

Assignment

1. Simplify.

$$\text{a) } \frac{\sqrt{50}}{\sqrt{5}} \\ \sqrt{10}$$

$$\text{b) } \frac{\sqrt{35}}{\sqrt{7}} \\ \sqrt{5}$$

$$\text{c) } \frac{\sqrt[3]{39}}{\sqrt[3]{3}} \\ \sqrt[3]{13}$$

$$\text{d) } \frac{\sqrt{28}}{\sqrt{7}} \\ 2$$

$$\text{e) } \frac{\sqrt{ab}}{\sqrt{b}} \\ \sqrt{a}$$

$$\text{f) } \frac{8\sqrt{42}}{2\sqrt{6}} \\ 4\sqrt{7}$$

$$\text{g) } \frac{25\sqrt{88}}{5\sqrt{8}} \\ 5\sqrt{11}$$

$$\text{h) } \frac{12\sqrt[4]{51}}{-6\sqrt[4]{17}} \\ -2\sqrt[4]{3}$$

$$\text{i) } \frac{4\sqrt{50}}{8\sqrt{10}} \\ \frac{\sqrt{5}}{2} \\ \text{or } \frac{1}{2}\sqrt{5}$$

$$\text{j) } \frac{6\sqrt{xy^2}}{15\sqrt{xy}} \\ \frac{2\sqrt{y}}{5} \text{ or } \frac{2}{5}\sqrt{y}$$

2. Simplify.

$$\text{a) } \frac{\sqrt{270}}{\sqrt{10}} \\ \sqrt{27} \\ 9 \cdot 3$$

$$\text{b) } \frac{\sqrt{90}}{\sqrt{5}} \\ \sqrt{18} \\ 9 \cdot 2$$

$$\text{c) } \frac{\sqrt{96}}{4\sqrt{3}} \\ \frac{1}{4}\sqrt{32} \\ 16 \cdot 2$$

$$\text{d) } \frac{3\sqrt{200}}{2\sqrt{5}} \\ \frac{3}{2}\sqrt{40} \\ 4 \cdot 10$$

