Heritage High School – Distance Learning
Mr. Leong's Algebra 1 Assignment Packet
May 18 – May 22

**Due Date:** Tuesday, May 26 by 9:00am
*Late work will not be accepted*

**Notes:** Included in this packet are some note taking templates.
- Solving Quadratics using the Quadratic Equation
- Determining the number of solutions using the Discriminant

*Those with internet access can complete the notes as you watch the YouTube videos linked below.*
https://youtu.be/ySRlyd3oZrI https://youtu.be/d4yBbAzPlsU

*Students with limited internet access can use the teacher's notes at the end of this packet.*

**Reading:** Textbook p.516-520 (hint: use the Dynamic e-book on Clever to see video tutorials)

**Exercises:** Textbook p.521 #10, 11, 14, 15, 18, 20, 37, 39, 40, 42-46, 74
*Please submit your answers through Clever and the Big Ideas Math site.*
*Those with limited internet access can email me a scan/photograph of their work.*
*Those without internet access may submit paper copies to the main office on Monday from 12-3pm.*

**Videos:** Here are some extra videos that may help you with the textbook exercises.

https://bit.ly/2Z5aGn5 https://bit.ly/3fOqyR7
https://bit.ly/2Z5OSrv https://bit.ly/2LxqM16
https://bit.ly/2WTO86c https://bit.ly/2T9EWtl
https://bit.ly/2X0yQN6 https://bit.ly/3dUDQtz
https://bit.ly/2WSn7jm https://bit.ly/2XdGq7h

**More Videos:** These YouTube videos show some alternatives to the Quadratic Formula.
https://youtu.be/ZBalWWHYFQc https://youtu.be/MHXO86wKeDY

**Tools:** Here is a PowerPoint on the Quadratic Formula.
https://ca01001129.schoolwires.net/Page/15726

**Contact:**
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Remind @fnctn
Zoom office hours (TBA)

# *Accessing Big Ideas Through Clever*

The preferred method of completing assignments is electronically through Clever.

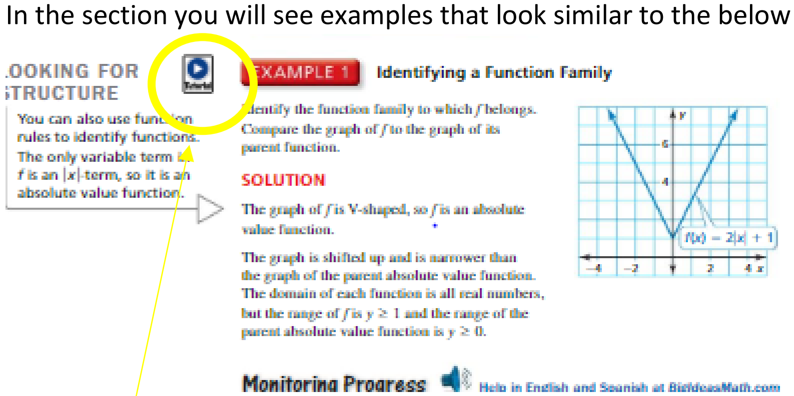
***To access your assignments:***

- Go to “clever.com/in/luhsd”
- Log in using your username and password as your student ID number
- Scroll down to “Math” where you will see the Big Ideas Math logo, click on “Big Ideas Math”
- If you are taking multiple math classes, you may need to select the book for the course you are working
- In the middle there is a tab that says “Assignments,” click on “Assignments”


- Choose an assignment to work on from the list. Click the pencil/enter to start the assignment.
- ***WARNING!!!!*** Clever does NOT automatically save and submit progress. Once you finish the last problem in an assignment, be sure to <u>click your name in the top-right corner and click “Submit”</u> to turn your assignment in.

***To access online tutorial videos:***

- Go to “clever.com/in/luhsd”
- Log in using your username and password as your student ID number
- Scroll down to “Math” where you will see the Big Ideas Math logo, click on “Big Ideas Math”
- If you are taking multiple math classes, you may need to select the book for the course you are working
- Click on “Student Dynamic ebook”
- You can use the “Contents” tab on the left to get to the section you wish to view
- In the section you will see examples that look similar to the below pic:




The blue circle with triangle indicates there is a tutorial video for that example. Click the icon to view.

