Honors Algebra II Name Dr. Gammill ID: 1

# Quadratic Inequalities

Date_____ Period____

**Solve each inequality.**

1) $(-x-5)(2x-5) \le 0$

$-x-5=0 \quad 2x-5=0$

$-x=5 \quad 2x=5$

$x=-5 \quad x=5/2$

$-5 \quad 5/2$

$\boxed{(-\infty,-5]\cup[5/2,\infty)}$

| | $(-x-5)(2x-5)\le 0$ |
|---|---|
| -10 | + · − ≤0 ✓ |
| 0 | − · − ≤0 ✗ |
| 10 | − + ≤0 ✓ |

2) $(-3x+2)(x-5) \le 0$

$-3x+2=0$

$-3x=-2$

$x=2/3$

$x-5=0$

$x=5$

$2/3 \quad 5$

| | $(-3x+2)(x-5)\le 0$ |
|---|---|
| -10 | + − ≤0 ✓ |
| 2 | − − ≤0 ✗ |
| 10 | − · − ≤0 ✓ |

$\boxed{(-\infty, 2/3]\cup[5,\infty)}$

3) $(x+3)^2 < 0$

$x+3=0$

$x=-3$

$-3$

$\boxed{\text{No Solution}}$

| | $(x+3)^2<0$ |
|---|---|
| -10 | +<0 ✗ |
| 10 | +<0 ✗ |

4) $2x^2-19x+42<0$

$(2x-7)(x-6)<0$

$x=7/2 \quad x=6$

$\frac{7}{2} \quad 6$

$\boxed{(\frac{7}{2},6)}$

| | $(2x-7)(x-6)<0$ |
|---|---|
| 0 | − · − <0 ✗ |
| 5 | + − <0 ✓ |
| 10 | + + <0 ✗ |

5) $-9x^2+18x-5 \ge 0$

$9x^2-18x+5\le 0$

$(3x-1)(3x-5)\le 0$

$x=1/3,\ 5/3$

$1/3 \quad 5/3$

$\boxed{[1/3, 5/3]}$

| | $(3x-1)(3x-5)\le 0$ |
|---|---|
| 0 | − · − <0 ✗ |
| 1 | + · − ≤0 ✓ |
| 2 | + · + ≤0 ✗ |

6) $x^2+2x+1 \ge 0$

$(x+1)^2 \ge 0$

$-1$

$\boxed{(-\infty,\infty)}$

| | $(x+1)^2>0$ |
|---|---|
| 0 | + >0 ✓ |
| 2 | + >0 ✓ |

7) $2x^2-x-6>x^2$

$x^2-x-6>0$

$(x-3)(x+2)>0$

$x=3,-2$

$-2 \quad 3$

$\boxed{(-\infty,-2)\cup(3,\infty)}$

| | $(x-3)(x+2)>0$ |
|---|---|
| -5 | − − >0 ✓ |
| 0 | − + >0 ✗ |
| 5 | + + >0 ✓ |

8) $-x^2-6x+1 \ge 6$

$-x^2-6x-5\ge 0$

$x^2+6x+5\le 0$

$(x+1)(x+5)\le 0$

$x=-1,-5$

$-5 \quad -1$

| | $(x+1)(x+5)\le 0$ |
|---|---|
| -10 | − · − ≤0 ✗ |
| -2 | − · + ≤0 ✓ |
| 10 | + · + ≤0 ✗ |

