HOMEWORK & EXTRA PRACTICE SCENARIOS

Algebra 1 Series

Book 4 Homework Guide

A NOTE TO PARENTS AND TEACHERS:
Each book in the Summit Math Algebra 1 Series has 2 parts. The first half of the book is the Guided Discovery Scenarios. The second half of the book is the Homework & Extra Practice Scenarios. Each section has a separate Answer Key. If the Answer Key does not provide enough guidance, you can access more information about how to solve each scenario using the resources listed below.

1. ***GUIDED DISCOVERY SCENARIOS***

   If you would like to get step-by-step guidance for the Guided Discovery Scenarios in each Algebra 1 book, you can subscribe to the Algebra 1 Videos for $9/month or $60/year ($5/mo.). With a subscription, you can access videos for every book in the Series. The videos show you how to solve each scenario in the Guided Discovery Scenarios section of the Algebra 1 books. You can find out more about these videos at www.summitmathbooks.com/algebra-1-videos.

2. ***HOMEWORK & EXTRA PRACTICE SCENARIOS***

   If you would like to get step-by-step guidance for the Homework & Extra Practice Scenarios in the book, you can use this Homework Guide. It provides more detailed guidance for solving the Homework & Extra Practice Scenarios in Book 4 of the Algebra 1 Series. Some scenarios are not included. If you would like something included in this Homework Guide, please email the author and explain which scenario(s) you would like to see included or which scenario(s) you would like more guidance for in this Homework Guide.

ANSWER KEY

5.
$-8x + 6y = 24$ → add $8x$ on both sides
$6y = 24 + 8x$ → divide by 6 on both sides
$\frac{6y}{6} = \frac{24 + 8x}{6}$
$y = \frac{24}{6} + \frac{8x}{6}$
$y = 4 + \frac{4}{3}x$
$y = \frac{4}{3}x + 4$

8a.
If you write the equation in Slope-Intercept Form, it will look like y = mx + b, where m is the slope and b is the y-intercept. The line crosses the y-axis at (0, −2) so b = −2.

To find the slope, pick 2 points on the line and find the rise and the run. Three points are easy to see on the line. They are (−3, −3), (0, −2) and (3, −1). To move from (−3, −3) to (0, −2), you can move up 1 unit and right 3 units. The rise is 1 and the run is 3. Slope is a ratio of rise to run. Written as a fraction, the slope is $\frac{\text{rise}}{\text{run}}$. For this line, the slope is $\frac{1}{3}$, so the value of m is $\frac{1}{3}$.

In Slope-Intercept Form the equation of this line is $y = \frac{1}{3}x + -2$, or $y = \frac{1}{3}x -2$.

8b.
If you write the equation in Slope-Intercept Form, it will look like y = mx + b, where m is the slope and b is the y-intercept. The line crosses the y-axis at (0, 1) so b = 1.

To find the slope, pick 2 points on the line and find the rise and the run. Three points are easy to see on the line. They are (−1, 4), (0, 1) and (1, −2). To move from (−1, 4) to (0, 1), you can move down 3 units and right 1 units. The rise is −4 and the run is 1 and the slope is a ratio of rise to run. Written as a fraction, the slope is $\frac{\text{rise}}{\text{run}}$. For this line, the slope is $\frac{-3}{1}$, which can be simplified as −3, so the value of m is −3.

In Slope-Intercept Form, the equation of this line is $y = -3x + 1$.

10a.
When an inequality is in the form y > mx + b, the points that make the inequality true are above the boundary line. y-values are up and down movements. To show points that have y-values that are greater than the boundary line, shade up, above the line.

10b.
When an inequality is in the form y < b, the points that make the inequality true are below the boundary line. y-values are up and down movements. To show points that have y-values that are less than the boundary line, shade down, below the line.

10b.
When an inequality is in Standard Form, it can help to convert it to Slope-Intercept Form.
$9x - 12y \leq -48$ → subtract $9x$ on both sides
$-12y \leq -48 - 9x$ → divide by −12 on both sides
$\frac{-12y}{-12} \leq \frac{-48 - 9x}{-12}$
$y \geq \frac{-48}{-12} - \frac{9x}{-12}$ → switch the inequality direction when you divide both sides by a negative number
$y \geq 4 + \frac{3}{4}x$
$y \geq \frac{3}{4}x + 4$

When an inequality is in the form $y \geq mx + b$, the points that make the inequality true are above the boundary line. They are also on the boundary line, but this scenario is asking you to think about whether the shaded region is above or below the boundary line. *y*-values are up and down movements. To show points that have *y*-values that are greater than the boundary line, shade up, above the line.

12a.
$4x + 5y = 30$ → replace y with −2
$4x + 5(-2) = 30$ → multiply 5 and −2
$4x - 10 = 30$ → add 10 to both sides
$4x = 40$ → divide by 4 on both sides
$x = 10$

12b.
$4x + 5y = 30$ → replace x with 0
$4(0) + 5y = 30$ → multiply 4 and 0
$5y = 30$ → divide by 5 on both sides
$y = 6$

13a.
$y = -5x^2 + 2x + 1$ → replace x with 1
$y = -5(1)^2 + 2(1) + 1$ → $(1)^2 = 1$
$y = -5 \cdot 1 + 2 \cdot 1 + 1$ → $-5 \cdot 1 = -5$ and $2 \cdot 1 = 2$
$y = -3 + 1$
$y = -2$

13b.
$y = -5x^2 + 2x + 1$ → replace x with −1
$y = -5(-1)^2 + 2(-1) + 1$ → $(-1)^2 = 1$
$y = -5 \cdot 1 + (-2) + 1$ → $-5 \cdot 1 = -5$
$y = -5 - 2 + 1$
$y = -7 + 1$
$y = -6$

15b.
The expression is a monomial because you can combine the like terms.
$5b + 3b = 8b$

15d.

The term $5a^2$ is a monomial, but the term $\frac{5}{a^2}$ is not a monomial. If a variable is in the denominator of a fraction, that term is not considered to be a monomial. To use a specific example, the term $\frac{x}{5}$ is a monomial but the term $\frac{5}{x}$ is not a monomial.

16a.
$5x - 2x = 3x$
When you combine like terms, you can see that the expression is a monomial.

16b.
The two terms contain different variables so they are not like terms and they cannot be combined. This expression is a binomial.

16c.
$\frac{4x + 8y}{4}$ → write the expression as two separate fractions
$\frac{4x}{4} + \frac{8y}{4}$ → simplify each fraction
$x + 2y$
This expression is a binomial.

16d.
$\frac{4y^5 + 3y^2}{y^2}$ → write the expression as two separate fractions
$\frac{4y^5}{y^2} + \frac{3y^2}{y^2}$ → simplify each fraction
$4y^3 + 3$
This expression is a binomial.

16e.
$3xy - xy = 2xy$
When you combine like terms, you can see that the expression is a monomial.

17a.
$3f + 2g - f = 2f - 2g$
When you combine the like terms, and write $3f - f$ as $2f$, you can see that the expression is a binomial.