Solving Quadratic Equations using the Quadratic Formula

Name: ____________________

Date: ____________________

You can find the solutions to any quadratic equation in standard form $(ax^2 + bx + c)$ using

**The Quadratic Formula.**

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

Ex 1: Solve $2x^2 - 5x + 3 = 0$ using the quadratic formula.

| | |
|---|---|
| | Identify *a, b,* and *c.* |
| | Substitute those values into the Quadratic Formula |
| | Simplify inside the radical. Be sure to follow order of operations! |
| | Evaluate the square root. |
| | Reduce the fractions if possible. Identify both solutions. |

Ex 2: $x^2 - 6x + 5 = 0$

Ex 3: $12x^2 - 4x - 5 = 0$

Ex 4: $-3x^2 + 2x + 7 = 0$

Ex 5: $4x^2 - 4x = -1$

<u>You Try!</u>

1: $-x^2 + 8x = -12$

2: $3x^2 = 10x - 9$

3: $-3x^2 - 6x - 9 = 0$

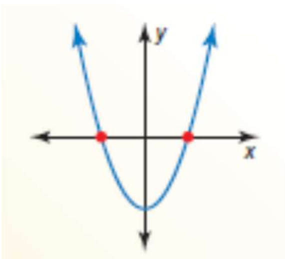
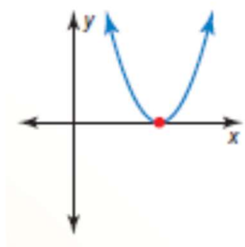
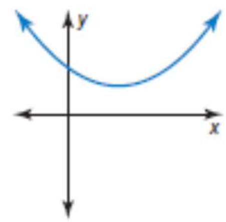
4: $2x^2 - 18 = 0$

Determining the number of solutions using the discriminant Name: ______________________
Date: ______________________

The expression under the radical in the Quadratic Formula, is called **the discriminant**.

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

**Interpreting the discriminant**

| $b^2 - 4ac > 0$ | $b^2 - 4ac = 0$ | $b^2 - 4ac < 0$ |
|---|---|---|
| <br>• Two real solutions<br>• Two *x*-intercepts | <br>• One real solution<br>• One *x*-intercept | <br>• No real solutions<br>• No *x*-intercepts |

Determine the number of real solutions for each quadratic equation.

Ex 1: $x^2 + 8x - 3 = 0$

| | |
|---|---|
| | Identify *a, b,* and *c.* |
| | Substitute those values into the discriminant of the Quadratic Equation |
| | Simplify. Be sure to follow order of operations! |
| | Determine the number of solutions (x-intercepts).<br>$b^2 - 4ac > 0$ Two solutions (two x-intercepts)<br>$b^2 - 4ac = 0$ One solution (one x-intercept)<br>$b^2 - 4ac < 0$ No solutions (no x-intercepts) |

Ex 2: $9x^2+1=6x$

<u>You Try!</u>

3: $6x^2+2x=-1$

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

<u>Use the discriminant to find the number of x-intercepts.</u>

Ex 1: $y=x^2-14x+2$

Ex 2: $f(x)=6x^2+2x+1$

<u>You Try!</u>

3: $y=-x^2+x-6$

4: $f(x)=x^2-x$

Solving Quadratic Equations using the Quadratic Formula

Name: Teacher Notes
Date: ______________

You can find the solutions to any quadratic equation in standard form ($ax^2 + bx + c$) using

**The Quadratic Formula.**

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

Ex 1: Solve $2x^2 - 5x + 3 = 0$ using the quadratic formula.

| | |
|---|---|
| $a = 2 \quad b = -5 \quad c = 3$ | Identify *a*, *b*, and *c*. |
| $x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(3)}}{2(2)}$ | Substitute those values into the Quadratic Formula |
| $x = \dfrac{5 \pm \sqrt{25 - 24}}{4} = \dfrac{5 \pm \sqrt{1}}{4}$ | Simplify inside the radical. Be sure to follow order of operations! |
| $x = \dfrac{5 \pm 1}{4}$ | Evaluate the square root. |
| $x = \dfrac{5+1}{4} = \dfrac{6}{4} = \dfrac{3}{2} \qquad x = \dfrac{5-1}{4} = \dfrac{4}{4} = 1$ | Reduce the fractions if possible. Identify both solutions. |