$\boxed{[-5,-1]}$

Unit 1 Test Review — Honors Alg II

(1) $36-4x^2$
$4(9-x^2)$
$4(3+x)(3-x)$

(2) $x^2+16x+48$
$(x+12)(x+4)$

(3) $6x^2-13x+5$
$(2x-1)(3x-5)$

(4) $6x^2-15x-21$
$3(2x^2-5x-7)$
$3(2x-7)(x+1)$

(5) $r^3+4r^2+5r+20$
$r^2(r+4)+5(r+4)$
$(r^2+5)(r+4)$

(6) $35ab+25a+7b^2+5b$
$5a(7b+5)+b(7b+5)$
$(5a+b)(7b+5)$

(7) $4x^3-37x^2+40x$
$x(4x^2-37x+40)$
$x(4x-5)(x-8)$
$x(4x-5)(x-8)$

(8) $80x^2-200x+125$
$5(16x^2-40x+25)$
$5(4x-5)(4x-5)$
$5(4x-5)^2$

Solving

(9) $x^2+3x-28=0$
$(x+7)(x-4)=0$
$\boxed{x=-7 \quad x=4}$

(10) $x^2=7-6x$
$x^2+6x-7=0$
$(x+7)(x-1)=0$
$\boxed{x=-7 \quad x=1}$

(11) $(x-1)^2-50=0$
$(x-1)^2=50$
$x-1=\pm 5\sqrt{2}$
$\boxed{x=1\pm 5\sqrt{2}}$

(12) $2x^2=-32x$
$2x^2+32x=0$
$2x(x+16)=0$
$2x=0 \quad x+16=0$
$\boxed{x=0 \quad x=-16}$

(13) $144-36x^2=0$
$36(4-x^2)=0$
$36(2+x)(2-x)=0$
$x+2=0 \quad 2-x=0$
$\boxed{x=-2}$ $-x=-2$
$\boxed{x=2}$

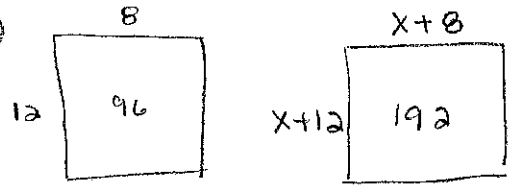
(14) $\frac{1}{4}x^2-\frac{3}{4}=\frac{26}{8}$
$2x^2-6=26$
$2x^2=32$
$x^2=16$
$\boxed{x=\pm 4}$

(15) $7p^2+112=-70p$
$7p^2+70p+112=0$
$7(p^2+10p+16)=0$
$7(p+8)(p+2)=0$
$\boxed{p=-8 \quad p=-2}$

(16) $4v^2+15v-42=-2-6v^2+6v$
$10v^2+9v-40=0$
$x=\frac{-9\pm\sqrt{81-4(-400)}}{20}$
$\boxed{x=8/5 \quad x=-5/2}$
$x=\frac{-9\pm\sqrt{1681}}{20}=x=\frac{-9\pm 41}{20}$

(17) $(x^2+3x+2)=(\overset{L}{x+2})(\overset{W}{x+1})$
$(x^2+8x+15)=(x+3)(x+5)$
(a) $(\overset{L}{x+2})\times(\overset{W}{x+1})$
(b) $(\overset{L}{x+3})\times(\overset{W}{x+5})$
(c) Length increased by 1
width increased by 4

(18)

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$(x+8)(x+12) = 192$

$x^2+12x+8x+96 = 192$

$x^2+20x-96 = 0$

$(x+24)(x-4) = 0$

$\boxed{x=4}$ (You can only increase $x=-24$ by a positive value of $x$.)