$$\text{e) } \frac{4\sqrt[3]{144}}{\sqrt[3]{9}} \\ 4\sqrt[3]{16} \\ 8 \cdot 2$$

$$3\sqrt{3}$$

$$2\sqrt{2}$$

$$\frac{1}{4}(4)\sqrt{2} \\ \sqrt{2}$$

$$\frac{3}{2}(4)\sqrt{10} \\ 6\sqrt{10}$$

$$4(2)\sqrt[3]{2} \\ 8\sqrt[3]{2}$$

3. Simplify.

$$\text{a) } \frac{2\sqrt{150}}{\sqrt{8}} \\ 25 \cdot 6 \\ 4 \cdot 2$$

$$\text{b) } \frac{4\sqrt{90}}{\sqrt{72}} \\ 9 \cdot 10 \\ 36 \cdot 2$$

$$\text{c) } \frac{3\sqrt{240}}{\sqrt{108}} \\ 16 \cdot 15 \\ 36 \cdot 3$$

$$\text{d) } \frac{18\sqrt{24}}{\sqrt{162}} \\ 4 \cdot 6 \\ 81 \cdot 2$$

$$\text{e) } \frac{3\sqrt[3]{32}}{2\sqrt[3]{216}} \\ 8 \cdot 4$$

$$\frac{2(5)\sqrt{6}}{2\sqrt{2}}$$

$$\frac{4(3)\sqrt{10}}{6\sqrt{2}}$$

$$\frac{3(4)\sqrt{15}}{6\sqrt{3}}$$

$$\frac{18(2)\sqrt{6}}{9\sqrt{2}}$$

$$\frac{3(2)\sqrt[3]{4}}{2(6)}$$

$$5\sqrt{3}$$

$$2\sqrt{5}$$

$$2\sqrt{5}$$

$$4\sqrt{3}$$

$$\frac{\sqrt[3]{4}}{2}$$

$$\text{or } \frac{1}{2}\sqrt[3]{4}$$

4. Simplify.

$$\text{a) } \frac{\sqrt{35} - \sqrt{21}}{\sqrt{7}}$$

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

$$\text{b) } \frac{9\sqrt{20} - 3\sqrt{10}}{3\sqrt{2}}$$

$$3\sqrt{10} - \sqrt{5}$$

$$\text{c) } \frac{8\sqrt{42} + 12\sqrt{75}}{4\sqrt{3}}$$

$$2\sqrt{14} + 3\sqrt{25}$$

$$2\sqrt{14} + 15$$

$$\text{d) } \frac{8\sqrt{20} + 10\sqrt{125}}{2\sqrt{5}}$$

$$4\sqrt{4} + 5\sqrt{25}$$

$$4(2) + 5(5)$$

$$8 + 25$$

$$33$$

$$\text{e) } \frac{\sqrt{75} + \sqrt{48} - \sqrt{27}}{\sqrt{3}}$$

$$\sqrt{25} + \sqrt{16} - \sqrt{9}$$

$$5 + 4 - 3$$

$$6$$

$$\text{f) } \frac{\sqrt{90} + 2\sqrt{40} - \sqrt{160}}{\sqrt{5}}$$

$$\sqrt{18} + 2\sqrt{8} - \sqrt{32}$$

$$9 \cdot 2 \quad 4 \cdot 2 \quad 16 \cdot 2$$

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

$$3\sqrt{2} + 4\sqrt{2} - 4\sqrt{2}$$

$$3\sqrt{2}$$

5. Simplify by rationalizing the denominator.

$$\text{a) } \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{\sqrt{2}}{2} \text{ or } \frac{1}{2}\sqrt{2}$$

$$\text{b) } \frac{6}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$$

$$\frac{6\sqrt{6}}{\sqrt{6}}$$

$$\text{c) } \frac{\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$\frac{\sqrt{15}}{3} \text{ or } \frac{1}{3}\sqrt{15}$$

$$\text{d) } \frac{\sqrt{3}}{-\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\frac{\sqrt{6}}{-2} \text{ or } -\frac{1}{2}\sqrt{6}$$

$$\text{e) } \frac{\sqrt{10}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$$

$$\frac{\sqrt{70}}{7} \text{ or } \frac{1}{7}\sqrt{70}$$

$$\text{f) } \frac{\sqrt{12}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$\frac{\sqrt{60}}{5} \quad 4 \cdot 1.5$$

$$\frac{2\sqrt{15}}{5}$$

$$\text{g) } \frac{2}{5\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$$

$$\frac{2\sqrt{6}}{5(6)} = \frac{\sqrt{6}}{15}$$

$$\text{h) } \frac{\sqrt{32}}{\sqrt{18}} \cdot \frac{\sqrt{18}}{\sqrt{18}}$$

$$\frac{\sqrt{576}}{18} = \frac{24}{18} = \frac{4}{3}$$

$$\text{i) } \frac{5}{\sqrt{50}} \cdot \frac{\sqrt{50}}{\sqrt{50}}$$

$$\frac{5\sqrt{50}}{50} \quad 25 \cdot 2$$

$$\frac{25\sqrt{2}}{50} \quad \frac{\sqrt{2}}{2}$$

$$\text{j) } \frac{14}{\sqrt{98}} \cdot \frac{\sqrt{98}}{\sqrt{98}}$$

$$\frac{14\sqrt{98}}{98} \quad 49 \cdot 2$$

$$\frac{98\sqrt{2}}{98} \quad \sqrt{2}$$

$$\text{k) } \frac{-2}{\sqrt{88}} \cdot \frac{\sqrt{88}}{\sqrt{88}}$$

$$\frac{-2\sqrt{88}}{88} \quad 4 \cdot 22$$

$$\frac{-4\sqrt{22}}{88} = \frac{-\sqrt{22}}{11}$$

$$\text{l) } \frac{3\sqrt{500}}{-\sqrt{27}} \cdot \frac{\sqrt{27}}{\sqrt{27}}$$

$$\frac{3\sqrt{13500}}{-27} \quad 900 \cdot 15$$

$$\frac{3(30)\sqrt{15}}{-27} = \frac{-10}{3}\sqrt{15}$$

6. Simplify.

a) $\sqrt{\frac{27}{10}}$

$= \frac{\sqrt{27}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$
 $\frac{\sqrt{270}}{10} \cdot 3$
 $\frac{3\sqrt{30}}{10}$

