Operations on Radicals Lesson #6:
Practice Test

1. $2\sqrt[3]{7}$, written as an entire radical, is

A. $\sqrt[3]{56}$ **B.** $\sqrt[3]{98}$
C. $\sqrt[3]{686}$ **D.** $\sqrt[3]{2744}$

$\sqrt[3]{2^3 \cdot 7}$
$\sqrt[3]{8 \cdot 7}$

2. Consider the following numbers. $10\sqrt{6}$, $4\sqrt{15}$, $7\sqrt{10}$, $12\sqrt{5}$

$\sqrt{6000}$

If the numbers are ranked from largest to smallest, which is the second largest value?

A. $12\sqrt{5}$

B. $4\sqrt{15}$

C. $7\sqrt{10}$

D. $10\sqrt{6}$

3. Consider the following statements
***Statement* 1** : $\sqrt{96} = 4\sqrt{6}$ ***Statement* 2** : $7\sqrt{2} = 98$ F

$\sqrt{98} = 7\sqrt{2}.$

***Statement* 3** : $24 = 4\sqrt{6}$ X

Which of the these statements is true?

A. 1 only **B.** 1 and 2 only
C. 1, 2, and 3 **D.** some other combination of 1, 2 and 3

4. When $3\sqrt{80} + 4\sqrt{405}$ is written in the form $k\sqrt{5}$, the value of k is

A. 7
B. 48
C. 92
D. 372

$3\sqrt{80} + 4\sqrt{405}$
$16 \cdot 5 \quad 81 \cdot 5$
$12\sqrt{5} + 36\sqrt{5}$
$48\sqrt{5}$

5. The exact value of $\left(4\sqrt{11}\right)^2$ is the whole number w.
The value of w is

A. 44 **B.** 176
C. 484 **D.** 1936

$(4\sqrt{11})(4\sqrt{11})$
$16(11)$

Numerical Response **1.** The expression $\sqrt{2}\left(\sqrt{5} - 12\sqrt{3}\right) - \sqrt{3}\left(\sqrt{8} - 2\sqrt{30}\right)$ can be written in simplest form $a\sqrt{b} - c\sqrt{d}$ where a, b, c, d are all positive integers. The value of $a + b + c + d$ is _____ .

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

3	7		

$\sqrt{10} - 12\sqrt{6} - \sqrt{24} + 2\sqrt{90}$

$4 \cdot 6 \quad 9 \cdot 10$

$1\sqrt{10} - 12\sqrt{6} - 2\sqrt{6} + 6\sqrt{10}$

$\underset{a}{7}\sqrt{\underset{b}{10}} - \underset{c}{14}\sqrt{\underset{d}{6}}$

$7 + 10 + 14 + 6 = 37.$

6. $\left(\sqrt{5}\right)^5$ is equivalent to

A. $5\sqrt{5}$ **B.** $10\sqrt{5}$

C. $25\sqrt{5}$ **D.** $625\sqrt{5}$

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

$5 \cdot 5 \cdot \sqrt{5}$

7. $\sqrt{x}\left(4 - \sqrt{x}\right)$ is equivalent to

A. $4\sqrt{x} - \sqrt{x}$ **B.** $\sqrt{4x} - x$

C. $4\sqrt{x} - x$ **D.** $4\sqrt{x} - 2\sqrt{x}$

$4\sqrt{x} - x$

Numerical Response **2.** $2\sqrt{3}\left(\sqrt{243} - 2\right) - \sqrt{2}\left(5 + 7\sqrt{2}\right)$ can be expanded and simplified to the form $p + q\sqrt{2} + r\sqrt{3}$. The value of $p + q + r$ is _____.

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

3	1		

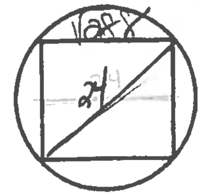
$2\sqrt{729} - 4\sqrt{3} - 5\sqrt{2} - 7(2)$

$54 - 4\sqrt{3} - 5\sqrt{2} - 14$

$\underset{p}{40} - \underset{q}{5}\sqrt{2} - \underset{r}{4}\sqrt{3}$

$40 + (-5) + (-4)$

8. A square is inscribed in a circle as shown. If the area of the circle is 144π cm^2, then the exact perimeter of the square is



