Line Zapper #1

$3x + 4y = 3$
$-3x + 3y = 18$

Line Zapper #2

$y = 2x - 4$
$y = 0.5x + 5$

Line Zapper #3

$y = 3x + 6$
$2x + 2y = 20$
$x - y = 10$

Repeated Challenges

Use additional paper as needed.

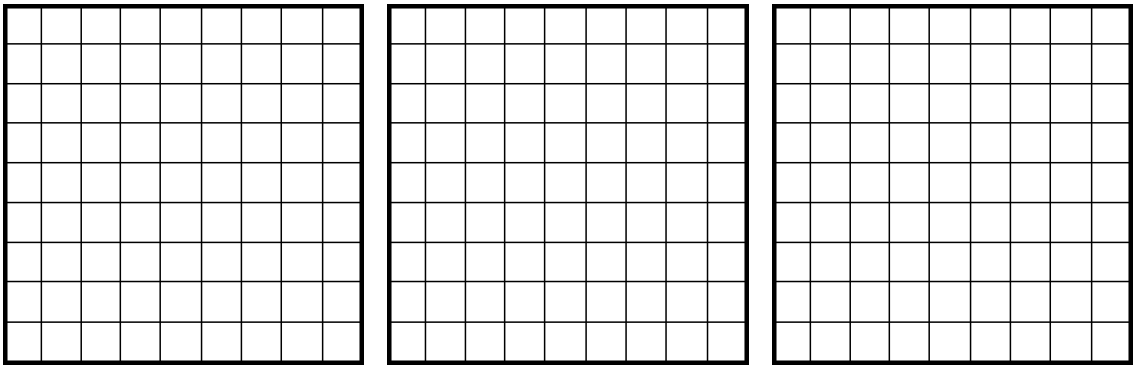
Cool-Down

desmos Science Mom Lesson 60

Unit A1.7, Lessons 1–2: Supplement Name _____

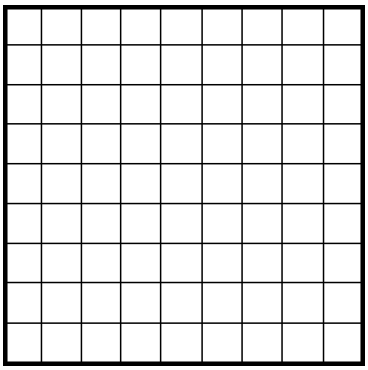
Your Pattern: Part 1

1. Draw your pattern in the space below.



2. Describe what about your pattern is changing and what is staying the same.

3. Draw the pattern for when $s = 4$.



4. How many tiles will there be when $s = 10$? Draw a picture if it helps with your thinking.

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Unit A1.7, Lessons 1–2: Supplement Name _____

Your Pattern: Part 2

1. Write an equation that represents your pattern.

2. Explain how you see each term of your equation represented in the pattern.

3. How many tiles will there be when $s = 15$? Show or explain your thinking.

Gallery Walk

1. What features of your classmates' work helped you understand their thinking?	2. Now that you've seen the work of other groups, what would you have done differently if you had more time?

Tables

Screens 4 and 5

Time (seconds)	Height (meters)
0	0
1	45
2	80

Screen 6

Time (seconds)	Height (meters)
0	20
1	45
2	60

Screen 9

Time (seconds)	Height (feet)
0	0
1	128
2	224
3	288

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Unit A1.7, Lesson 5: Supplement Name _____

