Algebra 1 Friday(!!), 8/09/19

Please have your packet open to page 8! Make sure you have a pencil and a calculator. If you need a calculator, there are a few of the basic pink ones on my desk still.

Algebra 1

Name_____ ID: 1

Multiplying Radicals Practice

Date_____ Period____

Simplify.

1) $\sqrt{25} \cdot \sqrt{10}$

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

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

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

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

6) $3\sqrt{10} \cdot \sqrt{10}$

7) $\sqrt{20} \cdot \sqrt{20} = \sqrt{400}$

$\sqrt{4} \cdot \sqrt{100}$

$2 \cdot 10$

20

20

8) $\sqrt{15} \cdot -2\sqrt{20} = -2\sqrt{300}$

$-2 \cdot \sqrt{100} \cdot \sqrt{3}$

$-2 \cdot 10 \cdot \sqrt{3}$

$-20\sqrt{3}$

9) $\sqrt{3} \cdot \sqrt{5} = \sqrt{15}$

10) $\sqrt{3} \cdot \sqrt{3} = \sqrt{9} = 3$

11) $\sqrt{5m^3} \cdot \sqrt{2m^1} = \sqrt{10\,m^4}$

$\sqrt{10} \cdot \sqrt{m^4}$

$\sqrt{10}\ m^2$

$\sqrt{10}\,m^2$

$m^2\sqrt{10}$

12) $\sqrt{8n^3} \cdot \sqrt{2n} = \sqrt{16\,n^4}$

$\sqrt{16} \cdot \sqrt{n^4}$

$4 \cdot n^2$

$4n^2$

outside · outside, inside · inside, simplify

13) $\sqrt{2x} \cdot \sqrt{20x^2}$ $= \sqrt{40x^3}$

$\sqrt{4} \cdot \sqrt{10} \cdot \sqrt{x^3}$

$2 \cdot \sqrt{10} \cdot x\sqrt{x}$

$2x\sqrt{10x}$

14) $4\sqrt{8x} \cdot \sqrt{8x^3}$ $= 4\sqrt{64x^4}$

$4 \cdot \sqrt{64} \cdot \sqrt{x^4}$

$4 \cdot 8 \cdot x^2$

$32x^2$

15) $\sqrt{3b^3} \cdot \sqrt{12b^2}$ $= \sqrt{36b^5}$

$\sqrt{36} \cdot \sqrt{b^5}$

$6 \cdot b^2\sqrt{b}$

$6b^2\sqrt{b}$

16) $\sqrt{3}(4 + \sqrt{3x})$

17) $\sqrt{2x}(\sqrt{5x} + \sqrt{2x})$

18) $\sqrt{3r}(\sqrt{10} + 5)$

19) $\sqrt{3m}(\sqrt{2} + \sqrt{5m})$

20) $\sqrt{2r}(\sqrt{2} + \sqrt{6r})$

21) $2\sqrt{15}(\sqrt{6n} + 4n)$

22) $-\sqrt{15}(4n^3 + \sqrt{6})$

23) $\sqrt{5x}(\sqrt{10x} + 3x)$

24) $\sqrt{6}(\sqrt{2k} + 5k^3)$

25) $-3\sqrt{5}(4 + 4\sqrt{5k})$

$3x^2 + 4x - 8 + 2x$

$3x^2 + 6x - 8$

$2\sqrt{3} - 7\sqrt{5} + 9\sqrt{3}$

$11\sqrt{3} - 7\sqrt{5}$

Task on Adding and Subtracting Radicals Name _____

There are three important rules when adding and subtracting radicals.

Rule #1 - When adding or subtracting two radicals, you must **simplify the radicands first**.

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1. What is the radicand of the following radical expression: $3\sqrt{5}$?

Throughout this task, we will be examining the following expression: $\sqrt{180} + 7\sqrt{20}$

As you can tell, this expression involves addition, so you will need to follow the rules.

Start with Rule #1 above. In order to add these two radicals, one must simplify the radicands first. That's what you will do in Questions 2 & 3.

$\sqrt{180} + 7\sqrt{20}$

$\sqrt{4} \cdot \sqrt{45} + 7 \cdot \sqrt{4} \cdot \sqrt{5}$

$2 \cdot \sqrt{9} \cdot \sqrt{5} + 7 \cdot 2 \cdot \sqrt{5}$

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

2. Simplify $\sqrt{180}$.

3. Simplify $7\sqrt{20}$. Do not forget the '7'!!!

$6\sqrt{5} + 14\sqrt{5}$

$20\sqrt{5}$

4. Rewrite the original expression by substituting your answers from #2 and #3.

$\sqrt{180} + 7\sqrt{20} =$ _____ (#2) + _____ (#3)

Rule #2 - In order to add or subtract two radicals, they must have the **same radicand**.

