Algebra 1 Semester 2 Study Guide Name Key (3)

Part 1 – This is part of your exam grade.

Systems of Linear Equations – I can write and solve systems of linear equations.

1. Solve each system of equations:

a) $y = 2x - 5$
$y = -4x + 19$ graphing (4, 3)

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

$y = -x + 6$
$-3x + (-x + 6) = 2$
$-4x + 6 = 2$
$-4x = -4$
$x = 1$

$1 + y = 6$
$y = 5$
$(1, 5)$

$-3(1) + 5 = 2$?
$-3 + 5 = 2$
$2 = 2$ ✓

Substitution

c) $2x + 3y = 6$
$-2(3x + 4y = 5)$

Write and solve a system of linear equations for each problem below. # 2 - 4 over

2. On Mr. Wood's farm, he raises chickens and cows. There are 34 animals in all. Mr. Wood counts 110 legs on these animals. Find the number of each type of animal.

3. A test has 24 questions worth 100 points. The true/false questions are worth 4 points each and the multiple choice questions are worth 5 points each. How many of each type of question are on the test?

4. Emma is throwing a party! She buys 3 rolls of streamers and 15 party hats for $30. Later, she buys 2 more rolls of streamers and 4 more party hats for $11. Find the cost of each roll of streamers and each party hat.

Exponents– I can simplify exponential expressions.

Simplify each expression.

5. $9^{-3} = \frac{1}{729}$

6. $(-2.34)^0 = 1$

7. $\frac{x^7}{x^{14}} = \frac{1}{x^7}$

8. $5m^{-4}n^3 = \frac{5n^3}{m^4}$

9. $\frac{-2x^5y^{-3}}{z^{-2}} = \frac{-2x^5z^2}{y^3}$

10. $(k^2)^4 = k^8$

11. $-3d^{-4} \cdot 5d^9 = -15d^5$

12. $x^{-4} \cdot x^2 \cdot x^{-1} = \frac{1}{x^3}$

13. $(t^{-2})^6 = \frac{1}{t^{12}}$

#1c) $6x + 9y = 18$

$-6x - 8y = -10$

$y = 8$

$2x + 3(8) = 6$

$2x + 24 = 6$

$2x = -18$

$x = -9$

$3(-9) + 4(8) = 5$?

$-27 + 32 = 5$

$5 = 5$ ✓

Elimination $(-9, 8)$

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2. On Mr. Wood's farm, he raises chickens and cows. There are 34 animals in all. Mr. Wood counts 110 legs on these animals. Find the number of each type of animal.

c = chickens

w = cows

$-2(c + w = 34)$

$2c + 4w = 110$

$-2c - 2w = -68$

$2w = 42$

$w = 21$ cows

$c = 34 - 21 = 13$ chickens

13×2 legs $= 26$

21×4 legs $= 84$

110 ✓

3. A test has 24 questions worth 100 points. The true/false questions are worth 4 points each and the multiple choice questions are worth 5 points each. How many of each type of question are on the test?

x = t/f questions

y = m.c. questions

$-4(x + y = 24)$

$4x + 5y = 100$

$-4x - 4y = -96$

$y = 4$ m.c. questions

$x = 24 - 4 = 20$ t/f questions

$20(4) + 4(5) = 100$ ✓

$80 + 20 = 100$

4. Emma is throwing a party! She buys 3 rolls of streamers and 15 party hats for \$30. Later, she buys 2 more rolls of streamers and 4 more party hats for \$11. Find the cost of each roll of streamers and each party hat.

s = cost each # of rolls of streamers

p = cost of each party hat

$-2(3s + 15p = 30)$

$3(2s + 4p = 11)$

$-6s - 30p = -60$

$6s + 12p = 33$

$-18p = -27$

$p = \$1.50$ per hat

#4)

$2(2.50) + 4(1.50) = 11$?