A. $12\sqrt{2}$ cm

B. $24\sqrt{2}$ cm

C. $36\sqrt{2}$ cm

D. $48\sqrt{2}$ cm

$A = \pi r^2$

$\frac{144\pi}{\pi} = \frac{\pi r^2}{\pi}$

$144 = r^2$

$12 = r$

if r=12 then d = 24

$a^2+b^2=c^2$

$2a^2 = 24^2$ so $2a^2 = 576$

$a = \sqrt{288}$

$P = 4\sqrt{288}$ (144·2)

$= 48\sqrt{2}$

9. If $2\sqrt[3]{4}\left(3\sqrt[3]{54} - \sqrt[3]{x}\right)$ is equal to 16, then x is equal to

A. 2

B. 4

C. 16

D. 64

$4\sqrt[3]{216} - 2\sqrt[3]{4x} = 16$

$4(6)$

$24 - 2\sqrt[3]{4x} = 16$

$-24 \qquad -24$

$-2\sqrt[3]{4x} = -8$

$\frac{-2\sqrt[3]{4x}}{-2} = \frac{-8}{-2}$

$\left(\sqrt[3]{4x}\right)^3 = 4^3$

$\frac{4x}{4} = \frac{64}{4}$

$x = 16$

10. $5 - 3\sqrt{2}$, multiplied by its conjugate, is

A. -11 **B.** 7

C. 19 **D.** $43 + 6\sqrt{2}$

$25 - 9(2)$

Numerical Response

3. $\left(2\sqrt{12} + \sqrt{24}\right)^2$ can be expressed in simplest form as $a + b\sqrt{c}$. The value of abc is ______.

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

6	9	1	2

$(2\sqrt{12} + \sqrt{24})(2\sqrt{12} + \sqrt{24})$

$4(12) + 2\sqrt{288} + 2\sqrt{288} + 24$

$72 + 4\sqrt{288}$ (144·2)

$72 + 4(12)\sqrt{2}$

$72 + 48\sqrt{2}$

11. Consider the following three equations.

$$3\sqrt[3]{64} = p, \qquad 48\sqrt{p} = q\sqrt{3}, \qquad 40\sqrt[4]{q} = r\sqrt[4]{6}.$$

$12 = p$

Which of the statements below is correct

A. $p<q<r$

B. $p<r<q$

C. $q<r<p$

D. $r<p<q$

$48\sqrt{p} = q\sqrt{3}$

$\frac{48\sqrt{12}}{\sqrt{3}} = \frac{q\sqrt{3}}{\sqrt{3}}$

$48\sqrt{4}$

$48(2) = q$

$q = 96$

$40\sqrt[4]{96} = r\sqrt[4]{6}$

$16 \cdot 6$

$40(2)\sqrt[4]{6}$

$80\sqrt[4]{6}$

$r = 80$

$p<r<q$

12. The first two terms of a geometric sequence are $6\sqrt{2}$ and 12. The third term of the sequence is

A. $12\sqrt{2}$ **B.** $18\sqrt{2}$

C. $24\sqrt{2}$ **D.** $24 - 6\sqrt{2}$

13. If $A = 15\sqrt{48}$ and $B = 6\sqrt{150}$, then $\frac{A}{B}$ is equal to

A. $\frac{18\sqrt{2}}{5}$ **B.** $\sqrt{2}$

C. $\frac{19\sqrt{2}}{42}$ **D.** $2\sqrt{2}$

$\frac{15\sqrt{48}}{6\sqrt{150}} \cdot \frac{\sqrt{150}}{\sqrt{150}}$

$\frac{15\sqrt{7200}}{6(150)}$ $3600 \cdot 2$

$\frac{900\sqrt{2}}{900}$

Numerical Response **14.** If $m * n$ means "$(m+n)$ multiplied by m", then the value of $\sqrt{10} * (\sqrt{5} * \sqrt{2})$ can be written as the sum of a rational number and an irrational number. The rational number is _____.

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

$m+n$

2	0		

$\sqrt{5} * \sqrt{2} = \sqrt{5}(\sqrt{5} + \sqrt{2})$

$= 5 + \sqrt{10}$

$\overset{m}{10} * \overset{n}{(5+\sqrt{10})} = \sqrt{10}\left[\sqrt{10} + (5 + \sqrt{10})\right]$

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

$= 20 + 5\sqrt{10}$

14. $\dfrac{6}{-5\sqrt{3}+1}$, expressed with a rational denominator, is

A. $\dfrac{-15\sqrt{3}+3}{38}$

B. $\dfrac{-15\sqrt{3}+3}{37}$

C. $\dfrac{-15\sqrt{3}-3}{38}$

D. $\dfrac{-15\sqrt{3}-3}{37}$

$$\frac{6}{(-5\sqrt{3}+1)}\cdot\frac{(-5\sqrt{3}-1)}{(-5\sqrt{3}-1)}$$

$$\frac{-30\sqrt{3}-6}{25(3)-1} = \frac{-30\sqrt{3}-6}{74} = \frac{-15\sqrt{3}-3}{37}$$

