WOODSTOCK ACADEMY | ALGEBRA II

UNIT 4

Quadratic Functions & Equations

STRIDES Student Workbook

Notes | Guided Practice | Independent Practice | Skills Checks

Name: _____

Class / Period: _____

Six lessons | Skills check at the end of each lesson

UNIT 4 Workbook Roadmap

How to use this workbook

4.1 The Quadratic Formula

4.2 Solving by Factoring

4.3 Graphing Quadratic Functions

4.4 Writing Quadratics & Regression

4.5 Linear-Quadratic Systems

4.6 Projectile Motion & Quadratic Models

Every lesson has: STRIDES notes (Subject, Rules, Illustrations, Definitions, Example, Steps); two guided-practice pages; independent practice; and a separate skills-check page. Show your work in the blank boxes and label graphs.

4.1 The Quadratic Formula

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

Standard Form:

Quadratic Formula:

Discriminant Cases:

Order of Operations:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

Quadratic equation:

Standard form:

Discriminant:

Roots / solutions:

Real solution:

4.1 The Quadratic Formula

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.1 The Quadratic Formula

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: $2x^2 + 3x - 2 = 0$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: $x^2 + 4x + 8 = 0$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.1 The Quadratic Formula

Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

Solve x^2 + 6x + 5 = 0 with the quadratic formula. Identify a, b, c and both roots.

Hint: Underline a=1, b=6, c=5.

GUIDED 2

Solve 3x^2 - 5x - 2 = 0. Show discriminant arithmetic before simplifying.

Hint: Use b=-5, not +5.

4.1 The Quadratic Formula

Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

Solve 2x^2 + 4x + 7 = 0. Explain the discriminant and number of real roots.

Hint: D is negative.

GUIDED 4

Solve x^2 - 4x - 1 = 0. Express solutions in simplest radical form.

Hint: sqrt(20) = 2sqrt(5).

4.1 The Quadratic Formula

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

$2x^2 - 7x + 3 = 0$

INDEPENDENT 2

$5x^2 + 2x - 3 = 0$

INDEPENDENT 3

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

INDEPENDENT 4

$4x^2 + 4x + 5 = 0$

4.1 The Quadratic Formula

SKILLS CHECK | Complete Independently

Skills Check | 4.1

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

Solve 2x^2 + x - 6 = 0 using the quadratic formula. Show a, b, c, D, and both roots.

QUESTION 2 | 5 POINTS

Solve x^2 - 6x + 2 = 0. Leave answers in simplest radical form.

CHECKPOINT REFLECTION: What step should I review before the next lesson?

4.2 Solving by Factoring

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

GCF First:

Zero Product Property:

Difference of Squares:

Factoring Trinomials:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

Factor:

Greatest common factor (GCF):

Zero Product Property:

Difference of squares:

Root / zero:

4.2 Solving by Factoring

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.2 Solving by Factoring

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: $x^2 - 7x + 12 = 0$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: $2x^2 - 8x = 0$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.2 Solving by Factoring

Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

Solve x^2 - 7x + 12 = 0.

Hint: Find two integers with product 12 and sum -7.

GUIDED 2

Solve 3x^2 + 12x = 0.

Hint: Take out the GCF first.

4.2 Solving by Factoring

Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

Solve $2x^2 + 7x + 3 = 0$.

Hint: Use the AC method, then group.

GUIDED 4

Solve $x^2 = 9x - 20$.

Hint: Move everything to the left first.

4.2 Solving by Factoring

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

x^2 + 3x - 18 = 0

INDEPENDENT 2

4x^2 - 12x = 0

INDEPENDENT 3

3x^2 - 11x + 6 = 0

INDEPENDENT 4

x^2 - 10x + 25 = 0

4.2 Solving by Factoring

SKILLS CHECK | Complete Independently

Skills Check | 4.2

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

Solve 2x^2 - 9x + 4 = 0 by factoring. Show every factor.

QUESTION 2 | 5 POINTS

Solve 5x^2 - 20x = 0 using a GCF and zero-product property.