$5 + 6 = 11$ ✓

$3s + 15(1.50) = 30$

$3s + 22.50 = 30$

$3s = 7.5$

$s = \$2.50$ per roll

Part 1

Exponential Functions – $y = ab^x$

Remember: a = the initial amount (the y-intercept) b = the growth factor - if $0 < b < 1$ this shows decay
- if $b \geq 1$ this shows growth

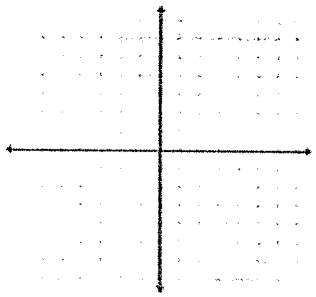
For #1-3, tell:

a) if the equation represents growth or decay (circle one)
b) the growth or decay factor (what is the value of b?)
c) the percent of growth or decay (what is the difference between b and 1? (1 + r) or (1 – r)
d) the initial value (what is the value of a?)
e) graph the function
f) tell the domain and range

1.

$y = 35(0.57)^x$

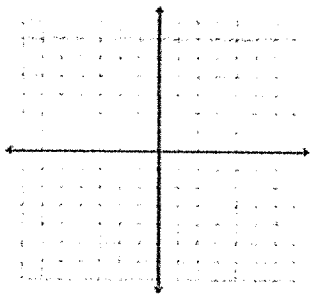
growth or decay
b = _____
% = _____
a = _____



2.

$y = 1.3^x$

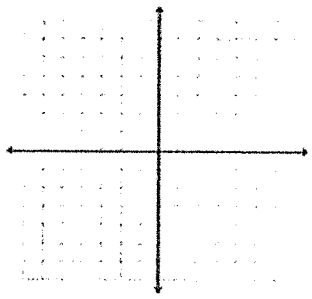
growth or decay
b = _____
% = _____
a = _____



3.

$y = 1.4(1.03)^x$

growth or decay
b = _____
% = _____
a = _____



5. Of #2 – 4, which shows the greatest growth? Explain.

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6. The price of a new car is $46,500. The value of the car depreciates at a rate of 7% per year. The following equation can be used to model the price of the car over time, x, in years: $f(x) = 46{,}500(.07)^x$.

a) What is the car worth after 5 years? $f(x) = 46{,}500(.07)^5 =$

b) After 36 months?
36 mos = 3 yrs. $f(x) = 46{,}500(.07)^3$

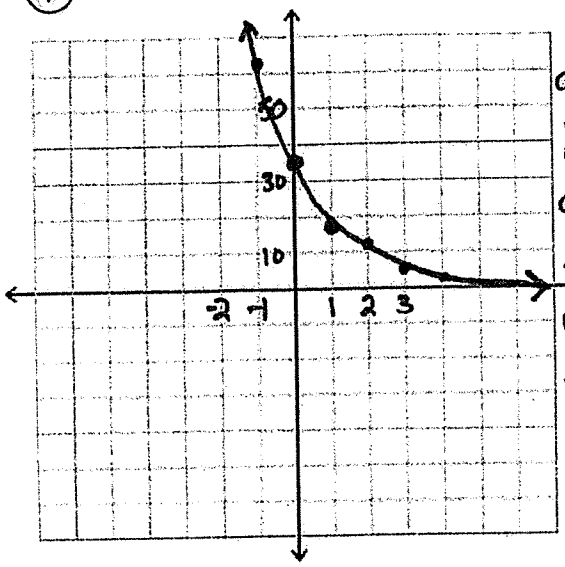
7. A dust bunny gathers dust at a rate of 11% per week. The dust bunny originally weighs 0.7 oz.

a) Write a function that represents the weight of the dust bunny at a given time. Use x for weeks and y for the weight of the dust bunny. $y = .7(1.11)^x$

b) Find the weight of the dust bunny after 7 weeks.

