# Math 10
# Radicals and Powers
# PRACTICE TEST

Name: _____

| Learning Goal | Beginning | Developing | Proficient | Sophisticated |
|---|---|---|---|---|
| I will be able to express a radicals in multiple forms (entire and mixed) | | | | |
| I will be able to use the laws of exponents to simplify power expressions | | | | |

**Learning Goal #1: I will be able to express radicals in multiple forms (entire and mixed)**

## Developing

| Write the below radical as a mixed radical: $\sqrt{45}$ | Write the below radical as a mixed radical: $\sqrt{24}$ |
|---|---|
| $5\underline{|45}$ $3\underline{|9}$ $3$ | $\sqrt{45}$ $3\sqrt{5}$ | $2\underline{|24}$ $2\underline{|12}$ $2\underline{|6}$ $3$ | $\sqrt{2\cdot2}\ 2\cdot3$ $2\sqrt{6}$ |
| Write the below mixed radical as an entire radical: $2\sqrt{3}$ | Write the below mixed radical as an entire radical: $3\sqrt{6}$ |
| $\sqrt{2\cdot2\cdot3}$ $\sqrt{12}$ | $\sqrt{3\cdot3\cdot6}$ $\sqrt{54}$ |

## Proficient

| Arrange the mixed radicals from least to greatest: | Write the below radical as a mixed radical: |
|---|---|
| $2\sqrt{3},\ 2\sqrt{2},\ 2\sqrt{5},\ \sqrt{9},\ 4\sqrt{3},$ $\sqrt{8}$ $\sqrt{48}$ _____ | $\sqrt[3]{72m^2n^6}$ $\sqrt[3]{2\cdot2\cdot2}\cdot3\cdot3\,mm\,nnn$ $2n^2\sqrt[3]{9m^2}$ $2\underline{|72}$ $3\underline{|36}$ $3\underline{|18}$ $2\underline{|6}$ $3$ |

# Sophisticated

| Arrange the mixed radicals from least to greatest: | Write the below entire radical as a mixed radical: |
|---|---|
| $5\sqrt{10}$, $4\sqrt{2}$, $4\sqrt[3]{2}$, $2\sqrt[3]{3}$ | $\sqrt{108m n^6 s^5}$ |

*Handwritten work (left):*
$\sqrt{250} \approx 15.3$
$\sqrt[3]{320} \approx 5.8$
$\sqrt[3]{128} \approx 5.1$
$\sqrt{32} \cdot \sqrt{8}$

$2\sqrt[3]{3}, \ 4\sqrt[3]{2}, \ 4\sqrt[3]{2}, \ 8\sqrt{19}$

*Handwritten work (right):*
$2\,\lfloor\,108$
$2\,\lfloor\,54$
$3\,\lfloor\,27$
$3\,\lfloor\,9$
$3$

$2\sqrt{5}, \ \sqrt[3]{93}$

$(2\cdot 2)(3\cdot 3)\, 3\, m \cdot n^6 \cdot s^5 \to 2 n^3 \quad s^2$

$6 n^3 s^2 \sqrt{3ms}$

---

**Explain** (in words) the error in the below solution.

$2\sqrt[3]{3} = 2 * \sqrt[3]{3}$ ← no error.

$= \sqrt[3]{6} * \sqrt[3]{3}$ ← $2 \neq \sqrt[3]{6}$ ∴ 2 would be $\sqrt[3]{8}$

$= \sqrt[3]{6 * 3}$ ← should be $\sqrt[3]{8 \cdot 3}$

$= \sqrt[3]{18}$

$\sqrt[3]{24}$

---

**Learning Goal #2: I will be able to use the laws of exponents to simplify power expressions**

# Developing

| Evaluate each power without using a calculator. | Evaluate each power without using a calculator. |
|---|---|
| $8^{\frac{1}{3}}$  ← p, ← a, r  $\sqrt[3]{8} = 2$ | $36^{0.5} \to 36^{\frac{1}{2}}$ ← p, ← r  $\sqrt{36} = 6$ |
| Evaluate each power without using a calculator. | Evaluate each power without using a calculator. |
| $2^{-3}$   $\dfrac{1}{2^3} = \dfrac{1}{8}$ | $6^{-2}$   $\dfrac{1}{6^2} = \dfrac{1}{3}$ |

# Proficient

Arrange these numbers in order from least to greatest: $\sqrt[3]{27}$, $49^{\frac{3}{2}}$, $2^2$, $\left(\frac{1}{25}\right)^{\frac{3}{2}}$

3    $(\sqrt{49})^3$    4    $\sqrt{\frac{1}{25}}^{\,3}$

$7^3$    $\left(\frac{1}{5}\right)^3 = \frac{1}{125}$

$343$

$\left(\frac{1}{25}\right)^{\frac{3}{2}}, \sqrt[3]{27}, 2^2, 49^{\frac{3}{2}}$

Evaluate $16^{1.5}$

$16^{\frac{3}{2} \leftarrow r}^{\ \leftarrow p}$

$\left(\sqrt{16}\right)^3 = 4^3 = 6$

# Sophisticated

Simplify

$\frac{x^2}{16y^4} = \frac{\sqrt{x^2}}{\sqrt{16y^4}}$

$\boxed{\dfrac{x}{4y^2}}$

$\left(\dfrac{64x^4y^4}{4x^6}\right)^{-\frac{1}{2}}$  $\leftarrow p$  $^{\frac{1}{2}} \uparrow r$

$\left(\dfrac{4x^6}{64x^4y^4}\right) = \dfrac{x^6}{16x^4y^4}$

$\dfrac{x^2}{16y^4}$

Evaluate $0.16^{-\frac{3}{2}}$

$\left(\frac{1}{0.16^{3/2}}\right) = \left(\frac{1}{0.4}\right)^3 = \frac{1}{0.064} \times 1000$

$(0.16)^{-\frac{3}{2}}$

$\left(\frac{16}{100}\right)^{-\frac{3}{2}} = \left(\frac{100}{16}\right)^{\frac{3}{2}}$    $\frac{1000}{64}$

$\dfrac{1000}{64}$

$\dfrac{500}{32} = \dfrac{250}{16} = \dfrac{125}{8}$

$\left(\sqrt{\frac{100}{16}}\right)^3 = \left(\frac{10}{4}\right)^3$

Simplify

$\left(\dfrac{16x^4y^4}{9x^2y^4}\right)^{-\frac{3}{2}} \rightarrow \left(\dfrac{16x^2}{9}\right)^{-\frac{3}{2}}$  $\leftarrow p$  $^{\frac{3}{2}} \uparrow r$

$\dfrac{9}{16x^2}$

$\left(\dfrac{(2x^2y^4)(8x^2)}{(3x^2)(3y^4)}\right)^{-\frac{3}{2}}$

$\left(\sqrt{\dfrac{9}{16x^2}}\right)^3 = \dfrac{\sqrt{9}}{\sqrt{16x^2}} = \left(\dfrac{3}{4x}\right)^3 = \boxed{\dfrac{27}{64x^3}}$