CHECKPOINT REFLECTION: What step should I review before the next lesson?

4.3 Graphing Quadratic Functions

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

Vertex Form:

Axis of Symmetry:

Direction of Opening:

Finding Intercepts:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

Parabola:

Vertex:

Axis of symmetry:

Intercept:

Maximum / minimum:

4.3 Graphing Quadratic Functions

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.3 Graphing Quadratic Functions

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: $y = (x - 2)^2 - 3$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: $y = -x^2 + 4x + 1$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.3 Graphing Quadratic Functions

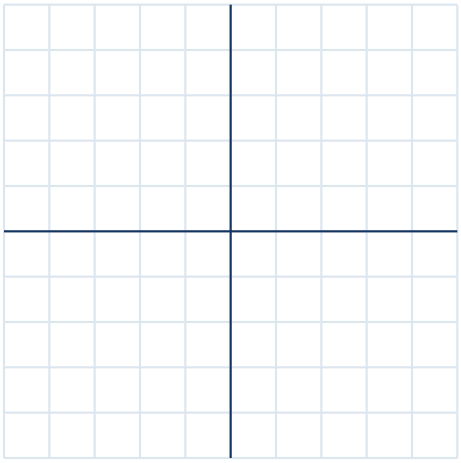
Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

Graph y = x^2 - 6x + 8. Label vertex, intercepts, and axis.

Hint: Use x=-b/(2a).

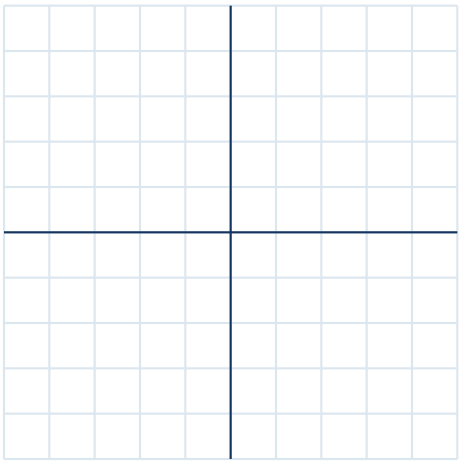


Label the key features.

GUIDED 2

Graph y = -x^2 + 4x + 5. Identify maximum value.

Hint: Negative a means parabola opens down.



Label the key features.

4.3 Graphing Quadratic Functions

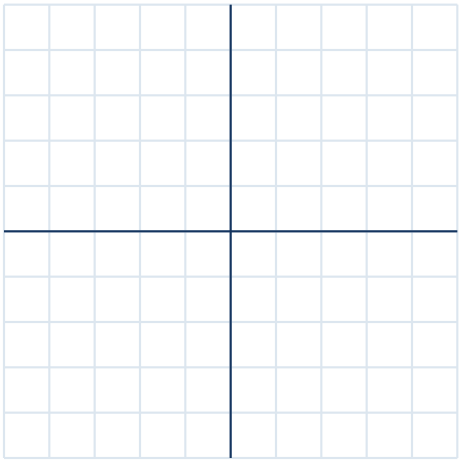
Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

Find vertex and axis for y = 2x^2 + 8x + 3; sketch five points.

Hint: Choose symmetric x-values.

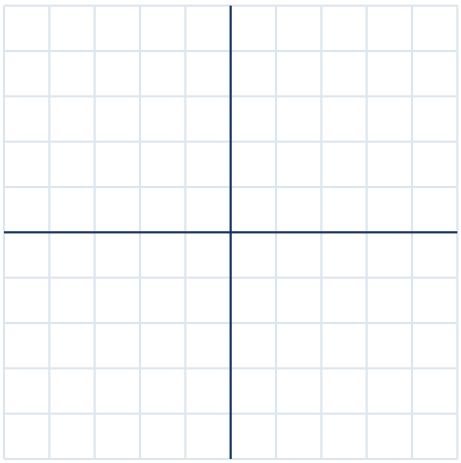


Label the key features.

