Utilizing the Explicit Formula – Day 3

Unit 7: Representations of Exponential Relations

For each of the following find the explicit formula and…

A. Identify the next three terms

B. Find the term named in the problem

C. Find the 8th term.

1. $3, -9, 27, -81, \ldots$

Find a_{11}

$a_5 = 243$

$a_6 = -729$

$a_7 = 2187$

$a_8 = -6561$

$a_{11} = 177147$

2. $-4, -8, -16, -32, \ldots$

Find a_{11}

$a_5 = -64$

$a_6 = -128$

$a_7 = -256$

$a_8 = -512$

$a_{11} = -4096$

3. $-0.75, -3, -12, -48, \ldots$

Find a_{10}

$a_5 = -192$

$a_6 = -768$

$a_7 = -3072$

$a_8 = -12288$

$a_{10} = -196608$

4. $2.5, -5, 10, -20, \ldots$

Find a_{11}

$a_5 = 40$

$a_6 = -80$

$a_7 = 160$

$a_8 = -320$

$a_{11} = 2560$

5. $-2, \frac{2}{5}, -\frac{2}{25}, \frac{2}{125}, \ldots$

Find a_9

$a_5 = \frac{-2}{625}$

$a_6 = \frac{2}{3125}$

$a_7 = \frac{-2}{15625}$

$a_8 = \frac{2}{78125}$

$a_9 = \frac{-2}{390625}$

6. $-2, -4, -8, -16, \ldots$

Find a_{12}

$a_5 = -32$

$a_6 = -64$

$a_7 = -128$

$a_8 = -256$

$a_{12} = -4096$

7. $-1, 4, -16, 64, \ldots$

Find a_{10}

$a_5 = -256$

$a_6 = 1024$

$a_7 = -4096$

$a_8 = 16384$

$a_{10} = 262144$

8. $1, 3, 9, 27, \ldots$

Find a_{11}

$a_5 = 81$

$a_6 = 243$

$a_7 = 729$

$a_8 = 2187$

$a_{11} = 59049$

9. $-1, 2, -4, 8, \ldots$

Find a_{12}

$a_5 = -16$

$a_6 = 32$

$a_7 = -64$

$a_8 = 128$

$a_{12} = 2048$

10. $-\frac{7}{4}, \frac{7}{8}, -\frac{7}{16}, \frac{7}{32}, \ldots$

Find a_9

$a_5 = \frac{-7}{64}$

$a_6 = \frac{7}{128}$

$a_7 = \frac{-7}{256}$

$a_8 = \frac{7}{512}$

$a_9 = \frac{-7}{1024}$

11. $-4, 12, -36, 108, \ldots$

Find a_{11}

$a_5 = -324$

$a_6 = 972$

$a_7 = -2916$

$a_8 = 8748$

$a_{11} = -236196$

12. $-3, -9, -27, -81, \ldots$

Find a_9

$a_5 = -243$

$a_6 = -729$

$a_7 = -2187$

$a_8 = -6561$

$a_9 = -19683$

13. $2, -\frac{2}{3}, \frac{2}{9}, -\frac{2}{27}, \ldots$

Find a_{11}

$a_5 = \frac{2}{81}$

$a_6 = \frac{-2}{243}$

$a_7 = \frac{2}{729}$

$a_8 = \frac{-2}{2187}$

$a_{11} = \frac{2}{59049}$

14. $-2, -8, -32, -128, \ldots$

Find a_{10}

$a_5 = -512$

$a_6 = -2048$

$a_7 = -8192$

$a_8 = -32768$

$a_{10} = -524288$

15. $4, 16, 64, 256, \ldots$

Find a_9

$a_5 = 1024$

$a_6 = 4096$

$a_7 = 16384$

$a_8 = 65536$

$a_9 = 262144$

16. $2, -1, \frac{1}{2}, -\frac{1}{4}, \ldots$

Find a_9

$a_5 = \frac{1}{8}$

$a_6 = \frac{-1}{16}$

$a_7 = \frac{1}{32}$

$a_8 = \frac{-1}{64}$

$a_9 = \frac{1}{128}$

17. $-3, -12, -48, -192, \ldots$

Find a_{10}

$a_5 = -768$

$a_6 = -3072$

$a_7 = -12288$

$a_8 = -49152$

$a_{10} = -786432$

18. $-4, -12, -36, -108, \ldots$

Find a_{11}

$a_5 = -324$

$a_6 = -972$

$a_7 = -2916$

$a_8 = -8748$

$a_{11} = -236196$

19. $-1, -3, -9, -27, \ldots$

Find a_{12}

$a_5 = -81$

$a_6 = -243$

$a_7 = -729$

$a_8 = -2187$

$a_{12} = -177147$

20. $2, -4, 8, -16, \ldots$

Find a_{12}

$a_5 = 32$

$a_6 = -64$

$a_7 = 128$

$a_8 = -256$

$a_{12} = -4096$

① $3, -9, 27, -81, \ldots$

$r = \frac{-9}{3} = -3$

Ⓐ $a_5 = -81 \cdot -3 = \boxed{243}$

$a_6 = 243 \cdot -3 = \boxed{-729}$

$a_7 = -729 \cdot -3 = \boxed{2187}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = 3(-3)^{11-1}$

