Date: _____

CHAPTER 5

Quadratic Relations II

Get Set

Answer these questions to check your understanding of the Prerequisite Skills concepts on pages 232–233 of the *Foundations for College Mathematics 11* textbook.

Polynomials

1. Simplify.

a) $5(7x)$ **b)** $-2(13x)$ **c)** $9(-3x)$

d) $6x^2 + 4x - x^2 + 2x$ **e)** $12x^2 - 7x + 9x^2 - 10x$ **f)** $3x - 4x^2 + x + 11x^2$

2. Expand and simplify.

a) $7(2x - 1)$ **b)** $4x(x - 3)$ **c)** $-2(3x + 5)$

Algebraic Expressions

3. Sketch the algebra tiles you would use to model each expression.

a) $x^2 + 4x$ **b)** $x^2 + 3x + 2$ **c)** $x^2 + 5x + 6$

Number Skills

4. Find two integers with each product and sum.

a) Product: 16, Sum: 10 **b)** Product: –20, Sum: 1

Solve Equations

5. Solve.

a) $-9x - 7 = 20$ **b)** $2x - 3 = 15$ **c)** $6x + 7 = 5x + 9$

Factor Polynomials

6. Factor.

a) $x^2 - 8x$ **b)** $x^2 - x - 12$ **c)** $2x^2 + 12x + 16$

Date: _____

5.1 Expand Binomials

Textbook pp. 234–241

Warm-Up

1. Number Skills

Evaluate.

a) 68% of 80

b) 3.5% of 110

c) 7% of 29

2. Algebra

Simplify.

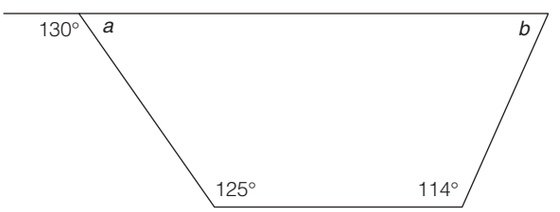
$(12x + 4) - (5x + 9)$

3. Relations

Write an equation, in slope y-intercept form, of the line that passes through points $(0, -4)$ and $(3, 2)$.

4. Geometry/Measurement

Find the measures of the indicated angles.



5. Data/Probability

An experiment consists of rolling two dice. Find the probability that the sum of the numbers is not 7.

6. Modelling

The perimeter of an isosceles triangle is 320 cm. The two equal sides are twice as long as the third side. Write a simplified equation to represent this situation.

7. Math Literacy

Which is the name for a line that cuts through a pair of parallel lines?

A perpendicular
B transversal
C bisector
D corresponding

8. Previous Section

Write the coordinates of the vertex of the quadratic relation $y = x^2 + 4$.

Date: _____

Practise

1. **a)** Write expressions for the dimensions of the rectangle.

x^2	x^2	x^2	x	x
x	x	x	1	1
x	x	x	1	1
x	x	x	1	1

b) Write a simplified algebraic expression to represent the area of the rectangle.

2. Expand and simplify.
a) $x(x + 1)$ **b)** $(x + 5)(x + 2)$ **c)** $(3x + 3)(x + 2)$

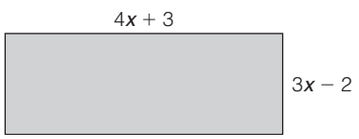
3. Expand and simplify.
a) $(7x + 3)(3x + 1)$ **b)** $(6 - 4x)(6 + 4x)$ **c)** $(9x - 1)(x + 8)$

4. Expand and simplify.
a) $(x + 6)(x - 6)$ **b)** $(5x - 3)(5x + 3)$ **c)** $(x + 1)(x - 1)$

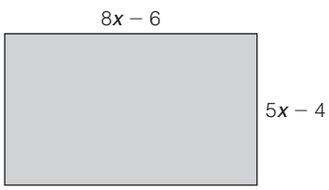
5. Expand and simplify.
a) $(x + 4)(x + 4)$ **b)** $(x + 13)^2$ **c)** $(3x - 2)(3x - 2)$

6. Write a simplified expression for the area of each figure. Then, calculate each area if $x = 6$ m.

a)



b)



Date: _____

5.2 Change Quadratic Relations From Vertex Form to Standard Form

Textbook pp. 242–247

Warm-Up

1. Number Skills

Write in scientific notation.

a) 8 956 713 402

b) 0.000 000 067

2. Algebra

Expand and simplify.

