Warmup:

Multiply the following polynomials:

#1. $3x(2x - 6)$

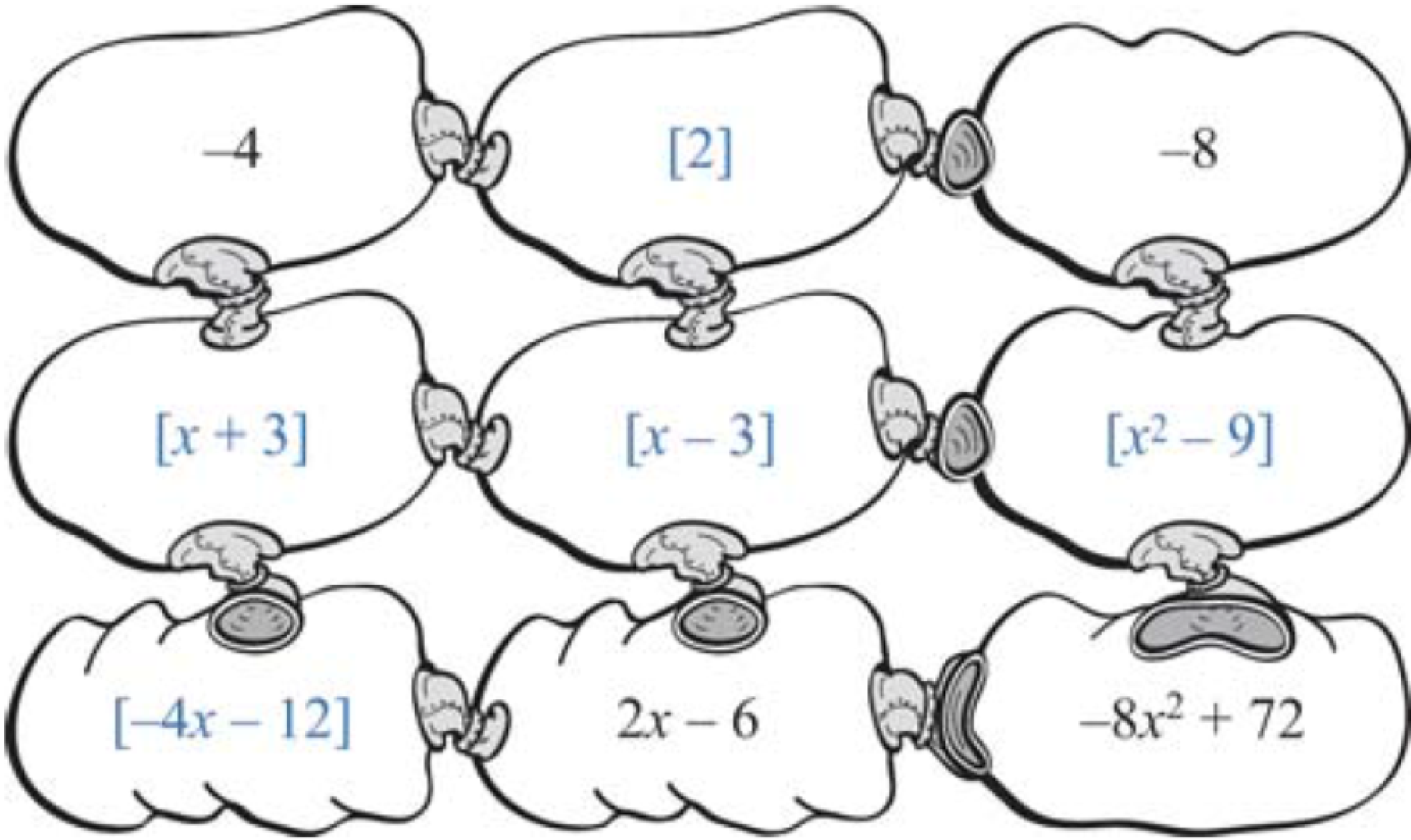
