Assignment

1. State whether each statement is true or false.

   a) $\sqrt{20} - \sqrt{5} = \sqrt{15}$ F

   b) $\sqrt{6} \times \sqrt{7} = \sqrt{42}$ T

   c) $\dfrac{\sqrt{12}}{\sqrt{2}} = \sqrt{6}$ T

   d) $\sqrt{36 + 9} = \sqrt{36} + \sqrt{9}$ F

2. State whether the following are true or false.

   a) The square roots of 36 are ± 6.   T

   b) The cube roots of 27 are ± 3.   F

   c) $\sqrt{36} = \pm 6$ T

   d) $\sqrt[3]{27} = \pm 3$ F

   e) If $x^2 = 36, x \in R$, then $x = \pm 6$.   T

   f) If $x^3 = 27, x \in R$, then $x = \pm 3$.   F

3. Without using a calculator, determine, where possible, the exact value of the following.

   a) $\sqrt{81}$ 9

   b) $\sqrt{-100}$ Not poss

   c) $\sqrt[3]{-64}$ -4

   d) $\sqrt[5]{100\,000}$ 10

   e) $\sqrt[4]{\dfrac{81}{16}}$ $\dfrac{\sqrt[4]{81}}{\sqrt[4]{16}} = \dfrac{3}{2}$

   f) $\sqrt[4]{-16}$ not poss.

4. Without using a calculator, arrange the following radicals in order from least to greatest.

   $4\sqrt[5]{1}$, $-2\sqrt[3]{-27}$, $\dfrac{3}{2}\sqrt[4]{16}$, $4\sqrt{\sqrt[3]{64}}$

   $4(1)$ $(-2)(-3)$ $\dfrac{3}{2}(2)$ $4(4)$

   4 6 3 16

   ②   ③   ①   ④

5. Use a calculator to arrange the following radicals in order from least to greatest.

   $\sqrt{10}$, $\sqrt[3]{-729}$, $\sqrt[5]{-243}$, $\sqrt[4]{4.096}$, $\sqrt[5]{25}$, $\sqrt[6]{242}$

   ⑤   ①   ②   ⑥   ③   ④

6. Convert the following radicals to mixed radicals in simplest form.

a) $\sqrt{50}$

$25 \cdot 2$

$5\sqrt{2}$

b) $\sqrt{60}$

$4 \cdot 15$

$2\sqrt{15}$

c) $\sqrt[3]{54}$

$27 \cdot 2$

$3\sqrt[3]{2}$

d) $\frac{1}{2}\sqrt{320}$

$64 \cdot 5$

$\frac{1}{2} \cdot 8\sqrt{5}$

$4\sqrt{5}$

e) $\sqrt[3]{3\,000}$

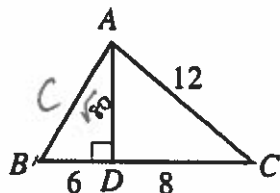$1000 \cdot 3$

$10\sqrt[3]{3}$

f) $\sqrt[3]{-81}$

$-27 \cdot 3$

$-3\sqrt[3]{3}$

g) $-5\sqrt[4]{162}$

$81 \cdot 2$

$-5 \cdot 3\sqrt[4]{2}$

$-15\sqrt[4]{2}$

h) $\sqrt[5]{-160}$

$-32 \cdot 5$

$-2\sqrt[5]{5}$

7. Use the Pythagorean Theorem to determine the exact length of AB.
Express the answer as   a) an exact value in simplest mixed radical form
                          b) a decimal to the nearest hundredth

$AD - \ '12^2 - 8^2 = \sqrt{80}$

$AB = 10.77$

$\sqrt{80}^2 + 6^2 = C^2$

$80 + 36 = C^2$

$\sqrt{116} = C$

$= \sqrt{116}$

1.29

a) $\boxed{2\sqrt{29}}$

b) 10.77

Do not use a calculator to answer question #8.

8. Given that $\sqrt{5}$ is approximately equal to 2.24, and $\sqrt{50}$ is approximately equal to 7.07, then find the approximate value of

a) $\sqrt{500}$ b) $\sqrt{5\,000}$ c) $\sqrt{20}$ d) $\sqrt{0.05}$ e) $\sqrt{0.5}$

9. Determine the exact distance between the following pairs of points.
Answer as a mixed radical in simplest form.

a) $(-3, 8)$ and $(-1, 4)$ b) $(3, 2)$ and $(-3, -4)$ c) $(15, 8)$ and $(9, 20)$

10. Convert the following mixed radicals to entire radicals.

a) $7\sqrt{5}$

$\sqrt{7^2 \cdot 5}$

$\sqrt{245}$

b) $2\sqrt[3]{4}$

$\sqrt[3]{2^3 \cdot 4}$

$\sqrt[3]{32}$

c) $-2\sqrt[4]{3}$

$-\sqrt[4]{2^4 \cdot 3}$

$-\sqrt[4]{48}$

d) $-10\sqrt[3]{7}$

$-\sqrt[3]{10^3 \cdot 7} = -\sqrt[3]{7000}$

or

$\sqrt[3]{-7000}$

e) $8\sqrt{10}$

$\sqrt{8^2 \cdot 10}$

$\sqrt{640}$

f) $\frac{1}{3}\sqrt[3]{9}$

$\sqrt[3]{\left(\frac{1}{3}\right)^3 \cdot 9} = \sqrt[3]{\frac{1}{3}}$

11. Without using a calculator, arrange the following radicals in order from greatest to least.

$3\sqrt{5}$, $5\sqrt{3}$, $\sqrt{60}$, $2\sqrt{11}$, $\frac{1}{3}\sqrt{450}$

→ convert to entire radical.