$\{3/2, 1\}$

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

Ex 2: $x^2-6x+5=0$ $a=1$ $b=-6$ $c=5$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2-4(1)(5)}}{2(1)}$$ $\{1,5\}$

$$x = \frac{6 \pm \sqrt{36-20}}{2} = \frac{6 \pm \sqrt{16}}{2}$$

$$x = \frac{6 \pm 4}{2} \quad x = \frac{10}{2} = 5 \quad x = \frac{2}{2} = 1$$

Ex 3: $12x^2-4x-5=0$

$a=12$ $b=-4$ $c=-5$ $\{5/6, -1/2\}$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2-4(12)(-5)}}{2(12)}$$

$$x = \frac{4 \pm \sqrt{16+240}}{24} = \frac{4 \pm \sqrt{256}}{24}$$

$$x = \frac{4 \pm 16}{24} \quad x = \frac{20}{24} = \frac{5}{6} \quad x = \frac{-12}{24} = \frac{-1}{2}$$

Ex 4: $-3x^2+2x+7=0$ $a=-3$ $b=2$ $c=7$

$$x = \frac{-2 \pm \sqrt{(2)^2-4(-3)(7)}}{2(-3)}$$

$$x = \frac{-2 \pm \sqrt{4+84}}{-6} = \frac{-2 \pm \sqrt{88}}{-6}$$ $\sqrt{2 \cdot 2 \cdot 2 \cdot 11}$ $2\sqrt{22}$

$\sqrt{88} \approx 9.38$

$$x = \frac{-2 \pm 2\sqrt{22}}{-6} = \boxed{\frac{-1 \pm \sqrt{22}}{-3}}$$ - or - $$\frac{-2 \pm 9.38}{-6}$$

can be simplified by 2

↳ answer in radical form

$$= \frac{7.38}{-6} \approx -1.23$$

$$= \frac{-11.38}{-6} \approx 1.9$$

$\{-1.23, 1.9\}$

answer in decimal form

Ex 5: $4x^2-4x=-1$ $\{1/2\}$

$+1 \quad +1$

$4x^2-4x+1=0$ $a=4$ $b=-4$ $c=1$

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

$$x = \frac{4 \pm \sqrt{16-16}}{8} = \frac{4 \pm \sqrt{0}}{8}$$

$$x = \frac{4 \pm 0}{8} \quad x = \frac{4}{8} = \frac{1}{2}$$

You Try!

1: $-x^2+8x=-12$

$+12 \quad +12$

$-x^2+8x+12=0$

$a=-1$ $b=8$ $c=12$

$$x = \frac{-8 \pm \sqrt{8^2-4(-1)(12)}}{2(-1)}$$

$$x = \frac{-8 \pm \sqrt{64+48}}{-2} = \frac{-8 \pm \sqrt{112}}{-2} = \frac{-8 \pm 10.58}{-2}$$

$$= \frac{2.58}{-2} \approx -1.29 \qquad = \frac{-18.58}{-2} \approx 9.29$$

$\{-1.29, 9.29\}$

2: $3x^2=10x-9$

$-10x+9 \quad -10x+9$

$3x^2-10x+9=0$

$a=3$ $b=-10$ $c=9$

$$x = \frac{-(-10) \pm \sqrt{(-10)^2-4(3)(9)}}{2(3)}$$

$$x = \frac{10 \pm \sqrt{100-108}}{6}$$

$$x = \frac{10 \pm \sqrt{-8}}{6}$$ ∴ can't √ a negative

{no real solution}

3: $-3x^2-6x-9=0$

$a=-3$ $b=-6$ $c=-9$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2-4(-3)(-9)}}{2(-3)}$$

$$x = \frac{6 \pm \sqrt{36-108}}{-6} = \frac{6 \pm \sqrt{-72}}{-6}$$ ∴ can't √ a negative