17b.
$6f^2g^5$
This expression is a monomial.

17c.

A trinomial is the sum of 3 monomials. Although g and 5 are both monomials, the term $\frac{1}{f}$ is not a monomial because the variable is in the denominator. Since one of the terms is not a monomial, the expression $\frac{1}{f} + g + 5$ is not considered to be a trinomial.

18a.
In the equation $H = -16t^2 + 85$, replace t with 2.
$H = -16(2)^2 + 85 \rightarrow (2)^2 = 4$
$H = -16{\cdot}4 + 85 \rightarrow -16{\cdot}4 = 64$
$H = -64 + 85$
$H = 21$
After falling for 2 seconds, the rock is 21 feet above the ground.

18b.
In the equation $H = -16t^2 + 85$, replace t with 0.
$H = -16(0)^2 + 85 \rightarrow (0)^2 = 0$
$H = -16{\cdot}0 + 85 \rightarrow -16{\cdot}0 = 0$
$H = 0 + 85$
$H = 85$
At the moment the rock is thrown, the rock is 85 feet above the ground.

20a.
$7x + 3 - 2x - 8$ → if it helps, rearrange the expression to see which terms are like terms
$7x - 2x + 3 - 8$ → "$7x - 2x$" is $5x$ and "$3 - 8$" is -5
$5x - 5$
The expression is a binomial.

20b.
To simplify $y^2 + 3y^2 - 2y^2$, all of the terms are like terms so you can think about it as $1 + 3 - 2 = 2$.
$y^2 + 3y^2 - 2y^2$ is $2y^2$
The expression is a monomial.

20c.
$5x - xy - 2x + 8xy + 2y$ → if it helps, you can rearrange the expression to see like terms
$5x - 2x + 8xy - xy + 2y$ → "$5x - 2x$" is $3x$ and "$8xy - xy$" is $7xy$
$3x + 7xy + 2y$
The expression is a trinomial.

22a.
$7xy - 4y - 12 + 3x^2 + 4y - xy - 6xy$ → if it helps, you can rearrange the expression to see like terms
$7xy - xy - 6xy - 4y + 4y - 12 + 3x^2$ → "$7xy - xy - 6xy$" is $0xy$ and "$-4y + 4y$" is $0y$
$0xy + 0y - 12 + 3x^2$
$0 + 0 - 12 + 3x^2$
$-12 + 3x^2$ → you can also write the expression as $3x^2 - 12$
The expression is a binomial.

22b.
$-y^2 + x - 5 + 5 - x + y^2 + x$ → if it helps, you can rearrange the expression to see like terms
$-y^2 + y^2 + x - x + x - 5 + 5$ → "$-y^2 + y^2$" is $0y^2$, "$x - x + x$" is x and $-5 + 5$ is 0
$0y^2 + x + 0$
$0 + x$
x
The expression is a monomial.

23a.

$\left(x^2 + 2x - 7\right) + \left(x^2 - 3x - 1\right)$

combine the x^2 terms: $x^2 + x^2 = 2x^2$

combine the x terms: $2x + (-3x) = 2x - 3x = -1x = -x$

combine the numbers: $-7 + (-1) = -7 - 1 = -8$

$2x^2 + (-x) - 8$

$2x^2 - x - 8$

The expression is a trinomial.

23b.

$\left(2x^2 - 8x - 11\right) + \left(x^2 + 8x + 12\right)$

combine the x^2 terms: $2x^2 + x^2 = 3x^2$

combine the x terms: $-8x + (+8x) = -8x + 8x = 0x = 0$

combine the numbers: $-11 + (+12) = -11 + 12 = 1$

$3x^2 + 0 + 1$

$3x^2 + 1$

The expression is a binomial.

23c.

$\left(2x^3 - 2x\right) + \left(2 - x^2\right)$

combine the x^3 terms: there is only one x^3 term and it is $2x^3$

combine the x^2 terms: there is only one x^2 term and it is $-x^2$

combine the x terms: there is only one x term and it is $-2x$

combine the numbers: there is only one number and it is 2

$2x^3 + \left(-x^2\right) + (-2x) + 2$

$2x^3 - x^2 - 2x + 2$

The expression is "none of these." It is a polynomial that has four terms.

24a.

$-1(-10) \;\rightarrow\; -1 \cdot -10 = 10$

24b.

$-(-3y + 1) \;\rightarrow\; -(-3y) + -(1) \;\rightarrow\; 3y - 1$

You can also think about $-(-3y + 1)$ as the opposite of $-3y + 1$. The opposite of $-3y$ is $3y$. The opposite of "+ 1" is "− 1." The opposite of $-3y + 1$ is $3y - 1$.

28.

$x^2 - 9x - \left(x^2 + 9x\right)$

To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.

$x^2 - 9x - x^2 - 9x \;\rightarrow$ if it helps, you can rearrange the expression to see like terms

$x^2 - x^2 - 9x - 9x$

combine the x^2 terms: $x^2 - x^2 = 0x^2 = 0$

combine the x terms: $-9x - 9x = -18x$

$0 - 18x$

$-18x$

29a.
$(y + 50) - (2y + 20)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$y + 50 - 2y + (-20) \rightarrow$ you can write "$+ (-20)$" as -20
$y + 50 - 2y - 20 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$y - 2y + 50 - 20$
$-y + 30$

29b.
$(2x^2 - 5x) - (7x^2 + 11x)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$2x^2 - 5x - 7x^2 - 11x \rightarrow$ if it helps, you can rearrange the expression to see like terms
$2x^2 - 7x^2 - 5x - 11x$
$-5x^2 - 16x$

29c.
$y + 3 - (y - 7)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$y + 3 - y + 7 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$y - y + 3 + 7$
$0y + 10$
10

30a.
$(x - 7) - (x + 7)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$x - 7 - x + (-7) \rightarrow$ you can write "$+ (-7)$" as -7
$x - 7 - x - 7 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$x - x - 7 - 7$
$0x - 14$
-14
This expression is a monomial.

30b.
$y^2 - (x^2 + y^2)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$y^2 - x^2 - y^2 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$y^2 - y^2 - x^2$
$0y^2 - x^2$
$-x^2$
This expression is a monomial.

30c.
$(2x^2 + 8x - 3) - (5x^2 + 7x - 9)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$2x^2 + 8x - 3 - 5x^2 - 7x + 9 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$2x^2 - 5x^2 + 8x - 7x - 3 + 9$
$-3x^2 + x + 6$
This expression is a trinomial.

31a.
$\left(x^2 - 5\right) - \left(-x^3 - x - 4\right)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$x^2 - 5 + x^3 + x + 4 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$x^3 + x^2 + x - 5 + 4$
$x^3 + x^2 + x - 1$
The expression is "none of these." It is a polynomial that has four terms.