GUIDED 4

Describe the change from y=x^2 to y=(x-3)^2+2; sketch both.

Hint: Vertex form exposes shifts.



Label the key features.

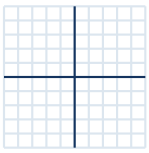
4.3 Graphing Quadratic Functions

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

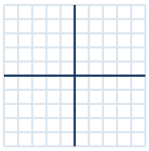
Graph y=x^2-2x-8; label key features.



Label the key features.

INDEPENDENT 2

Graph y=-2x^2+8x; label key features.



Label the key features.

INDEPENDENT 3

Find vertex, axis, and intercepts for y=x^2+4x+1.

INDEPENDENT 4

Sketch y=(x+1)^2-4 and state minimum.

4.3 Graphing Quadratic Functions

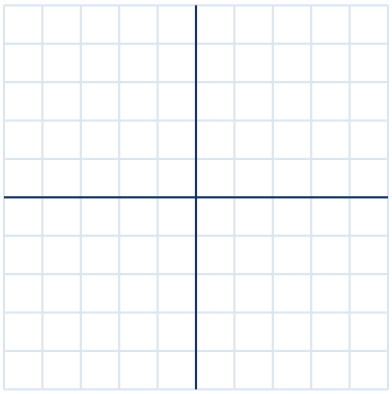
SKILLS CHECK | Complete Independently

Skills Check | 4.3

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

Graph y=x^2-4x-5; label vertex, axis, x-intercepts, and y-intercept.



Label the key features.

QUESTION 2 | 5 POINTS

Graph y=-x^2+6x-5; label maximum point and roots.

CHECKPOINT REFLECTION: What step should I review before the next lesson?

4.4 Writing Quadratics & Regression

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

Vertex Form from a Vertex:

Standard Form from Points:

Quadratic Regression:

Model Interpretation:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

Quadratic model:

Regression:

Scatterplot:

Residual:

Coefficient:

4.4 Writing Quadratics & Regression

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.4 Writing Quadratics & Regression

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: Vertex (2, 5), point (0, –3)

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: Data: (0,1), (1,4), (2,9), (3,16)

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.4 Writing Quadratics & Regression

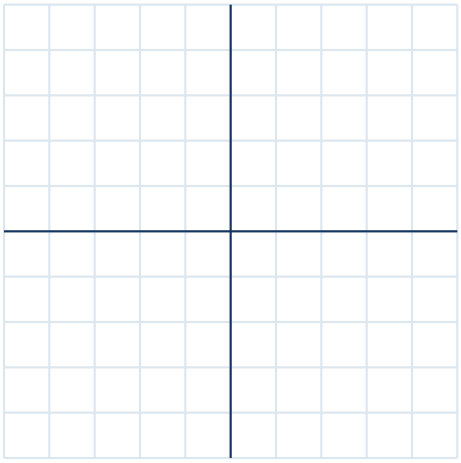
Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

A parabola has vertex (1,4) and passes through (3,-4). Write an equation.

Hint: Start y=a(x-1)^2+4.

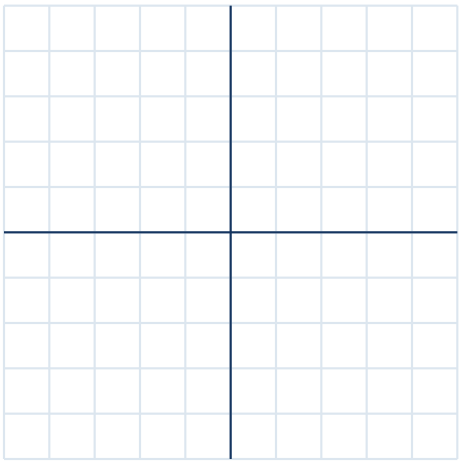


Label the key features.

GUIDED 2

A quadratic passes through (0,3), (1,6), (2,7). Find a,b,c using substitution.

Hint: At x=0, c=3.



Label the key features.