b) $\frac{5\sqrt{14}}{\sqrt{70}} \cdot \frac{\sqrt{70}}{\sqrt{70}}$

$\frac{5\sqrt{980}}{70} \cdot 16.5$
 $\frac{5(14)\sqrt{5}}{70}$
 $\frac{\sqrt{5}}{2}$

c) $\sqrt{\frac{243}{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{\sqrt{243}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$
 $\frac{\sqrt{486}}{2} \cdot 1.6$
 $\frac{9\sqrt{6}}{2}$

d) $\frac{20\sqrt{12}}{12\sqrt{20}} \cdot \frac{\sqrt{20}}{\sqrt{20}}$

$\frac{20\sqrt{40}}{12(20)} \cdot 16.15$
 $\frac{4\sqrt{5}}{12}$ $\frac{\sqrt{5}}{3}$

7. Express the following with rational denominators.

a) $\frac{(\sqrt{7} - \sqrt{2})\sqrt{2}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\frac{\sqrt{14} - 2}{2}$

b) $\frac{(\sqrt{3} + 2\sqrt{2})\sqrt{3}}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$\frac{3 + 2\sqrt{6}}{2(3)}$
 $\frac{3 + 2\sqrt{6}}{6}$

c) $\frac{(\sqrt{5} + \sqrt{2})\sqrt{6}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$

$\frac{\sqrt{30} + \sqrt{12}}{6} \cdot 1.3$
 $\frac{\sqrt{30} + 2\sqrt{3}}{6}$

8. a) Students are asked to simplify the radical expression $\frac{6\sqrt{40} - 8\sqrt{20}}{2\sqrt{5}}$.

Erica decides to simplify the expression by rationalizing the denominator, whereas Jaclyn divides each term in the numerator by the denominator. Determine the simplification by each method, and state which method you prefer.

omit
 ☺

b) Without doing the simplification, explain why Jaclyn's method would be more difficult if the radical expression was $\frac{6\sqrt{40} - 8\sqrt{20}}{2\sqrt{7}}$.

9. Simplify and express in lowest terms.

a) $\frac{(10\sqrt{18} - 5\sqrt{24}) \cdot \frac{\sqrt{5}}{\sqrt{5}}}{\sqrt{5}}$

$$\frac{10\sqrt{90} - 5\sqrt{120}}{\sqrt{5}} = \frac{10(3)\sqrt{10} - 5(2)\sqrt{30}}{\sqrt{5}} = \frac{30\sqrt{10} - 10\sqrt{30}}{\sqrt{5}} = 6\sqrt{10} - 2\sqrt{30}$$

b) $\frac{(15\sqrt{18} - 3\sqrt{242}) \cdot \frac{\sqrt{8}}{\sqrt{8}}}{-3\sqrt{8}}$

$$\frac{15\sqrt{144} - 3\sqrt{1936}}{-3(8)} = \frac{15(12) - 3(44)}{-24} = \frac{180 - 132}{-24} = -2$$

10. A rectangular garden has length $3\sqrt{6}$ metres and area $(9\sqrt{2} - 6\sqrt{3})$ square meters.

$A = lw$
 $w = \frac{A}{l}$

a) Write and simplify an expression for the width of the garden.

$$w = \frac{(9\sqrt{2} - 6\sqrt{3}) \cdot \frac{\sqrt{6}}{\sqrt{6}}}{3\sqrt{6}} = \frac{9\sqrt{12} - 6\sqrt{18}}{3(6)} = \frac{9(2)\sqrt{3} - 6(3)\sqrt{2}}{18} = \frac{18\sqrt{3} - 18\sqrt{2}}{18} = \sqrt{3} - \sqrt{2}$$

b) Determine the perimeter of the garden to the nearest tenth of a metre.