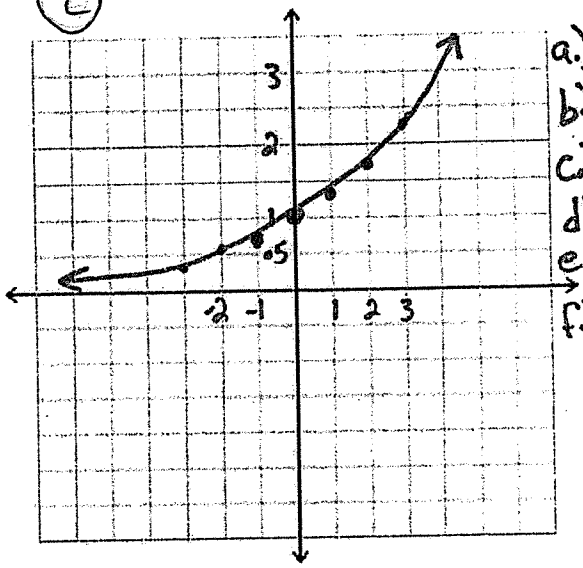
$y = .7(1.11)^7 = 1.45$ oz.

1



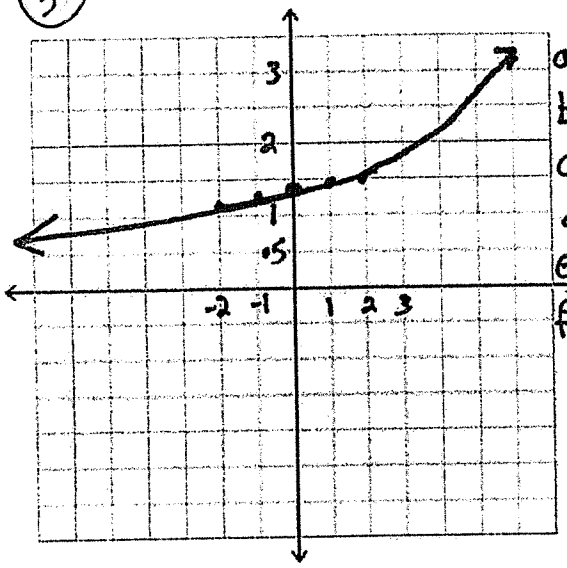
a.) Decay
b.) .57
c.) 43%
d.) 35
e.) $(-\infty, \infty)$
f.) $(0, \infty)$

2



a.) Growth
b.) 1.3
c.) 30%
d.) 1
e.) $(-\infty, \infty$
f.) $(0, \infty)$

3



a.) Growth
b.) 1.03
c.) [redacted]3%
d.) 1.4
e.) $(-\infty, \infty)$
f.) $(0, \infty)$

Part 2 - Key (2)

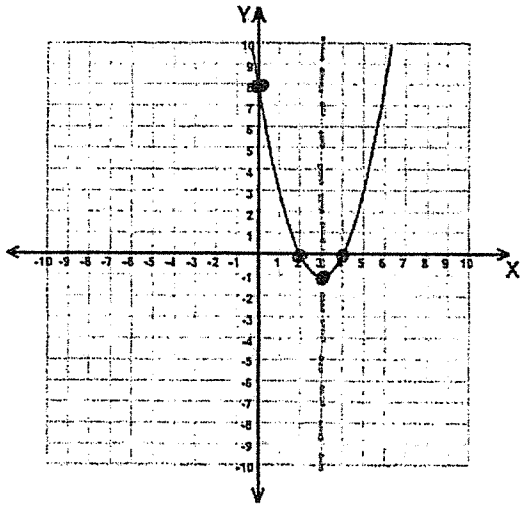
Quadratic Functions – HSF-IF.B.4, HSF-IF.C.7, HSF-IF.C.9, HSA-REI.D.10, HSA-SSE.A.1, HSA-SSE.B.3, HSA-APR.B.3, HSF -IF.C.8, HSA-REI.B.4, HSA -REI.D.10

For 1 – 4,

- a) find the y-intercept(s)
- b) find the x-intercept(s)/zero(s)/root(s)/solution(s)
- c) identify the vertex
- d) is the vertex a maximum or a minimum
- e) identify the axis of symmetry