31b.
$\left(5x^2y^2 - 4xy^2 + xy\right) - \left(11x^2y - 9xy^2 + xy\right)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$5x^2y^2 - 4xy^2 + xy - 11x^2y + 9xy^2 - xy \rightarrow$ if it helps, you can rearrange the expression to see like terms
$5x^2y^2 - 11x^2y - 4xy^2 + 9xy^2 + xy - xy$
$5x^2y^2 - 11x^2y + 5xy^2 + 0xy$
$5x^2y^2 - 11x^2y + 5xy^2$
The expression is a trinomial.

32.
$\left(-0.8x^2 - 1.4x + 0.7\right) - \left(-1.3x^2 + 0.6x - 5.3\right)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$-0.8x^2 - 1.4x + 0.7 + 1.3x^2 - 0.6x + 5.3 \rightarrow$ if it helps, you can rearrange the expression to see like terms
$-0.8x^2 + 1.3x^2 - 1.4x - 0.6x + 0.7 + 5.3$
$0.5x^2 - 2x + 6$

34.
There are 2 rectangles in the figure. A smaller rectangle is inside a larger rectangle. To create the shaded region, you can subtract the area of the smaller rectangle from the area of the larger rectangle. To find the area of a rectangle, multiply the base and the height.
The area of the larger rectangle is $7 \cdot 5 = 35$. The area of the smaller rectangle is $3 \cdot x = 3x$.
Shaded region = larger rectangle − smaller rectangle
Shaded region = $35 - 3x$

35a.
$4(x - 7) \rightarrow 4 \cdot x - 4 \cdot 4 \rightarrow 4x - 16$

35b.
$-6(5x - 9) \rightarrow -6 \cdot 5x - (-6 \cdot 9) \rightarrow -30x - (-54) \rightarrow -30x + 54$

36a.
$-3f\left(f^2 + 5f\right) \rightarrow -3f \cdot f^2 + (-3f \cdot 5f) \rightarrow -3f^3 + \left(-15f^2\right) \rightarrow -3f^3 - 15f^2$

36b.
$-\frac{1}{2}d\,(6d - 2) \rightarrow -\frac{1}{2}d \cdot 6d - \left(-\frac{1}{2}d \cdot 2\right) \rightarrow -3d^2 - (-d) \rightarrow -3d^2 + d$

36c.
$8\left(\frac{1}{4}y^2 - \frac{3}{2}y + \frac{3}{8}\right) \rightarrow \left(8 \cdot \frac{1}{4}y^2\right) - \left(8 \cdot \frac{3}{2}y\right) + \left(8 \cdot \frac{3}{8}\right) \rightarrow 2y^2 - 12y + 3$

38.
$2x(5x^2+7x+2) \;\rightarrow\; (2x \cdot 5x^2)+(2x \cdot 7x)+(2x \cdot 2) \;\rightarrow\; 10x^3+14x^2+4x$

39.
$-4x^2(x^2-12x-3) \;\rightarrow\; (-4x^2 \cdot x^2)-(-4x^2 \cdot 12x)-(-4x^2 \cdot 3) \;\rightarrow\; -4x^4-(-48x^3)-(-12x^2)$
$\rightarrow\; -4x^4+48x^3+12x^2$

41.
$-x(-5x^3+x^2-2x+3) \;\rightarrow\; (-x \cdot 5x^3)+(-x \cdot x^2)-(-x \cdot 2x)+(-x \cdot 3)$
$\rightarrow\; 5x^4+(-x^3)-(-2x^2)+(-3x)$
$\rightarrow\; 5x^4-x^3+2x^2-3x$

42.
$-3x^2(-x^3+7x^2-9x+2) \;\rightarrow\; (-3x^2 \cdot -x^3)+(-3x^2 \cdot 7x^2)-(-3x^2 \cdot 9x)+(-3x^2 \cdot 2)$
$\rightarrow\; 3x^5+(-21x^4)-(-27x^3)+(-6x^2)$
$\rightarrow\; 3x^5-21x^4+27x^3-6x^2$

44c.
To find the area of this rectangle, add the areas of the smaller rectangles that form the figure in the previous scenario.
$35x^2+45x+14x+18 \;\rightarrow\; 35x^2+59x+18$

46.
To find the area of this figure, add the areas of the smaller rectangles that form the figure in the previous scenario.
$2x^3+10x^2+3x^2+8x+15x+12 \;\rightarrow\; 2x^3+13x^2+23x+12$

49b.
$3y-7-y+3y^2 \;\rightarrow\;$ rearrange the terms to help you see like terms
$3y-y-7+3y^2 \;\rightarrow\;$ combine like terms: $3y-y=2y$
$2y-7+3y^2 \;\rightarrow\;$ put the polynomial in Standard Form
$3y^2+2y-7$

51c.
$3-12x+2x^2-x \;\rightarrow\;$ rearrange the terms to help you see like terms
$3+2x^2-12x-x \;\rightarrow\;$ combine like terms: $-12x-x=-13x$
$3+2x^2-13x \;\rightarrow\;$ put the polynomial in Standard Form
$2x^2-13x+3$

52a.
$-5x(-x^2-3y^2+2x) \;\rightarrow\; (-5x \cdot -x^2)-(-5x \cdot 3y^2)+(-5x \cdot 2x) \;\rightarrow\; 5x^3-(-15xy^2)+(-10x^2)$
$\rightarrow\; 5x^3+15xy^2-10x^2 \;\rightarrow\;$ put the polynomial in Standard Form
$5x^3-10x^2+15xy^2$ (these terms are arranged in descending order by the exponents of the x terms)
or
$15xy^2-10x^2+5x^3$ (these terms are arranged in ascending order by the exponents of the x terms)

52b.
$y^2(2y^2 - 7x - 3y) \;\rightarrow\; (y^2 \cdot 2y^2) - (y^2 \cdot 7x) - (y^2 \cdot 3y) \;\rightarrow\; 2y^4 - 7xy^2 - 3y^3$
$2y^4 - 3y^3 - 7xy^2$ (the terms are arranged in descending order by the exponents of the y terms)
or
$-7xy^2 - 3y^3 + 2y^4$ (the terms are arranged in ascending order by the exponents of the y terms)

53.
$2x^3 - 3y^3 - xy^2 + 6x^2y + y^2x \;\rightarrow\;$ rewrite the last term to put x before y
$2x^3 - 3y^3 - xy^2 + 6x^2y + xy^2 \;\rightarrow\;$ arrange the terms in descending order by the x exponents
$2x^3 + 6x^2y - xy^2 + xy^2 - 3y^3 \;\rightarrow\;$ combine like terms: $-xy^2 + xy^2 = 0xy^2 = 0$
$2x^3 + 6x^2y - 3y^3$

55.
$(x - 5)(x - 8)$
$x(x - 8) - 5(x - 8)$
$x \cdot x \;+\; x \cdot (-8) \;+\; (-5) \cdot x \;+\; (-5) \cdot (-8)$
$x^2 \;+\; (-8x) \;+\; (-5x) \;+\; 40$
$x^2 - 8x - 5x + 40$
$x^2 - 13x + 40$