$3d(d - 7) - 2d(d + 5)$

3. Relations

A line passes through points (2, –5) and (–4, 3). What is the slope of the line?

4. Geometry/Measurement

Find the area of a triangle with base 10.2 cm and height 4.6 cm, to the nearest tenth of a square centimetre.

5. Data/Probability

Consider this set of data.

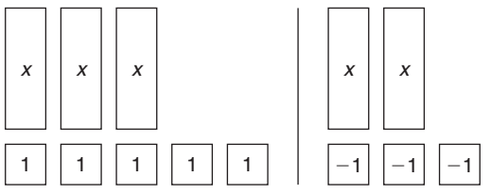
15, 29, 21, 34, 14, 21, 10, 8, 22, 30, 8, 30, 10, 30

a) Find the first and third quartiles.

b) What is the inter-quartile range?

6. Modelling

Write the equation modelled by these algebra tiles.



7. Math Literacy

Andrew wants to know the favourite song of students at his school. Which is an example of a random sample?

A He asks his friends.

B He e-mails all students to ask them.

C He writes students' names on slips of paper and selects 5 names without looking.

D He asks the first 10 students who come in the school one morning.

8. Previous Section

Expand and simplify.

$(3k + 1)(5k - 6)$

Date: _____

Practise

Section 5.2

1. Write each relation in standard form.

a) $y = (x + 2)^2$
$= (x + 2)(x + 2)$

b) $y = (x - 8)^2$

c) $y = (x - 11)^2$

2. Write each relation in standard form.

a) $y = 6(x + 3)^2$
$= 6(x + 3)(x + 3)$

b) $y = -(x - 1)^2$

c) $y = 0.75(x + 4)^2$

3. Write each relation in standard form.

a) $y = (x + 5)^2 + 2$
$= (x + 5)(x + 5) + 2$

b) $y = (x + 3)^2 - 9$

c) $y = (x - 7)^2 - 4$

4. Write each relation in standard form.

a) $y = 8(x + 2)^2 - 3$
$= 8(x + 2)(x + 2) - 3$

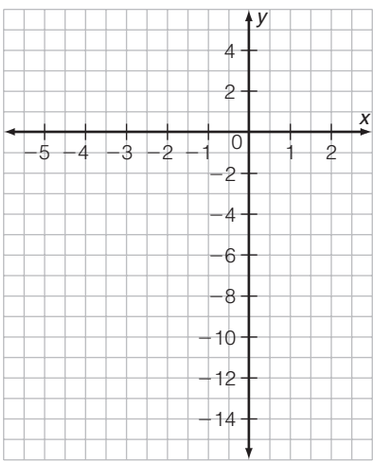
b) $y = -3(x + 6)^2 + 6$

c) $y = -4(x - 5)^2 + 1$

5. Graph the relations on the same set of axes. Are the relations the same?

A $y = -2(x + 2)^2 + 4$

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



6. For each quadratic relation, write an equation in standard form.

a) $a = -1$, vertex at (10, 0)

b) $y = 5x^2 + bx + c$, minimum of −5 when $x = 1$

Date: _____

5.3 Factor Trinomials of the Form $x^2 + bx + c$

Textbook pp. 248–255

Warm-Up

1. Number Skills

Evaluate.

a) $\frac{3}{4} - \frac{7}{10}$

b) $\frac{5}{4} \div \frac{2}{3}$

2. Algebra

Evaluate the expression for $w = -2$.

