Squares, Square Roots, and the Laws of Exponents

Hints/Guide:

Exponents are a way to represent repeated multiplication, so that 3^4 means 3 multiplied four times, or $3 \cdot 3 \cdot 3 \cdot 3$, which equals 81. In this example, 3 is the base and 4 is the power.

Roots are the base numbers that correspond to a given power, so the square (referring to the power of 2) root of 81 is 9 because $9 \cdot 9 = 81$ and the fourth root of 81 is 3 because $3 \cdot 3 \cdot 3 \cdot 3$ is 81.

$\sqrt[n]{x}$, where n is the root index and x is the radicand

There are certain rules when dealing with exponents that we can use to simplify problems. They are:

Adding powers	$a^m a^n = a^{m+n}$
Multiplying powers	$(a^m)^n = a^{mn}$
Subtracting powers	$\frac{a^m}{a^n} = a^{m-n}$
Negative powers	$a^{-n} = \frac{1}{a^n}$
To the zero power	$a^0 = 1$

Exercises: Evaluate:

1. $(8-4)^2 =$
2. $(4-2)^2\,(5-8)^3 =$
3. $5\,(8-3)^2 =$
4. $\sqrt{25-16} =$
5. $\sqrt{5(9 \bullet 125)} =$
6. $\sqrt{(8-4)(1+3)} =$

Simplify the following problems using exponents (Do not multiply out):

7. $5^2\,5^4 =$
8. $(12^4)^3 =$
9. $5^9 \div 5^4 =$
10. $10^3 \div 10^{-5} =$
11. $7^{-3} =$
12. $3^{-4} =$
13. $(3^3 \bullet 3^2)^3 =$
14. $5^3 \cdot 5^4 \div 5^7 =$