Utilizing the Explicit Formula – Day 2

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. 1.5, −6, 24, −96, ... Find a_{10} $a_5 = 384$ $a_6 = -1536$ $a_7 = 6144$ $a_8 = -24576$ $a_{10} = -393216$	2. 3, −6, 12, −24, ... Find a_{12} $a_5 = 48$ $a_6 = -96$ $a_7 = 192$ $a_8 = -384$ $a_{12} = -6144$
3. −2, −8, −32, −128, ... Find a_{10} $a_5 = -496$ $a_6 = -1984$ $a_7 = -7936$ $a_8 = -31744$ $a_{10} = -524288$	4. 64, 32, 16, 8, ... Find a_{12} $a_5 = 4$ $a_6 = 2$ $a_7 = 1$ $a_8 = \frac{1}{2}$ $a_{12} = \frac{1}{16}$
5. $-\frac{9}{4}, -\frac{3}{2}, -1, -\frac{2}{3}, \ldots$ Find a_{11} $a_5 = \frac{-4}{9}$ $a_6 = \frac{-8}{27}$ $a_7 = \frac{-16}{81}$ $a_8 = \frac{-32}{243}$ $a_{11} = \frac{-256}{6561}$	6. −40, −20, −10, −5, ... Find a_{11} $a_5 = \frac{-5}{2}$ $a_6 = \frac{-5}{4}$ $a_7 = \frac{-5}{8}$ $a_8 = \frac{-5}{16}$ $a_{11} = \frac{-5}{128}$
7. −2, −10, −50, −250, ... Find a_9 $a_5 = -1250$ $a_6 = -6250$ $a_7 = -31250$ $a_8 = -156250$ $a_9 = -781250$	8. 1, 3, 9, 27, ... Find a_{11} $a_5 = 81$ $a_6 = 243$ $a_7 = 729$ $a_8 = 2187$ $a_{11} = 59049$
9. 2, −4, 8, −16, ... Find a_{11} $a_5 = 32$ $a_6 = -64$ $a_7 = 128$ $a_8 = -256$ $a_{11} = 2048$	10. −3, −9, −27, −81, ... Find a_9 $a_5 = -243$ $a_6 = -729$ $a_7 = -2187$ $a_8 = -6561$ $a_9 = -19683$

