

**Utilizing the Explicit Formula**  
Unit 6: Representations of Linear 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 52<sup>nd</sup> term.

<p>1. 1, -9, -19, -29, ... Find <math>a_{39}</math></p> <p><math>a_5 = -29 - 10 = -39</math>  <math>a_6 = -39 - 10 = -49</math>  <math>a_7 = -49 - 10 = -59</math></p> <p><math>a_{39} = -379</math>  <math>a_{52} = -509</math></p>	<p>2. 38, 31, 24, 17, ... Find <math>a_{24}</math></p> <p><math>a_5 = 17 - 7 = 10</math>  <math>a_6 = 10 - 7 = 3</math>  <math>a_7 = 3 - 7 = -4</math></p> <p><math>a_{24} = -123</math>  <math>a_{52} = -319</math></p>
<p>3. -22, -24, -26, -28, ... Find <math>a_{27}</math></p> <p><math>a_5 = -28 - 2 = -30</math>  <math>a_6 = -30 - 2 = -32</math>  <math>a_7 = -32 - 2 = -34</math></p> <p><math>a_{27} = -74</math>  <math>a_{52} = -124</math></p>	<p>4. 3, -6, -15, -24, ... Find <math>a_{39}</math></p> <p><math>a_5 = -24 - 9 = -33</math>  <math>a_6 = -33 - 9 = -42</math>  <math>a_7 = -42 - 9 = -51</math></p> <p><math>a_{39} = -339</math>  <math>a_{52} = -456</math></p>
<p>5. 33, 37, 41, 45, ... Find <math>a_{20}</math></p> <p><math>a_5 = 45 + 4 = 49</math>  <math>a_6 = 49 + 4 = 53</math>  <math>a_7 = 53 + 4 = 57</math></p> <p><math>a_{20} = 109</math>  <math>a_{52} = 237</math></p>	<p>6. 34, 26, 18, 10, ... Find <math>a_{23}</math></p> <p><math>a_5 = 10 - 8 = 2</math>  <math>a_6 = 2 - 8 = -6</math>  <math>a_7 = -6 - 8 = -14</math></p> <p><math>a_{23} = -142</math>  <math>a_{52} = -374</math></p>
<p>7. -7, -1, 5, 11, ... Find <math>a_{29}</math></p> <p><math>a_5 = 11 + 6 = 17</math>  <math>a_6 = 17 + 6 = 23</math>  <math>a_7 = 23 + 6 = 29</math></p> <p><math>a_{29} = 161</math>  <math>a_{52} = 299</math></p>	<p>8. 39, -61, -161, -261, ... Find <math>a_{37}</math></p> <p><math>a_5 = -261 - 100 = -361</math>  <math>a_6 = -361 - 100 = -461</math>  <math>a_7 = -461 - 100 = -561</math></p> <p><math>a_{37} = -3561</math>  <math>a_{52} = -5061</math></p>
<p>9. -16, -116, -216, -316, ... Find <math>a_{40}</math></p> <p><math>a_5 = -316 - 100 = -416</math>  <math>a_6 = -416 - 100 = -516</math>  <math>a_7 = -516 - 100 = -616</math></p> <p><math>a_{40} = -3916</math>  <math>a_{52} = -5116</math></p>	<p>10. -18, -8, 2, 12, ... Find <math>a_{34}</math></p> <p><math>a_5 = 12 + 10 = 22</math>  <math>a_6 = 22 + 10 = 32</math>  <math>a_7 = 32 + 10 = 42</math></p> <p><math>a_{34} = 312</math>  <math>a_{52} = 492</math></p>

11. 29, 35, 41, 47, ...

Find  $a_{26}$

$$a_5 = 47 + 6 = 53$$

$$a_{26} = 179$$

$$a_6 = 53 + 6 = 59$$

$$a_{52} = 335$$

$$a_7 = 59 + 6 = 65$$

12. 2, -3, -8, -13, ...

Find  $a_{40}$

$$a_5 = -13 - 5 = -18$$

$$a_{40} = -193$$

$$a_6 = -18 - 5 = -23$$

$$a_{52} = -253$$

$$a_7 = -23 - 5 = -28$$

13. -1, -11, -21, -31, ...

Find  $a_{24}$

$$a_5 = -31 - 10 = -41$$

$$a_{24} = -231$$

$$a_6 = -41 - 10 = -51$$

$$a_{52} = -511$$

$$a_7 = -51 - 10 = -61$$

14. -19, -219, -419, -619, ...

Find  $a_{27}$

$$a_5 = -619 - 200 = -819$$

$$a_{27} = -5219$$

$$a_6 = -819 - 200 = -1019$$

$$a_{52} = -10219$$

$$a_7 = -1019 - 200 = -1219$$

15. 40, 46, 52, 58, ...