56a.
$(2x + 10)(x - 3)$
$2x(x - 3) + 10(x - 3)$
$2x \cdot x \;+\; 2x \cdot (-3) \;+\; 10 \cdot x \;+\; 10 \cdot (-3)$
$2x^2 \;+\; (-6x) \;+\; 10x \;-\; 30$
$2x^2 + 4x - 30$

56b.
$(3x - 6)\left(2x - \frac{1}{3}\right)$
$3x\left(2x - \frac{1}{3}\right) - 6\left(2x - \frac{1}{3}\right)$
$3x \cdot 2x \;+\; 3x \cdot \left(-\frac{1}{3}\right) \;+\; (-6) \cdot 2x \;+\; (-6) \cdot \left(-\frac{1}{3}\right)$
$6x^2 \;+\; (-1x) \;+\; (-12x) \;+\; \frac{6}{1} \cdot \frac{1}{3}$
$6x^2 - x - 12x + 2$
$6x^2 - 13x + 2$

58.
$(x + 4)(-x^2 - 2x + 9)$
$x(-x^2 - 2x + 9) + 4(-x^2 - 2x + 9)$
$x \cdot (-x^2) \;+\; x \cdot (-2x) \;+\; x \cdot 9 \;+\; 4 \cdot (-x^2) \;+\; 4 \cdot (-2x) \;+\; 4 \cdot 9$
$-x^3 \;+\; (-2x^2) \;+\; 9x \;+\; (-4x^2) \;+\; (-8x) \;+\; 36$
$-x^3 - 2x^2 + 9x - 4x^2 - 8x + 36 \;\rightarrow\;$ arrange the terms in descending order by the exponents
$-x^3 - 2x^2 - 4x^2 + 9x - 8x + 36 \;\rightarrow\;$ combine like terms
$-x^3 - 6x^2 + x + 36$

59a.
To find the area of the square, multiply the base and the height.
$(5x + 2)(5x + 2)$
$5x(5x + 2) + 2(5x + 2)$
$5x \cdot 5x \; + \; 5x \cdot 2 \; + \; 2 \cdot 5x \; + \; 2 \cdot 2$
$25x^2 \; + \; 10x \; + \; 10x \; + \; 4$
$25x^2 + 20x + 4$

59b.
To find the area of the rectangle, multiply the base and the height.
$(4x - 1)\left(x^2 - 2x + 7\right)$
$4x\left(x^2 - 2x + 7\right) - 1\left(x^2 - 2x + 7\right)$
$4x \cdot x^2 \; + \; 4x \cdot (-2x) \; + \; 4x \cdot 7 \; + \; (-1) \cdot x^2 \; + \; (-1) \cdot (-2x) \; + \; (-1) \cdot 7$
$4x^3 \; + \; \left(-8x^2\right) \; + \; 28x \; + \; \left(-x^2\right) \; + \; 2x \; + \; (-7)$
$4x^3 - 8x^2 \; + \; 28x \; - \; x^2 \; + \; 2x \; - \; 7$ → arrange the terms in descending order by the exponents
$4x^3 - 8x^2 \; - \; x^2 \; + \; 28x \; + \; 2x \; - \; 7$ → combine like terms
$4x^3 - 9x^2 \; + \; 30x \; - \; 7$

60a.
$25(2)^2 + 20(2) + 4 \;\rightarrow\; 25 \cdot 4 + 40 + 4 \;\rightarrow\; 100 + 40 + 4 \;\rightarrow\; 140 + 4 \;\rightarrow\;$ 144 square units

60b.
$4(2)^3 - 9(2)^2 \; + \; 30(2) \; - \; 7 \;\rightarrow\; 4 \cdot 8 - 9 \cdot 4 + 60 - 7 \;\rightarrow\; 32 - 36 + 60 - 7$
$\rightarrow\; -4 + 60 - 7 \;\rightarrow\; 56 - 7 \;\rightarrow\;$ 49 square units

61a.
$-2(x + 3y) \;\rightarrow\; (-2 \cdot x) + (-2 \cdot 3y) \;\rightarrow\; -2x + (-6y) \;\rightarrow\; -2x - 6y$ or $-6y - 2x$

61b.
$-4x\left(x^2 - 5x + 9\right) \;\rightarrow\; \left(-4x \cdot x^2\right) - (-4x \cdot 5x) + (-4x \cdot 9) \;\rightarrow\; -4x^3 - \left(-20x^2\right) + (-36x)$
$\rightarrow\; -4x^3 + 20x^2 - 36x$

61c.
$xy(2x + 7y - 1) \;\rightarrow\; (xy \cdot 2x) + (xy \cdot 7y) - (xy \cdot 1) \;\rightarrow\; 2x^2y + 7xy^2 - xy$
or, you could write the expression as follows:
$2x^2y - xy + 7xy^2$ (the terms are arranged in descending order by the exponents of the x terms)
or, you could write the expression as follows:
$7xy^2 - xy + 2x^2y$ (the terms are arranged in descending order by the exponents of the x terms)

62a.
$(x + 8)(x - 9)$
$x(x - 9) + 8(x - 9)$
$x \cdot x \; + \; x \cdot (-9) \; + \; 8 \cdot x \; + \; 8 \cdot (-9)$
$x^2 \; + \; (-9x) \; + \; 8x \; - \; 72$
$x^2 - 9x \; + \; 8x \; - \; 72$
$x^2 - x - 72$

62b.
$(2x-5)(x+2)$
$2x(x+2)-5(x+2)$
$2x \cdot x \;+\; 2x \cdot 2 \;+\; (-5) \cdot x \;+\; (-5) \cdot 2$
$2x^2 \;+\; 4x \;+\; (-5x) \;+\; (-10)$
$2x^2 \;+\; 4x \;-\; 5x \;-\; 10$
$2x^2 - x - 10$

62c.
$(2x+11)(3x-2)$
$2x(3x-2)+11(3x-2)$
$2x \cdot 3x \;+\; 2x \cdot (-2) \;+\; 11 \cdot 3x \;+\; 11 \cdot (-2)$
$6x^2 \;+\; (-4x) \;+\; 33x \;+\; (-22)$
$6x^2 - 4x + 33x - 22$
$6x^2 + 29x - 22$

63a.
$(x+3)\left(x^2+7x+2\right)$
$x\left(x^2+7x+2\right) \;+\; 3\left(x^2+7x+2\right)$
$x \cdot x^2 \;+\; x \cdot 7x \;+\; x \cdot 2 \;+\; (-1) \cdot x^2 \;+\; (-1) \cdot (-2x) \;+\; (-1) \cdot 7$
$4x^3 \;+\; \left(-8x^2\right) \;+\; 28x \;+\; \left(-x^2\right) \;+\; 2x \;+\; (-7)$
$4x^3 - 8x^2 + 28x - x^2 + 2x - 7$ → arrange the terms in descending order by the exponents
$4x^3 - 8x^2 - x^2 + 28x + 2x - 7$ → combine like terms
$4x^3 - 9x^2 + 30x - 7$