$6x^2 - 18x$

#2. $(x - 4)(x + 5)$

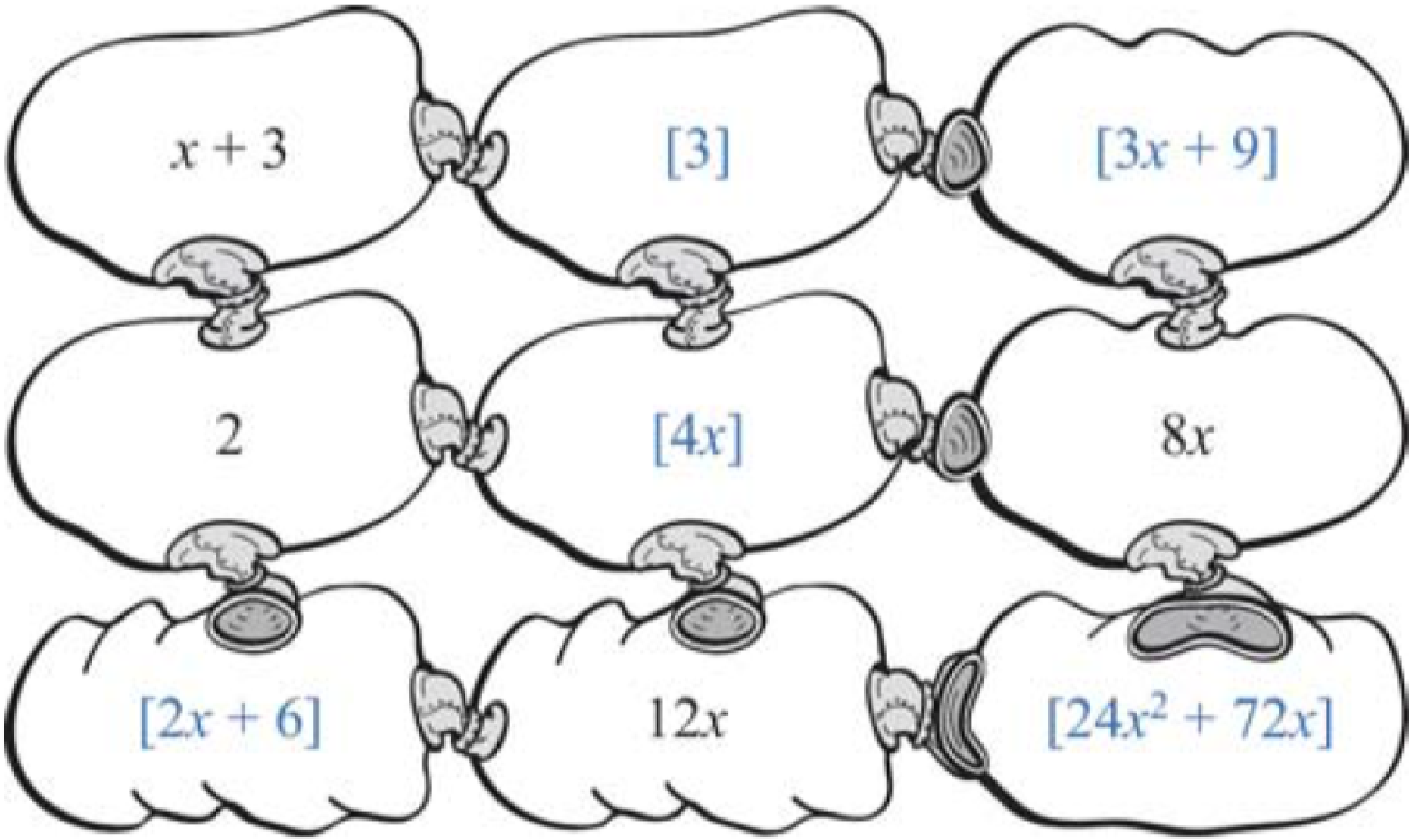
