

*AAT

Chapter 2: D.I. Complex Numbers (IC/HW)

Name: Key

Date: _____ Period: _____

Complex Numbers

1. $6x - 12 = 10(x - 4)$

$6x - 12 = 10x - 40$

$28 = 4x$

$7 = x$

2. $\left(\frac{3}{n} + \frac{7}{n} - \frac{5}{n} = 3\right)$ Solve for n.

$3 + 7 - 5 = 3n$

$5 = 3n$

$n = \frac{5}{3}$

3. Solve the equation: $\left(\frac{-5}{y+4} + \frac{2}{y-4} = \frac{7}{y^2-16}\right)$ $(y+4)(y-4)$

$-5(y-4) + 2(y+4) = 7$

$-5y + 20 + 2y + 8 = 7$

$-3y + 28 = 7$

$-3y = -21$

$y = 7$

4. $i(6 - 3i)^2$

$i(6 - 3i)(6 - 3i) = i(36 - 36i + 9i^2) = i(36 - 36i - 9) = i(27 - 36i)$

$27i - 36i^2$

$27i + 36$

5. $(6 + 7i)(6 - 7i)$

$36 - 49i^2 = 36 + 49 = 85$

6. $\frac{3-2i}{4-3i} \cdot \frac{(4+3i)}{(4+3i)} = \frac{12+i-6i^2}{16-9i^2} = \frac{18+i}{25}$

7. $3|4x - 10| + 20 = 26$

$\frac{3}{3}|4x - 10| = \frac{6}{3}$

$|4x - 10| = 2$

$4x - 10 = 2$

$4x = 12$

$x = 3$

or $4x - 10 = -2$

$4x = 8$

$x = 2$

8. Solve: $2 \geq 3 - 2x > -4$

$\frac{-1}{-2} \geq \frac{-2x}{-2} > \frac{-7}{-2}$

$\frac{1}{2} \leq x < \frac{7}{2}$

Simplify the following.

$$9. \frac{10 + \sqrt{-225}}{5} \quad \frac{10 + 15i}{5} = 2 + 3i$$

$$10. \sqrt{-144} - \sqrt{-81} \quad 12i - 9i = 3i$$

$$11. \sqrt{-27xy^2} \quad \sqrt{-9 \cdot 3 \cdot x \cdot y^2} = 3i|y|\sqrt{3x}$$

$$12. (7i)(3i) \quad 21i^2 = -21$$

$$13. \sqrt{\frac{-16}{25}} \cdot \sqrt{\frac{-100}{64}} \quad \left(\frac{4}{5}i\right)\left(\frac{10}{8}i\right) = i^2 = -1$$

$$14. \sqrt{-121} \cdot \sqrt{4} \quad 11i \cdot 2 = 22i$$

$$15. (3 - 5i) + (2 + 2i) \quad 5 - 3i$$

$$16. (1 + 2i) - (3 - 4i) \quad -2 + 6i$$

$$17. (5 + i)(3 - 2i) \quad 15 - 7i - 2i^2 = 17 - 7i$$

$$19. \frac{i}{1-i} \cdot \frac{(1+i)}{(1+i)} = \frac{i+i^2}{1-i^2} = \frac{i-1}{1+1} = \frac{i-1}{2} \quad \text{or} \quad \frac{-1}{2} - \frac{i}{2}$$

$$18. (2 - 3i)^2 \quad (2 - 3i)(2 - 3i) = 4 - 12i + 9i^2 = -5 - 12i$$

Solve:

$$20. y = 2x^2 + 5x + 4 \quad -5 \pm \sqrt{25 - 4(2)(4)} = \frac{-5 \pm \sqrt{-7}}{2(2)} = \frac{-5 \pm i\sqrt{7}}{4}$$

Inequalities and More on Inequalities

1. $6x - 12 = 10(x - 4)$ $6x - 12 = 10x - 40$

$28 = 4x$

$7 = x$

2. $\left(\frac{3}{n} + \frac{7}{n} - \frac{5}{n} = 3\right)$ Solve for n.