63b.
$(x-y)\left(x^2-2xy-y^2\right)$
$x\left(x^2-2xy-y^2\right) - y\left(x^2-2xy-y^2\right)$
$x \cdot x^2 \;+\; x \cdot (-2xy) \;+\; x \cdot (-y^2) \;+\; (-y) \cdot x^2 \;+\; (-y) \cdot (-2xy) \;+\; (-y) \cdot (-y^2)$
$x^3 \;+\; \left(-2x^2y\right) \;+\; \left(-xy^2\right) \;+\; \left(-x^2y\right) \;+\; 2xy^2 \;+\; y^3$
$x^3 - 2x^2y - xy^2 - x^2y + 2xy^2 + y^3$ → arrange the terms in descending order by the x exponents
$x^3 - 2x^2y - x^2y - xy^2 + 2xy^2 + y^3$ → combine like terms
$x^3 - 3x^2y + xy^2 + y^3$

64.
$(4x+1)(5x-2)$
$4x(5x-2)+1(5x-2)$
$4x \cdot 5x \;+\; 4x \cdot (-2) \;+\; 1 \cdot 5x \;+\; 1 \cdot (-2)$
$20x^2 \;+\; (-8x) \;+\; 5x \;+\; (-2)$
$20x^2 - 8x + 5x - 2$

At this step in your work, there are 4 terms. After you combine like terms, the expression becomes $20x^2 - 3x - 2$. The simplified expression has 3 terms.

65.
$(3x+2)(3x-2)$
$3x(3x-2)+2(3x-2)$
$3x \cdot 3x \;+\; 3x \cdot (-2) \;+\; 2 \cdot 3x \;+\; 2 \cdot (-2)$
$9x^2 \;+\; (-6x) \;+\; 6x \;+\; (-4)$
$9x^2 - 6x + 6x - 4$

At this step in your work, there are 4 terms. After you combine like terms, the expression becomes $20x^2 + 0x - 4$, which can be written as $20x^2 - 4$. The simplified expression has 2 terms.

66a.
$(2x+9)(2x-9)$
$2x(2x-9)+9(2x-9)$
$2x \cdot 2x \;+\; 2x \cdot (-9) \;+\; 9 \cdot 2x \;+\; 9 \cdot (-9)$
$4x^2 \;+\; (-18x) \;+\; 18x \;+\; (-81)$
$4x^2 - 18x + 18x - 81$
$4x^2 - 81$

66b.
$(5x-1)(5x+1)$
$5x(5x+1) - 1(5x+1)$
$5x \cdot 5x \;+\; 5x \cdot 1 \;+\; (-1) \cdot 5x \;+\; (-1) \cdot 1$
$25x^2 \;+\; 5x \;+\; (-5x) \;+\; (-1)$
$25x^2 + 5x - 5x - 1$
$25x^2 - 1$

66c.
$\left(\frac{1}{3}x - 6\right)\left(\frac{1}{3}x + 6\right)$
$\frac{1}{3}x\left(\frac{1}{3}x + 6\right) - 6\left(\frac{1}{3}x + 6\right)$
$\frac{1}{3}x \cdot \frac{1}{3}x \;+\; \frac{1}{3}x \cdot 6 \;+\; (-6) \cdot \frac{1}{3}x \;+\; (-6) \cdot 6$
$\frac{1}{9}x^2 \;+\; 2x \;+\; (-2x) \;+\; (-36)$
$\frac{1}{9}x^2 + 2x - 2x - 36$
$\frac{1}{9}x^2 - 36$

67a.
$(x+7y)(x-7y)$
$x(x-7y)+7y(x-7y)$
$x \cdot x \;+\; x \cdot (-7y) \;+\; 7y \cdot x \;+\; 7y \cdot (-7y)$
$x^2 \;+\; (-7xy) \;+\; 7xy \;+\; \left(-49y^2\right)$
$x^2 - 7xy + 7xy - 49y^2$
$x^2 - 49y^2$

67b.
$\left(11x^2 - 8y\right)\left(11x^2 + 8y\right)$
$11x^2\left(11x^2 + 8y\right) - 8y\left(11x^2 + 8y\right)$
$11x^2 \cdot 11x^2 \ + \ 11x^2 \cdot 8y \ + \ (-8y) \cdot 11x^2 \ + \ (-8y) \cdot 8y$
$121x^4 \ + \ 88x^2y \ + \ \left(-88x^2y\right) \ + \ \left(-64y^2\right)$
$121x^4 + 88x^2y - 88x^2y - 64y^2$
$121x^4 - 64y^2$

71a.
$(y + 11)(y + 11)$
$y(y + 11) + 11(y + 11)$
$y \cdot y \ + \ y \cdot 11 \ + \ 11 \cdot y \ + \ 11 \cdot 11$
$y^2 \ + \ 11y \ + \ 11y \ + \ 121$
$y^2 \ + \ 22y \ + \ 121$

71b.
$(2y - 5)(2y - 5)$
$2y(2y - 5) - 5(2y - 5)$
$2y \cdot 2y \ + \ 2y \cdot (-5) \ + \ (-5) \cdot 2y \ + \ (-5) \cdot (-5)$
$4y^2 \ + \ (-10y) \ + \ (-10y) \ + \ 25$
$4y^2 - 10y - 10y + 25$
$4y^2 - 20y + 25$

71c.
$\left(3x^2 - 8\right)\left(3x^2 - 8\right)$
$3x^2\left(3x^2 - 8\right) - 8\left(3x^2 - 8\right)$
$3x^2 \cdot 3x^2 \ + \ 3x^2 \cdot (-8) \ + \ (-8) \cdot 3x^2 \ + \ (-8) \cdot (-8)$
$9x^4 \ + \ (-24x^2) \ + \ (-24x^2) \ + \ 64$
$9x^4 - 24x^2 - 24x^2 + 64$
$9x^4 - 48x^2 + 64$

72a.
$(x - 7)^2$
$(x - 7)(x - 7)$
$x(x - 7) - 7(x - 7)$
$x \cdot x \ + \ x \cdot (-7) \ + \ (-7) \cdot x \ + \ (-7) \cdot (-7)$
$x^2 \ + \ (-7x) \ + \ (-7x) \ + \ 49$
$x^2 - 7x - 7x + 49$
$x^2 - 14x + 49$

72b.
$(x - 2y)(x - 2y)$
$x(x - 2y) - 2y(x - 2y)$
$x \cdot x \ + \ x \cdot (-2y) \ + \ (-2y) \cdot x \ + \ (-2y) \cdot (-2y)$
$x^2 \ + \ (-2xy) \ + \ (-2xy) \ + \ 4y^2$
$x^2 - 2xy - 2xy + 4y^2$
$x^2 - 4xy + 4y^2$

72c.
$(x^2+3y)(x^2+3y)$
$x^2(x^2+3y)+3y(x^2+3y)$
$x^2 \cdot x^2 \ + \ x^2 \cdot 3y \ + \ 3y \cdot x^2 \ + \ 3y \cdot 3y$
$x^4 \ + \ 3x^2y \ + \ 3x^2y \ + \ 9y^2$
$x^4+6x^2y+9y^2$

73a.
The middle term is $7x+7x$ or $7x \cdot 2$, which is $14x$.