$$P = 2l + 2w = 2(3\sqrt{6}) + 2(\sqrt{3} - \sqrt{2}) = 6\sqrt{6} + 2\sqrt{3} - 2\sqrt{2} = 15.3 \text{ m}$$

11. A triangle has an area of $(3\sqrt{288} - 2\sqrt{12})$ square metres with a base of $3\sqrt{2}$ metres.

Express the height of the triangle

a) as an exact value in simplest form b) as a decimal to the nearest 0.01 m.

$A = \frac{bh}{2}$
 $h = \frac{2A}{b}$

$$h = \frac{2(3\sqrt{288} - 2\sqrt{12})}{3\sqrt{2}} = \frac{6\sqrt{288} - 4\sqrt{12}}{3\sqrt{2}} = \frac{(72\sqrt{2} - 8\sqrt{3}) \cdot \frac{\sqrt{2}}{\sqrt{2}}}{3\sqrt{2}} = \frac{72(2) - 8\sqrt{6}}{3(2)} = \frac{144 - 8\sqrt{6}}{6} = \frac{72 - 4\sqrt{6}}{3}$$

this is a big # so I simplified first

b) 20.73 m

Multiple Choice

12. Without using technology, determine which of the following expressions is not equivalent to the others.

- A. $\frac{36}{\sqrt{48}} \cdot \frac{\sqrt{48}}{\sqrt{48}}$
 - B. $(\sqrt{3})^3 \cdot 3\sqrt{3}$
 - C. $\sqrt{192} - \sqrt{75}$
 - D. $\frac{\sqrt{54}}{\sqrt{3}} = \sqrt{9} = 3$
- Handwritten work for A: $\frac{36\sqrt{48}}{48} = \frac{36(4)\sqrt{3}}{48} = 3\sqrt{3}$

13. $\frac{2 + \sqrt{8}}{2}$ can be simplified to
- A. $1 + \sqrt{8}$
 - B. $1 + \sqrt{6}$
 - C. $1 + \sqrt{4}$
 - D. $1 + \sqrt{2}$
- Handwritten work: $\frac{2 + 2\sqrt{2}}{2} = 1 + \sqrt{2}$

14. If $\frac{\sqrt{10} \times \sqrt{12}}{\sqrt{6}} = 2\sqrt{t}$, then t is equal to
- A. $\sqrt{5}$
 - B. $\sqrt{10}$
 - C. 5
 - D. 10
- Handwritten work: $\frac{\sqrt{10} \cdot \sqrt{12}}{\sqrt{6}} = \frac{\sqrt{20}}{\sqrt{6}} = \frac{\sqrt{10 \cdot 2}}{\sqrt{6}} = \frac{\sqrt{10} \cdot \sqrt{2}}{\sqrt{6}} = \frac{\sqrt{10} \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{3}} = \frac{\sqrt{10}}{\sqrt{3}} = 2\sqrt{t}$

Numerical Response

15. The expression $\frac{1}{\sqrt{27}} - \frac{5\sqrt{3}}{4\sqrt{24}}$ can be written in the form $a\sqrt{3} - b\sqrt{2}$, $a, b > 0$. To the nearest hundredth, the value of b is ____.

(Record your answer in the numerical response box from left to right.)