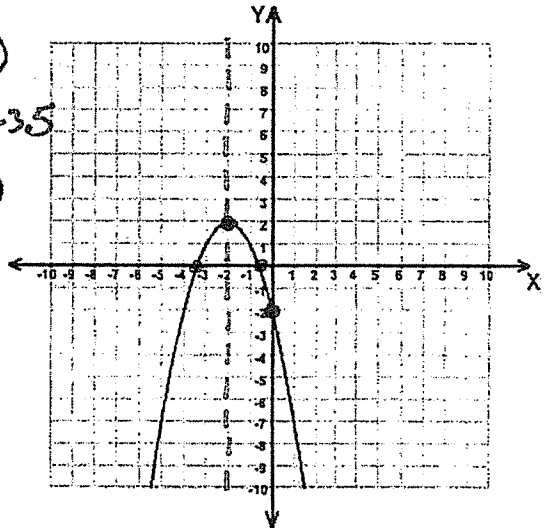
1.

a.) (0,8)
b.) 2 and 4
c.) (3,-1)
d.) Min.
e.) x = 3



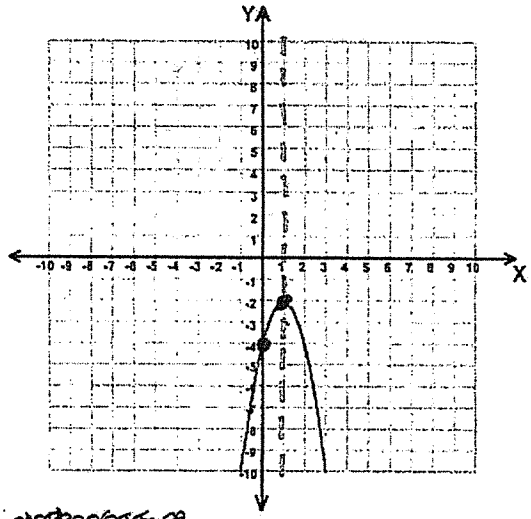
2.

a.) (0,-2)
b.) -1.5 and -3.5
c.) (-2,2)
d.) Max.
e.) x = -2



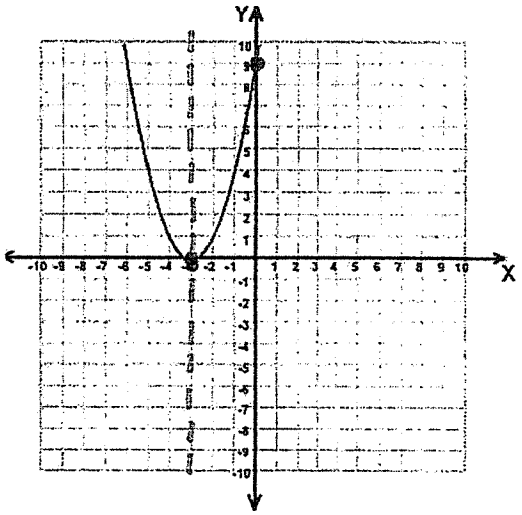
3.

a.) (0,-4)
b.) None
c.) (1,-2)
d.) Max.
e.) x = 1



4.

a.) (0,9)
b.) -3
c.) (-3,0)
d.) Min.
e.) x = -3



Factor each expression for 5 – 8.

5. $6x^5 + 3x^4 - 9x^2$

$3x^2(2x^3 + x^2 - 3)$

6. $49r^2 - 144$

$(7r+12)(7r-12)$

7. $2y^2 - 2y - 112$

$2(y^2 - y - 56)$

a:1 b:-1 c:-56

-1	+-8	7	-56

$\frac{-8}{1x}$ $\frac{7}{1x}$

$2(x-8)(x+7)$

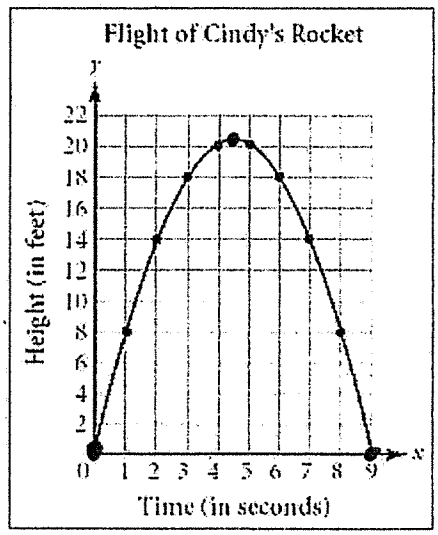
8. $12d^2 - 8d + 1$

$(2x-1)(6x-1)$

Key-Part 2

Part 2

The following is a graph of the path of a rocket after it is launched.