Screen 10

Time (seconds)	Height (meters)
0	0
1	52
2	94
3	126

Screen 11

Time (seconds)	Height (feet)
0	0
1	112
2	192
3	240

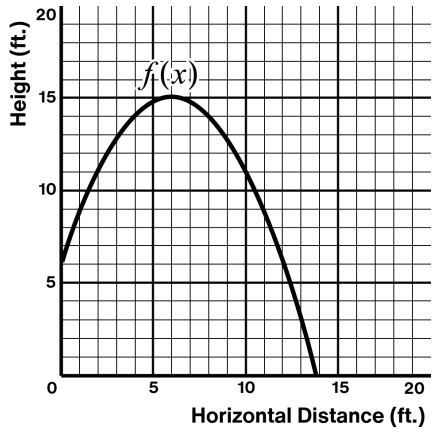
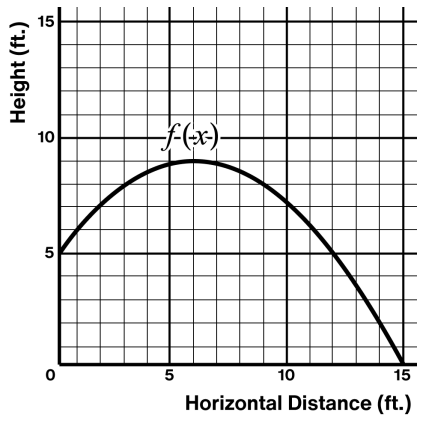
The ball hits the ground 15 feet from where it is launched.	The maximum height of the ball is 15 feet.	Vertex at $(3, 13)$
The range of this graph is $0 \leq y \leq 15$.	$f(2) = 12$	y-intercept at $(0, 15)$

The ball hits the ground 15 feet from where it is launched.	The maximum height of the ball is 15 feet.	Vertex at $(3, 13)$
The range of this graph is $0 \leq y \leq 15$.	$f(2) = 12$	y-intercept at $(0, 15)$

Unit A1.7, Lesson 7: Robot Launch Name _____

Activity 1: Ball Launch

1. Match the cards to the graphs and table. One card will not match because it has an error.

Graph or Table	Card #1	Card #2
		
<table><tr><th>Horizontal Distance (ft.)</th><th>Height (ft.)</th></tr><tr><td>0</td><td>4</td></tr><tr><td>1</td><td>9</td></tr><tr><td>2</td><td>12</td></tr><tr><td>3</td><td>13</td></tr><tr><td>4</td><td>12</td></tr></table>		
		

2. Fix the card with the error so that each table or graph has two matching cards. Discuss your thinking with a partner.

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Unit A1.7, Lesson 7: Robot Launch Name _____

Activity 2: The Best Robot

Here is information about each robot's ball launches.

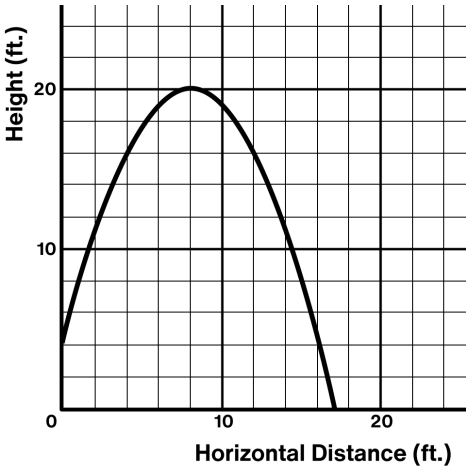
Robot A

Horizontal Distance (ft.)	Height (ft.)
0	5
1	12
2	17
3	20

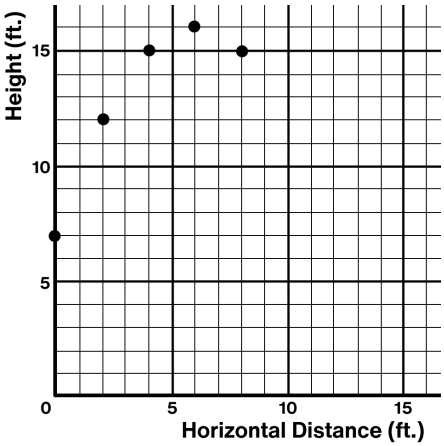
Robot B

The height of the ball can be modeled by $f(x) = 4 - x^2$, where x is the horizontal distance the ball has traveled.

Robot C



Robot D



Workspace for deciding which robots get each award:

Awards: Give out as many of these awards as you want.