15. $\dfrac{1}{\sqrt{q}+\sqrt{r}}$ is equivalent to

A. $\dfrac{\sqrt{q}+\sqrt{r}}{q-r}$

B. $\dfrac{\sqrt{q}+\sqrt{r}}{q+r}$

C. $\dfrac{\sqrt{q}-\sqrt{r}}{q-r}$

D. $\dfrac{\sqrt{q}-\sqrt{r}}{q^2-r^2}$

$$\frac{1}{\sqrt{q}+\sqrt{r}}\cdot\frac{\sqrt{q}-\sqrt{r}}{\sqrt{q}-\sqrt{r}}$$

$$\frac{\sqrt{q}-\sqrt{r}}{q-r}$$

Numerical Response **5.** The expression $\dfrac{20\sqrt{5}}{\sqrt{10}} - \dfrac{16}{\sqrt{8}}$ can be expressed in the form $k\sqrt{2}$, where $k \in W$. The value of k is _____.

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

6			

① $\dfrac{20\sqrt{5}}{\sqrt{10}}\cdot\dfrac{\sqrt{10}}{\sqrt{10}}$

$\dfrac{20\sqrt{50}}{10}$

$2\sqrt{50}$ (25·2)

$10\sqrt{2}$

② $\dfrac{16}{\sqrt{8}}\cdot\dfrac{\sqrt{8}}{\sqrt{8}}$

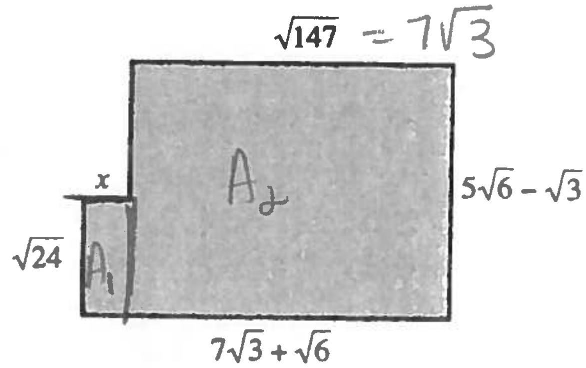
$\dfrac{16\sqrt{8}}{8}$

$2\sqrt{8}$ (4·2)

$4\sqrt{2}$

$10\sqrt{2}-4\sqrt{2} = 6\sqrt{2}$

Written Response - 5 marks



1. Consider the shaded region shown.

- Determine, in simplest radical form, an expression for x.

$x = 7\sqrt{3}+\sqrt{6} - \sqrt{147}$ ($49 \cdot 3$)

$7\sqrt{3}+\sqrt{6} - 7\sqrt{3}$

$x = \sqrt{6}$

- Show that the area of the shaded region is equal to $105\sqrt{2} - 9$.

$A_1 = \sqrt{24}(\sqrt{6})$

$= \sqrt{144}$

$= 12$

$A_2 = (7\sqrt{3})(5\sqrt{6} - \sqrt{3})$

$= 35\sqrt{18} - 7(3)$ ($9 \cdot 2$)

$= 35(3)\sqrt{2} - 21$

$= 105\sqrt{2} - 21$

$A_{total} = 12 + 105\sqrt{2} - 21 = 105\sqrt{2} - 9$

- Determine, in simplest radical form, an expression for the perimeter of the shaded region.

$P = 2(7\sqrt{3}+\sqrt{6}) + 2(5\sqrt{6}-\sqrt{3})$

$= 14\sqrt{3} + 2\sqrt{6} + 10\sqrt{6} - 2\sqrt{3}$

$= 12\sqrt{3} + 12\sqrt{6}$.

Answer Key

1. A	2. D	3. A	4. B	5. B	6. C	7. C	8. D
9. C	10. B	11. B	12. A	13. B	14. D	15. C	

Numerical Response

1. | 3 | 7 | | |
2. | 3 | 1 | | |
3. | 6 | 9 | 1 | 2 |
4. | 2 | 0 | | |
5. | 6 | | | |

Written Response

1. • $\sqrt{6}$ • $12\sqrt{3} + 12\sqrt{6}$