9. Identify and explain the real world meaning of the following points. Height is in feet and time is in seconds.

a) Vertex (4.5, 20.5) How long the rocket took to reach max height.

b) x-intercept(s) 0 and 9 Rocket flew for 9 secs.

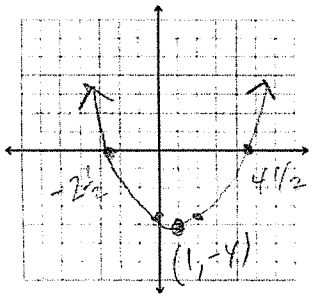
c) y-intercept(s) 0 Rocket started off the ground.

10. How long does it take for the rocket to reach the **ground**?

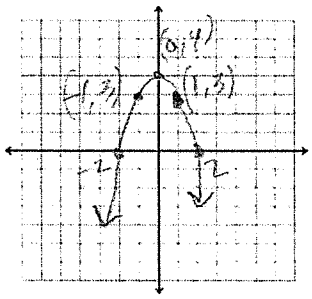
9 seconds

For 11 - 14, graph each quadratic function. See better graph

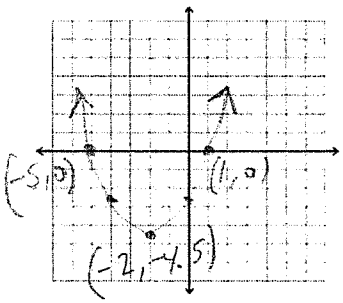
11. $y = \frac{1}{3}(x-1)^2 - 4$



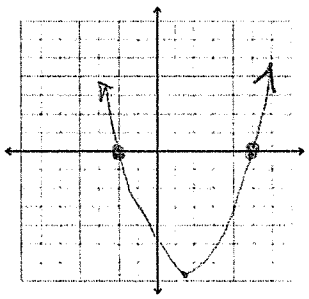
12. $y = -x^2 + 4$



13. $y = x^2 + 4x - 5$



14. $y = (x-5)(x+2)$



15. Explain what can be determined by looking at each form of a quadratic function.

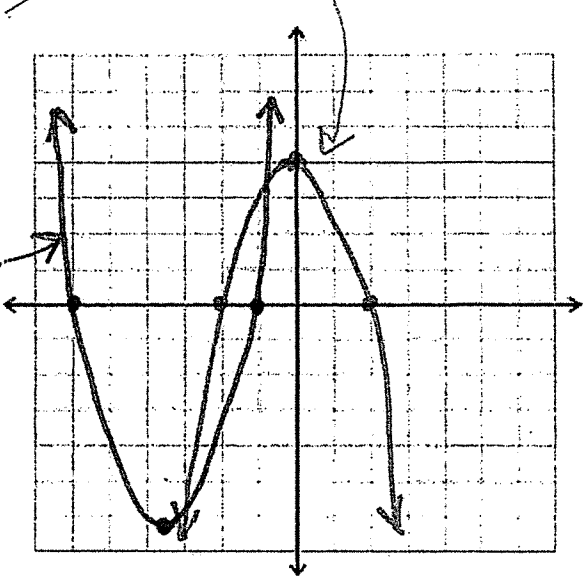
a) Standard $y = ax^2 + bx + c$ y-int. and Min./Max.

b) Factored $y = (x-a)(x-b)$ Zeros/Solutions + Min./Max.