$a_{11} = 3(-3)^{10}$

$a_{11} = 3(59049)$

$\boxed{a_{11} = 177147}$

Ⓒ $a_8 = 2187 \cdot -3$

$\boxed{a_8 = -6561}$

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② $-4, -8, -16, -32, \ldots$

$r = \frac{-8}{-4} = 2$

Ⓐ $a_5 = -32 \cdot 2 = \boxed{-64}$

$a_6 = -64 \cdot 2 = \boxed{-128}$

$a_7 = -128 \cdot 2 = \boxed{-256}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = -4(2)^{11-1}$

$a_{11} = -4(2)^{10}$

$a_{11} = -4(1024)$

$\boxed{a_{11} = -4096}$

Ⓒ $a_8 = -256 \cdot 2$

$\boxed{a_8 = -512}$

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③ $-0.75, -3, -12, -48, \ldots$

$r = \frac{-3}{-0.75} = 4$

Ⓐ $a_5 = -48 \cdot 4 = \boxed{-192}$

$a_6 = -192 \cdot 4 = \boxed{-768}$

$a_7 = -768 \cdot 4 = \boxed{-3072}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{10} = -0.75(4)^{10-1}$

$a_{10} = -0.75(4)^9$

$a_{10} = -0.75(262144)$

$\boxed{a_{10} = -196608}$

Ⓒ $a_8 = -3072 \cdot 4$

$\boxed{a_8 = -12288}$

(4) $2.5, -5, 10, -20, \ldots$

$r = \frac{-5}{2.5} = -2$

(A) $a_5 = -20 \cdot -2 = \boxed{40}$

$a_6 = 40 \cdot -2 = \boxed{-80}$

$a_7 = -80 \cdot -2 = \boxed{160}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = 2.5(-2)^{11-1}$

$a_{11} = 2.5(-2)^{10}$

$a_{11} = 2.5(1024)$

$\boxed{a_{11} = 2560}$

(C) $a_8 = 160 \cdot -2$

$\boxed{a_8 = -320}$

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(5) $-2, \frac{2}{5}, \frac{-2}{25}, \frac{2}{125}, \ldots$

$r = \frac{2/5}{-2} = \frac{2}{5} \cdot \frac{-1}{2} = \frac{-1}{5}$

(A) $a_5 = \frac{2}{125} \cdot \frac{-1}{5} = \boxed{\frac{-2}{625}}$

$a_6 = \frac{-2}{625} \cdot \frac{-1}{5} = \boxed{\frac{2}{3125}}$

$a_7 = \frac{2}{3125} \cdot \frac{-1}{5} = \boxed{\frac{-2}{15625}}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_9 = -2\left(\frac{-1}{5}\right)^{9-1}$

$a_9 = -2\left(\frac{-1}{5}\right)^{8}$

$a_9 = -2\left(\frac{1}{390625}\right)$

$\boxed{a_9 = \frac{-2}{390625}}$

(C) $a_8 = \frac{-2}{15625} \cdot \frac{-1}{5}$

$\boxed{a_8 = \frac{2}{78125}}$

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(6) $-2, -4, -8, -16, \ldots$

$r = \frac{-4}{-2} = 2$

(A) $a_5 = -16 \cdot 2 = \boxed{-32}$

$a_6 = -32 \cdot 2 = \boxed{-64}$

$a_7 = -64 \cdot 2 = \boxed{-128}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{12} = -2(2)^{12-1}$

$a_{12} = -2(2)^{11}$

$a_{12} = -2(2048)$

$\boxed{a_{12} = -4096}$

(C) $a_8 = -128 \cdot 2$

$\boxed{a_8 = -256}$

⑦ $-1, 4, -16, 64, \ldots$

$r = \frac{4}{-1} = -4$

Ⓐ $a_5 = 64 \cdot -4 = \boxed{-256}$

$a_6 = -256 \cdot -4 = \boxed{1024}$

$a_7 = 1024 \cdot -4 = \boxed{-4096}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{10} = -1(-4)^{10-1}$