This is similar to saying that the two radicals must be "like terms".

5. The re-written expression in #4 should have produced the same radicand. So, these two radicals can be added. What is the new radicand that they have in common?

For Questions 6-9, consider the radical expressions with already simplified radicands. Based on Rule #2, can these radicals be added/subtracted? **Your answer should be "yes" or "no".**

6. $3\sqrt{2} + 2\sqrt{3}$ — $3\sqrt{2} + 2\sqrt{3}$

7. $4\sqrt{5} - \sqrt{5}$ — $3\sqrt{5}$

8. $22\sqrt{7} - 22\sqrt{6}$ — $22\sqrt{7} - 22\sqrt{6}$

9. $10\sqrt{11} + 24\sqrt{11}$ — $34\sqrt{11}$

10

Rule #3 - When adding or subtracting two radicals, **you only add the coefficients**. The radicand remains the same.

For example, one can compute $4\sqrt{10}+7\sqrt{10}$ because both radicals have the same radicand. In order to add them, you only add the coefficients (4 and 7). Thus, $4\sqrt{10}+7\sqrt{10}=11\sqrt{10}$.

10. Refer back to your answer to Question #4. Add the two radicals by only adding the coefficients. The radicand should stay the same.

① Simplify ② + or − by combining like terms

Follow **all three rules** in order to simplify the expressions below.

11. $2\sqrt{15}+7\sqrt{15}$ → $9\sqrt{15}$

12. $20\sqrt{3}-4\sqrt{27}$ → $20\sqrt{3}-4\cdot\sqrt{9}\cdot\sqrt{3}$ → $20\sqrt{3}-4\cdot3\cdot\sqrt{3}$ → $20\sqrt{3}-12\sqrt{3}$ → $8\sqrt{3}$

13. $17\sqrt{8}+5\sqrt{44}$ → $17\cdot\sqrt{4}\cdot\sqrt{2}+5\cdot\sqrt{4}\cdot\sqrt{11}$ → $17\cdot2\cdot\sqrt{2}+5\cdot2\cdot\sqrt{11}$ → $34\sqrt{2}+10\sqrt{11}$

Math 1
Notes on Adding and Subtracting Radicals Name _____

Standards Addresssed: MM1A2.
Students will simplify and operate with radical expressions, polynomials, and rational expressions.
a. Simplify algebraic and numeric expressions involving square root.
b. Perform operations with square roots.

In order to add two monomials, the monomials must be _____ _____.

Similarly, in order to add two radicals, the radicals must have the same _____.

For example, one cannot add $3\sqrt{6}$ and $2\sqrt{29}$ because their radicands are different.

When adding two monomials, you **only** add the _____.

The same rule applies for adding two radicals!

To add $3\sqrt{2}$ and $8\sqrt{2}$, one adds the numbers on the outside only to get $11\sqrt{2}$.

The Rules for Adding and Subtracting Radicals

Rule #1 - When adding or subtracting two radicals, you must *simplify the radicands first*.

Rule #2 - In order to add or subtract two radicals, they must have the *same radicand*.

Rule #3 - When adding or subtracting two radicals, *you only add the coefficients*. The radicand remains the same.

Simplify.

$10\sqrt{19}-7\sqrt{17}$ $8\sqrt{7}-12\sqrt{7}$ $3\sqrt{6}+5\sqrt{24}$

11

① Simplify

② add or subtract by combining like terms

Perfect Squares:

4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

Multiplying Radicals

① outside · outside
② inside · inside
③ simplify

Adding/Subtracting Radicals

① simplify
② + or − to combine like terms/radicals

Example 1: $3x^1(2x^1-4)$

$6x^2-12x$

① distribute (multiply)

Example 2: $2\sqrt{3}(-4\sqrt{8}+6\sqrt{2})$

① distribute (multiply)
② simplify

$-8\sqrt{24}+12\sqrt{6}$

$-8\cdot\sqrt{4}\cdot\sqrt{6}+12\sqrt{6}$

$-8\cdot2\cdot\sqrt{6}+12\sqrt{6}$

$-16\sqrt{6}+12\sqrt{6}$

$-4\sqrt{6}$

example 3: $4\sqrt{2}(6\sqrt{7}-1\sqrt{20})$

$24\sqrt{14}-4\sqrt{40}$

$24\sqrt{14}-4\cdot\sqrt{4}\cdot\sqrt{10}$

$24\sqrt{14}-4\cdot2\cdot\sqrt{10}$

$24\sqrt{14}-8\sqrt{10}$