$6w + 8 - (4w + 1)$

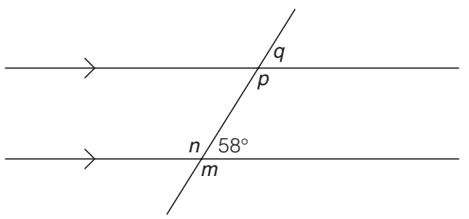
3. Relations

Write this equation for a linear relation in slope y-intercept form.

$3x + 5y - 10 = 0$

4. Geometry/Measurement

Find the measures of the indicated angles.



5. Data/Probability

A set of data has a range of 48. The least value in the set of data is 12. What is the greatest value in the set of data?

6. Problem Solving

The perimeter of a rectangle is given by $6x + 8$. What might the dimensions of the rectangle be? Give two different answers.

7. Math Literacy

Rearrange the letters to spell the name for an algebraic expression with three terms.

TONI LIMAR

8. Previous Section

Write the relation $y = -2(x + 3)^2 - 4$ in standard form.

Date: _____

Practise

Section 5.3

1. Factor. Expand to check.
a) $x^2 + 14x + 45$ **b)** $x^2 - 2x + 1$ **c)** $x^2 + 17x + 42$

2. Factor each trinomial.
a) $x^2 + 7x - 60$ **b)** $x^2 - 16x - 57$ **c)** $x^2 - x - 2$

3. Model each expression using algebra tiles. Record the model. Then, factor the expression.
a) $x^2 + 9x + 14$ **b)** $x^2 + 11x + 10$

4. Write a trinomial expression for the area of each rectangle. Then, write expressions for the dimensions.

a)

x^2	x	x	x
x	1	1	1

b)

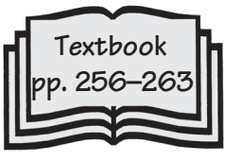
x^2	x	x	x	x
x	1	1	1	1
x	1	1	1	1
x	1	1	1	1
x	1	1	1	1
x	1	1	1	1

5. Factor.
a) $x^2 + 13x$ **b)** $x^2 - x$

6. Factor.
a) $x^2 - 10x + 21$ **b)** $x^2 - 16$ **c)** $x^2 - 100x$

Date: _____

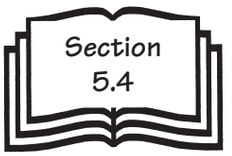
5.4 Factor Trinomials of the Form $ax^2 + bx + c$



Warm-Up

1. Number Skills	2. Algebra
Evaluate. **a)** $2^3 \times 3^2 \times 7$ **b)** 4×3^4	Expand. $2x(7x^2 + 5x - 2)$
3. Relations	**4. Geometry/Measurement**
Write an equation for the line that is parallel to $y = -\frac{1}{2}x + 4$ and passes through point (4, 9).	The hypotenuse of a right isosceles triangle measures 8.1 cm. Find the length of each leg to the nearest tenth of a centimetre.
5. Data/Probability	**6. Problem Solving**
Calculate the variance and the standard deviation for the set of data. Round your answers to two decimal places. 96, 5, 6, 7, 10, 13	Find the greatest power with a base of 3 and a value less than 500.
7. Math Literacy	**8. Previous Section**
What is the name for figures with the same size and shape?	Factor. $x^2 - 6x - 7$

Date: _____



Practise

1. Factor each trinomial fully. Expand to check.
a) $2x^2 + 4x - 16$ **b)** $3x^2 + 21x + 18$ **c)** $6x^2 - 42x + 72$

2. Factor each trinomial fully.
a) $2x^2 + 10x - 48$ **b)** $8x^2 - 8x - 160$ **c)** $-4x^2 + 12x - 8$

3. Factor each trinomial fully. Expand to check.
a) $1.75x^2 - 7x - 63$ **b)** $-2.8x^2 - 11.2x - 8.4$ **c)** $3.25x^2 + 52x + 208$

