|  |  |
| --- | --- |
|

|  |
| --- |
| **Simplifying Radicals** |

 |

(For this lesson, the term "radical" will refer only to "square root".)

When working with the simplification of radicals you must remember some basic information about **perfect square**numbers.

**You need to remember:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **Perfect Squares** |
| **4** |   | **=  2 x 2** |
| **9** |   | **=  3 x 3** |
| **16** |   | **=  4 x 4** |
| **25** |   | **=  5 x 5** |
| **36** |   | **=  6 x 6** |
| **49** |   | **=  7 x 7** |
| **64** |   | **=  8 x 8** |
| **81** |   | **=  9 x 9** |
| **100** |   | **=  10 x 10** |

 |

 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |
| --- |
| **Radicals (square roots)** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl2.gif** |   | **=  2** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl3.gif** |   | **=  3** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl4.gif** |   | **=  4** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl5.gif** |   | **=  5** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl6.gif** |   | **=  6** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl7.gif** |   | **=  7** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl8.gif** |   | **=  8** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl9.gif** |   | **=  9** |
| **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl10.gif** |   | **=  10** |

 |

 |

While there are certainly many more perfect squares, the ones appearing in the charts above are the ones most commonly used.

|  |
| --- |
| **To simplify means to find another expression with the same value.  It does not mean to find a decimal approximation.** |

|  |
| --- |
| **To simplify (or reduce) a radical:** |

**1.**  Find the **largest** perfect square which will divide evenly into the number under your radical sign.  This means that when you divide, you get no remainders, no decimals, no fractions.

|  |  |  |
| --- | --- | --- |
| **Reduce:** | http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl1.gif | the **largest** perfect square that divides evenly into 48 is **16.** |

|  |  |  |
| --- | --- | --- |
|

|  |  |
| --- | --- |
| http://www.regentsprep.org/regents/math/algebra/ao1/goolisheye.gif | If the number under your radical cannot be divided evenly by any of the perfect squares, your radical is already in simplest form and cannot be reduced further. |

 |

**2.**  Write the number appearing under your radical as the product (multiplication)
      of the perfect square and your answer from dividing.

|  |
| --- |
| http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl11.gif |

**3.** Give each number in the product its own radical sign.

|  |
| --- |
| http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl12.gif |

**4.**  Reduce the "perfect" radical which you have now created.



**5.**  You now have your answer.



|  |  |  |
| --- | --- | --- |
|

|  |  |
| --- | --- |
| http://www.regentsprep.org/regents/math/algebra/ao1/an0050.gif | **What happens if I do not choose the largest perfect square to start the process?** |

 |

If instead of choosing 16 as the largest perfect square to start this process,
you choose 4, look what happens.....





 Unfortunately, this answer is **not in simplest form.**
  The 12 can also be divided by the perfect square (4).

**If you do not choose the largest perfect square to start the process, you will have to repeat the process.**

|  |
| --- |
| **Example:** |

|  |  |
| --- | --- |
| **Reduce:** | **http://www.regentsprep.org/regents/math/algebra/ao1/Lsimpl18.gif** |

Don't let the number in front of the radical distract you.
It is simply "along for the ride" and will be multiplied times our final answer.

The largest perfect square dividing evenly into 50 is 25.



Reduce the "perfect" radical and multiply times the 3 (who is "along for the ride")



|  |  |  |
| --- | --- | --- |
|

|  |  |
| --- | --- |
| **Note:** The examples shown in these lessons on radicals show **ALL** of the steps in the process.  It may**NOT** be necessary for you to list **EVERY**step.  As long as you understand the process and can arrive at the correct answer, you are **ALL SET**!! | http://www.regentsprep.org/regents/math/algebra/ao1/an0040.gif |

 |