(19) $f(x) = x^2-4x+13$

$f(x)-13 = x^2-4x$

$f(x)-13+4 = x^2-4x+4$

$f(x)-9 = (x-2)^2$

$\boxed{f(x) = (x-2)^2+9}$

$\boxed{\text{Vertex: } (2,9)}$

* Standard Form * $f(x) = ax^2+bx+c$

* Vertex Form * $f(x) = a(x-h)^2+k$

(20) $f(x) = 2x^2+6x+25$ $\quad b = 6 \to 3 \to 9 \to \frac{9}{2}$

$f(x)-25 = 2x^2+6x$

$f(x)-25+\frac{9}{2} = 2x^2+6x+\frac{9}{2}$

$f(x)-\frac{41}{2} = 2(x^2+3x+\frac{9}{4})$

$f(x)-\frac{41}{2} = 2(x+\frac{3}{2})^2$

$\boxed{f(x) = 2(x+\frac{3}{2})^2+\frac{41}{2}}$

$\boxed{\text{Vertex: } (-3/2, 41/2)}$

(21) $4x^2-12x+9=0$

$b^2-4ac$

$144-4(36)$

$144-144$

A $\boxed{0}$

B C

$\boxed{1 \text{ Real Solution}}$

(22) $x^2+2x+18=0$

$4-4(18)$

$4-72$

$\boxed{-68}$

$\boxed{2 \text{ Imaginary Solutions}}$

(23) $x^2-2x=-10$

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

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

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

$x = \frac{2 \pm 6i}{2}$

$\boxed{x = 1 \pm 3i}$

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

(24) $3x^2-12x+4=0$

$x = \frac{12 \pm \sqrt{144-4(12)}}{6}$

$x = \frac{12 \pm \sqrt{96}}{6}$

$x = \frac{12 \pm 4\sqrt{6}}{6}$

$\boxed{x = \frac{6 \pm 2\sqrt{6}}{3}}$

(25) $\sqrt{-45} =$

$\sqrt{-3\ 3\ 5}$

$\boxed{3i\sqrt{5}}$

45
9 5
3 3

(26) $\sqrt{\frac{-16}{3}} = \frac{\sqrt{-16}}{\sqrt{3}} = \frac{4i}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \boxed{\frac{4i\sqrt{3}}{3}}$

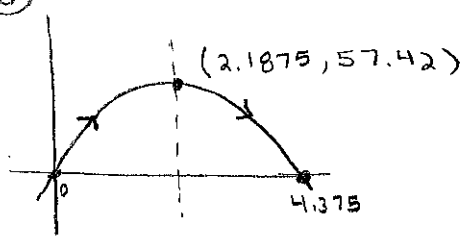
(27) $\frac{3\sqrt{-24}}{\sqrt{7}} = \frac{3\sqrt{-2\ 2\ 2\ 3}}{\sqrt{7}}$

$= \frac{3 \cdot 2i\sqrt{6}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \boxed{\frac{6i\sqrt{42}}{7}}$

(28) $h(t) = -16t^2 + 70t = t(-16t + 70) \rightarrow t = 0$ and $t = 70/16 \approx 4.375$

(a) The initial height is 0

(b)

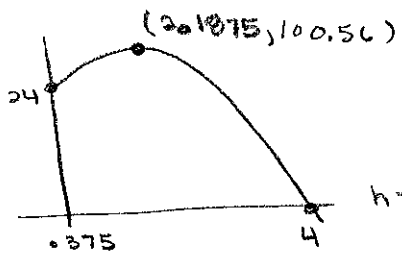



(c) 2.1875 seconds

(d) 57.42 feet

(e) after 4.375 seconds

(29) (a) $h(t) = -16t^2 + 70t + 24 \rightarrow t = \dfrac{-70 \pm \sqrt{4900 - 4(-384)}}{-32} = \dfrac{-70 \pm \sqrt{6436}}{-32}$




$\rightarrow t = -.31$ and $t = 4.69$

$h = -b/2a = -70/2(-16) = 2.1875$

(b) $t = -.31$ and $4.69$

(c) 4.69 seconds

(d) It is only in the air for positive values of x. So, it is in the air for about 4.7 seconds.