{no real solution}

4: $2x^2-18=0$

$a=2$ $b=0$ $c=-18$

$$x = \frac{-0 \pm \sqrt{0^2-4(2)(-18)}}{2(2)}$$

$$x = \frac{0 \pm \sqrt{0+144}}{4} = \frac{0 \pm \sqrt{144}}{4} = \frac{0 \pm 12}{4}$$

$$x = \frac{12}{4} = 3 \quad x = \frac{-12}{4} = -3$$

$\{\pm 3\}$

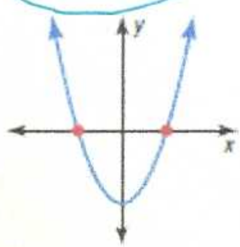
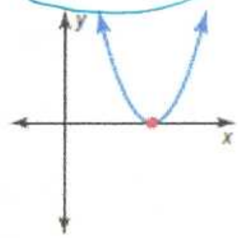
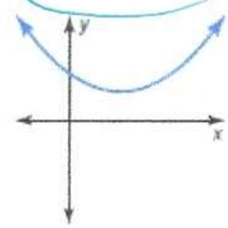
Determining the number of solutions using the discriminant

Name: Teacher Notes
Date: ______________

The expression under the radical in the Quadratic Formula, is called **the discriminant**.

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

**Interpreting the discriminant**

| positive # | $=0$ | negative # |
|---|---|---|
| $b^2 - 4ac > 0$ | $b^2 - 4ac = 0$ | $b^2 - 4ac < 0$ |
|  |  |  |
| • Two real solutions<br>• Two *x*-intercepts | • One real solution<br>• One *x*-intercept | • No real solutions<br>• No *x*-intercepts |

Determine the number of real solutions for each quadratic equation.

Ex 1: $x^2 + 8x - 3 = 0$

$b^2 - 4ac$

| | |
|---|---|
| $a=1 \quad b=8 \quad c=-3$ | Identify *a*, *b*, and *c*. |
| $(8)^2 - 4(1)(-3)$ | Substitute those values into the discriminant of the Quadratic Equation |
| $64 + 12$ | Simplify. Be sure to follow order of operations! |
| 76 – positive discriminant<br>$\boxed{\text{2 real solutions}}$ | Determine the number of solutions (x-intercepts).<br>$b^2 - 4ac > 0$ Two solutions (two x-intercepts)<br>$b^2 - 4ac = 0$ One solution (one x-intercept)<br>$b^2 - 4ac < 0$ No solutions (no x-intercepts) |

Ex 2: $9x^2+1=6x$

$-6x \quad -6x$

$9x^2-6x+1=0$

$a=9 \quad b=-6 \quad c=1$

$(-6)^2-4(9)(1)$

$36-36$

$=0$

$\boxed{\text{1 real solution}}$

You Try!

3: $6x^2+2x=-1$

$+1 \quad +1$

$6x^2+2x+1=0$

$a=6 \quad b=2 \quad c=1$

$(2)^2-4(6)(1)$

$4-36$

$=-32$

$\boxed{\text{0 real solutions}}$

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

$a=-1 \quad b=4 \quad c=-4$

$(4)^2-4(-1)(-4)$

$16-16$

$=0$

$\boxed{\text{1 real solution}}$

Use the discriminant to find the number of x-intercepts.

Ex 1: $y=x^2-14x+2$

$a=1 \quad b=-14 \quad c=2$

$(-14)^2-4(1)(2)$

$196-8$

$=188$

$\boxed{\text{2 real solutions}}$

Ex 2: $f(x)=6x^2+2x+1$

$a=6 \quad b=2 \quad c=1$

$(2)^2-4(6)(1)$

$4-24$

$=-20$

$\boxed{\text{0 real solutions}}$

You Try!