Highest Launch	Farthest Launch	Cutest Robot	Strongest Robot

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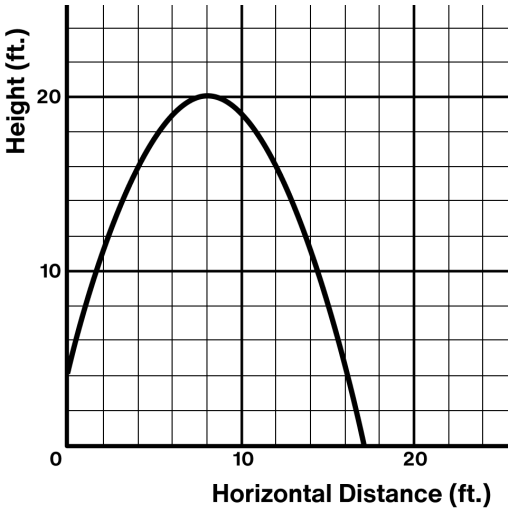
Unit A1.7, Lesson 7: Robot Launch Name _____

Lesson Synthesis

How do the features of a parabola help you describe the motion of a ball?

Use this parabola if it helps you to explain your thinking.



Cool-Down

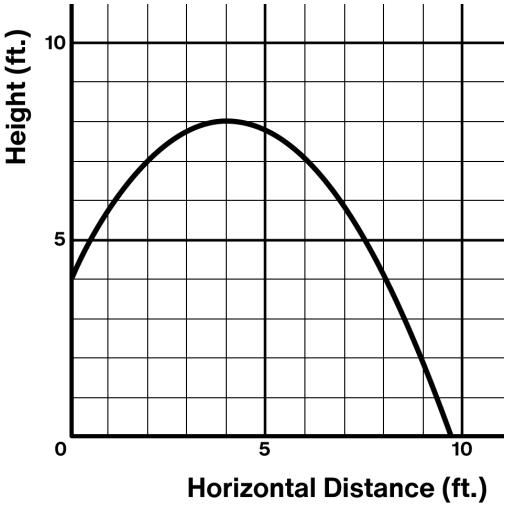
The graph shows the height of a ball after it is launched.

1.1 Mark and label the vertex of this parabola.

1.2 What does the vertex tell you about the movement of the ball?

2.1 Mark and label the x-intercept(s) of this parabola.

2.2 What do the x-intercept(s) tell you about the movement of the ball?



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Unit A1.8, Lesson 3: X-Factor Name _____

Warm-Up

Match each expression in factored form with its equivalent expression in standard form.

Factored Form		Standard Form	
1. $(5x + 6)(x - 3)$	_____	A. $5x^2 + 43x - 18$	
2. $(5x - 3)(x + 6)$	_____	B. $5x^2 - 9x - 18$	
3. $(5x - 2)(x + 9)$	_____	C. $5x^2 - 43x - 18$	
4. $(5x + 2)(x - 9)$	_____	D. $5x^2 + 27x - 18$	

Activity 1: Diagram Puzzles

Complete each diagram puzzle, standard-form expression, and factored-form expression.

	Diagram	Standard Form	Factored Form
1	$3x$ -5 $4x$ | | | $-9x$ | 15	_____ _____ $+ 15$	$(3x - 5)(4x$ _____ $)$
2	$2x$ 3 $4x^2$ | $6x$ | -9	$4x^2$ _____	$(2x + 3)($_____$)$
3	-3 $2x^2$ | $-3x$ $8x$ |	$2x^2 + 5x$ _____	

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Unit A1.8, Lesson 3: X-Factor Name _____

	Diagram	Standard Form	Factored Form
4	$3x^2$ | $4x$ $15x$ | 20		
5	x | x x | x^2 | | -10	$x^2 - 3x - 10$	
6	$3x^2$ | | 1	$3x^2 + 4x + 1$	
7	| |	$x^2 + 9x + 20$	
8	| |	$6x^2 + 7x + 2$	

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Unit A1.8, Lesson 3: X-Factor Name _____

Activity 2: Next Steps

Tameeka is trying to factor $2x^2 + 9x + 7$.