(30) $(8+i) - (6-10i)$

$8 + i - 6 + 10i$

$\boxed{2 + 11i}$

(31) $(5+3i)(7-4i)$

$35 - 20i + 21i - 12i^2$

$35 + 12 - i$

$\boxed{47 - i}$

(32) $i\sqrt{7}(3i - 2\sqrt{7})$

$3\sqrt{7}\, i^2 - 2i \cdot 7$

$\boxed{-3\sqrt{7} - 14i}$

(33) $\dfrac{2i(8+i)}{8-i(8+i)}$

$= \dfrac{16i + 2i^2}{64 + 1}$

$= \boxed{\dfrac{-2 + 16i}{65}}$

(34) $\dfrac{4+2i}{3-5i} \dfrac{(3+5i)}{(3+5i)}$

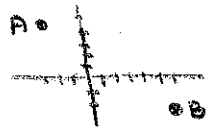
$\dfrac{12 + 20i + 6i + 10i^2}{9 + 25}$

$\dfrac{22 + 26i}{34} = \boxed{\dfrac{11 + 13i}{17}}$

(35) $|-4 - 9i| = \sqrt{16 + 81} = \boxed{\sqrt{97}}$

(36) (A) $-3 + 5i$

(B) $6 - 2i$




(37) $|-3 + 5i| = \sqrt{9 + 25} = \sqrt{34} \approx \boxed{5.8}$

$|6 - 2i| = \sqrt{36 + 4} = \sqrt{40} \approx \boxed{6.3}$

(38) $x^2 + 4x - 1 = 0 \rightarrow x = \dfrac{-4 \pm \sqrt{16 - 4(-1)}}{2}$

$x = \dfrac{-4 \pm \sqrt{20}}{2}$ $\rightarrow x = .24$, $x = -4.24$

$\leftarrow$ -4.24 .24 $\rightarrow$ $[-4.24, .24]$

$x^2 + 4x - 1 \le 0$

| | |
|---|---|
| -5 | x |
| 0 | ✓ |
| 5 | x |

(39) $4x^2 - 24x + 36 < 0$

$x^2 - 6x + 9 < 0$

$(x-3)^2 < 0$

$\leftarrow$ x x x $\rightarrow$ No Real Solution

(40) $f(-5) = 25 + 25 + 14 = 64$

$f(-3) = 9 + 15 + 14 = 38$

ROC $= (38 - 64)/(-3 - (-5)) = -26/2 = -13$

Honors Algebra II Name: _____

Revisiting Quadratics Review

**Factor Completely**

1. $36-4x^2$

2. $x^2+16x+48$

2. $6x^2-13x+5$

4. $6x^2-15x-21$

5. $r^3+4r^2+5r+20$

6. $35ab+25a+7b^2+5b$

7. $4x^3-37x^2+40x$

8. $80x^2-200x+125$

**Solve each quadratic by factoring or by taking the square root.**

9. $x^2+3x-28=0$

10. $x^2=7-6x$

11. $(x-1)^2-50=0$

12. $2x^2=-32x$

13. $144-36x^2=0$

14. $\frac{1}{4}x^2-\frac{3}{4}=\frac{26}{8}$

15. $7p^2+112=-70p$

16. $4v^2+15v-42=-2-6v^2+6v$

**17. Abby would like to enlarge a rectangular closet that has an area of $(x^2+3x+2)ft^2$. The length is $(x+2)ft$. After construction, the area will be $(x^2+8x+15)ft$, with a length of $(x+3)ft$.**

a. Find the dimensions of the closet before construction.
b. Find the dimensions of the closet after construction
c. By how many feet will the length and width increase after construction?

**18. A restaurant has a patio that is 8 feet wide and 12 feet long. Ian, the restaurant owner wants to double the area of the patio by increasing the length and width by the same amount, $x$.**

a. Draw a sketch of the original patio and find its area.
b. Draw a sketch of the new patio, and write an equation for the new area.
c. Can your equation be solved by factoring?
d. Is there a single solution or more than one solution? Explain.

**Put the equation in vertex form by completing the square.**

19. $f(x)=x^2-4x+13$

20. $f(x)=2x^2+6x+25$

**For each quadratic equation, find the discriminant ad determine the number and type of solutions.**

21. $4x^2-12x+9=0$

Discriminant: _____

Number of unique solutions: _____

Type of Solution: _____

22. $x^2+18=-2x$

Discriminant: _____

Number of unique solutions: _____

Type of Solution: _____

**Solve the following quadratic equations using the quadratic formula. Leave answers exact. Simplify appropriately. Show all work.**

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

24. $3x^2-12x+4=0$