Find  $a_{29}$

$$a_5 = 58 + 6 = 64$$

$$a_{29} = 208$$

$$a_6 = 64 + 6 = 70$$

$$a_{52} = 346$$

$$a_7 = 70 + 6 = 76$$

16. 6, 16, 26, 36, ...

Find  $a_{35}$

$$a_5 = 36 + 10 = 46$$

$$a_{35} = 346$$

$$a_6 = 46 + 10 = 56$$

$$a_{52} = 516$$

$$a_7 = 56 + 10 = 66$$

17. 31, 231, 431, 631, ...

Find  $a_{39}$

$$a_5 = 631 + 200 = 831$$

$$a_{39} = 7631$$

$$a_6 = 831 + 200 = 1031$$

$$a_{52} = 10231$$

$$a_7 = 1031 + 200 = 1231$$

18. -21, -11, -1, 9, ...

Find  $a_{40}$

$$a_5 = 9 + 10 = 19$$

$$a_{40} = 369$$

$$a_6 = 19 + 10 = 29$$

$$a_{52} = 489$$

$$a_7 = 29 + 10 = 39$$

19. -2, -9, -16, -23, ...

Find  $a_{27}$

$$a_5 = -23 - 7 = -30$$

$$a_{27} = -184$$

$$a_6 = -30 - 7 = -37$$

$$a_{52} = -359$$

$$a_7 = -37 - 7 = -44$$

20. 40, 30, 20, 10, ...

Find  $a_{25}$

$$a_5 = 10 - 10 = 0$$

$$a_{25} = -200$$

$$a_6 = 0 - 10 = -10$$

$$a_{52} = -470$$

$$a_7 = -10 - 10 = -20$$

① Common difference:

$$-9 - (1) = -10$$

$$-19 - (-9) = -10$$

$$-29 - (-19) = -10$$

$$d = -10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$1 = -10(1) + b$$

$$1 = -10 + b$$

$$+10 \quad +10$$

$$11 = b$$

$$a_n = -10n + 11$$

Specific Terms:

$$a_{39} = -10(39) + 11$$

$$a_{39} = -390 + 11$$

$$a_{39} = -379$$

$$a_{52} = -10(52) + 11$$

$$a_{52} = -520 + 11$$

$$a_{52} = -509$$

② Common Difference:

$$31 - (38) = -7$$

$$24 - (31) = -7$$

$$17 - (24) = -7$$

$$d = -7$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$38 = -7(1) + b$$

$$38 = -7 + b$$

$$+7 \quad +7$$

$$45 = b$$

$$a_n = -7n + 45$$

Specific Terms:

$$a_{24} = -7(24) + 45$$

$$a_{24} = -168 + 45$$

$$a_{24} = -123$$

$$a_{52} = -7(52) + 45$$

$$a_{52} = -364 + 45$$

$$a_{52} = -319$$

③ Common Difference:

$$-24 - (-22) = -2$$

$$-26 - (-24) = -2$$

$$-28 - (-26) = -2$$

$$d = -2$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-22 = -2(1) + b$$

$$-22 = -2 + b$$

$$+2 \quad +2$$

$$-20 = b$$

$$a_n = -2n - 20$$

Specific Terms:

$$a_{27} = -2(27) - 20$$

$$a_{27} = -54 - 20$$

$$a_{27} = -74$$

$$a_{52} = -2(52) - 20$$

$$a_{52} = -104 - 20$$

$$a_{52} = -124$$

④ Common Difference:

$$-6 - (3) = -9$$

$$-15 - (-6) = -9$$

$$-24 - (-15) = -9$$

$$d = -9$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$3 = -9(1) + b$$

$$3 = -9 + b$$

$$+9 \quad +9$$

$$12 = b$$

$$a_n = -9n + 12$$

Specific Terms:

$$a_{39} = -9(39) + 12$$

$$a_{39} = -351 + 12$$

$$a_{39} = -339$$

$$a_{52} = -9(52) + 12$$

$$a_{52} = -468 + 12$$

$$a_{52} = -456$$

⑤ Common Difference:

$$37 - (33) = 4$$

$$41 - (37) = 4$$

$$45 - (41) = 4$$

$$d = 4$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$33 = 4(1) + b$$

$$33 = 4 + b$$

$$-4 \quad -4$$

$$29 = b$$

$$a_n = 4n + 29$$

Specific Terms:

$$a_{20} = 4(20) + 29$$

$$a_{20} = 80 + 29$$

$$a_{20} = 109$$

$$a_{52} = 4(52) + 29$$

$$a_{52} = 208 + 29$$

$$a_{52} = 237$$

⑥ Common Difference:

$$26 - (34) = -8$$

$$18 - (26) = -8$$

$$10 - (18) = -8$$

$$d = -8$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$34 = -8(1) + b$$

$$34 = -8 + b$$

$$+8 \quad +8$$

$$42 = b$$

$$a_n = -8n + 42$$

Specific Terms:

$$a_{23} = -8(23) + 42$$

$$a_{23} = -184 + 42$$

$$a_{23} = -142$$

$$a_{52} = -8(52) + 42$$

$$a_{52} = -416 + 42$$

$$a_{52} = -374$$

⑦ Common Difference:

$$-1 - (-7) = 6$$

$$5 - (-1) = 6$$

$$11 - (5) = 6$$

$$d = 6$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-7 = 6(1) + b$$

$$-7 = 6 + b$$

$$\begin{array}{r} -6 \\ \hline -13 = b \end{array}$$

$$a_n = 6n - 13$$

Specific Terms:

$$a_{29} = 6(29) - 13$$

$$a_{29} = 174 - 13$$

$$a_{29} = 161$$

$$a_{52} = 6(52) - 13$$

$$a_{52} = 312 - 13$$

$$a_{52} = 299$$

⑧ Common Difference:

$$-61 - (39) = -100$$

$$-161 - (-61) = -100$$

$$-261 - (-161) = -100$$

$$d = -100$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$39 = -100(1) + b$$

$$39 = -100 + b$$

$$\begin{array}{r} +100 \\ \hline 139 = b \end{array}$$

$$a_n = -100n + 139$$

Specific Terms:

$$a_{37} = -100(37) + 139$$

$$a_{37} = -3700 + 139$$

$$a_{37} = -3561$$

$$a_{52} = -100(52) + 139$$

$$a_{52} = -5200 + 139$$

$$a_{52} = -5061$$

⑨ Common Difference:

$$-116 - (-16) = -100$$

$$-216 - (-116) = -100$$

$$-316 - (-216) = -100$$

$$d = -100$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-16 = -100(1) + b$$

$$-16 = -100 + b$$

$$\begin{array}{r} +100 \\ \hline 84 = b \end{array}$$

$$84 = b$$

$$a_n = -100n + 84$$

Specific Terms:

$$a_{40} = -100(40) + 84$$

$$a_{40} = -4000 + 84$$

$$a_{40} = -3916$$

$$a_{52} = -100(52) + 84$$

$$a_{52} = -5200 + 84$$

$$a_{52} = -5116$$

⑩ Common Difference:

$$-8 - (-18) = 10$$

$$2 - (-8) = 10$$

$$12 - (2) = 10$$

$$d = 10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-18 = 10(1) + b$$

$$-18 = 10 + b$$

$$\begin{array}{r} -10 \\ -10 \end{array}$$

$$-28 = b$$

$$a_n = 10n - 28$$

Specific Terms:

$$a_{34} = 10(34) - 28$$

$$a_{34} = 340 - 28$$

$$a_{34} = 312$$

$$a_{52} = 10(52) - 28$$

$$a_{52} = 520 - 28$$

$$a_{52} = 492$$

⑪ Common Difference:

$$35 - (29) = 6$$

$$41 - (35) = 6$$

$$47 - (41) = 6$$

$$d = 6$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$29 = 6(1) + b$$

$$29 = 6 + b$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

$$23 = b$$

$$a_n = 6n + 23$$

Specific Terms:

$$a_{26} = 6(26) + 23$$

$$a_{26} = 156 + 23$$

$$a_{26} = 179$$

$$a_{52} = 6(52) + 23$$

$$a_{52} = 312 + 23$$

$$a_{52} = 335$$

⑫ Common Difference:

$$-3 - (2) = -5$$

$$-8 - (-3) = -5$$

$$-13 - (-8) = -5$$

$$d = -5$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$2 = -5(1) + b$$

$$2 = -5 + b$$

$$\begin{array}{r} +5 \\ +5 \end{array}$$

$$7 = b$$

$$a_n = -5n + 7$$

Specific Terms:

$$a_{40} = -5(40) + 7$$

$$a_{40} = -200 + 7$$

$$a_{40} = -193$$

$$a_{52} = -5(52) + 7$$

$$a_{52} = -260 + 7$$

$$a_{52} = -253$$

⑬ Common Difference:

$$-11 - (-1) = -10$$

$$-21 - (-11) = -10$$

$$-31 - (-21) = -10$$

$$d = -10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-1 = -10(1) + b$$

$$-1 = -10 + b$$

$$\begin{array}{r} +10 \quad +10 \\ \hline \end{array}$$

$$9 = b$$

$$a_n = -10n + 9$$

Specific Terms:

$$a_{24} = -10(24) + 9$$

$$a_{24} = -240 + 9$$

$$a_{24} = -231$$

$$a_{52} = -10(52) + 9$$

$$a_{52} = -520 + 9$$

$$a_{52} = -511$$

⑭ Common Difference:

$$-219 - (-19) = -200$$

$$-419 - (-219) = -200$$

$$-619 - (-419) = -200$$

$$d = -200$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-19 = -200(1) + b$$

$$-19 = -200 + b$$

$$\begin{array}{r} +200 \quad +200 \\ \hline \end{array}$$

$$181 = b$$

$$a_n = -200n + 181$$

Specific Terms:

$$a_{27} = -200(27) + 181$$

$$a_{27} = -5400 + 181$$

$$a_{27} = -5219$$

$$a_{52} = -200(52) + 181$$

$$a_{52} = -10400 + 181$$

$$a_{52} = -10219$$

⑮ Common Difference:

$$46 - (40) = 6$$

$$52 - (46) = 6$$

$$58 - (52) = 6$$

$$d = 6$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$40 = 6(1) + b$$

$$40 = 6 + b$$

$$\begin{array}{r} -6 \quad -6 \\ \hline \end{array}$$

$$34 = b$$

$$a_n = 6n + 34$$

Specific Terms:

$$a_{29} = 6(29) + 34$$

$$a_{29} = 174 + 34$$

$$a_{29} = 208$$

$$a_{52} = 6(52) + 34$$

$$a_{52} = 312 + 34$$

$$a_{52} = 346$$

16

Common Difference:

$$16 - (6) = 10$$

$$26 - (16) = 10$$

$$36 - (26) = 10$$

$$d = 10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$6 = 10(1) + b$$

$$6 = 10 + b$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$-4 = b$$

$$a_n = 10n - 4$$

Specific Terms:

$$a_{35} = 10(35) - 4$$

$$a_{35} = 350 - 4$$

$$a_{35} = 346$$

$$a_{52} = 10(52) - 4$$

$$a_{52} = 520 - 4$$

$$a_{52} = 516$$

17

Common Difference:

$$231 - (31) = 200$$

$$431 - (231) = 200$$

$$631 - (431) = 200$$

$$d = 200$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$31 = 200(1) + b$$

$$31 = 200 + b$$

$$\begin{array}{r} -200 \quad -200 \\ \hline \end{array}$$

$$-169 = b$$

$$a_n = 200n - 169$$

Specific Terms:

$$a_{39} = 200(39) - 169$$

$$a_{39} = 7800 - 169$$

$$a_{39} = 7631$$

$$a_{52} = 200(52) - 169$$

$$a_{52} = 10400 - 169$$

$$a_{52} = 10231$$

18

Common Difference:

$$-11 - (-21) = 10$$

$$-1 - (-11) = 10$$

$$9 - (-1) = 10$$

$$d = 10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-21 = 10(1) + b$$

$$-21 = 10 + b$$

$$\begin{array}{r} -10 \quad -10 \\ \hline \end{array}$$

$$-31 = b$$

$$a_n = 10n - 31$$

Specific Terms:

$$a_{40} = 10(40) - 31$$

$$a_{40} = 400 - 31$$

$$a_{40} = 369$$

$$a_{52} = 10(52) - 31$$

$$a_{52} = 520 - 31$$

$$a_{52} = 489$$



19) Common Difference:

$$-9 - (-2) = -7$$

$$-16 - (-9) = -7$$

$$-23 - (-16) = -7$$

$$d = -7$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$-2 = -7(1) + b$$

$$-2 = -7 + b$$

$$+7 \quad +7$$

$$5 = b$$

$$a_n = -7n + 5$$

Specific Terms:

$$a_{27} = -7(27) + 5$$

$$a_{27} = -189 + 5$$

$$a_{27} = -184$$

$$a_{52} = -7(52) + 5$$

$$a_{52} = -364 + 5$$

$$a_{52} = -359$$

20) Common Difference:

$$30 - (40) = -10$$

$$20 - (30) = -10$$

$$10 - (20) = -10$$

$$d = -10$$

Explicit Formula:

$$a_n = d \cdot n + b$$

$$40 = -10(1) + b$$

$$40 = -10 + b$$

$$+10 \quad +10$$

$$50 = b$$

$$a_n = -10n + 50$$

Specific Terms:

$$a_{25} = -10(25) + 50$$

$$a_{25} = -250 + 50$$

$$a_{25} = -200$$

$$a_{52} = -10(52) + 50$$

$$a_{52} = -520 + 50$$

$$a_{52} = -470$$