4.4 Writing Quadratics & Regression

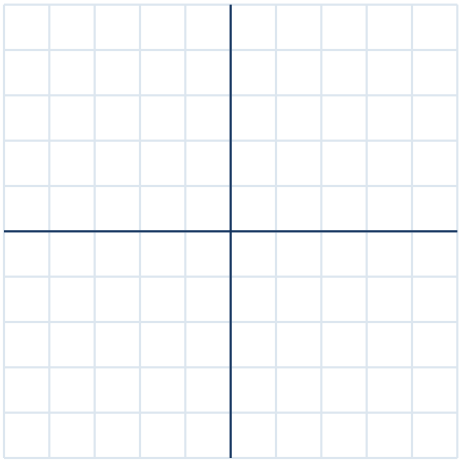
Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

Use Desmos regression for table (0,1),(1,4),(2,9),(3,16). Record model and prediction at x=4.

Hint: Fit y1~ax1^2+bx1+c.

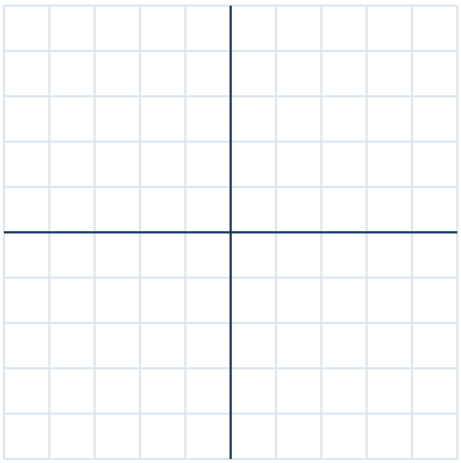


Label the key features.

GUIDED 4

A bridge arch has vertex (5,12) and crosses ground at x=0. Write the model and find the second ground intercept.

Hint: Use vertex form and symmetry.



Label the key features.

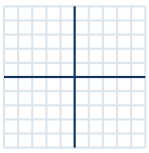
4.4 Writing Quadratics & Regression

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

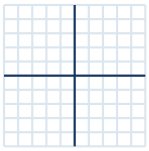
Vertex (2,-1), point (4,7): write vertex form.



Label the key features.

INDEPENDENT 2

Fit quadratic through (0,2),(1,5),(2,10).



Label the key features.

INDEPENDENT 3

Use regression for (0,2),(1,5),(2,10),(3,17); predict x=5.

INDEPENDENT 4

Vertex (3,9), passes through (0,0): find both roots.

4.4 Writing Quadratics & Regression

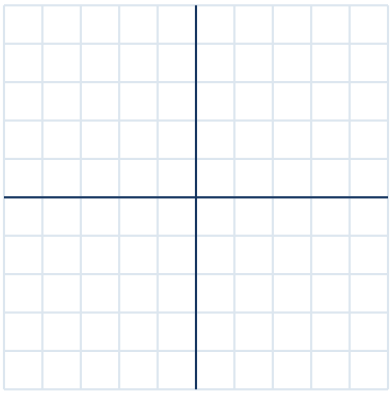
SKILLS CHECK | Complete Independently

Skills Check | 4.4

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

Write a quadratic with vertex (2,8) passing through (0,0). Show substitution for a.



Label the key features.

QUESTION 2 | 5 POINTS

For (0,1),(1,3),(2,7),(3,13), determine the quadratic model and predict y at x=4.

CHECKPOINT REFLECTION: What step should I review before the next lesson?

4.5 Linear-Quadratic Systems

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

Substitution Method:

Set Equal Method:

Zero Product Property:

Checking Ordered Pairs:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

System of equations:

Intersection:

Substitution:

Ordered pair:

Number of solutions:

4.5 Linear-Quadratic Systems

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.5 Linear-Quadratic Systems

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: $y = x + 2$ and $y = x^2 - 4$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: $y = 2x + 3$ and $y = -x^2 + 4x + 3$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.5 Linear-Quadratic Systems

