

Name _____

Date _____

KEY

Complex NumbersExpress these numbers in terms of i .

① $\sqrt{-3} = i\sqrt{3}$

⑤ $\sqrt{\frac{-9}{16}} = \frac{3}{4}i$

② $-\sqrt{-16} = -\sqrt{-1(4)} = -4i$

⑥ $\sqrt{-\frac{25}{4}} = \frac{5}{2}i$

③ $\sqrt{-128} = i\sqrt{64}\sqrt{2} = 8i\sqrt{2}$

⑦ $-\sqrt{-80} = -i4\sqrt{5} \rightarrow -4i\sqrt{5}$

④ $\sqrt{-12} = 2i\sqrt{3}$

⑧ $-\sqrt{-75} = -i5\sqrt{3} \rightarrow -5i\sqrt{3}$

Multiply.

⑨ $-12i \cdot (-3) = 36i$

⑫ $-\sqrt{-10}(-\sqrt{-10}) = i^2 10 = -10$

⑩ $\sqrt{-2}\sqrt{-3} = i \cdot i\sqrt{6} = -\sqrt{6}$

⑬ $-\sqrt{-7}(-\sqrt{-7}) = i^2 7 = -7$

⑪ $\sqrt{-5} \cdot 6i = 6i^2\sqrt{5} = -6\sqrt{5}$

⑭ $-3i \cdot 4\sqrt{-8} = -12i^2\sqrt{4 \cdot 2} = 24\sqrt{2}$

Add.

⑮ $5i + 4i = 9i$

⑰ $(3+2i) + (5-i) = 8+i$

⑯ $-2i + (-3i) = -5i$

⑱ $(-2+3i) + (7+8i) = 5+11i$

⑰ $3i + (8-5i) = 8-2i$

㉑ $(4-3i) + (5-2i) = 9-5i$

⑱ $-2i + (-3+8i) = -3+6i$

㉒ $5+9i-16i+16-i^2 = 22-7i$

Find: $i^1 = i$ $i^2 = -1$ $i^3 = -i$ $i^4 = 1$

Multiply.

⑳ $7i \cdot 9i = -63$

㉓ $(1-i)(1+i) = 1+1 = 2$

㉑ $(-3i)^2 = 9i^2 = -9$

㉔ $(6+3i)(6-3i) = 36+9 = 45$

㉒ $(3+2i)(1+i) = 1+5i$

㉕ $(\frac{1}{2}+i)(\frac{1}{2}-i) = \frac{1}{4}+1 = \frac{5}{4}$

㉓ $(5-2i)^2 = 21-20i$

㉖ $(\sqrt{3}+i)(\sqrt{3}-i) = 3+1 = 4$

★ ㉓ What do you notice about 27-30 and what each problem equals? They are conjugates; each equals a simple real number.

★ ㉔ $(a+bi)(a-bi) = a^2+b^2$

Find the conjugate of each number.

① $-4+8i = -4-8i$

⑤ $\sqrt{2}+\frac{1}{2}i$

② $-19i = 19i$

⑥ $\sqrt{3}+0.4i$

③ $6-5i = 6+5i$

⑦ $r-ti$

④ $103 = 103$

⑧ $-m+ni$

★ The product of a complex number $a+bi$ and its conjugate $a-bi$ is the positive real number a^2+b^2 !

So, $(7+2i)(7-2i) = 49+4 = 53$

& $(-3+i)(-3-i) = 9-i^2 = 10$

★ & $(p-qi)(p+qi) = p^2+q^2$