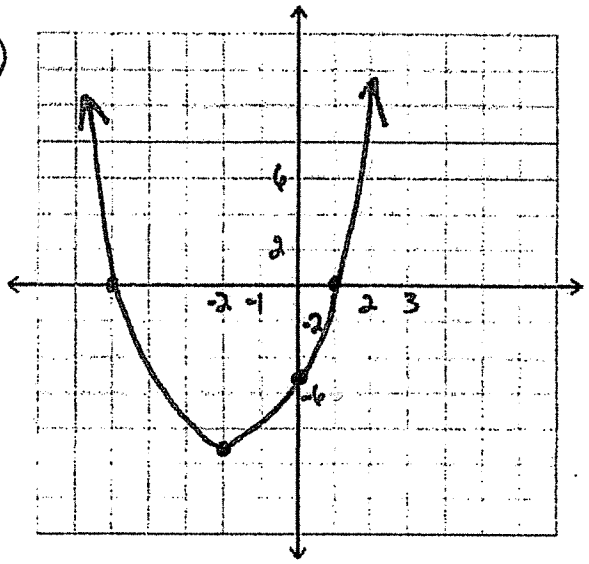
c) Vertex $y = a(x-h)^2 + k$ Vertex + Min./Max.

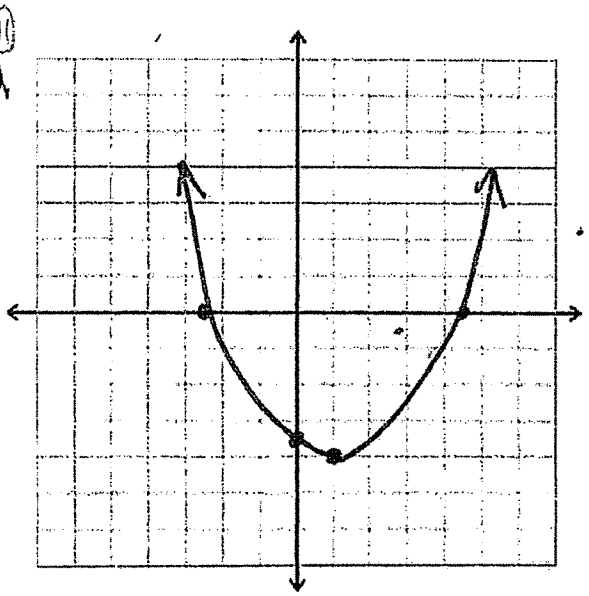
11.)

12.)



13.)





14.)

Algebra 1 Semester 2 Study Guide Name Key (2)

Part 3 – This is part of your exam grade.

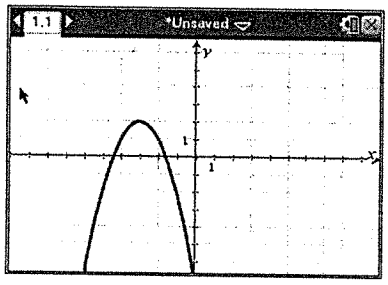
Quadratic Functions

1. What is the vertex of $g(x) = (x-3)^2 + 2$? (3,2)

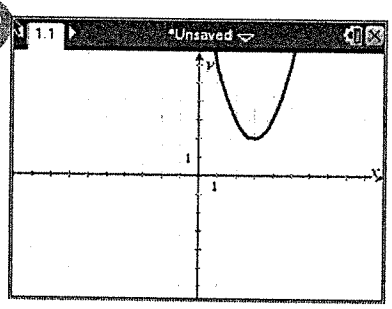
Which of the following has the **same vertex** as g(x)? There may be more than one correct answer.

a) $h(x) = -2(x-3)^2 - 2$ b) $f(x) = (x+3)^2 + 2$ c) $p(x) = x^2 - 6x + 11$ d) $q(x) = (x-3)(x+2)$

e)

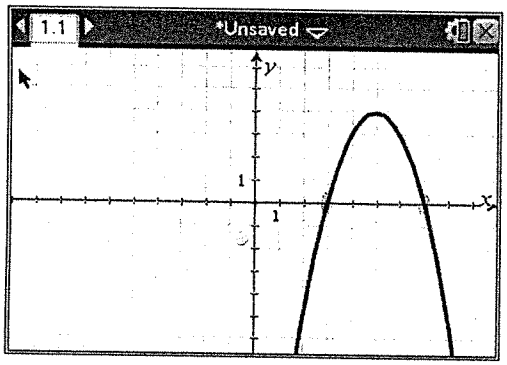


f)



Determine the number of solutions for the following quadratic functions in questions 17 and 18. What are the solutions?

