

## 1.4 Working with Radicals – Worksheet

MCR3U

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**1)** Simplify

a)  $3(4\sqrt{5})$

b)  $\sqrt{5}(-2\sqrt{7})$

c)  $2\sqrt{3}(3\sqrt{2})$

**2)** Express each as a mixed radical in simplest form

a)  $\sqrt{12}$

b)  $\sqrt{147}$

c)  $\sqrt{252}$

**3)** Simplify

a)  $2\sqrt{3} - 5\sqrt{3} + 4\sqrt{3}$

b)  $11\sqrt{5} - 4\sqrt{5} - 5\sqrt{5} - 6\sqrt{5}$

c)  $\sqrt{6} - 4\sqrt{2} + 3\sqrt{6} - \sqrt{2}$

d)  $2\sqrt{10} - \sqrt{10} - 4\sqrt{10} + \sqrt{5}$

**4)** Add or subtract as indicated

a)  $8\sqrt{2} - 4\sqrt{8} + \sqrt{32}$

b)  $\sqrt{20} - 4\sqrt{12} - \sqrt{125} + 2\sqrt{3}$

c)  $5\sqrt{3} - \sqrt{72} + \sqrt{243} + \sqrt{8}$

d)  $\sqrt{44} + \sqrt{88} + \sqrt{99} + \sqrt{198}$

5) Expand and simplify

a)  $5\sqrt{6}(2\sqrt{3})$

b)  $8\sqrt{5}(\sqrt{10})$

c)  $11\sqrt{2}(5\sqrt{3})$

6) Expand and simplify where possible

a)  $3(8 - \sqrt{5})$

b)  $\sqrt{3}(\sqrt{6} - \sqrt{3})$

c)  $8\sqrt{2}(2\sqrt{8} + 3\sqrt{12})$

7) Expand and simplify where possible

a)  $(\sqrt{2} + 5)(\sqrt{2} + 5)$

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

c)  $(1 + \sqrt{5})(1 - \sqrt{5})$

d)  $(4 - 3\sqrt{7})(\sqrt{7} + 1)$

**8) Simplify**

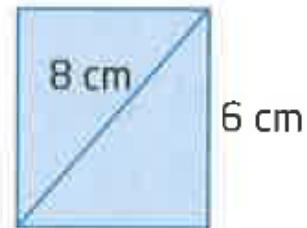
a)  $\frac{1}{4}\sqrt{54} - \frac{1}{4}\sqrt{150}$

b)  $\frac{1}{2}\sqrt{8} + \frac{3}{5}\sqrt{50} - \frac{2}{3}\sqrt{18}$

**9) Find a simplified expression for the area of each shape**

- a) A right triangle with a vertical leg labeled  $\sqrt{6}$  and a horizontal leg labeled  $2\sqrt{3}$ . A right angle symbol is at the vertex where the two legs meet at the bottom-left corner.
- b) A right trapezoid with parallel bases labeled  $5\sqrt{6}$  and  $4\sqrt{3}$ . The height is labeled  $3\sqrt{5}$ . Right angle symbols are at the top-left and bottom-right vertices.
- c) A right trapezoid with parallel bases labeled  $5\sqrt{6}$  and  $4\sqrt{3}$ . The height is labeled  $3\sqrt{5}$ . Right angle symbols are at the top-left and bottom-right vertices.
- d) A circle with a radius drawn to the right, labeled  $\sqrt{2}$ .

**10) Find the area and perimeter of the rectangle shown. Express your answer in simplified radical form.**



**11)** Simplify each of the following

a)  $\frac{21-7\sqrt{6}}{7}$

b)  $\frac{12-\sqrt{48}}{4}$

**Answers**

1) a)  $12\sqrt{5}$  b)  $-2\sqrt{35}$  c)  $6\sqrt{6}$

2) a)  $2\sqrt{3}$  b)  $7\sqrt{3}$  c)  $6\sqrt{7}$

3) a)  $\sqrt{3}$  b)  $-4\sqrt{5}$  c)  $4\sqrt{6} - 5\sqrt{2}$  d)  $-3\sqrt{10} + \sqrt{5}$

4) a)  $4\sqrt{2}$  b)  $-3\sqrt{5} - 6\sqrt{3}$  c)  $14\sqrt{3} - 4\sqrt{2}$  d)  $5\sqrt{11} + 5\sqrt{22}$

5) a)  $30\sqrt{2}$  b)  $40\sqrt{2}$  c)  $55\sqrt{6}$

6) a)  $24 - 3\sqrt{5}$  b)  $3\sqrt{2} - 3$  c)  $64 + 48\sqrt{6}$

7) a)  $27 + 10\sqrt{2}$  b)  $5\sqrt{3} + 5\sqrt{6} + 10\sqrt{2} + 20$  c) -4 d)  $-17 + \sqrt{7}$

8) a)  $-\frac{1}{2}\sqrt{6}$  b)  $2\sqrt{2}$

9) a)  $3\sqrt{2}$  b)  $60\sqrt{2}$  c) 45 d)  $2\pi$

10) area =  $12\sqrt{7}$  cm<sup>2</sup>; perimeter =  $12 + 4\sqrt{7}$  cm

11) a)  $3 - \sqrt{6}$  b)  $3 - \sqrt{3}$