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

Find a_{10}

$a_5 = 324$

$a_6 = -972$

$a_7 = 2916$

$a_8 = -8748$

$a_{10} = -78732$

12. $5, -\frac{5}{3}, \frac{5}{9}, -\frac{5}{27}, \ldots$

Find a_{12}

$a_5 = \frac{5}{81}$

$a_6 = \frac{-5}{243}$

$a_7 = \frac{5}{729}$

$a_8 = \frac{-5}{2187}$

$a_{12} = \frac{-5}{177147}$

13. $-4, 2, -1, \frac{1}{2}, \ldots$

Find a_{10}

$a_5 = \frac{-1}{4}$

$a_6 = \frac{1}{8}$

$a_7 = \frac{-1}{16}$

$a_8 = \frac{1}{32}$

$a_{10} = \frac{1}{128}$

14. $-\frac{1}{4}, -\frac{1}{8}, -\frac{1}{16}, -\frac{1}{32}, \ldots$

Find a_{11}

$a_5 = \frac{-1}{64}$

$a_6 = \frac{-1}{128}$

$a_7 = \frac{-1}{256}$

$a_8 = \frac{-1}{512}$

$a_{11} = \frac{-1}{4096}$

15. $1, 2, 4, 8, \ldots$

Find a_{10}

$a_5 = 16$

$a_6 = 32$

$a_7 = 64$

$a_8 = 128$

$a_{10} = 512$

16. $-3, 9, -27, 81, \ldots$

Find a_9

$a_5 = -243$

$a_6 = 729$

$a_7 = -2187$

$a_8 = 6561$

$a_9 = -19683$

17. $-4, -\frac{4}{3}, -\frac{4}{9}, -\frac{4}{27}, \ldots$

Find a_{10}

$a_5 = \frac{-4}{81}$

$a_6 = \frac{-4}{243}$

$a_7 = \frac{-4}{729}$

$a_8 = \frac{-4}{2187}$

$a_{10} = \frac{-4}{19683}$

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

Find a_{10}

$a_5 = -324$

$a_6 = -972$

$a_7 = -2916$

$a_8 = -8748$

$a_{10} = -78732$

19. $-4, 12, -36, 108, \ldots$

Find a_{12}

$a_5 = -324$

$a_6 = 972$

$a_7 = -2916$

$a_8 = 8748$

$a_{12} = 708588$

20. $-3, -12, -48, -192, \ldots$

Find a_{10}

$a_5 = -768$

$a_6 = -3072$

$a_7 = -12288$

$a_8 = -49152$

$a_{10} = -786432$

① $1.5, -6, 24, -96, \ldots$

$r = \frac{-6}{1.5} = -4$

Ⓐ $a_5 = -96 \cdot -4 = \boxed{384}$

$a_6 = 384 \cdot -4 = \boxed{-1536}$

$a_7 = -1536 \cdot -4 = \boxed{6144}$

Ⓑ Explicit Formula

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

$a_{10} = 1.5(-4)^{10-1}$

$a_{10} = 1.5(-4)^9$

$a_{10} = 1.5(-262144)$

$\boxed{a_{10} = -393216}$

Ⓒ $a_8 = 6144 \cdot -4$

$\boxed{a_8 = -24576}$

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② $3, -6, 12, -24, \ldots$

$r = \frac{-6}{3} = -2$

Ⓐ $a_5 = -24 \cdot -2 = \boxed{48}$

$a_6 = 48 \cdot -2 = \boxed{-96}$

$a_7 = -96 \cdot -2 = \boxed{192}$

Ⓑ Explicit Formula

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

$a_{12} = 3(-2)^{12-1}$

$a_{12} = 3(-2)^{11}$

$a_{12} = 3(-2048)$

$\boxed{a_{12} = -6144}$

Ⓒ $a_8 = 192 \cdot -2$

$\boxed{a_8 = -384}$

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③ $-2, -8, -32, -128, \ldots$

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

Ⓐ $a_5 = -128 \cdot 4 = \boxed{-512}$

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

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

Ⓑ Explicit Formula

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

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

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

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

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

Ⓒ $a_8 = -8192 \cdot 4$

$\boxed{a_8 = -32768}$

(4) $64, 32, 16, 8, \ldots$

$r = \frac{32}{64} = \frac{1}{2}$

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

$a_6 = 4 \cdot \frac{1}{2} = \boxed{2}$

$a_7 = 2 \cdot \frac{1}{2} = \boxed{1}$

(B) Explicit Formula

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

$a_{12} = 64 \left(\frac{1}{2}\right)^{12-1}$

$a_{12} = 64 \left(\frac{1}{2}\right)^{11}$

$a_{12} = 64 \left(\frac{1}{1024}\right)$

$\boxed{a_{12} = \frac{1}{32}}$

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

$\boxed{a_8 = \frac{1}{2}}$

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(5) $-\frac{9}{4}, -\frac{3}{2}, -1, -\frac{2}{3}, \ldots$

$r = \frac{-3/2}{-9/4} = -\frac{3}{2} \cdot -\frac{4}{9} = \frac{12}{18} = \frac{2}{3}$

(A) $a_5 = -\frac{2}{3} \cdot \frac{2}{3} = \boxed{\frac{-4}{9}}$

$a_6 = -\frac{4}{9} \cdot \frac{2}{3} = \boxed{\frac{-8}{27}}$

$a_7 = -\frac{8}{27} \cdot \frac{2}{3} = \boxed{\frac{-16}{81}}$

(B) Explicit Formula

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

$a_{11} = -\frac{9}{4} \left(\frac{2}{3}\right)^{11-1}$

$a_{11} = -\frac{9}{4} \left(\frac{2}{3}\right)^{10}$

$a_{11} = -\frac{9}{4} \left(\frac{1024}{59049}\right)$

$\boxed{a_{11} = \frac{-256}{6561}}$

(C) $a_8 = \frac{-16}{81} \cdot \frac{2}{3}$

$\boxed{a_8 = \frac{-32}{243}}$

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(6) $-40, -20, -10, -5, \ldots$

$r = \frac{-20}{-40} = \frac{1}{2}$

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

$a_6 = -\frac{5}{2} \cdot \frac{1}{2} = \boxed{\frac{-5}{4}}$

$a_7 = -\frac{5}{4} \cdot \frac{1}{2} = \boxed{\frac{-5}{8}}$

(B) Explicit Formula

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

$a_{11} = -40 \left(\frac{1}{2}\right)^{11-1}$

$a_{11} = -40 \left(\frac{1}{2}\right)^{10}$

$a_{11} = -40 \left(\frac{1}{1024}\right)$

$\boxed{a_{11} = \frac{-5}{128}}$

(C) $a_8 = -\frac{5}{8} \cdot \frac{1}{2}$

$\boxed{a_8 = \frac{-5}{16}}$

⑦ $-2, -10, -50, -250, \ldots$

$r = \frac{-10}{-2} = 5$

Ⓐ $a_5 = -250 \cdot 5 = \boxed{-1250}$

$a_6 = -1250 \cdot 5 = \boxed{-6250}$

$a_7 = -6250 \cdot 5 = \boxed{-31250}$

Ⓑ Explicit Formula

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

$a_9 = -2(5)^{9-1}$

$a_9 = -2(5)^8$

$a_9 = -2(390625)$

$\boxed{a_9 = -781250}$

Ⓒ $a_8 = -31250 \cdot 5$

$\boxed{a_8 = -156250}$

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

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

Ⓐ $a_5 = -16 \cdot -2 = \boxed{32}$

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

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

Ⓑ Explicit Formula

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

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

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

$a_{11} = 2(1024)$

$\boxed{a_{11} = 2048}$

Ⓒ $a_8 = 128 \cdot -2$

$\boxed{a_8 = -256}$

(10) $-3, -9, -27, -81, \ldots$

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

(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) $a_8 = -2187 \cdot 3$

$\boxed{a_8 = -6561}$

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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