3: $y=-x^2+x-6$

$a=-1 \quad b=1 \quad c=-6$

$(1)^2-4(-1)(-6)$

$1-24$

$=-23$

$\boxed{\text{0 real solutions}}$

4: $f(x)=x^2-x$

$a=1 \quad b=-1 \quad c=0$

$(-1)^2-4(1)(0)$

$1-0$

$=1$

$\boxed{\text{2 real solutions}}$

CCAlg1 **9.5c Notes – Solving Quadratics – Choosing an Efficient Method** Mathematician: Solutions
**HW #128** Notes + p.521 #38 – 46 all Date: ________ P: ____

| METHOD | MOST EFFICIENT WHEN: |
| --- | --- |
| **Zero Product Rule**<br><br>$a \cdot b = 0$<br><br>**Solving by Factoring** | **USE:** If the equation looks **easy to factor**, then this is the most efficient method. Example: $x^2+8x+15=0$<br>$(x+3)(x+5)=0$<br><br>**DO NOT USE:** If equation is not factorable, or does not appear easy to factor. |
| **Using Square Roots**<br><br>$\sqrt{(x-m)^2}=\pm\sqrt{v}$ | **USE:** If the equation has a variable that is involved in a **perfect square** and the perfect square is easy to isolate. Example: $(x-7)^2=27$<br>$\sqrt{(x-7)^2}=\pm\sqrt{27}$<br><br>**DO NOT USE:** If the equation is a trinomial and creating a perfect square doesn't appear easy to do. |
| **Completing the Square**<br><br>$1x+bx+\left(\frac{b}{2}\right)^2=v+\left(\frac{b}{2}\right)^2$<br><br>$\left(x-\frac{b}{2}\right)^2=d$ | **USE:** If the equation does not look factorable, and *a* = 1, and *b* is even… and you'd rather not use the quadratic formula. Example: $x^2-8x+1=7$<br><br>**DO NOT USE:** If *b* is odd or if all terms are not divisible by *a.* |
| **Quadratic Formula**<br><br>$ax+bx+c=0$ then<br><br>$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ | **USE:** Can be used for any quadratic equation.<br><br>**DO NOT USE:** If it is easier to solve using another method. |

Solve each equation using any method. Leave your answer in exact, simplified form. Explain your choice of method.

1. $x^2-10x=1$

$x^2-10x+25=1+25$

$(x-5)^2=26$

$\sqrt{(x-5)^2}=\pm\sqrt{26}$

$x-5=\pm\sqrt{26}$

$x=5\pm\sqrt{26}$

Completing the Square because b was even and the lead coefficient was already 1.

2. $2x^2-13x-24=0$

a=2
b=-13
c=-24

$x=\frac{-13\pm\sqrt{(-13)^2-4(2)(-24)}}{2(2)}$

$x=\frac{13\pm\sqrt{169+192}}{4}=\frac{13\pm\sqrt{361}}{4}$

$x=\frac{13\pm19}{4}$

$\frac{13+19}{4}=\frac{32}{4}=8=x$

$\frac{13-19}{4}=\frac{-6}{4}=-3/2=x$

Quadratic Formula because a≠1, b is odd and I don't know if it's factorable.

3. $x^2+8x+12=0$

$1\cdot 12$
$2\cdot 6$
$3\cdot 4$

$(x+6)(x+2)=0$

$x=-6,-2$

Method: Factored & Zero Product Rule because factoring was so easy.

4. $x^2-7x=30$

$1\cdot 30$
$2\cdot 15$
$3\cdot 10$
$5\cdot 6$

$x^2-7x-30=0$

$(x-10)(x+3)=0$

$x=10,-3$

Method:

Same!

5. $9x^2-5=4$

$9x^2=9$

$x^2=1$

$\sqrt{x^2}=\pm\sqrt{1}$

$x=\pm 1$

Method: Square Root because there was a simple perfect square that was easy to isolate.

6. $\frac{1}{2}(x-4)(2x+3)=0$

$2x+3=0$
$2x=-3$
$x=-3/2$

$x=4 \quad x=-3/2$

Method: Zero Product Rule because it was already $=0$ and factored.

7. $\sqrt{(x-9)^2}=\pm\sqrt{1}$

$x-9=\pm\sqrt{1}$

$x-9=\pm 1$

$x=9\pm 1$

$x=9+1 \qquad x=9-1$

$x=10 \qquad x=8$

Method: Square Root Method because there was already an isolated perfect square.

Now feel free to start your homework on this page: p.521 #38 – 46 all