13 \div 8 = 1.626$                        $21 \div 13 = 1.6153....$

- b) Each term is around 1.6, and the sequence appears to be converging

The limit of this sequence is the “Golden Number” or “Golden Ratio”, usually called  $\phi$  (“phi”)