73b.
The middle term is $-8x-8x$ or $-8x \cdot 2$, which is $-16x$.

73c.
The middle term is $5xy+5xy$ or $5xy \cdot 2$, which is $10xy$.

73d.
The middle term is $-4xy-4xy$ or $-4xy \cdot 2$, which is $-8xy$.

74a.
The middle term is $\frac{1}{2}x+\frac{1}{2}x$ or $\frac{1}{2}x \cdot 2$, which is $1x$ or just x.
When you square a binomial, the middle term is double the product of the 2 terms in the binomial.

74b.
The middle term is $-\frac{1}{3}x-\frac{1}{3}x$ or $-\frac{1}{3}x \cdot 2$, which is $-\frac{2}{3}x$.
When you square a binomial, the middle term is double the product of the 2 terms in the binomial.
The last term is $\left(-\frac{1}{3}x\right) \cdot \left(-\frac{1}{3}x\right)$, which is $\frac{1}{9}x^2$.

74c.
The middle term is $\frac{4}{5}xy+\frac{4}{5}xy$ or $\frac{4}{5}xy \cdot 2$, which is $\frac{8}{5}xy$.
When you square a binomial, the middle term is double the product of the 2 terms in the binomial.
The last term is $\frac{4}{5}y \cdot \frac{4}{5}y$, which is $\frac{16}{25}y^2$.

75a.
$(10+x)(10+x)$
$(10)^2 \ + \ 2 \cdot (10 \cdot x) \ + \ (x)^2$
$100 \ + \ 2 \cdot (10x) \ + \ x^2$
$100+20x+x^2$

75b.
$(4x-9)(4x-9)$
$(4x)^2 \ + \ 2 \cdot (4x \cdot -9) \ + \ (-9)^2$
$16x^2 \ + \ 2 \cdot (-36x) \ + \ 81$
$16x^2 \ + \ (-72x) \ + \ 81$
$16x^2-72x+81$

75c.
$(11x + 2y)(11x + 2y)$
$(11x)^2 \ + \ 2 \cdot (11x \cdot 2y) \ + \ (2y)^2$
$121x^2 \ + \ 2 \cdot (22xy) \ + \ 4y^2$
$121x^2 + 44xy + 4y^2$

76a.
$(x + y)^2$
$(x + y)(x + y)$
$(x)^2 \ + \ 2 \cdot (x \cdot y) \ + \ (4y)^2$
$x^2 + 2 \cdot xy + y^2$
$x^2 + 2xy + y^2$

76b.
$(f - g)^2$
$(f - g)(f - g)$
$(f)^2 \ + \ 2 \cdot (f \cdot -g) \ + \ (-g)^2$
$f^2 + 2 \cdot (-fg) + g^2$
$f^2 + (-2fg) + g^2$
$f^2 - 2fg + g^2$

76c.
Option #1: combine $1 + 5$ and then square the result
$(1 + 5)^2 \ \rightarrow \ (6)^2 \ \rightarrow \ 36$

Option #2: square the binomial
$(1 + 5)^2 \ \rightarrow \ (1 + 5)(1 + 5)$
$(1)^2 \ + \ 2 \cdot (1 \cdot 5) \ + \ (5)^2$
$1 \ + \ 2 \cdot 5 \ + \ 25 \ \rightarrow \ 1 \ + \ 10 \ + \ 25 \ \rightarrow \ 11 \ + \ 25 \ \rightarrow \ 36$

76d.
Option #1: combine $9 - 3$ and then square the result
$(9 - 3)^2 \ \rightarrow \ (6)^2 \ \rightarrow \ 36$

Option #2: square the binomial
$(9 - 3)^2 \ \rightarrow \ (9 - 3)(9 - 3)$
$(9)^2 \ + \ 2 \cdot (9 \cdot -3) \ + \ (-3)^2$
$81 \ + \ 2 \cdot (-27) \ + \ 9 \ \rightarrow \ 81 + (-54) + 9 \ \rightarrow \ 81 - 54 + 9 \ \rightarrow \ 27 + 9 \ \rightarrow \ 36$

78a.
To find the area of the square, multiply the base and the height.
$(x + 4y)(x + 4y)$
$(x)^2 \ + \ 2 \cdot (x \cdot 4y) \ + \ (4y)^2$
$x^2 + 2 \cdot 4xy + y^2$
$x^2 + 8xy + y^2$

78b.

To find the area of the square, multiply the base and the height.

$\left(3x^2-2\right)\left(3x^2-2\right)$

$\left(3x^2\right)^2 \ + \ 2\cdot\left(3x^2\cdot -2\right) \ + \ (-2)^2$

$9x^4+2\cdot\left(-6x^2\right)+4$

$9x^4+\left(-12x^2\right)+4$

$9x^4-12x^2+4$

80.

Square the binomial.

$(2x-3y)(2x-3y)$

$(2x)^2 \ + \ 2\cdot(2x\cdot -3y) \ + \ (3y)^2$

$4x^2+2\cdot(-6xy)+9y^2$

$4x^2-12xy+9y^2$

Rearrange the terms.

$4x^2+9y^2-12xy$

Since $4x^2+9y^2=100$, you can replace $4x^2+9y^2$ with 100.

$100-12xy$

Since $xy = 5$, you can replace xy with 5.

$100-12(5) \ \rightarrow \ 100-60 \ \rightarrow \ 40$

81.

There are 2 rectangles in the figure. A smaller rectangle is inside a larger rectangle. To create the shaded region, you can subtract the area of the smaller rectangle from the area of the larger rectangle. To find the area of a rectangle, multiply the base and the height.

The area of the larger rectangle is $(2x+1)\cdot(2x+1)$ or $(2x+1)^2$.

The area of the smaller rectangle is $(x+2)\cdot(x-2)$.

Shaded region = larger rectangle − smaller rectangle

Shaded region = $(2x+1)\cdot(2x+1)-(x+2)\cdot(x-2)$

Multiply each pair of binomials.

$(2x+1)\cdot(2x+1)-(x+2)\cdot(x-2)$

$\left(4x^2+2\cdot(2x)+1\right) \ - \ \left(x^2-2x+2x-4\right)$

$\left(4x^2+4x+1\right) \ - \ \left(x^2-4\right)$

Distribute the subtraction sign to both terms in the binomial x^2-4.

$4x^2+4x+1-x^2+4$ → if it helps, you can rearrange the expression to see like terms

$4x^2-x^2+4x+1+4$ → combine like terms

$3x^2+4x+5$

82a.

