

Name \_\_\_\_\_

Date \_\_\_\_\_

|                         |      |      |      |
|-------------------------|------|------|------|
| LT 1: Communication     | LT 1 | LT 2 | LT 4 |
| LT 2: Patterns/Modeling |      |      |      |
| LT 4: Solving           |      |      |      |

Matching Section

f 1.  $a^n \cdot a^m$

g 2.  $(a^n)^m$

d 3.  $\frac{a^n}{a^m}$

e 4.  $a^{-n}$

c 5.  $\sqrt[m]{a^n}$

a 6. Quadratic Formula

b 7. Quadratic Explicit Equation

~~a.~~  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

~~b.~~  $y = ax^2 + bx + c$

~~c.~~  $a^{\frac{n}{m}}$

~~d.~~  $a^{n-m}$

~~e.~~  $\frac{1}{a^n}$

~~f.~~  $a^{n+m}$

~~g.~~  $a^{nm}$

8. Given the equations,  $f(x) = -6x + 5$  and  $g(x) = 4x - 7$ , find:

a)  $f(x) = 41$

$41 = -6x + 5$

$36 = -6x$

$-6 = x$

b)  $g(x) = -39$

$-39 = 4x - 7$

$-32 = 4x$

$x = -8$

|             |
|-------------|
| Answer Box  |
| a) $x = -6$ |
| b) $x = -8$ |

9. If  $f(x) = 5^x$ , then solve for x when  $f(x) = 3125$ . Show all work.  $X = \underline{5}$

$3125 = 5 \cdot 625$

$3125 = 5 \cdot 5 \cdot 125$

$3125 = 5 \cdot 5 \cdot 5 \cdot 25$

$3125 = 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 = 5^5$

~~$5^x = 5^5$~~

$x = 5$

10. If  $f(x) = 3 \cdot 2^x$ , then solve for x when  $f(x) = 192$ . Show all work.  $X = \underline{6}$

$3 \cdot 2^x = 192$

$2^x = 64$

$64 = 2 \cdot 32$

$64 = 2 \cdot 2 \cdot 16$

$64 = 2 \cdot 2 \cdot 2 \cdot 8$

$64 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 4$

$64 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

~~$2^x = 2^6$~~

$x = 6$

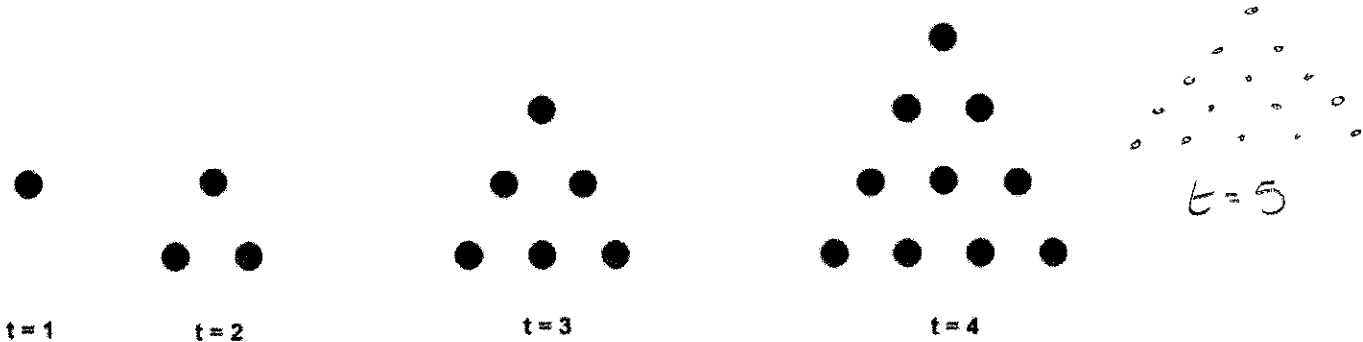
11 a. Assuming the pattern continues, draw the next figure in the sequence.

Figure 1

Figure 2

Figure 3

Figure 4



b. Find a formula for the number of blocks in any figure number (hint: make a table).

Show all work and thinking.

$$y = ax^2 + bx + c$$

$a = \frac{2^{nd} \text{ difference}}{2} = \frac{1}{2}$   $c = 0$

0 0 ← c

| t | Dots | 1 <sup>st</sup> difference | 2 <sup>nd</sup> difference |
|---|------|----------------------------|----------------------------|
| 1 | 1    | +1                         | +1                         |
| 2 | 3    | +2                         | +1                         |
| 3 | 6    | +3                         | +1                         |
| 4 | 10   | +4                         | +1                         |
| 5 | 15   | +5                         | +1                         |