0	.	3	1
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① simplify

② LCD: $3\sqrt{3} + 8\sqrt{6}$

$$\frac{1}{\sqrt{27}} - \frac{5\sqrt{3}}{4\sqrt{24}} = \frac{1(8\sqrt{6}) - 5\sqrt{3}(3\sqrt{3})}{(3\sqrt{3})(8\sqrt{6})} = \frac{8\sqrt{6} - 45}{24\sqrt{18}}$$

$$= \frac{(8\sqrt{6} - 45) \cdot \sqrt{2}}{72\sqrt{2}} = \frac{8\sqrt{12} - 45\sqrt{2}}{72}$$

$$= \frac{16\sqrt{3} - 45\sqrt{2}}{144} \text{ or } \frac{16}{144}\sqrt{3} - \frac{45}{144}\sqrt{2}$$

Handwritten notes: $\frac{1}{9 \cdot 3}$, $\frac{5\sqrt{3}}{4 \cdot 6}$, $\frac{1}{3\sqrt{3}} - \frac{5\sqrt{3}}{8\sqrt{6}}$, $\frac{8\sqrt{6} - 15(3)}{24\sqrt{18} \cdot 9.2}$, $\frac{8\sqrt{6} - 45}{72\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$, $\frac{8\sqrt{12} - 45\sqrt{2}}{72(2)}$

$b = 0.3125$

16. When the equation $\sqrt{2} + a\sqrt{5} = \sqrt{72}$ is solved for a , the solution is $a = \sqrt{t}$, where $t \in W$. The value of t is _____.

(Record your answer in the numerical response box from left to right.)

1	0		
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$$\sqrt{2} + a\sqrt{5} = \sqrt{72}$$

$$a = \frac{\sqrt{72} - \sqrt{2}}{\sqrt{5}}$$

$$= \frac{6\sqrt{2} - 1\sqrt{2}}{\sqrt{5}} = \frac{5\sqrt{2}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$= \frac{5\sqrt{10}}{5}$$

$$= \sqrt{10}$$

Answer Key

1. a) $\sqrt{10}$ b) $\sqrt{5}$ c) $\sqrt[3]{13}$ d) 2 e) \sqrt{a}
 f) $4\sqrt{7}$ g) $5\sqrt{11}$ h) $-2\sqrt[4]{3}$ i) $\frac{1}{2}\sqrt{5}$ j) $\frac{2}{5}\sqrt{y}$
2. a) $3\sqrt{3}$ b) $3\sqrt{2}$ c) $\sqrt{2}$ d) $3\sqrt{10}$ e) $8\sqrt[3]{2}$
3. a) $5\sqrt{3}$ b) $2\sqrt{5}$ c) $2\sqrt{5}$ d) $4\sqrt{3}$ e) $\frac{1}{2}\sqrt[3]{4}$
4. a) $\sqrt{5} - \sqrt{3}$ b) $3\sqrt{10} - \sqrt{5}$ c) $2\sqrt{14} + 15$ d) 33 e) 6 f) $3\sqrt{2}$
5. a) $\frac{1}{2}\sqrt{2}$ b) $\sqrt{6}$ c) $\frac{1}{3}\sqrt{15}$ d) $-\frac{1}{2}\sqrt{6}$ e) $\frac{1}{7}\sqrt{70}$ f) $\frac{2}{3}\sqrt{15}$ g) $\frac{1}{13}\sqrt{6}$
 h) $\frac{4}{3}$ i) $\frac{1}{2}\sqrt{2}$ j) $\sqrt{2}$ k) $-\frac{1}{22}\sqrt{22}$ l) $-\frac{10}{3}\sqrt{15}$
6. a) $\frac{3}{10}\sqrt{30}$ b) $\sqrt{5}$ c) $\frac{9}{2}\sqrt{6}$ d) $\frac{1}{3}\sqrt{15}$
7. a) $\frac{\sqrt{14} - 2}{2}$ b) $\frac{3 + 2\sqrt{6}}{6}$ c) $\frac{\sqrt{30} + 2\sqrt{3}}{6}$
8. a) $6\sqrt{2} - 8$ probably Jaclyn's method b) 40 and 20 do not divide exactly by 7
9. a) $6\sqrt{10} - 2\sqrt{30}$ b) -2
10. a) $\sqrt{3} - \sqrt{2}$ meters b) 15.3 metres
11. a) $\frac{72 - 4\sqrt{6}}{3}$ meters b) 20.73 metres 12. D 13. D 14. C

15.

0	.	3	1
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16.

1	0		
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