

Roots and Powers Assignment

Name: KEY

1. a. Classify the following numbers into the appropriate number sets: 8, $\sqrt{5}$, 0, $\frac{5}{9}$, -6.

Natural 8

Whole 0

5 Integer -6

Rational $\frac{5}{9}$

Irrational $\sqrt{5}$

b. Explain why 8 belongs to four number sets.

1 Natural, whole, integer, rational

2. Express $x^{\frac{2}{3}}$ as a radical.

1 $(\sqrt[3]{x})^2$

3. Express $\sqrt[5]{x}$, as a power.

1 $x^{\frac{1}{5}}$

4. Find the exact value of

3 a) $(-8)^{\frac{2}{3}}$

12 $(\sqrt[3]{-8})^2$

$(\frac{1}{-2})^2$

$\frac{1}{4}$

3 b) 0.3^{-4}

$(0.3)^4$

$\frac{1}{0.0081}$

3 c) $-27^{\frac{4}{3}}$

$(\sqrt[3]{-27})^4$

$(-3)^4$

81

3 d) $81^{\frac{3}{4}}$

$(\sqrt[4]{81})^3$

$(3)^3$

27

2 e) 7^{-2}

$$\frac{1}{7^2}$$

10 $\frac{1}{49}$

3 f) $\left(\frac{9}{4}\right)^{-5}$

$$\left(\sqrt{\frac{4}{9}}\right)^5$$

$$\left(\frac{2}{3}\right)^5$$

$$\frac{32}{243}$$

3 g) $\left(\frac{81}{16}\right)^{\frac{3}{4}}$

$$\left(\sqrt[4]{\frac{81}{16}}\right)^3$$

$$\left(\frac{3}{2}\right)^3$$

$$\frac{27}{8}$$

2 h) $16^{\frac{1}{4}}$

$$\left(\sqrt[4]{16}\right)^1$$

$$2$$

5. Sarah used her calculator to determine that $(-27)^{-\frac{2}{3}}$ is $\frac{1}{9}$. Use the exponent laws to show that this answer is correct.

2 $\left(\sqrt[3]{-27}\right)^2$

$$\left(\frac{1}{3}\right)^2$$

$$\frac{1}{9}$$

6.

Express as a mixed radical in simplest form

a) $\sqrt{32}$

2 $\frac{\sqrt{16} \times \sqrt{2}}{4\sqrt{2}}$

2 b) $\sqrt{48}$

$$\frac{\sqrt{16} \times \sqrt{3}}{4\sqrt{3}}$$

2 c) $-\sqrt{27}$

$$-\sqrt{9} \times \sqrt{3}$$

$$-3\sqrt{3}$$

3 d) $-3\sqrt{32}$

$$-3 \times \sqrt{16} \times \sqrt{2}$$

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

$$-12\sqrt{2}$$

3 e) $2\sqrt{50}$

$$2 \times \sqrt{25} \times \sqrt{2}$$

$$2 \times 5 \times \sqrt{2}$$

$$10\sqrt{2}$$

3 f) $\frac{1}{2}\sqrt{32}$

$$\frac{1}{2} \times \sqrt{16} \times \sqrt{2}$$

$$\frac{1}{2} \times 4 \times \sqrt{2}$$

$$2\sqrt{2}$$

7. Express as an entire radical.

12

a) $3\sqrt{2}$

$$\sqrt{3 \cdot 3} \times \sqrt{2}$$

$$\sqrt{9} \times \sqrt{2}$$

$$\sqrt{18}$$

b) $4\sqrt{3}$

$$\sqrt{4 \cdot 4} \cdot \sqrt{3}$$

$$\sqrt{16} \cdot \sqrt{3}$$

$$\sqrt{48}$$

c) $2\sqrt{5}$

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

$$\sqrt{4} \cdot \sqrt{5}$$

$$\sqrt{20}$$

d) $5\sqrt{27}$

$$\sqrt{5 \cdot 5} \times \sqrt{27}$$

$$\sqrt{25} \times \sqrt{27}$$

$$\sqrt{675}$$

e) $6\sqrt{8}$

$$\sqrt{6 \cdot 6} \times \sqrt{8}$$

$$\sqrt{36} \times \sqrt{8}$$

$$\sqrt{288}$$

f) $2\sqrt{227}$

$$\sqrt{2 \cdot 2} \cdot \sqrt{227}$$

$$\sqrt{4} \cdot \sqrt{227}$$

$$\sqrt{908}$$