4. Factor each polynomial fully. Expand to check.
a) $7x^2 - 35x$ **b)** $-5x^2 - 120x$ **c)** $-13.5x^2 - 175.5x$

5. Factor fully. Then, check your work.
a) $7x^2 - 63$ **b)** $1 - x^2$ **c)** $8.8x^2 - 220$

6. Factor fully.
a) $8x^2 - 32$ **b)** $3x^2 + 6x - 45$ **c)** $12x^2 + 60x$

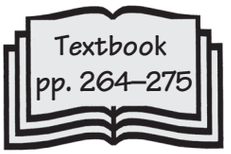
d) $9x^2 - 9x - 180$ **e)** $-5.6x^2 + 28$ **f)** $3.1x^2 - 12.4x - 37.2$

7. Which pair of expressions are equivalent? How do you know?
a) $5x^2 - 10x - 25$
$5(x - 5)(x - 5)$

b) $3x^2 + 6x - 9$
$3(x + 3)(x - 1)$

Date: _____

5.5 The x-Intercepts of a Quadratic Relation



Warm-Up

1. Number Skills

Evaluate.
$40 \div (5 + 3) + 2^2 \times 8$

2. Algebra

Solve.
$7p = 8(2p - 1)$

3. Relations

Write an equation for the line that passes through points (0, 6) and (–4, 0).

4. Geometry/Measurement

Find the volume of a cone with height 7.6 cm and diameter 5.2 cm to the nearest tenth of a cubic centimetre.

5. Data/Probability

Red, blue, and green marbles were placed in a bag. In 16 trials, a marble was selected randomly, then replaced. Red marbles were drawn twice and blue marbles were drawn six times. What is the experimental probability of choosing a green marble?

6. Modelling

Sketch the algebra tiles you would use to model $5x + 6 = 4x - 1$.

7. Math Literacy

A composite number is a number
A with two or more digits
B with exactly two factors, one and itself
C that is a factor of another number
D with more than two factors

8. Previous Section

Factor fully.
$3x^2 - 9x - 30$

Date: _____

Practise

Section 5.5

1. Complete each statements.

a) The zeros of a quadratic relation are the x-coordinates of the points where the graph of the relation crosses the _____.

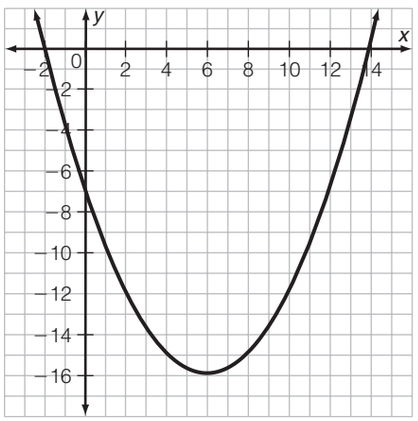
b) $y = -3(x + 5)(x - 2)$ is written in _____ form.

c) $y = 4(x + 7)^2 - 11$ is written in _____ form.

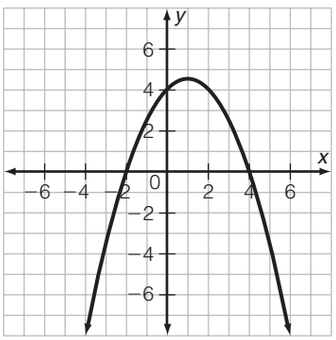
d) $y = -x^2 + 11x - 9$ is written in _____ form.