1. Discuss with a partner:
   - *How can you tell Tameeka's work is incorrect?*
   - *What did Tameeka do well?*
   - *What could she try next?*

	2x	1
x	$2x^2$	x
7	14x	7

Sneha is trying to factor $2x^2 + 23x - 12$. She started by creating this diagram.

2.1 List pairs of constants Sneha could try in order to complete the outside of the diagram.

	2x	—
x	$2x^2$	
—		-12

Sneha tried the numbers -6 and 2.

2.2 Discuss with a partner:
   - *How can you tell Sneha's work is incorrect?*
   - *What did Sneha do well?*
   - *What could she try next?*

	2x	(2)
x	$2x^2$	2x
(-6)	-12x	-12

2.3 Rewrite $2x^2 + 23x - 12$ in factored form.
Use the diagram supplement if it helps with your thinking.

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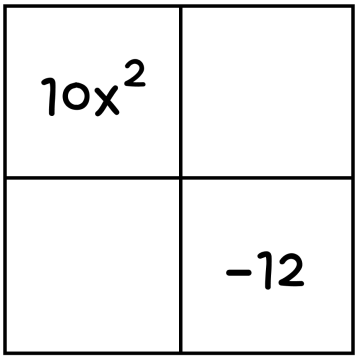
Unit A1.8, Lesson 3: X-Factor Name _____

Ariana is trying to factor $10x^2 - 7x - 12$. She starts by creating this diagram.



3.1 Ariana says: *I have to use factors of* 10*. I also need to use factors of* -12.

What do you think she means?

3.2 Rewrite $10x^2 - 7x - 12$ in factored form.

Here are three other expressions with a c-value of -12. Rewrite each expression in factored form.

4.1 $x^2 + x - 12$

4.2 $3x^2 - 16x - 12$

4.3 $6x^2 - 1x - 12$

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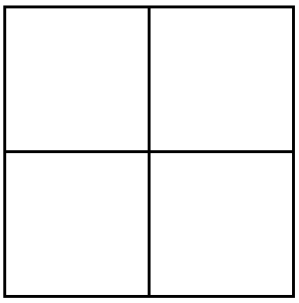
Unit A1.8, Lesson 3: X-Factor Name _____

Lesson Synthesis

Describe how to rewrite a standard-form expression in factored form.

Use the example if it helps with your thinking.

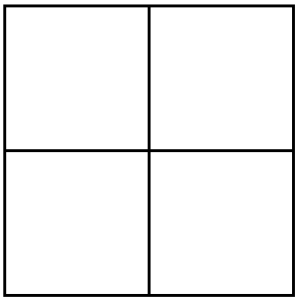
$5x^2 - 31x - 28$



Cool-Down

Rewrite $x^2 + 3x - 28$ in factored form.

Use the diagram if it helps with your thinking.



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Unit A1.8, Lesson 4: Form Up

A $x^2 + 5x - 6$	**I** $x^2 - 15x + 56$	**Q** $x^2 - 6x - 40$
B $x^2 + 3x - 10$	**J** $x^2 + 18x + 80$	**R** $x^2 + 11x + 18$
C $4x^2 - 8x - 5$	**K** $4x^2 + 13x + 10$	**S** $3x^2 + 13x + 12$
D $2x^2 - 13x - 24$	**L** $3x^2 + 8x - 16$	**T** $2x^2 + 15x + 18$

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Unit A1.8, Lesson 4: Form Up

E $100x^2 - 9$	**M** $25x^2 - 64$	**U** $x^2 - 36$
F $9x^2 - 1$	**N** $x^2 - 16$	**V** $x^2 - 4$
G $-2x^2 + 2x + 4$	**O** $-6x^2 + 21x$	**W** $15x^2 - 5x - 20$
H $6x^2 - 6x - 36$	**P** $5x^2 - 15x - 20$	**X** $10x^2 - 60x + 80$

Unit A1.8, Lesson 4: Form Up Name _____

Activity 1: Spotting Similarities

Here are three groups of expressions.