$\sqrt{45}$ $\sqrt{75}$ $\sqrt{44}$ $\sqrt{50}$

④   ①   ②   ⑤   ③

12. Consider the radicals $3\sqrt[3]{10}$, $4\sqrt[3]{3}$, $5\sqrt[3]{2}$, $2\sqrt[3]{31}$.

a) **Explain** how to arrange the radicals in order from least to greatest without using a calculator.

convert to entire radical, the largest radicand will be largest number

b) Arrange the radicals in order from least to greatest without using a calculator.

$3\sqrt[3]{10}$ $4\sqrt[3]{3}$ $5\sqrt[3]{2}$ $2\sqrt[3]{31}$

$=\sqrt[3]{3^3 \cdot 10}$ $\sqrt[3]{4^3 \cdot 3}$ $\sqrt[3]{5^3 \cdot 2}$ $\sqrt[3]{2^3 \cdot 31}$

$=\sqrt[3]{270}$ $\sqrt[3]{192}$ $\sqrt[3]{250}$ $\sqrt[3]{248}$
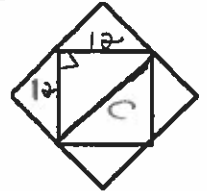
④   ①   ③   ②

Multiple Choice **13.** Without using a calculator, determine which of the following radicals is not equal to the others.

$\sqrt{192}$

   A. $8\sqrt{3}$ **B.** $\sqrt{192}$

   C. $3\sqrt{24}$ **D.** $4\sqrt{12}$

   $\sqrt{216}$ $\sqrt{192}$

Numerical Response **14.** The smaller square has side length 12 cm. The side length of the larger square can be written in simplest mixed radical form as $a\sqrt{b}$, where $a, b \in N$.

The value of b^a is ____.   diameter = side length

$12^2 + 12^2 = c^2$

$288 = c^2$

$c = \sqrt{288} = 12\sqrt{2}$
      $144 \cdot 2$ a   b

$2^{12} = 4096$

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

4	0	9	6

$\sqrt[3]{} = S$

15. The volume of an ice cube is 32 000 mm³. The exact length of each edge of the ice cube can be written in simplest mixed radical form as $p\sqrt[3]{q}$ where p and q are whole numbers.

The value of $p - q$ is _____.

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

1	6		

$\sqrt[3]{32000} = 20\sqrt[3]{4}$
$8000 \cdot 4$ p   q $20 - 4$
                                                p   q

Answer Key

1. a) false   b) true   c) true   d) false
2. a) true   b) false   c) false   d) false   e) true   f) false

3. a) 9   b) not possible   c) −4   d) 10   e) $\dfrac{3}{2}$ f) not possible

4. $\dfrac{3}{2}\sqrt[4]{16}, 4\sqrt[5]{1}, -2\sqrt[3]{-27}, 4\sqrt{\sqrt[3]{64}}$ 5. $\sqrt[3]{-729}, \sqrt[5]{-243}, \sqrt[5]{25}, \sqrt[6]{242}, \sqrt{10}, \sqrt[4]{4096}$

6. a) $5\sqrt{2}$ b) $2\sqrt{15}$ c) $3\sqrt[3]{2}$ d) $4\sqrt{5}$ e) $10\sqrt[3]{3}$ f) $-3\sqrt[3]{3}$ g) $-15\sqrt[4]{2}$ h) $-2\sqrt[5]{5}$
7. a) $2\sqrt{29}$ b) 10.77   8. a) 22.4   b) 70.7   c) 4.48   d) 0.224   e) 0.707

9. a) $2\sqrt{5}$ b) $6\sqrt{2}$ c) $6\sqrt{5}$

10. a) $\sqrt{245}$ b) $\sqrt[3]{32}$ c) $-\sqrt[4]{48}$ d) $-\sqrt[3]{7000}$ or $\sqrt[3]{-7000}$ e) $\sqrt{640}$ f) $\sqrt[3]{\dfrac{1}{3}}$

11. $5\sqrt{3}, \sqrt{60}, \dfrac{1}{3}\sqrt{450}, 3\sqrt{5}, 2\sqrt{11}$

12. a) Write each mixed radical as an entire radical and compare the radicands. The new radicands are determined by cubing the original coefficients and multiplying by the original radicands.
    b) $4\sqrt[3]{3}, 2\sqrt[3]{31}, 5\sqrt[3]{2}, 3\sqrt[3]{10}$

13. C   14. | 4 | 0 | 9 | 6 | 15. | 1 | 6 | | |