$3 + 7 - 5 = 3n$

$5 = 3n$

$\frac{5}{3} = n$

3. Solve the equation: $\left(\frac{-5}{y+4} + \frac{2}{y-4} = \frac{7}{y^2-16}\right) (y+4)(y-4)$

$-5(y-4) + 2(y+4) = 7$

$-5y + 20 + 2y + 8 = 7$

$-3y + 28 = 7$

$-3y = -21$

$y = 7$

4. $i(6-3i)^2$
 $i(6-3i)(6-3i)$
 $i(36-36i+9i^2)$
 $i(36-36i-9)$
 $i(27-36i)$
 $27i-36i^2$
 $27i+36$

5. $(6+7i)(6-7i)$
 $36-49i^2$

$36+49$

85

6. $\frac{3-2i}{4-3i} \cdot \frac{(4+3i)}{(4+3i)} = \frac{12+i-6i^2}{16-9i^2} = \frac{18+i}{25}$

7. $3|4x-10| + 20 = 26$

$\frac{3}{3}|4x-10| = \frac{6}{3}$

$4x-10 = 2$

$4x = 12$

$x = 3$

$4x-10 = -2$

$4x = 8$

$x = 2$

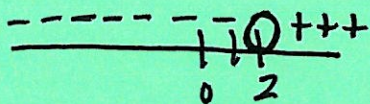
Solve: $2 \geq (3-2x) > -4$

$\frac{-1}{-2} \geq \frac{-2x}{-2} > \frac{-7}{-2}$

$\frac{1}{2} \leq x < \frac{7}{2}$

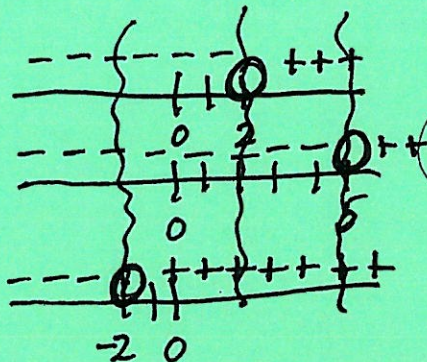
Solve the following inequalities. Graph and express as interval.

9. $\frac{1}{x-2} > 0$



$x > 2$ or $(2, \infty)$

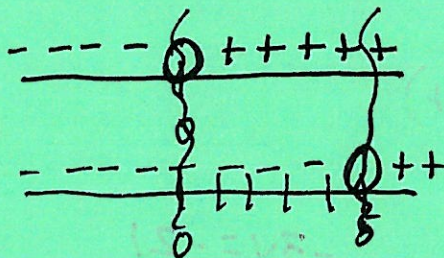
10. $\frac{x-2}{(x-5)(x+2)} \leq 0$



$5 > x \geq 2$ or $x < -2$

$(-\infty, -2) \cup [2, 5)$

11. $\frac{5p}{p-5} > 0$



$x < 0$ or $x > 5$

$(-\infty, 0) \cup (5, \infty)$

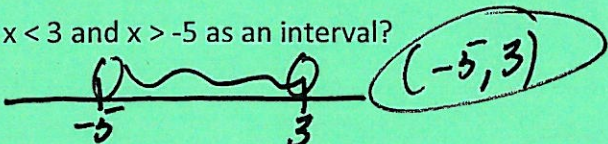
12. $2|-11-7x| - 2 > 0$

$|-11-7x| > 1$

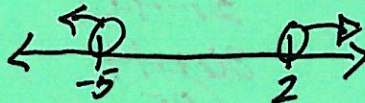
$-11-7x \geq 1$ or $-11-7x \leq -1$
 $-7x \geq 12$ $-7x \leq 10$
 $x \leq -\frac{12}{7}$ or $x > -\frac{10}{7}$

$(-\infty, -\frac{12}{7}) \cup (-\frac{10}{7}, \infty)$

13. What is $x < 3$ and $x > -5$ as an interval?



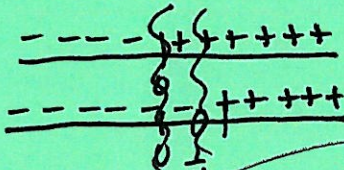
14. What is $x > 2$ or $x < -5$ as an interval?



15. Express in terms of intervals: $12x^2 \geq 3x$

$12x^2 - 3x \geq 0$

$3x(4x-1) \geq 0$



$(x \leq 0$ or $x \geq \frac{1}{4})$
 $(-\infty, 0] \cup [\frac{1}{4}, \infty)$

16. $|8x-1| < 6$

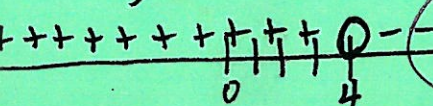
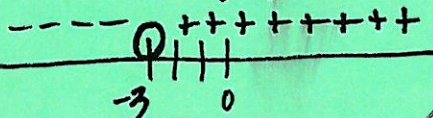
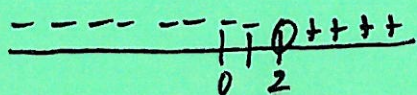
$8x-1 < 6$; $8x-1 > -6$