Group 1	Group 2	Group 3
$4x^2 - 25$	$8x^2 + 32x + 24$	$x^2 - 6x - 27$
$x^2 - 36$	$4x^2 - 8x - 32$	$x^2 + 2x - 80$
$x^2 - 100$	$10x^2 + 20x + 10$	$x^2 - 13x + 30$
$25x^2 - 49$	$2x^2 - 22x + 60$	$x^2 + 2x - 63$

1. Explain how the expressions in each group are alike.

   Group 1:

   Group 2:

   Group 3:

2. Factor one expression from each group.

Group 1: _____	**Group 2:** _____	**Group 3:** _____

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Unit A1.8, Lesson 4: Form Up Name _____

Deiondre factored the expression $7x^2 + 28x + 21$.

3.1 Discuss with a classmate:

- *Are* $7x^2 + 28x + 21$ *and* $7(x^2 + 4x + 3)$ *equivalent? How do you know?*
- *Why might Deiondre have written* $7(x^2 + 4x + 3)$ *as a first step?*

3.2 Does Deiondre's expression belong in group 1, 2, or 3? Explain your thinking.

Deiondre's Work

$7x^2 + 28x + 21$

$7(x^2 + 4x + 3)$

$7(x + 3)(x + 1)$

Yasmine factored the expression $9x^2 - 49$.

4.1 Discuss with a classmate: *Does Yasmine's expression belong in group 1, 2, or 3? Explain your thinking.*

4.2 Write a new expression in standard form that belongs in the same group as Yasmine's.

4.3 Factor the expression you wrote in problem 4.2.

Yasmine's Work

$9x^2 - 49$

$9x^2 + 0x - 49$

$(3x - 7)(3x + 7)$

Factor each expression.

5. $3x^2 - 6x - 105$

6. $16x^2 - 49$

7. $4x^2 + 52x + 120$

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Unit A1.8, Lesson 4: Form Up Name _____

Activity 2: Solve and Swap

1. Your teacher will give you a card. Factor the expression on your card.
2. Find a partner and swap cards. Factor your new expression and check with your partner.
3. Find a new partner and repeat step 2.

Card ____ Partner Check: _____	Card ____ Partner Check: _____
Card ____ Partner Check: _____	Card ____ Partner Check: _____
Card ____ Partner Check: _____	Card ____ Partner Check: _____
Card ____ Partner Check: _____	Card ____ Partner Check: _____

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Unit A1.8, Lesson 4: Form Up Name _____

Lesson Synthesis

What do you think is important to remember when factoring an expression in standard form?

Use the expressions if they help with your thinking.

$5x^2 - 18x - 8$

$9x^2 - 16$

$6x^2 - 24x - 30$

Cool-Down

Factor the expression $2x^2 - 8x - 10$.

Science Mom Lesson 81

STudent worksheet

desmos Science Mom Lesson 83

Unit A1.8, Lesson 13: Supplement Name _____

Activity 2: Solution Search

Use screen 8 to guide your exploration of solutions to quadratic equations.

1.1 Here is an equation that has **two integer solutions**. Find two more equations.

Equation: $1x^2 - 5x + 6 = 0$ **Solutions:** $x = \frac{5 \pm \sqrt{1}}{2}$	**Equation:** **Solutions:**	**Equation:** **Solutions:**

1.2 Find three equations that have **one solution**.

Equation: **Solutions:**	**Equation:** **Solutions:**	**Equation:** **Solutions:**

1.3 Find three equations that have **no solutions**.

Equation: **Solutions:**	**Equation:** **Solutions:**	**Equation:** **Solutions:**

2. Examine the equations and solutions you found.
Discuss with your partner: *What patterns do you notice?*

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Unit A1.8, Lesson 14: Formula Fluency Name(s) _____

Activity 1: Form Over Function

Here are four quadratic equations and their solutions.
Use the quadratic formula to show that the solutions are correct.

