Simplify.

1. \((\sqrt{2} + \sqrt{5})(\sqrt{3} + \sqrt{2}) = \) __________

\[
\left(2\sqrt{5}\right)^2 = \_\_\_\_\_\_\_\_\_
\]

\[
(2\sqrt{3} - 4)^2 = \_\_\_\_\_\_\_\_\_
\]

\[
(3 - \sqrt{7})(3 + \sqrt{7}) = \_\_\_\_\_\_\_\_\_
\]

\[
\frac{2}{\sqrt{6}} = \_\_\_\_\_\_\_\_\_
\]

\[
\frac{3}{\sqrt{20}} = \_\_\_\_\_\_\_\_\_
\]

2. More radicals

\[
\frac{2}{\sqrt[3]{4}} = \_\_\_\_\_\_\_\_\_
\]

\[
\frac{4}{\sqrt[4]{9x^3}} = \_\_\_\_\_\_\_\_\_
\]

\[
\frac{3xy}{\sqrt[3]{8x^3y^2}} = \_\_\_\_\_\_\_\_\_
\]

\[
\sqrt[5]{7} = \_\_\_\_\_\_\_\_\_
\]

\[
\frac{8}{\sqrt{x + 2}} = \_\_\_\_\_\_\_\_\_
\]

3. \(\frac{2}{\sqrt{2} + 2} = \) __________

\[
\frac{4}{2 - \sqrt{3}} = \_\_\_\_\_\_\_\_\_
\]
4. Write the following equation in standard form.
   a) $2 + x = 4x^2 \rightarrow \text{find } b.$ ________

   b) $2x^2 = 3 \rightarrow \text{find } b.$ ________

5. In the equation $ax^2 + bx + c = 0$, $b^2 - 4ac$ is called the discriminant.
   Using $2x^2 - 4x + 3$ find the discriminant. __________ (simplest form)

6. Find the solution of
   a) $5x = 3$
   b) $2x = 0$
   c) $2x(4) = 0$
   d) $2x(3x + 2) = 0$
   e) $(3x + 2)(5x - 1) = 0$
   f) $x^2 - 4x = 12$
   g) $12x^2 = 3x$
   h) $x(x+1) = x + x(x+2)$
   i) $(x + 2)^2 = 1$
   j) $3x^2 - 12 = 0$

7. Which of these are perfect squares?
   a) $-25$
   b) $1600$
   c) $x^{12}$
   d) $9x^4$
   e) $1 + x^2$
   f) $x^2 + 24x + 144$
   
a) \( x^2 - 49 = 0 \)  
b) \( x^2 + 25 = 0 \)

   c) \( (x + 3)^2 = 4 \)  
d) \( (2x - 4)^2 = 1 \)

   e) \( (4x - 3)^2 + 4 = 0 \)  
f) \( x^2 + 8x + _____ = 9 + _____ \)

   g) \( 2x^2 + 6x - 8 = 0 \)

8. Solve by completing the square - no other method will do.
   
a) \( x^2 - 4x - 60 = 0 \)  
b) \( x^2 + 12x - 6 = 0 \)

   c) \( 3x^2 - 12x + 3 = 0 \)
9. Write down the general quadratic equation.

10. Write down the quadratic formula.

11. Find the solution of the following equations by using the quadratic formula.

   a) \( x^2 + 2 = 0 \)  
   b) \( x^2 = 5x \)

   c) \( 3x^2 - 4x + 1 = 0 \)  
   d) \( 4x^2 + x + 3 = 0 \)

   e) \( 2x^2 - 2x - 3 = 0 \)

12. Let \( i = \sqrt{-1} \) and we will choose to define \( i^2 = -1 \).

    Find
    \[
    \sqrt{-64} = \quad \quad \sqrt{-5} = \quad \quad \sqrt{-400} = \quad \\
    -\sqrt{4} = \quad \quad (-25)^{\frac{1}{5}} = \quad
    \]
Def. A complex number is a number of the form \( a + bi \) where \( a \) and \( b \) are real numbers.

Find the sum of \((2 + 3x)\) and \((4 - 7x)\). __________________

Find \((2 - 3y) - (4 + 6y) = \) ________________

Find
\[(2 + 3i) + (5 - 4i)\] ________________
\[(3 - i) - (7 + 5i)\] ________________

\[3(2 + i) - 4(3 - 2i)\] ________________

What about the product of two complex numbers?
If we remember how to multiply polynomial, it is the same idea with one added condition. Remember that \(i^2 = -1\)

Find
\[(2 + 3i)(4 - i) = \) ________________
\[3i(1 - 2i) = \) ________________

\[(2 - 3i)\] \(^2\) ________________
\[-2(1 + 3i)\] ________________

That leaves only division and graphing of complex numbers.
**Division of complex numbers.**

Find the opposite (the additive inverse) of \(2 - 3i\). \(- (2 - 3i)\) = 

Find the opposite of \(-4 + 5i\). ______________, of \(6i\) = ____________

We want to look at the conjugate of a complex number and it’s not the same thing as the opposite but there is some similarity.

**Def.** Let \(a + bi\) be a given complex number. The conjugate of \(a + bi\) is defined by \(a - bi\).

Find the conjugate of each of the complex numbers.

\[2 - 3i \rightarrow \) ________________
\[0 - 4i \rightarrow \) ________________
\[-3 + 0i \rightarrow \) ________________

we use this idea when we divide two complex numbers
Def. The absolute value of a complex number $a + bi$ is defined as $\sqrt{a^2 + b^2}$.

Find the absolute value (modulus) of

$3 - 4i \rightarrow \quad -3 + 4i = \quad -3 - 4i = \quad$

$2 + 3i \rightarrow \quad 2i \rightarrow \quad 4 + 0i \rightarrow \quad$

Now let’s see how we divide two complex numbers.

$(3 + i) ÷ 2 = \quad (3 + 4i) ÷ (2i) = \frac{3 + 4i}{2i} = \quad$

$(2 - i) ÷ (1 - 2i) = \frac{2 - i}{1 - 2i} = \quad$

One more equation.

$5. \quad x = 2 + \frac{35}{x}$