2. Find the x-intercepts of each quadratic relation.

a) $y = \frac{1}{4}x^2 - 3x - 7$

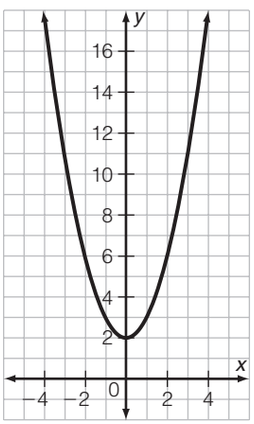


b) $y = -\frac{1}{2}x^2 + x + 4$

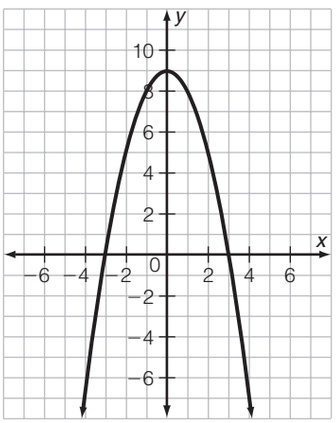


3. Find the zeros of each quadratic relation.

a) $y = x^2 + 2$



b) $y = -x^2 + 9$



Date: _____

4. Find the zeros of each quadratic relation.

a) $y = (x - 7)(x + 3)$

b) $y = 4(x + 5)(x + 5)$

c) $y = -2(x + 1)(x - 1)$

d) $y = -40x(x - 100)$

5. Factor each relation to find the zeros.

a) $y = x^2 + 3x - 18$

b) $y = -x^2 - x + 6$

c) $y = -3x^2 + 18x - 15$

d) $y = -x^2 + 16$

6. Express each relation in standard form and in intercept form. Then, determine the number of zeros in each relation.

a) $y = 2(x + 4)^2 - 2$

b) $y = (x + 4)^2 - 16$

c) $y = 3(x + 1)^2 - 12$

d) $y = -2(x + 1)^2 + 18$

7. How many zeros does each relation have?

a) $y = x^2 + 4x + 4$ **b)** $y = x^2 - 4$ **c)** $y = x^2 + 4$

8. The relation $y = (x - 1)^2 - 4$ is written in vertex form.

a) Express the relation in standard form.

b) Express the relation in intercept form.

c) Check your answers by comparing x-values for the same y-values. Complete the table.

y	**Vertex Form:** $y = (x - 1)^2 - 4$	**Standard Form:** $y =$ _____	**Intercept Form:** $y =$ _____
–2	5		
–1	0		
0	–3		
1			
2			
3			
4			
5			

Date: _____

5.6 Solve Problems Involving Quadratic Relations

Textbook pp. 276–285

Warm-Up

1. Number Skills

Evaluate.

a) $482.6 \div 0.2$

b) $15.72 \div 0.03$

2. Algebra

Simplify.

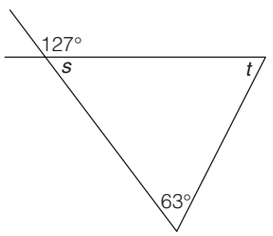
$(5b^2 + 3b - 2) + (4b^2 - 9b - 8)$

3. Relations

Write an equation for a line that has the same y-intercept as $x - 2y + 6 = 0$ and is perpendicular to $y = 4x + 1$.

4. Geometry/Measurement

Find the measures of the indicated angles.



5. Data/Probability

Find the mean, the median, and the mode of the set of data.

14, 15, 15, 21, 11, 5, 19, 20, 8, 13, 6, 9, 19, 6

6. Modelling

The cost, in dollars, to make belts is $1200 plus $6 per belt. Write an equation to represent the total cost.

7. Math Literacy

Annie surveyed her class to identify the most popular movie among the students in her grade. Identify the population and the sample.

8. Previous Section

Find the zeros of the quadratic relation $y = x^2 + 3x - 4$.

Date: _____

Section 5.6

Practise

1. Find the zeros of each quadratic relation.

a) $y = (x + 10)(x - 1)$ **b)** $y = 9(x - 2)(x + 1)$

2. Express each quadratic relation in intercept form.

a) $y = x^2 - x - 42$ **b)** $y = 3x^2 + 27x - 108$

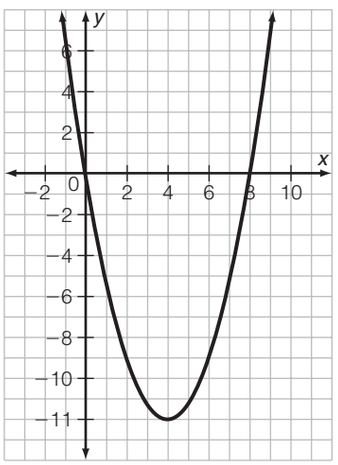
3. Find the zeros of each quadratic relation.