$x^2 + 5x - 4x - 20$

$x^2 + x - 20$

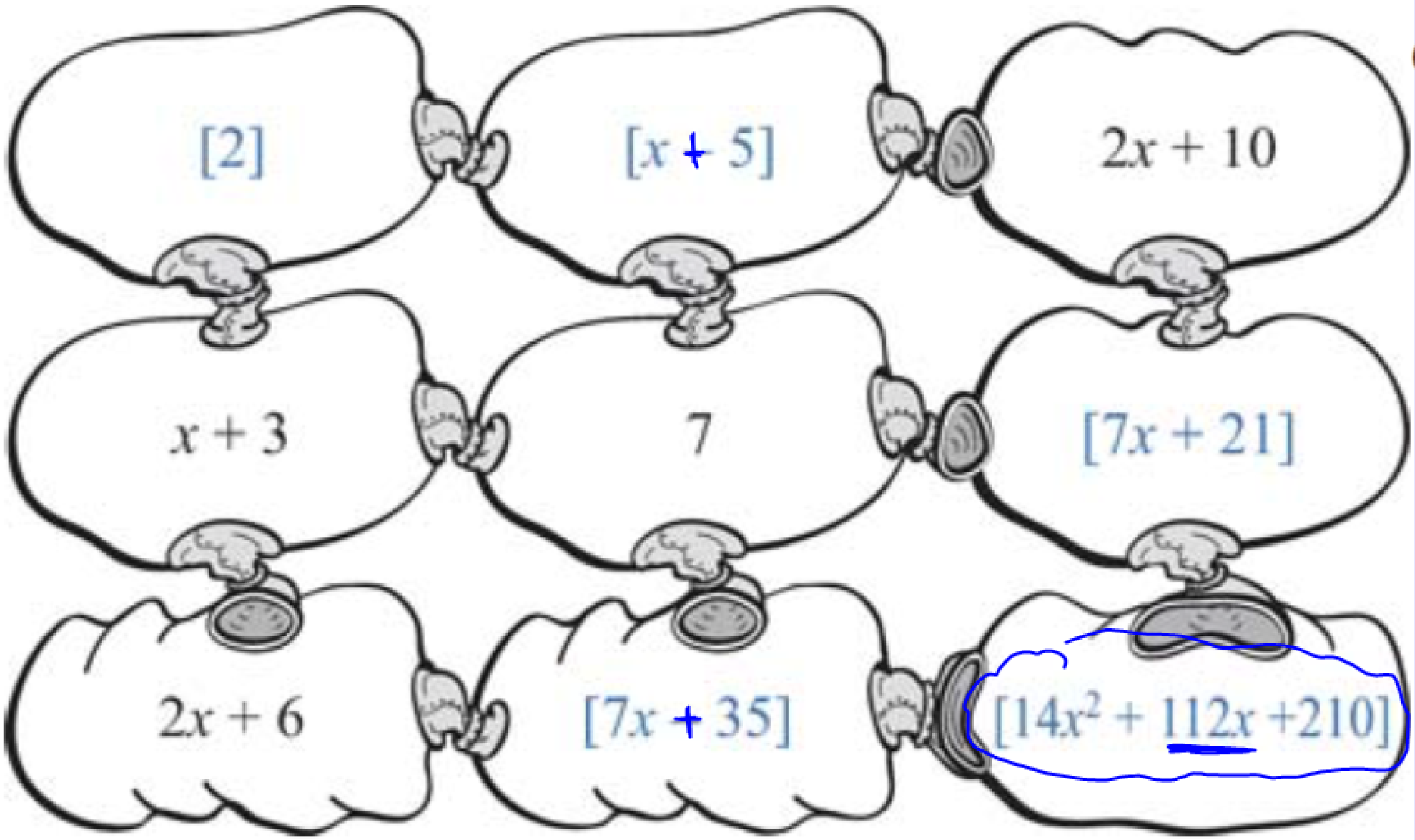
3.