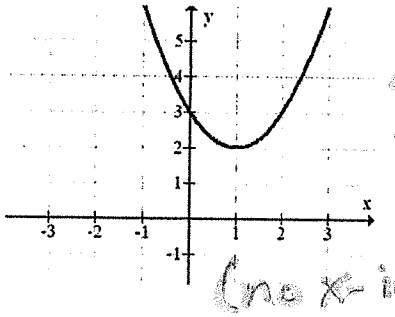
2.



2 solutions

3, 7

3.



no solution

(no x-int.)

For 4 - 11, round answers to the nearest hundredth if necessary.

4. Find the roots of $4x^2 - 15 = 9$.

$x = \pm 2.45$

5. Find the zeros of $z^2 + 6z - 27 = 0$.

$x = -9, x = 3$

6. Solve the equation $c^2 - 3c = 0$.

$c = 0, c = 3$

7. Solve $10x^2 - 7x = 33$.

$x = -1.5, x = 2.2$

8. Find all of the zeros of $2x^2 + 15x + 28 = 0$.

$x = -4, x = -3.5$

9. Find the roots of $2x^2 - 7x - 13 = 0$.

$x = -1.34, x = 4.84$

10. Find the solutions to $2x^2 + 3x - 7 = 0$.

$x = -2.77, x = 1.27$

11. Solve $2x^2 + 4x - 6 = 0$.

$x = -3, x = 1$

Polynomial Review

Find the sum, difference or product of each for 1 – 12.

1. $(4x^2-5x)-2x(2x^2-3x+3)$ $-4x^3+10x^2-11x$

2. $(3p-7)(3p+4)$ $9p^2-9p-28$

3. $(6-3x^2)+(x^3-x+5)$ x^3-3x^2-x+11

4. $-2n^3(n^2-3n+4)$ $-2n^5+6n^4-8n^3$

5. $(2a^2+4c^3)^2$ $4a^4+16a^2c^3+16c^6$

6. $(n^4+2n-1)+(5n-n^4-4)$ $7n-5$

7. $(4x+3)(2x+1)$ $8x^2+10x+3$

8. $(4h^2-5)(5h^2-6)$ $20h^4-49h^2+30$

9. $(2x^3+4x^2+1)(x-4)$ $2x^4-4x^3-16x^2+x-4$

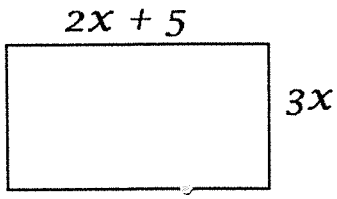
10. $(-4x^2+5x-8)+(-x^2+3x+6)$ $-5x^2+8x-2$

11. $(2x^2-3x-3)-(-6x^2+3x+8)$ $8x^2-6x-11$

12. $(2x^3+4x^2+1)(x-4)$ $2x^4-4x^3-16x^2+x-4$

13. a) Write an expression for the perimeter of the figure below.

    b) Write an expression for the area of the figure below.



$3x(2x+5) = 6x^2+15x$

14. The surface area, S, of a right circular cylinder is calculated using the formula $S=2\pi r^2+2\pi rh$, where r is the radius of the cylinder and h is the height of the cylinder. Rearrange the formula to solve for height (h).

$S = 2\pi r^2 + 2\pi rh$

$\frac{S-2\pi r^2}{2\pi r} = \frac{2\pi rh}{2\pi r} \Rightarrow \boxed{\frac{S-2\pi r^2}{2\pi r} = h}$

15. If F denotes a temperature in degrees Fahrenheit and C is the same temperature measured in degrees Celsius, then F and C are related by the equation $F=\frac{9}{5}C+32$. Rewrite this equation to solve for C in terms of F.

$F = \frac{9}{5}C + 32$

$\frac{5}{9}(F-32) = \frac{9}{5}C\left(\frac{5}{9}\right)$

$\boxed{\frac{5F-160}{9} = C}$