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

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

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

$a_{10} = 4(-19683)$

$\boxed{a_{10} = -78732}$

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

$\boxed{a_8 = -8748}$

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(12) $5, \frac{-5}{3}, \frac{5}{9}, \frac{-5}{27}, \ldots$

$r = \frac{-5/3}{5} = \frac{-5}{3} \cdot \frac{1}{5} = \frac{-1}{3}$

(A) $a_5 = \frac{-5}{27} \cdot \frac{-1}{3} = \boxed{\frac{5}{81}}$

$a_6 = \frac{5}{81} \cdot \frac{-1}{3} = \boxed{\frac{-5}{243}}$

$a_7 = \frac{-5}{243} \cdot \frac{-1}{3} = \boxed{\frac{5}{729}}$

(B) Explicit Formula

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

$a_{12} = 5\left(\frac{-1}{3}\right)^{12-1}$

$a_{12} = 5\left(\frac{-1}{3}\right)^{11}$

$a_{12} = 5\left(\frac{-1}{177147}\right)$

$\boxed{a_{12} = \frac{-5}{177147}}$

(C) $a_8 = \frac{5}{729} \cdot \frac{-1}{3}$

$\boxed{a_8 = \frac{-5}{2187}}$

(13) $-4, 2, -1, \frac{1}{2}, \ldots$

$r = \frac{2}{-4} = -\frac{1}{2}$

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

$a_6 = -\frac{1}{4} \cdot -\frac{1}{2} = \boxed{\frac{1}{8}}$

$a_7 = \frac{1}{8} \cdot -\frac{1}{2} = \boxed{-\frac{1}{16}}$

(B) Explicit Formula

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

$a_{10} = -4\left(-\frac{1}{2}\right)^{10-1}$

$a_{10} = -4\left(-\frac{1}{2}\right)^{9}$

$a_{10} = -4\left(\frac{-1}{512}\right)$

$\boxed{a_{10} = \frac{1}{128}}$

(C) $a_8 = -\frac{1}{16} \cdot -\frac{1}{2}$

$\boxed{a_8 = \frac{1}{32}}$

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(14) $-\frac{1}{4}, -\frac{1}{8}, -\frac{1}{16}, -\frac{1}{32}, \ldots$

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

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

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

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

(B) Explicit Formula

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

$a_{11} = -\frac{1}{4}\left(\frac{1}{2}\right)^{11-1}$

$a_{11} = -\frac{1}{4}\left(\frac{1}{2}\right)^{10}$

$a_{11} = -\frac{1}{4}\left(\frac{1}{1024}\right)$

$\boxed{a_{11} = \frac{-1}{4096}}$

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

$\boxed{a_8 = \frac{-1}{512}}$

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(15) $1, 2, 4, 8, \ldots$

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

(A) $a_5 = 8 \cdot 2 = \boxed{16}$

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

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

(B) Explicit Formula

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

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

$a_{10} = 1(2)^{9}$

$a_{10} = 1(512)$

$\boxed{a_{10} = 512}$

(C) $a_8 = 64 \cdot 2$

$\boxed{a_8 = 128}$

(16) $-3, 9, -27, 81, \ldots$

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

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

$\boxed{a_8 = 6561}$

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(17) $-4, \frac{-4}{3}, \frac{-4}{9}, \frac{-4}{27}, \ldots$

$r = \frac{-4/3}{-4} = -\frac{4}{3} \cdot -\frac{1}{4} = \frac{1}{3}$

(A) $a_5 = \frac{-4}{27} \cdot \frac{1}{3} = \boxed{\frac{-4}{81}}$

$a_6 = \frac{-4}{81} \cdot \frac{1}{3} = \boxed{\frac{-4}{243}}$

$a_7 = \frac{-4}{243} \cdot \frac{1}{3} = \boxed{\frac{-4}{729}}$

(B) Explicit Formula

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

$a_{10} = -4\left(\frac{1}{3}\right)^{10-1}$

$a_{10} = -4\left(\frac{1}{3}\right)^9$

$a_{10} = -4\left(\frac{1}{19683}\right)$

$\boxed{a_{10} = \frac{-4}{19683}}$

(C) $a_8 = \frac{-4}{729} \cdot \frac{1}{3}$

$\boxed{a_8 = \frac{-4}{2187}}$

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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

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

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

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

$a_{10} = -4(19683)$

$\boxed{a_{10} = -78732}$

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

$\boxed{a_8 = -8748}$

(19) $-4, 12, -36, 108, \ldots$

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

(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

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

$a_{12} = -4(-3)^{12-1}$

$a_{12} = -4(-3)^{11}$

$a_{12} = -4(-177147)$

$\boxed{a_{12} = 708588}$

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

$\boxed{a_8 = 8748}$

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(20) $-3, -12, -48, -192, \ldots$

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

(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) $a_8 = -12288 \cdot 4$

$\boxed{a_8 = -49152}$