Name: _____ Date: _____

SQUARE ROOT ARITHMETIC REVIEW
ALGEBRA 2 WITH TRIGONOMETRY

In your first course on algebra, you learned a variety of arithmetic involving square roots. The most important properties of square roots are outlined below.

SQUARE ROOT PROPERTIES

For any two positive real numbers *a* and *b*, the following are true:

(1) $\sqrt{a}\cdot\sqrt{b}=\sqrt{a\cdot b}$ and equivalently $\sqrt{a\cdot b}=\sqrt{a}\cdot\sqrt{b}$ (2) $\dfrac{\sqrt{a}}{\sqrt{b}}=\sqrt{\dfrac{a}{b}}$ and equivalently $\sqrt{\dfrac{a}{b}}=\dfrac{\sqrt{a}}{\sqrt{b}}$

(3) In general $\sqrt{a}+\sqrt{b}\neq\sqrt{a+b}$

***Exercise* #1:** The first square root property allows us to write square root expressions in **simplest radical form** by factoring out any rational factors of the square root. Write each of the following expressions in their simplest radical form.

(a) $\sqrt{48}$ (b) $\sqrt{200}$ (c) $5\sqrt{18}$ (d) $\dfrac{\sqrt{72}}{2}$

***Exercise* #2:** Which of the following is equivalent to the product $\left(\sqrt{12}-4\right)\left(\sqrt{3}+3\right)$?

(1) $2\sqrt{3}-6$ (3) $3\sqrt{2}+7$

(2) $2\sqrt{6}-1$ (4) $3\sqrt{6}-1$

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***Exercise* #3:** Which of the following is equivalent to $\left(\sqrt{8}-2\right)^2$?

(1) $4-8\sqrt{2}$ (3) 62

(2) $12-8\sqrt{2}$ (4) 4

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Generally speaking, it is only possible to combine square root expressions when they contain the same radicand (the number under the square root). When two square root expressions do contain the same radicand, then summing them is equivalent to combining like terms.

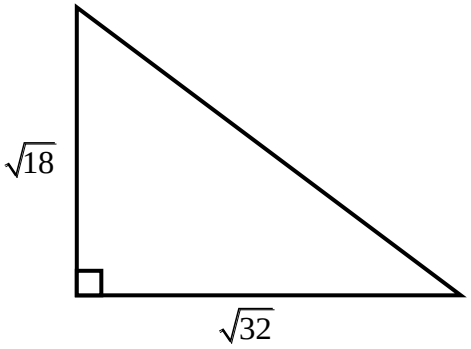
***Exercise* #4:** Write each of the following sums in simplest radical form.

(a) $\sqrt{27}+\sqrt{75}$

(b) $\sqrt{50}+7\sqrt{8}+\frac{2}{3}\sqrt{162}$

***Exercise* #5:** Consider the right triangle shown below that has leg lengths of $\sqrt{18}$ and $\sqrt{32}$.

(a) Determine the length of the triangle's hypotenuse in simplest radical form.



(b) Determine the perimeter of the triangle in simplest radical form.

***Exercise* #6:** Which of the following would be equivalent to $\left(\left(2-\sqrt{3}\right)\left(2+\sqrt{3}\right)\right)^2$?

(1) 1

(2) 49

(3) $8-4\sqrt{3}$

(4) $5+2\sqrt{3}$

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SQUARE ROOT ARITHMETIC REVIEW
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Write each of the following in *simplest radical form*.

(a) $\sqrt{75}$ (b) $2\sqrt{18}$ (c) $\frac{\sqrt{8}}{2}$ (d) $\frac{5}{3}\sqrt{27}$

2. If the product $7\sqrt{500}$ was written in simplest $a\sqrt{b}$ form, then the value of *a* would be

(1) 35 (3) 70

(2) 700 (4) 21

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3. The radius of the circle whose equation is $x^2 + y^2 = 50$ is which of the following?

(1) $10\sqrt{2}$ (3) 25

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

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4. Which of the following is the hypotenuse of a right triangle whose legs measure 4 and 6?

(1) $5\sqrt{7}$ (3) $2\sqrt{13}$

(2) $6\sqrt{17}$ (4) $4\sqrt{6}$

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5. Which of the following is equivalent to the expression $\left(\sqrt{2} - \sqrt{6}\right)$ after it has been squared?

(1) $8 - 4\sqrt{3}$ (3) -4

(2) $4\sqrt{2}$ (4)

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6. Find each of the following products in *simplest radical form*.

(a) $\left(3 - \sqrt{5}\right)\left(3 + \sqrt{5}\right)$ (b) $\left(\sqrt{2} + 7\right)\left(\sqrt{2} - 7\right)$ (c) $\left(\sqrt{10} - \sqrt{2}\right)\left(\sqrt{10} + \sqrt{2}\right)$

7. Which of the following is equivalent to $\sqrt{48}+2\sqrt{108}$?

(1) $3\sqrt{156}$ (3) $24\sqrt{2}$

(2) $2\sqrt{156}$ (4) $16\sqrt{3}$

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8. In simplest form, the perimeter of an equilateral triangle whose side length is $\sqrt{50}$ is

(1) $15\sqrt{2}$ (3) $75\sqrt{2}$

(2) $5\sqrt{6}$ (4) $15\sqrt{6}$

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9. The sum $\frac{2}{3}\sqrt{162}+\frac{5}{2}\sqrt{128}$ is equal to

(1) $\frac{7}{5}\sqrt{290}$ (3) $26\sqrt{2}$

(2) $51\sqrt{2}$ (4) $\frac{19}{6}\sqrt{290}$

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10. When $\sqrt{80}$ is subtracted from $\sqrt{45}$ the result is

(1) $-\sqrt{5}$ (3) $-\sqrt{35}$

(2) $\sqrt{5}$ (4) $7\sqrt{5}$

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APPLICATIONS

11. Consider an equilateral triangle whose side lengths are each equal to 8 inches shown below. Determine the area of the equilateral triangle in simplest radical form. First, find the height of the equilateral triangle by using the Pythagorean Theorem on ½ of the equilateral triangle.