The Quadratic Formula

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

1.1 $x^2 - 8x + 15 = 0$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$ Solutions: $x = 5$ and $x = 3$	1.2 $x^2 + 10x + 18 = 0$ Solutions: $x = -5 \pm \frac{\sqrt{28}}{2}$
1.3 $9x^2 - 6x = -1$ Solution: $x = \frac{1}{3}$	1.4 $2x^2 + 6x + 5 = 0$ No solutions

2. Discuss with a partner: *Do you think that the quadratic formula is the best strategy for solving each of these equations? Explain your thinking.*

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Unit A1.8, Lesson 14: Formula Fluency Name(s) _____

Activity 2: Error Analysis

Your teacher will give you a supplement with the same equations from the previous activity.
Each attempt to solve the equation contains an error.

1. With a partner:
   - Identify the error in each attempt. Then discuss or show how to correct the error.
   - Discuss why someone might make this error.

2.1 Solve the following equation using the quadratic formula, **but include an error that you think would be common**.

$$3x^2 - 6x - 1 = 0$$

2.2 Swap equations with a classmate. Identify and describe the error in each other's work.

3.1 Reflect: *What kinds of errors do you think you are most likely to make when using the quadratic formula?*

3.2 Write two pieces of advice that will help your future self correctly use the quadratic formula. Include examples if they help with your thinking.

-
-

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Unit A1.8, Lesson 14: Formula Fluency Name(s) _____

Lesson Synthesis

What are some advantages of using the quadratic formula to solve quadratic equations?

What are some disadvantages?

Use the examples if they help with your thinking.

$$x^2 - 6x + 8 = 0$$

$$x^2 + 4x - 1 = 0$$

$$2x^2 + 7x - 10 = 0$$

Cool-Down

The Quadratic Formula

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

Use the quadratic formula to solve the equation $2x^2 + 5x - 12 = 0$.

Science Mom Lesson 84

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Unit A1.8, Lesson 14: Supplement Name(s) _____

Error Analysis

1.1 $x^2 - 8x + 15 = 0$	**1.2** $x^2 + 10x + 18 = 0$
$a = 1, b = -8, c = 15$	$a = 1, b = 10, c = 18$
$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(15)}}{2(1)}$	$x = \frac{-10 \pm \sqrt{10^2 - 4(1)(18)}}{2(1)}$
$x = \frac{8 \pm \sqrt{-64 - 60}}{2}$	$x = \frac{-10 \pm \sqrt{100 - 72}}{2}$
$x = \frac{8 \pm \sqrt{-124}}{2}$	$x = \frac{-10 \pm \sqrt{28}}{2}$
No solutions	$x = -5 \pm \sqrt{14}$

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Unit A1.8, Lesson 14: Supplement Name(s) _____

Error Analysis

1.3

$9x^2 - 6x = -1$

$a = 9, b = -6, c = -1$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(9)(-1)}}{2(9)}$$

$$x = \frac{6 \pm \sqrt{36 + 36}}{18}$$

$$x = \frac{6 \pm \sqrt{72}}{18}$$

1.4

$2x^2 + 6x + 5 = 0$

$a = 2, b = 6, c = 5$

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(2)(5)}}{2(2)}$$

$$x = \frac{-6 \pm \sqrt{36 - 40}}{4}$$

$$x = \frac{-6 \pm \sqrt{-4}}{4}$$

$$x = \frac{-6 \pm 2}{4}$$

$x = -2$ and $x = -1$

Shooting Stars #1

$y = x^2 - 11$
$y = 5$

Shooting Stars #2

$y = x^2$
$y = -4x + 12$

Shooting Stars #3

$y = (x - 2)^2$
$y = x$

Repeated Challenges

Use additional paper as needed.

Cool-Down