$8x < 7$ $8x > -5$

$x < \frac{7}{8}$; $x > -\frac{5}{8}$

$-\frac{5}{8} < x < \frac{7}{8}$

17. $(x-2)(x+3)(4-x) \leq 0$



$3 \leq x \leq 2$ or $x \geq 4$

$[-3, 2] \cup [4, \infty)$

18. $-3x^2 < -21x + 3$

$0 < 3x^2 - 21x + 3$

graph

$(-\infty, .15) \cup (6.85, \infty)$

Quadratics and Other Equations

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$$i(6-3i)(6-3i)$$

$$i(36 - 36i + 9i^2)$$

$$i(36 - 36i - 9)$$

$$i(27 - 36i)$$

$$27i - 36i^2$$

$$27i + 36$$

5. $(6+7i)(6-7i)$

$$36 - 49i^2 = 36 + 49 = 85$$

6. $\frac{3-2i}{4-3i} \cdot \frac{(4+3i)}{(4+3i)} = \frac{12+i-6i^2}{16-9i^2} = \frac{18+i}{25}$

7. $3|4x-10| + 20 = 26$

$$\frac{3}{3}|4x-10| = \frac{6}{3}$$

$$|4x-10| = 2$$

$$4x-10 = 2 \text{ or } 4x-10 = -2$$

$$4x = 12 \text{ or } 4x = 8$$

$$x = 3 \text{ or } x = 2$$

8. Solve: $2 \geq 3 - 2x > -4$

$$\frac{-1}{-2} \geq \frac{-2x}{-2} > \frac{-7}{-2}$$

$$\frac{1}{2} \leq x < \frac{7}{2}$$

Solve by factoring.

9. $x^2 - 7x + 10 = 0$

$$(x-5)(x-2) = 0$$

$$x = 5 \text{ or } x = 2$$

10. $4x^2 + x - 14 = 0$

$$(4x-7)(x+2) = 0$$

$$4x-7=0 \text{ or } x+2=0$$

$$x = \frac{7}{4} \text{ or } x = -2$$

Solve by completing the square.

11. $x^2 + x - 8 = 0$

$$x^2 + x + \frac{1}{4} = 8 + \frac{1}{4}$$

$$\sqrt{\left(x + \frac{1}{2}\right)^2} = \sqrt{\frac{33}{4}}$$

$$x + \frac{1}{2} = \pm \frac{\sqrt{33}}{2}$$

$$x = -\frac{1}{2} \pm \frac{\sqrt{33}}{2}$$

12. $x^2 - 18x + 10 = 0$

$$x^2 - 18x + 81 = -10 + 81$$

$$\sqrt{(x-9)^2} = \sqrt{71}$$

$$x - 9 = \pm \sqrt{71}$$

$$x = 9 \pm \sqrt{71}$$

13. $4x^2 - 20x + 25 = 0$

$$\frac{4x^2 - 20x}{4} = \frac{-25}{4}$$

$$x^2 - 5x + \frac{25}{4} = \frac{-25}{4} + \frac{25}{4}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \sqrt{0}$$

$$x - \frac{5}{2} = 0$$

$$x = \frac{5}{2}, \text{d.r.}$$

Solve using the quadratic equation.

14. $5x^2 + 13x = 6$

$$\frac{-13 \pm \sqrt{13^2 - 4(5)(-6)}}{2(5)}$$

$$= \frac{-13 \pm \sqrt{289}}{10} = \frac{-13}{10} \pm \frac{17}{10}$$

$$x = \frac{2}{5}, -3$$

15. $16t^2 - 64t + 0 = 0$

$$\frac{64 \pm \sqrt{64^2 - 4(16)(0)}}{2(16)}$$

$$= \frac{64 \pm \sqrt{4096}}{32} = \frac{64 \pm 64}{32}$$

$$x = 4, 0$$

Solve using any method.

16. $16t^2 - 64t + 48 = 0$

$$\frac{64 \pm \sqrt{64^2 - 4(16)(48)}}{2(16)}$$

$$= \frac{64 \pm \sqrt{1024}}{32} = \frac{64 \pm 32}{32}$$

$$x = 3, 1$$

17. $\sqrt{2x-2} + \sqrt{x-4} = 6$

- graph -

$$x = 8.5$$

18. $3x^3 - 4x^2 - 27x + 36 = 0$

- graph -

$$x = \pm 3, \frac{4}{3}$$

19. $x + \sqrt{5x+19} = -1$

$$\left(\sqrt{5x+19}\right)^2 = (-1-x)^2$$

$$5x+19 = 1 + 2x + x^2$$

$$0 = x^2 - 3x - 18$$

$$0 = (x-6)(x+3)$$

$$x = 6 \text{ or } x = -3$$