Algebra 2
Operations with Complex Numbers / Radicals / Square Root Method

Imaginary KEY
Date: _____ **Period:** ____

Simplify. No Decimals.

1.) $\sqrt{-48}$

$\sqrt{-1}\cdot\sqrt{16}\cdot\sqrt{3}$

$\boxed{4i\sqrt{3}}$

2.) $\sqrt{80}$

$\sqrt{16}\cdot\sqrt{5}$

$\boxed{4\sqrt{5}}$

3.) $\sqrt{-200}$

$\sqrt{-1}\cdot\sqrt{100}\cdot\sqrt{2}$

$\boxed{10i\sqrt{2}}$

4.) $\sqrt{50}$

$\sqrt{25}\cdot\sqrt{2}$

$\boxed{5\sqrt{2}}$

5.) $\sqrt{-20}$

$\sqrt{-1}\cdot\sqrt{4}\cdot\sqrt{5}$

$\boxed{2i\sqrt{5}}$

6.) $\sqrt{-72}$

$\sqrt{-1}\cdot\sqrt{36}\cdot\sqrt{2}$

$\boxed{6i\sqrt{2}}$

7.) $\sqrt{-52}$

$\sqrt{-1}\cdot\sqrt{4}\cdot\sqrt{13}$

$\boxed{2i\sqrt{13}}$

8.) $\sqrt{-25}$

$\boxed{5i}$

9.) $\sqrt{200}$

$\sqrt{100}\sqrt{2}$

$\boxed{10\sqrt{2}}$

10.) $\sqrt{-32}$

$\sqrt{-1}\sqrt{16}\sqrt{2}$

$\boxed{4i\sqrt{2}}$

11.) $\sqrt{-125}$

$\sqrt{-1}\cdot\sqrt{25}\cdot\sqrt{5}$

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

12.) $\sqrt{-16}$

$\boxed{4i}$

Simplify.

13.) $(7i)+(-3+5i)-(-3+8i)$

$7i-3+5i+3-8i$

$\boxed{4i}$

14.) $(-2+7i)-8-(3-6i)$

$-2+7i-8-3+6i$

$\boxed{-13+13i}$

15.) $(8+8i)(-1-8i)$

$-8-64i-8i-64i^2$

$-8-72i-64(-1)$

$\boxed{56-72i}$

16.) $(2-6i)(-4+8i)$

$-8+16i+24i-48i^2$

$-8+40i-48(-1)$

$\boxed{40+40i}$

17.) $(2+8i)(-1-7i)(-3-i)$

$(-2-14i-8i-56i^2)(-3-i)$

$(54-22i)(-3-i)$

$-162-54i+66i+22i^2$

$\boxed{-184+12i}$

18.) $(-6-i)(2+7i)(-8+i)$

$(-12-42i-2i-7i^2)(-8+i)$

$(-5-44i)(-8+i)$

$40-5i+352i-44i^2$

$\boxed{84+347i}$

19.) $(2i)(-5i)$

$-10i^2$

$-10(-1)$

$\boxed{10}$

20.) $(-3i)(-7i)(5i)$

$(21i^2)(5i)$

$(-21)(5i)$

$\boxed{-105i}$

21.) $\frac{(2+3i)}{2i}\cdot\frac{2i}{2i}$

$\frac{4i+6i^2}{4i^2}$

$\frac{-6+4i}{-4}$

$\frac{-3+2i}{-2}$

$\boxed{\frac{3-2i}{2}}$

* JUST MULTIPLY BY i

22.) $\frac{(3-4i)}{(5+2i)}\cdot\frac{(5-2i)}{(5-2i)}$

$\frac{15-6i-20i+8i^2}{25-10i+10i-4i^2}$

$\boxed{\frac{7-26i}{29}}$

Solve each quadratic using the Square Root Method. Simplify any radical answers.

23.) $2x^2 - 7 = 33$

$2x^2 = 40$

$\sqrt{x^2} = \sqrt{20}$

$x = \pm\sqrt{20}$

$x = \pm\sqrt{4}\cdot\sqrt{5}$

$x = \pm 2\sqrt{5}$

24.) $-4x^2 = 64$

$\sqrt{x^2} = \sqrt{-16}$

$x = \pm 4i$

25.) $\sqrt{(m-5)^2} = \sqrt{25}$

$M - 5 = \pm\sqrt{25}$

$M - 5 = \pm 5$

$M = 5 \pm 5$

$M = 10 \quad M = 0$

26.) $3(t-2)^2 = 36$

$\sqrt{(t-2)^2} = \sqrt{12}$

$t - 2 = \pm\sqrt{12}$

$t - 2 = \pm\sqrt{4}\sqrt{3}$

$t = 2 \pm 2\sqrt{3}$

27.) $-3(x-8)^2 + 11 = 38$

$-3(x-8)^2 = 27$

$\sqrt{(x-8)^2} = \sqrt{-9}$

$x - 8 = \pm 3i$

$x = 8 \pm 3i$

28.) $10 - 6(m+4)^2 = 106$

$-6(M+4)^2 = 96$

$\sqrt{(M+4)^2} = \sqrt{-16}$

$M + 4 = \pm 4i$

$M = -4 \pm 4i$

29.) $5(c+3)^2 - 20 = -120$

$5(c+3)^2 = -100$

$\sqrt{(c+3)^2} = \sqrt{-20}$

$c + 3 = \pm\sqrt{-1}\sqrt{4}\sqrt{5}$

$c + 3 = \pm 2i\sqrt{5}$

$c = -3 \pm 2i\sqrt{5}$

30.) $14 - 4(k-7)^2 = -86$

$-4(k-7)^2 = -100$

$\sqrt{(k-7)^2} = \sqrt{25}$

$k - 7 = \pm 5$

$k = 7 \pm 5$

$k = 12 \quad k = -2$

Review. Factor each polynomial completely.

31.) $3x^2 - 11x + 10$

30 / -5 × -6 / -11

$3x^2 - 5x - 6x + 10$

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

$x(3x - 5) - 2(3x - 5)$

$(3x - 5)(x - 2)$

32.) $3x^2 + 29x - 10$

-30 / -30 × 1 / 29

$3x^2 - 30x + x - 10$

$(3x^2 - 30x) + (x - 10)$

$3x(x - 10) + 1(x - 10)$

$(x - 10)(3x + 1)$

33.) $27m^3 - 125$

$(3m)^3 - (5)^3$

$(3m - 5)(9m^2 + 15m + 25)$

34.) $16c^4 - 81$

$(4c^2 + 9)(4c^2 - 9)$

$(4c^2 + 9)(2c + 3)(2c - 3)$

35.) $24x^3 - 18x^2 - 30x$

$6x[4x^2 - 3x - 5]$

36.) $8t^4 + 10t^2 - 3$

-24 / 12 × -2 / 10

$8t^4 + 12t^2 - 2t^2 - 3$

$(8t^4 + 12t^2) + (-2t^2 - 3)$

$4t^2(2t^2 + 3) - 1(2t^2 + 3)$

$(2t^2 + 3)(4t^2 - 1)$

$(2t^2 + 3)(2t - 1)(2t + 1)$

37.) $4m^2 - 8m - 5$

-20 / -10 × 2 / -8

$4m^2 - 10m + 2m - 5$

$(4m^2 - 10m) + (2m - 5)$

$2m(2m - 5) + 1(2m - 5)$

$(2m - 5)(2m + 1)$

38.) $n^4 - 1$

$(n^2 + 1)(n^2 - 1)$

$(n^2 + 1)(n + 1)(n - 1)$