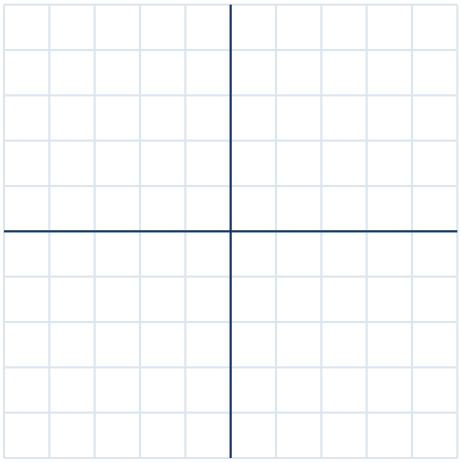
Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

Solve y=x^2 and y=2x+3. Show both intersection points.

Hint: Set x^2=2x+3.

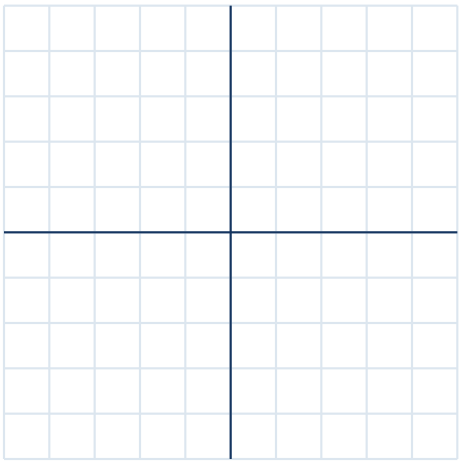


Label the key features.

GUIDED 2

Solve y=x^2-4x+1 and y=-2x+4.

Hint: Move all terms to one side.



Label the key features.

4.5 Linear-Quadratic Systems

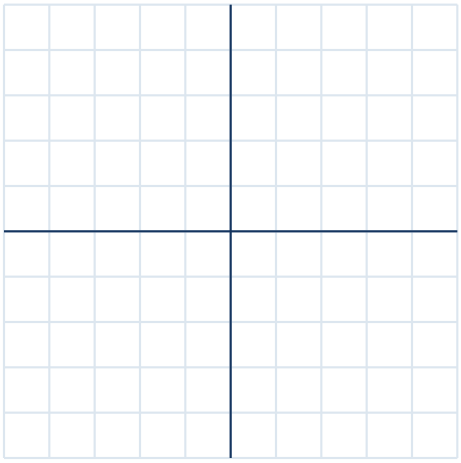
Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

Solve y=x^2+2 and y=2x+1. Explain the number of intersections.

Hint: Use discriminant.

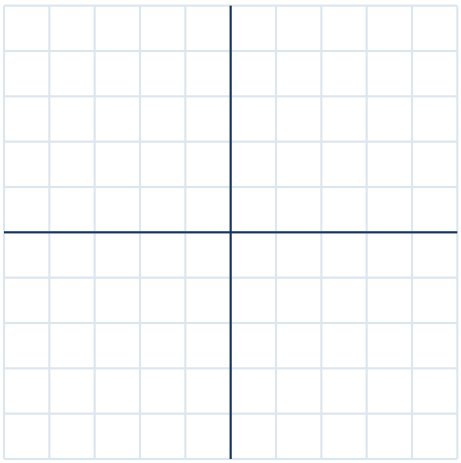


Label the key features.

GUIDED 4

Graph y=-x^2+4 and y=x+2; estimate intersections then solve exactly.

Hint: Graph first, then set equal.



Label the key features.

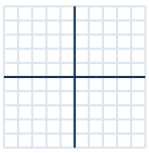
4.5 Linear-Quadratic Systems

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

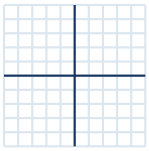
y=x^2-1 and y=x+1



Label the key features.

INDEPENDENT 2

y=x^2+3x and y=2x+2



Label the key features.