Pick a point, solve for b

$$1 = \frac{1}{2}(1)^2 + b(1) + 0$$

$$1 = \frac{1}{2}(1) + b$$

$$1 = \frac{1}{2} + b$$

$$-\frac{1}{2} - \frac{1}{2} \quad b = \frac{1}{2}$$

$$y = \frac{1}{2}x^2 + \frac{1}{2}x + 0$$

12. Give the type of function (linear, exponential, or quadratic) and write an equation for the table below.

a. Type of function: Quadratic

0 16 ← c

| X | Y |
|---|---|
| 1 | 9 |
| 2 | 4 |
| 3 | 1 |
| 4 | 0 |
| 5 | 1 |
| 6 | 4 |

|      |      |
|------|------|
| > -7 | > +2 |
| > -5 | > +2 |
| > -3 | > +2 |
| > -1 | > +2 |
| > +1 | > +2 |
| > +3 | > +2 |

$$y = ax^2 + bx + c$$

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

$$c = 16$$

$$9 = 1(1)^2 + b(1) + 16$$

$$9 = 1(1) + b + 16$$

$$9 = 1 + b + 16$$

$$9 = 17 + b$$

$$-17 - 17$$

$$-8 = b$$

$$y = x^2 - 8x + 16$$

b. Write the equation for this situation  $y = x^2 - 8x + 16$

13. Circle which answer matches the solution (a, b, or c) to this quadratic function. Show your work in the space provided to demonstrate proficiency.

$$x^2 - 4x - 7 = 0$$

$$X = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(-7)}}{2(1)}$$

$$X = \frac{4 \pm \sqrt{16 + 28}}{2}$$

$$X = \frac{4 \pm \sqrt{44}}{2}$$

a.  $x = \frac{4 \pm \sqrt{44}}{2}$

b.  $x = \frac{4 \pm \sqrt{-20}}{2}$

c.  $x = \frac{4 \pm 12}{2}$

d.  $x = \frac{4 \pm 2\sqrt{10}}{2}$

What is the simplified answer?

$$\sqrt{44} = \sqrt{4 \cdot 11}$$

$$\sqrt{44} = \sqrt{2 \cdot 2 \cdot 11}$$

$$\sqrt{44} = \sqrt{2^2} \cdot \sqrt{11}$$

$$\sqrt{44} = 2\sqrt{11}$$

$$X = \frac{4 \pm 2\sqrt{11}}{2}$$

or

$$X = 2 \pm \sqrt{11}$$

14. Solve the following equation by factoring. Show all your work. To earn a 4, solutions MUST be simplified.

$$x^2 - x - 12 = 0$$

multiply

~~$$\begin{array}{cc} & -12 \\ -4 & 3 \\ & -1 \\ \text{add} & \end{array}$$~~

$$(x-4)(x+3) = 0$$

$$x-4=0 \quad x+3=0$$

$$x=4$$

$$x=-3$$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

15. Solve the following equation using the quadratic formula. Show all your work. To earn a 4, solutions MUST be simplified.

$$2x^2 + x - 6 = 0$$

$$X = \frac{-1 \pm \sqrt{(1)^2 - 4(2)(-6)}}{2(2)}$$

$$\sqrt{49} = \sqrt{7 \cdot 7} = \sqrt{7^2} = 7$$

$$X = \frac{-1 \pm \sqrt{1 + 48}}{4}$$

$$X = \frac{-1 \pm 7}{4}$$

$$X = \frac{-1 \pm \sqrt{49}}{4}$$

$$X = \frac{-1 + 7}{4}$$

$$X = \frac{-1 - 7}{4}$$

$$X = \frac{6}{4}$$

$$X = \frac{-8}{4}$$

3

$$X = \frac{3}{2}$$

$$X = -2$$

4

16. Solve the following equation by factoring OR using the quadratic formula. Show all your work. To earn a 4, solutions MUST be simplified.

$$x^2 - x - 30 = 0$$

$$X = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-30)}}{2(1)}$$

$$X = \frac{1 \pm \sqrt{1 + 120}}{2}$$

$$X = \frac{1 \pm \sqrt{121}}{2}$$

$$\sqrt{121} = \sqrt{11 \cdot 11} = \sqrt{11^2} = 11$$

$$X = \frac{1 \pm 11}{2}$$

$$X = \frac{1 + 11}{2}$$

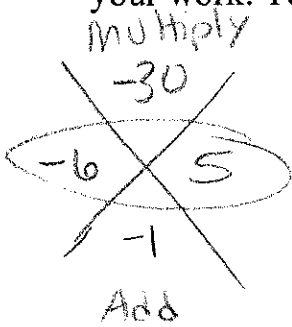
$$X = \frac{1 - 11}{2}$$

$$X = \frac{12}{2}$$

$$X = \frac{-10}{2}$$

$$X = 6$$

$$X = -5$$



$$(x-6)(x+5) = 0$$

$$x-6=0 \quad x+5=0$$

$$x=6$$

$$x=-5$$