$a_{10} = -1(-4)^9$

$a_{10} = -1(-262144)$

$\boxed{a_{10} = 262144}$

Ⓒ $a_8 = -4096 \cdot -4$

$\boxed{a_8 = 16384}$

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⑧ $1, 3, 9, 27, \ldots$

$r = \frac{3}{1} = 3$

Ⓐ $a_5 = 27 \cdot 3 = \boxed{81}$

$a_6 = 81 \cdot 3 = \boxed{243}$

$a_7 = 243 \cdot 3 = \boxed{729}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = 1(3)^{11-1}$

$a_{11} = 1(3)^{10}$

$a_{11} = 1(59049)$

$\boxed{a_{11} = 59049}$

Ⓒ $a_8 = 729 \cdot 3$

$\boxed{a_8 = 2187}$

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⑨ $-1, 2, -4, 8, \ldots$

$r = \frac{2}{-1} = -2$

Ⓐ $a_5 = 8 \cdot -2 = \boxed{-16}$

$a_6 = -16 \cdot -2 = \boxed{32}$

$a_7 = 32 \cdot -2 = \boxed{-64}$

Ⓑ Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{12} = -1(-2)^{12-1}$

$a_{12} = -1(-2)^{11}$

$a_{12} = -1(-2048)$

$\boxed{a_{12} = 2048}$

Ⓒ $a_8 = -64 \cdot -2$

$\boxed{a_8 = 128}$

(10) $-\frac{7}{4}, \frac{7}{8}, -\frac{7}{16}, \frac{7}{32}, \ldots$

$r = \frac{7/8}{-7/4} = \frac{7}{8} \cdot \frac{-4}{7} = \frac{-1}{2}$

(A) $a_5 = \frac{7}{32} \cdot \frac{-1}{2} = \boxed{\frac{-7}{64}}$

$a_6 = \frac{-7}{64} \cdot \frac{-1}{2} = \boxed{\frac{7}{128}}$

$a_7 = \frac{7}{128} \cdot \frac{-1}{2} = \boxed{\frac{-7}{256}}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_9 = -\frac{7}{4}\left(\frac{-1}{2}\right)^{9-1}$

$a_9 = -\frac{7}{4}\left(\frac{-1}{2}\right)^{8}$

$a_9 = -\frac{7}{4}\left(\frac{1}{256}\right)$

$\boxed{a_9 = \frac{-7}{1024}}$

(C) $a_8 = \frac{-7}{256} \cdot \frac{-1}{2}$

$\boxed{a_8 = \frac{7}{512}}$

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(11) $-4, 12, -36, 108, \ldots$

$r = \frac{12}{-4} = -3$

(A) $a_5 = 108 \cdot -3 = \boxed{-324}$

$a_6 = -324 \cdot -3 = \boxed{972}$

$a_7 = 972 \cdot -3 = \boxed{-2916}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = -4(-3)^{11-1}$

$a_{11} = -4(-3)^{10}$

$a_{11} = -4(59049)$

$\boxed{a_{11} = -236196}$

(C) $a_8 = -2916 \cdot -3$

$\boxed{a_8 = 8748}$

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(12) $-3, -9, -27, -81, \ldots$

$r = \frac{-9}{-3} = 3$

(A) $a_5 = -81 \cdot 3 = \boxed{-243}$

$a_6 = -243 \cdot 3 = \boxed{-729}$

$a_7 = -729 \cdot 3 = \boxed{-2187}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_9 = -3(3)^{9-1}$

$a_9 = -3(3)^{8}$

$a_9 = -3(6561)$

$\boxed{a_9 = -19683}$

(C) $a_8 = -2187 \cdot 3$

$\boxed{a_8 = -6561}$

(13) $2, \ -\frac{2}{3}, \ \frac{2}{9}, \ -\frac{2}{27}, \ \ldots$

$r = \frac{-2/3}{2} = -\frac{2}{3} \cdot \frac{1}{2} = -\frac{1}{3}$

(A) $a_5 = -\frac{2}{27} \cdot -\frac{1}{3} = \boxed{\frac{2}{81}}$

$a_6 = \frac{2}{81} \cdot -\frac{1}{3} = \boxed{\frac{-2}{243}}$

$a_7 = -\frac{2}{243} \cdot -\frac{1}{3} = \boxed{\frac{2}{729}}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = 2\left(-\frac{1}{3}\right)^{11-1}$

$a_{11} = 2\left(-\frac{1}{3}\right)^{10}$

$a_{11} = 2\left(\frac{1}{59049}\right)$

$\boxed{a_{11} = \frac{2}{59049}}$

(C) $a_8 = \frac{2}{729} \cdot -\frac{1}{3}$

$\boxed{a_8 = \frac{-2}{2187}}$

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(14) $-2, \ -8, \ -32, \ -128, \ \ldots$