INDEPENDENT 3

y=x^2+1 and y=2x

INDEPENDENT 4

y=-x^2+5 and y=x+3

4.5 Linear-Quadratic Systems

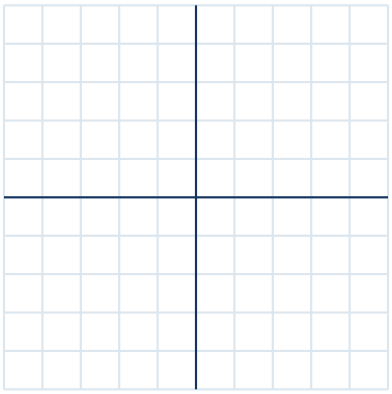
SKILLS CHECK | Complete Independently

Skills Check | 4.5

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

Solve y=x^2-3x+1 and y=x+1. Give intersection ordered pairs.



Label the key features.

QUESTION 2 | 5 POINTS

Solve y=x^2+2 and y=2x+2. Explain whether there are zero, one, or two intersections.

CHECKPOINT REFLECTION: What step should I review before the next lesson?

4.6 Projectile Motion & Quadratic Models

STRIDES | Student-Completed Notes | Page A: Concepts, Rules & Vocabulary

Name: _____ Period: _____ Date: _____

S SUBJECT | Explain what you are learning and why it matters.

R RULES | Describe each named rule in your own words.

Height Model:

Vertex Time:

Ground-Level Solution:

Domain in Context:

MY OWN RULE / REMINDER:

D DEFINITIONS | Retrieve and write a definition for each term.

Projectile:

Initial height:

Initial velocity:

Maximum height:

Time of flight:

4.6 Projectile Motion & Quadratic Models

STRIDES | Student-Completed Notes | Page B: Illustrations & Connections

Name: _____ Period: _____ Date: _____

I ILLUSTRATIONS | Sketch, graph, or diagram a key idea.

Label important features. Use arrows and a key when helpful.

Explain what your illustration shows:

An additional connection, question, or rule I discovered:

4.6 Projectile Motion & Quadratic Models

STRIDES | Student-Completed Notes | Page C: Examples & Written Steps

Name: _____ Period: _____ Date: _____

E EXAMPLE | Solve and annotate each worked example.

Example 1: $h(t) = -16t^2 + 32t + 5$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

Example 2: $h(t) = -5t^2 + 20t + 1$

MATHEMATICAL WORK	VERBAL EXPLANATION OF STEPS

S STEPS | Summarize a repeatable process in your own words.

4.6 Projectile Motion & Quadratic Models

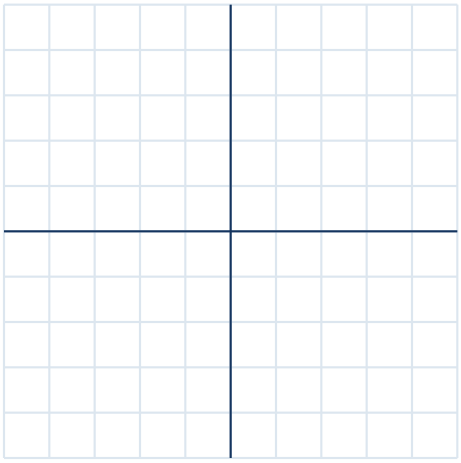
Guided Practice | Page 1 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 1

A ball follows h(t)=-16t^2+48t+4. Find peak time and height.

Hint: Use the vertex of h(t).

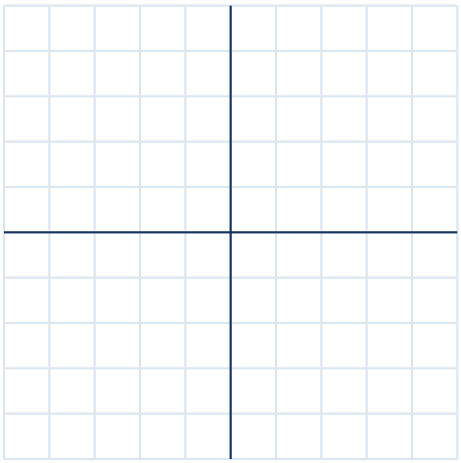


Label the key features.