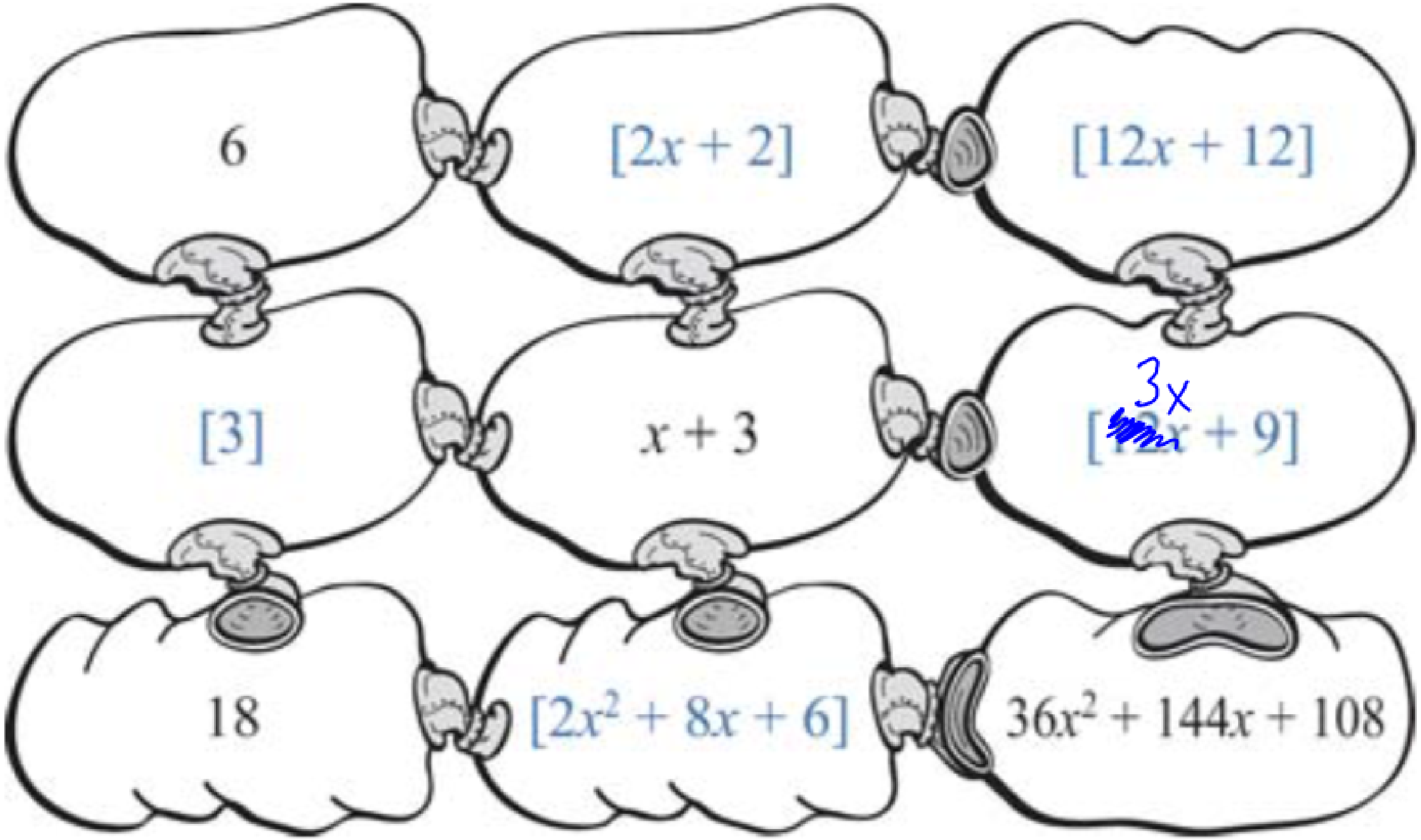
4.



5.



6.



QUIZ TIME!!

Quiz #2 Polynomials

Square Roots

E.Q.
How do we simplify radicals?
How do we perform operations with radicals?

PERFECT SQUARE

- A number that can be expressed as the product of two equal integers.

SQUARE ROOT

- A number that when multiplied by itself equals a given number.

RADICAL

$\sqrt{25} = 5$ $\sqrt[3]{}$ $\sqrt[4]{}$

$\sqrt[5]{}$

- A sign placed in front of a number to denote the root is to be extracted.

RADICAND

$\sqrt{25}$ $\sqrt{x^4}$ $\sqrt{25x^3y^2}$

The expression under a radical sign.

simplifying radicals

To simplify a radical, factor the expression under the radical sign to its prime factors. For every pair of like factors, bring out one of the factors. Multiply whatever is outside the sign, then multiply whatever is inside the sign. Remember that for each pair, you "bring out" only one of the numbers.

$\sqrt{4} = 2$ because 2 is a factor used twice ($2 \times 2 = 4$). $\sqrt{9} = 3$ because 3 is a factor used twice ($3 \times 3 = 9$)

2 2 3 3

$\sqrt{\cancel{4}}$ $\sqrt{\cancel{3 \cdot 3}}$

$\sqrt{\cancel{2 \cdot 2}} = 2$ $\sqrt{\cancel{3 \cdot 3}} = 3$

***Examples*:** $\sqrt{28}$ $\sqrt{54}$ $\sqrt{150}$ $\sqrt{720}$

$\sqrt{\cancel{14} \cdot 2}$

$\sqrt{7 \cdot \cancel{2 \cdot 2}}$

$2\sqrt{7}$

$\sqrt{2 \cdot \cancel{27}}$

$\sqrt{2 \cdot 3 \cdot \cancel{9}}$

$\sqrt{2 \cdot \cancel{3 \cdot 3} \cdot 3}$

$3\sqrt{2 \cdot 3}$

$3\sqrt{6}$

$\sqrt{3 \cdot \cancel{50}}$

$\sqrt{3 \cdot 2 \cdot \cancel{25}}$

$\sqrt{3 \cdot 2 \cdot \cancel{5 \cdot 5}}$

$5\sqrt{3 \cdot 2}$

$5\sqrt{6}$

$\sqrt{\cancel{72} \cdot \cancel{10}}$

$\sqrt{\cancel{36} \cdot 2 \cdot 5 \cdot 2}$

$\sqrt{\cancel{6 \cdot 6} \cdot \cancel{2} \cdot 5 \cdot \cancel{2}}$

$6 \cdot 2\sqrt{5}$

$12\sqrt{5}$

Simplify completely:

$\sqrt{9}$

$\sqrt{3 \cdot 3}$

3

$\sqrt{32}$

$\sqrt{16 \cdot 2}$

$\sqrt{8 \cdot 2 \cdot 2}$

$\sqrt{4 \cdot 2 \cdot 2 \cdot 2}$

$\sqrt{\boxed{\cancel{2 \cdot 2}} \cdot \boxed{\cancel{2 \cdot 2}} \cdot 2}$

$2 \cdot 2 \sqrt{2} = 4\sqrt{2}$

$\sqrt{10 \cdot 5}$

$\sqrt{\cancel{5} \cdot 2 \cdot \cancel{5}}$

$5 \sqrt{2}$

$\sqrt{50}$

$\sqrt{25 \cdot 2}$

$\sqrt{5 \cdot 5 \; 2}$

$5\sqrt{2}$

$\sqrt{120}$

$\sqrt{\cancel{10} \cdot \cancel{12}}$

$\sqrt{5 \cdot 2 \cdot 6 \cdot 2}$

$\sqrt{5 \cdot 2 \cdot 2 \cdot 3 \cdot 2}$

$2\sqrt{5 \cdot 3 \cdot 2}$

$\boxed{2\sqrt{30}}$

$10 \cdot 12$

$10 \cdot 6 \cdot 2$

$10 \cdot 2 \cdot 3 \cdot 2$

$2\sqrt{10 \cdot 3}$

$\sqrt{33}$

$\sqrt{3 \cdot 11}$

$\sqrt{33}$

$3\sqrt{12}$

$3\sqrt{6 \cdot 2}$

$3\sqrt{3 \cdot 2 \cdot 2}$

$3 \cdot 2\sqrt{3}$

$\boxed{6\sqrt{3}}$

$5\sqrt{80}$

$5\sqrt{\cancel{40} \cdot 2}$

$5\sqrt{\cancel{20} \cdot 2 \cdot 2}$

$5\sqrt{4 \cdot 5 \cdot 2 \cdot 2}$

$5\sqrt{2 \cdot \cancel{2} \cdot 5 \cdot 2 \cdot \cancel{2}}$

$5 \cdot 2 \cdot 2\sqrt{5} = 20\sqrt{5}$

What happens if there's a variable?

Follow the same steps. Remember that $x^2 = x \cdot x$ and $x^3 = x \cdot x \cdot x$ and $x^4 = x \cdot x \cdot x \cdot x$ and so on. Once you write out the factors of the variable, you can circle your pairs and simplify from there.

Simplify:

1. $\sqrt{x^4}$

$\sqrt{x \cdot x \cdot x \cdot x}$

$x \cdot x$

x^2

2. $\sqrt{x^7}$

$\sqrt{x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}$

$x \cdot x \cdot x \quad \sqrt{x}$

$x^3\sqrt{x}$

3. $\sqrt{b^{16}}$

$b \cdot b \cdot b \cdot b \cdot b \cdot b$
$b \cdot b \quad b \quad b \quad b \quad b$
$b \quad b \quad b \quad b$

$b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b$

b^8

4. $\sqrt{z^{13}}$

$\sqrt{z^1 \cdot z^{12}}$

$\boxed{z^6\sqrt{z}}$

$\sqrt{16x^2}$

$\sqrt{16 \cdot x^2}$

$\sqrt{(4 \cdot \cancel{4})(\cancel{x^2})}$

$4x$

$\sqrt{25y^6}$

$5y^3$

$\sqrt{12z^5}$

$\sqrt{3 \cdot 4 \cdot z^1 \cdot z^4}$

$\sqrt{3 \cdot \cancel{2 \cdot 2} \cdot z \cdot \cancel{z^4}}$

$2z^2\sqrt{3z}$

$\sqrt{128v^2}$

$\sqrt{2 \cdot 64 \cdot v^2}$

$\sqrt{2 \cdot 2 \cdot 32\, v^2}$

$\underline{2 \cdot 2} \cdot 2 \cdot \cancel{16}\, v^2$

$2 \cdot \cancel{8}$

$\underline{2 \cdot 2} \cdot 2$

$8v\sqrt{2}$

$\sqrt{245b^3}$

$\sqrt{49 \cdot 5 \cdot b \cdot b \cdot b}$

$\sqrt{\underline{7 \cdot 7} \cdot 5 \cdot \underline{b \cdot b} \cdot b}$

$7b\sqrt{5b}$

HW #6: Operations with Radicals