$(5x+9)+(2x-3)$ → you can ignore the parentheses

$5x+9+2x-3$ → if it helps, you can rearrange the expression to see like terms

$5x+2x+9-3$ → combine like terms

$7x+6$

82b.
$(5x+9)(2x-3)$
$5x(2x-3)+9(2x-3)$
$5x \cdot 2x \;+\; 5x \cdot (-3) \;+\; 9 \cdot 2x \;+\; 9 \cdot (-3)$
$10x^2 \;+\; (-15x) \;+\; 18x \;+\; (-27)$
$10x^2-15x+18x-27$
$10x^2+3x-27$

83a.
$(3x-11)(3x-11)$
$(3x)^2 \;+\; 2 \cdot (3x \cdot -11) \;+\; (-11)^2$
$9x^2+2 \cdot (-33x)+121$
$9x^2-66x+121$

83b.
$(7-2x)-(7-2x)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$7-2x-7+2x \rightarrow$ if it helps, you can rearrange the expression to see like terms
$7-7-2x+2x$
$0+0$
0

85a.
$-2(x+5)(x-1)$
Option 1: Multiply the binomials first
$-2\left(x^2-1x+5x-5\right) \rightarrow$ combine like terms inside parentheses
$-2\left(x^2+4x-5\right) \rightarrow$ distribute the −2 to all 3 terms inside parentheses
$-2x^2-8x+10$

Option 2: Start by distributing the −2 to the first binomial
$(-2x-10)(x-1) \rightarrow$ multiply the binomials
$-2x^2+2x-10x+10 \rightarrow$ combine like terms
$-2x^2-8x+10$

85b.
$5(x-4)(x-4)$
Option 1: Multiply the binomials first
$5\left(x^2-4x-4x+16\right) \rightarrow$ combine like terms inside parentheses
$5\left(x^2-8x+16\right) \rightarrow$ distribute the 5 to all 3 terms inside parentheses
$5x^2-40x+80$

Option 2: Start by distributing the −2 to the first binomial
$(5x-20)(x-4) \rightarrow$ multiply the binomials
$5x^2-20x-20x+80 \rightarrow$ combine like terms
$5x^2-40x+80$

85c.
$-10(2x-1)(2x+1)$
Option 1: Multiply the binomials first
$-10\left(4x^2+2x-2x-1\right)$ → combine like terms inside parentheses
$-10\left(4x^2-1\right)$ → distribute the −2 to all 3 terms inside parentheses
$-40x^2+10$

Option 2: Start by distributing the −2 to the first binomial
$(-20x+10)(2x+1)$ → multiply the binomials
$-40x^2-20x+20x+10$ → combine like terms
$-40x^2+10$

86a.
$(2y-5)(2y+5)$
$4y^2+10y-10y-25$
$4y^2-25$

86b.
$(10x^4+6)-(10x^4-6)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$10x^4+6-10x^4+6$ → if it helps, you can rearrange the expression to see like terms
$10x^4-10x^4+6+6$ → combine like terms
12

86c.
$(8x-1)(8x-1)$
$(8x)^2\ +\ 2\cdot(8x\cdot -1)\ +\ (-1)^2$
$64x^2+2\cdot(-8x)+1$
$64x^2-16x+1$

87a.
$-(x+7y)^2$ → first, square the binomial
$-[(x+7y)(x+7y)]$
$-\left[(x)^2\ +\ 2\cdot(x\cdot 7y)\ +\ (7y)^2\right]$
$-\left[x^2+14xy+49y^2\right]$ → distribute the negative sign to all 3 terms in parentheses
$-x^2-14xy-49y^2$

87b.
$5-(x+5)^2$ → first, square the binomial
$5-[(x+5)(x+5)]$
$5-\left[(x)^2\ +\ 2\cdot(x\cdot 5)\ +\ (5)^2\right]$
$5-\left[x^2+10x+25\right]$ → distribute the negative sign to all 3 terms in parentheses
$5-x^2-10x-25$ → put the terms in Standard Form
$-x^2-10x-25+5$ → combine like terms: $-25+5$ is -20
$-x^2-10x-20$

88.
$(x+y)^2 = 14$
Square the binomial.
$(x+y)(x+y) = 14$
$x^2 \ + \ 2 \cdot (x \cdot y) \ + \ y^2 = 14$
$x^2 + 2xy + y^2 = 14$ → rearrange the terms
$x^2 + y^2 + 2xy = 14$ → since $xy = -6$, you can replace xy with -6
$x^2 + y^2 + 2(-6) = 14$
$x^2 + y^2 + (-12) = 14$
$x^2 + y^2 - 12 = 14$ → add 12 to both sides
$x^2 + y^2 = 26$
Since $x^2 + y^2 = 26$, the value of $x^2 + y^2$ is 26.

89.
$-(2-x)^2 + 4x^2 = -3(3-x)(1+x)$ → first, square the binomial: $(2-x)^2$ is $4 - 4x + x^2$
$-\left(4 - 4x + x^2\right) + 4x^2 = -3(3-x)(1+x)$ → multiply the binomials: $(3-x)(1+x)$ is $3 + 2x - x^2$
$-\left(4 - 4x + x^2\right) + 4x^2 = -3\left(3 + 2x - x^2\right)$ → distribute the negative sign on the left side
$-4 + 4x - x^2 + 4x^2 = -3\left(3 + 2x - x^2\right)$ → distribute the -3 on the right side
$-4 + 4x - x^2 + 4x^2 = -9 - 6x + 3x^2$ → combine $-x^2 + 4x^2$ on the left side
$-4 + 4x + 3x^2 = -9 - 6x + 3x^2$ → subtract $3x^2$ on both sides
$-4 + 4x = -9 - 6x$ → add $6x$ on both sides
$-4 + 10x = -9$ → add 4 on both sides
$10x = -5$ → divide by 10 on both sides
$x = -\frac{1}{2}$

96b.
$(3x - 10) - (10 - 3x)$
To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.
$3x - 10 - 10 + 3x$ → if it helps, you can rearrange the expression to see like terms
$3x + 3x - 10 - 10$ → combine like terms
$6x - 20$

97a.
$3(x-2)(x+5)$ → multiply the binomials first
$3\left(x^2 + 5x - 2x - 10\right)$ → combine like terms inside parentheses
$3\left(x^2 + 3x - 10\right)$ → distribute the 3 to all 3 terms inside parentheses
$3x^2 + 9x - 30$

97b.
$-(6x-5)(6x+5)$ → multiply the binomials first
$-\left(36x^2 + 30x - 30x - 25\right)$ → combine like terms inside parentheses
$-\left(36x^2 - 25\right)$ → distribute the negative sign to both terms inside parentheses
$-36x^2 + 25$

98a.
$(3y - 8)(2x + 7)$
$6y^2 + 21y - 16y - 56$ → combine like terms
$6y^2 + 5y - 56$ → distribute the negative sign to both terms inside parentheses

98b.

$\left(4x^2+3\right)-\left(4x^2-3\right)$

To remove the parentheses, distribute the subtraction symbol to both terms inside parentheses.

$4x^2+3-4x^2+3 \rightarrow$ if it helps, you can rearrange the expression to see like terms

$4x^2-4x^2+3+3 \rightarrow$ combine like terms

6

98c.