GUIDED 2

For h(t)=-16t^2+32t+0, determine when it reaches the ground.

Hint: Factor; reject initial launch as landing time.



Label the key features.

4.6 Projectile Motion & Quadratic Models

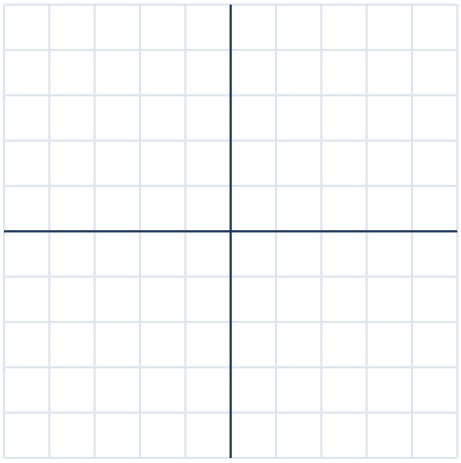
Guided Practice | Page 2 of 2

Use the STRIDES notes. Write each algebra step and explain your reasoning.

GUIDED 3

A launched object follows h(t)=-4.9t^2+19.6t+1.5. Find maximum height.

Hint: Metric formula; use t=-b/(2a).

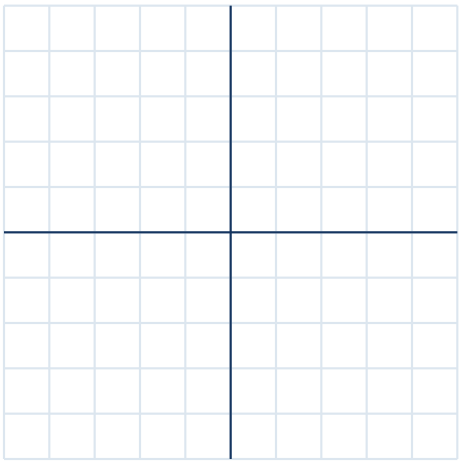


Label the key features.

GUIDED 4

The ball h(t)=-16t^2+40t+6 passes 20 feet at what times?

Hint: Set h(t)=20 and use formula.



Label the key features.

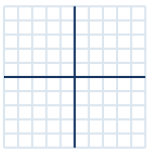
4.6 Projectile Motion & Quadratic Models

Independent Practice | Show Your Work

Complete independently. Use an equation, table, or labeled sketch as needed.

INDEPENDENT 1

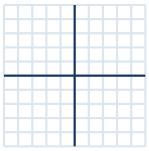
h(t)=-16t^2+64t+5: maximum time and height.



Label the key features.

INDEPENDENT 2

h(t)=-16t^2+48t: landing time.



Label the key features.

INDEPENDENT 3

h(t)=-4.9t^2+14.7t+2: maximum height.

INDEPENDENT 4

h(t)=-16t^2+24t+10: when is height 10 ft?

4.6 Projectile Motion & Quadratic Models

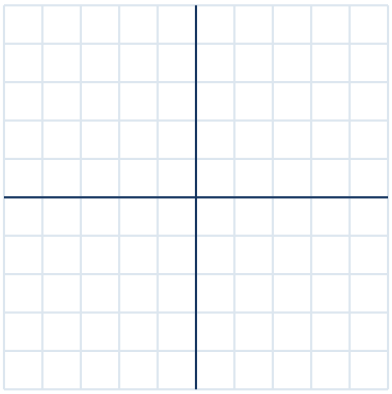
SKILLS CHECK | Complete Independently

Skills Check | 4.6

Score: _____ / 10 Teacher initials: _____ Ready to advance: YES / NOT YET

QUESTION 1 | 5 POINTS

A soccer ball has h(t)=-16t^2+40t+3. Find peak time and maximum height. Label units.



Label the key features.

QUESTION 2 | 5 POINTS

Find the positive time when the soccer ball hits the ground. Show equation setup and solution.

CHECKPOINT REFLECTION: What step should I review before the next lesson?