a) $y = x^2 + 4x - 45$ **b)** $y = 4x^2 + 12x - 72$

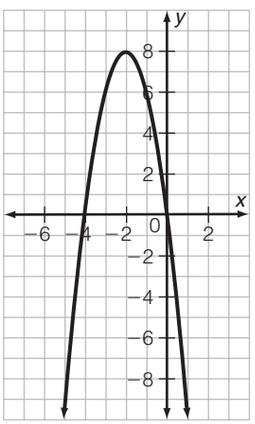
c) $y = 2x^2 - 288$ **d)** $y = 2.75x^2 - 11x - 88$

4. Write the equation of the axis of symmetry for each parabola.

a)



b)



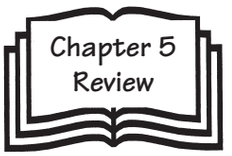
5. Write the equation of the axis of symmetry for each quadratic relation.

a) $y = (x - 17)(x + 3)$ **b)** $y = -3(x + 8)(x + 10)$ **c)** $y = 14x(x + 9)$

d) $y = -6(x - 42)(x + 6)$ **e)** $y = 5(x + 4)(x - 10)$ **f)** $y = -x(x - 1)$

Date: _____

Chapter 5 Review

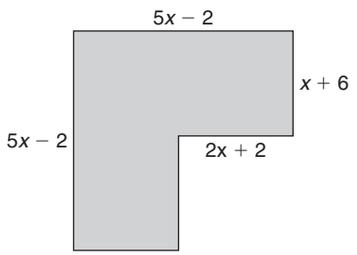


5.1 Expand Binomials, textbook pages 234–241

1. Expand and simplify.

a) $(x + 5)(x + 6)$ **b)** $(x + 1)^2$ **c)** $(x - 5)(x + 5)$ **d)** $(3x + 6)(2x - 4)$

2. Write a simplified expression for the area of this shape.



5.2 Change Quadratic Relations From Vertex Form to Standard Form, textbook pages 242–247

3. Write each relation in standard form.

a) $y = 7(x + 3)^2 + 7$ **b)** $y = -4(x - 5)^2 + 1$ **c)** $y = 0.25(x - 12)^2 - 6$

4. Determine the y-intercept for each relation.

a) $y = 2(x - 8)^2 - 76$ **b)** $y = -0.4(x - 5)^2 - 10$

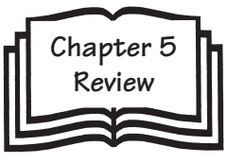
5.3 Factor Trinomials of the Form $x^2 + bx + c$, textbook pages 248–255

5. Factor.

a) $x^2 + 4x + 4$ **b)** $x^2 + 13x + 36$ **c)** $x^2 - 16x$

d) $x^2 - 1$ **e)** $x^2 - 2x - 3$ **f)** $x^2 + 13x - 48$

Date: _____



5.4 Factor Trinomials of the Form $ax^2 + bx + c$, textbook pages 256–263

6. Factor fully.

a) $6x^2 + 60x + 144$ **b)** $-3x^2 - 3x + 18$ **c)** $-14x^2 + 420x$

d) $5x^2 - 60x - 225$ **e)** $-x^2 + 100$ **f)** $-13x^2 - 221x$

5.5 The x-Intercepts of a Quadratic Relation, textbook pages 264–275

7. Find the zeros of each quadratic relation.

a) $y = x^2 - 121$ **b)** $y = 7x^2 + 49x + 84$

8. Write each relation in standard form. Then, find the zeroes.

a) $y = 3(x + 3)^2 - 3$ **b)** $y = -2(x + 7)^2 + 18$

5.6 Solve Problems Involving Quadratic Relations, textbook pages 276–285

9. A rectangular garden is 4 m by 12 m. It is to be surrounded by a walkway of uniform width.

a) Sketch and label a diagram to represent the garden and the walkway.

b) Write a relation, in standard form, for the total area of the garden and walkway.

c) Stones for the walkway cost \$9/m^2. If the total cost of the walkway cannot exceed \$1200, what is the maximum allowable width of the walkway?