$\left(4x-\frac{1}{4}\right)^2\left(4x-\frac{1}{4}\right)$

$\left(4x-\frac{1}{4}\right)\left(4x-\frac{1}{4}\right)$

$(4x)^2 \ + \ 2\cdot\left(4x\cdot-\frac{1}{4}\right) \ + \ \left(-\frac{1}{4}\right)^2$

$16x^2+2\cdot(-1x)+\frac{1}{16}$

$16x^2-2x+\frac{1}{16}$

99a.

$x-3-(x-3)^2 \rightarrow$ first, square the binomial

$x-3-[(x-3)(x-3)]$

$x-3-\left[x^2 \ + \ 2\cdot(x\cdot-3) \ + \ (-3)^2\right]$

$x-3-\left[x^2-6x+9\right] \rightarrow$ distribute the negative sign to all 3 terms in parentheses

$x-3-x^2+6x-9 \rightarrow$ put the terms in Standard Form

$-x^2+6x+x-9-3 \rightarrow$ combine like terms: $6x+x$ is $7x$ and $-9-3$ is -12

$-x^2+7x-12$

99b.

$(x+1)^3$

$(x+1)(x+1)(x+1) \rightarrow$ multiply two binomials first: $(x+1)(x+1)$ is x^2+2x+1

$\left(x^2+2x+1\right)(x+1)$

$\left(x^2+2x+1\right)\cdot x+\left(x^2+2x+1\right)\cdot 1$

$x^3+2x^2+x+x^2+2x+1 \rightarrow$ put the terms in Standard Form

$x^3+2x^2+x^2+x+2x+1 \rightarrow$ combine like terms

x^3+3x^2+3x+1

100.

To find points on the graph, use the equation. The equation is $y=x^2-2$. Replace the x in the equation with different numbers and solve for y. The x- and y-values together form an ordered pair, which is a point you can plot on the graph.

If $x=-3$, $y=(-3)^2-2 \ \rightarrow \ y=9-2 \ \rightarrow \ y=7$. If $x=-3$, $y=7$. Plot the point $(-3, 7)$.

If $x=-2$, $y=(-2)^2-2 \ \rightarrow \ y=4-2 \ \rightarrow \ y=2$. If $x=-2$, $y=2$. Plot the point $(-2, 2)$.

If $x=-1$, $y=(-1)^2-2 \ \rightarrow \ y=1-2 \ \rightarrow \ y=-1$. If $x=-1$, $y=-1$. Plot the point $(-1, -1)$.

If $x=0$, $y=(0)^2-2 \ \rightarrow \ y=0-2 \ \rightarrow \ y=-2$. If $x=0$, $y=-2$. Plot the point $(0, -2)$.

If $x=1$, $y=(1)^2-2 \ \rightarrow \ y=1-2 \ \rightarrow \ y=-1$. If $x=1$, $y=-1$. Plot the point $(1, -1)$.

If $x=2$, $y=(2)^2-2 \ \rightarrow \ y=4-2 \ \rightarrow \ y=2$. If $x=2$, $y=2$. Plot the point $(2, 2)$.

If $x=3$, $y=(3)^2-2 \ \rightarrow \ y=9-2 \ \rightarrow \ y=7$. If $x=3$, $y=7$. Plot the point $(3, 7)$.

110a.
This list of numbers are the perfect squares.
$1^2,\ 2^2,\ 3^2,\ 4^2,\ 5^2,\ 6^2,\ 7^2,\ 8^2,\ 9^2 \dots$

110a.
This list of numbers is the powers of 3.
$3^0,\ 3^1,\ 3^2,\ 3^3,\ 3^4,\ 3^5,\ 3^6,\ 3^7,\ 3^8 \dots$

110c.
To continue this list, keep dividing each number by 2 to get the next number.
$$8\div 2 = 4,\quad 4\div 2 = 2,\quad 2\div 2 = 1,\quad 1\div 2 = \frac{1}{2},\quad \frac{1}{2}\div 2 = \frac{1}{4},\quad \frac{1}{4}\div 2 = \frac{1}{8},\quad \frac{1}{8}\div 2 = \frac{1}{16},\quad \frac{1}{16}\div 2 = \frac{1}{32},\ \dots$$

111.
One way to analyze the pattern in these figures is to look for triangles. In the first figure, there is one triangle. 3 sides. 3 toothpicks. In the 2nd figure, there are 3 triangles. 3 sets of 3 sides. 9 toothpicks. In the 3rd figure, there are 6 triangles. 6 sets of 3 sides. 18 toothpicks. Notice the pattern that develops below:

Figure #:	Triangles:	Toothpicks:
1	1	1x3 = 3
2	3	3x3 = 9
3	6	6x3 = 18
4	10	10x3 = 30
5	15	15x3 = 45

One thing you can see in the numbers above is that nth figure has *n* more triangles than the figure before it. The 4th figure has 4 more triangles than the 3rd figure, the 5th figure has 5 more triangles than the 4th figure, and so on...

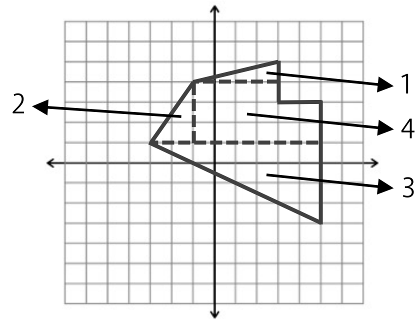
111c.
This is very challenging. The number of toothpicks in the *n*th figure is $n(n + 1)$ multiplied by 3 and then divided by 2. As a fraction, you can write it as $\frac{3n(n+1)}{2}$. Using decimals, you can write the expression as $1.5n(n + 1)$. If you distribute the *n*, you can write it as $1.5\left(n^2 + n\right)$.

113a.
Food is 15% of the budget. $600 is 15% of the total monthly income.
Solve: $600 = 0.15T$, if T is the total monthly income.
$600\div 0.15 = 4000$
The total monthly income is $4,000.
25% is the total goes to the Other category. 25% of $4,000 is 0.25(1,000), which is $1,000.

113b.
To see how to find the total monthly income, look at the previous explanation in 113a.

114.

To find the area of the entire shape, divide it into rectangles and right triangles.



To find the area of a triangle, multiply the base and height and then divide by 2.

Triangle #1 has a base of 4 units and a height of 1 unit. Its area is $\frac{1}{2}\cdot(4\cdot1) \rightarrow \frac{1}{2}\cdot(4) \rightarrow 2$ units^2

Triangle #2 has a base of 2 units and a height of 3 units. Its area is $\frac{1}{2}\cdot(2\cdot3) \rightarrow \frac{1}{2}\cdot(6) \rightarrow 3$ units^2

Triangle #3 has a base of 8 units and a height of 4 units. Its area is $\frac{1}{2}\cdot(8\cdot4) \rightarrow \frac{1}{2}\cdot(32) \rightarrow 16$ units^2

The total area of the triangles is 2 + 3 + 16 = 21 units^2.

To find the area of Shape #4, you can count the squares inside it or you can divide it into 2 separate rectangles and find the area of each rectangle separately.

The area of Shape #4 is 16 units^2.

The area of the entire figure is 21 units^2 + 16 units^2, which is 37 units^2.