$r = \frac{-8}{-2} = 4$

(A) $a_5 = -128 \cdot 4 = \boxed{-512}$

$a_6 = -512 \cdot 4 = \boxed{-2048}$

$a_7 = -2048 \cdot 4 = \boxed{-8192}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{10} = -2(4)^{10-1}$

$a_{10} = -2(4)^9$

$a_{10} = -2(262144)$

$\boxed{a_{10} = -524288}$

(C) $a_8 = -8192 \cdot 4$

$\boxed{a_8 = -32768}$

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(15) $4, \ 16, \ 64, \ 256, \ \ldots$

$r = \frac{16}{4} = 4$

(A) $a_5 = 256 \cdot 4 = \boxed{1024}$

$a_6 = 1024 \cdot 4 = \boxed{4096}$

$a_7 = 4096 \cdot 4 = \boxed{16384}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_9 = 4(4)^{9-1}$

$a_9 = 4(4)^8$

$a_9 = 4(65536)$

$\boxed{a_9 = 262144}$

(C) $a_8 = 16384 \cdot 4$

$\boxed{a_8 = 65536}$

(16) $2, -1, \frac{1}{2}, \frac{-1}{4}, \ldots$

$r = \frac{-1}{2}$

(A) $a_5 = \frac{-1}{4} \cdot \frac{-1}{2} = \boxed{\frac{1}{8}}$

$a_6 = \frac{1}{8} \cdot \frac{-1}{2} = \boxed{\frac{-1}{16}}$

$a_7 = \frac{-1}{16} \cdot \frac{-1}{2} = \boxed{\frac{1}{32}}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_9 = 2\left(\frac{-1}{2}\right)^{9-1}$

$a_9 = 2\left(\frac{-1}{2}\right)^{8}$

$a_9 = 2\left(\frac{1}{256}\right)$

$\boxed{a_9 = \frac{1}{128}}$

(C) $a_8 = \frac{1}{32} \cdot \frac{-1}{2}$

$\boxed{a_8 = \frac{-1}{64}}$

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(17) $-3, -12, -48, -192, \ldots$

$r = \frac{-12}{-3} = 4$

(A) $a_5 = -192 \cdot 4 = \boxed{-768}$

$a_6 = -768 \cdot 4 = \boxed{-3072}$

$a_7 = -3072 \cdot 4 = \boxed{-12288}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{10} = -3(4)^{10-1}$

$a_{10} = -3(4)^{9}$

$a_{10} = -3(262144)$

$\boxed{a_{10} = -786432}$

(C) $a_8 = -12288 \cdot 4$

$\boxed{a_8 = -49152}$

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(18) $-4, -12, -36, -108, \ldots$

$r = \frac{-12}{-4} = 3$

(A) $a_5 = -108 \cdot 3 = \boxed{-324}$

$a_6 = -324 \cdot 3 = \boxed{-972}$

$a_7 = -972 \cdot 3 = \boxed{-2916}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{11} = -4(3)^{11-1}$

$a_{11} = -4(3)^{10}$

$a_{11} = -4(59049)$

$\boxed{a_{11} = -236196}$

(C) $a_8 = -2916 \cdot 3$

$\boxed{a_8 = -8748}$

(19) $-1, -3, -9, -27, \ldots$

$r = \frac{-3}{-1} = 3$

(A) $a_5 = -27 \cdot 3 = \boxed{-81}$

$a_6 = -81 \cdot 3 = \boxed{-243}$

$a_7 = -243 \cdot 3 = \boxed{-729}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{12} = -1(3)^{12-1}$

$a_{12} = -1(3)^{11}$

$a_{12} = -1(177147)$

$\boxed{a_{12} = -177147}$

(C) $a_8 = -729 \cdot 3$

$\boxed{a_8 = -2187}$

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(20) $2, -4, 8, -16, \ldots$

$r = \frac{-4}{2} = -2$

(A) $a_5 = -16 \cdot -2 = \boxed{32}$

$a_6 = 32 \cdot -2 = \boxed{-64}$

$a_7 = -64 \cdot -2 = \boxed{128}$

(B) Explicit Formula

$a_n = a_1 (r)^{n-1}$

$a_{12} = 2(-2)^{12-1}$

$a_{12} = 2(-2)^{11}$

$a_{12} = 2(-2048)$

$\boxed{a_{12} = -4096}$

(C) $a_8 = 128 \cdot -2$

$\boxed{a_8 = -256}$