

N.RN.1**SELECTED RESPONSE**

Select the correct answer.

1. Write the radical expression in rational exponent form.

$\sqrt[5]{a}$

(A) a^5

(B) $a^{\frac{1}{5}}$

(C) 5^a

(D) $\left(\frac{1}{5}\right)^a$

2. Write the radical expression in rational exponent form.

$\sqrt[3]{k^7}$

(A) $k^{\frac{7}{3}}$

(B) $k^{\frac{3}{7}}$

(C) k^4

(D) k^{10}

3. Which values of p give the expression $p^{\frac{3}{2}}$ a real number result when simplified?

(A) $p \geq 3$

(B) $p \leq 2$

(C) $p \leq 0$

(D) $p \geq 0$

Select all correct answers.

4. Which of the following do not have integer exponents when rewritten in rational exponent form and simplified? Assume that s is nonnegative.

(A) $\sqrt{s^4}$

(B) $\sqrt[6]{s^3}$

(C) $\sqrt[4]{s^6}$

(D) $\sqrt[3]{s^9}$

(E) $\sqrt[5]{s^{15}}$

(F) $\sqrt[8]{s^2}$

Match each radical expression with its equivalent rational exponent expression. Assume that w is nonnegative.

_____ 5. $\sqrt[3]{w^5}$

_____ 6. $\sqrt[5]{w^3}$

_____ 7. $\sqrt{w^5}$

_____ 8. $\sqrt[3]{w}$

A $w^{\frac{5}{3}}$

B $w^{\frac{3}{5}}$

C $w^{\frac{1}{5}}$

D $w^{\frac{1}{3}}$

E $w^{\frac{2}{5}}$

F $w^{\frac{2}{3}}$

G $w^{\frac{5}{2}}$

H $w^{\frac{3}{2}}$

N.RN.2

SELECTED RESPONSE

Select the correct answer.

1. Simplify $(\sqrt[7]{z^3})^8$. Assume z is positive.

(A) $z^{\frac{56}{3}}$

(B) $z^{\frac{24}{7}}$

(C) $z^{\frac{24}{56}}$

(D) $z^{\frac{11}{15}}$

2. Which of the following is equal to $\sqrt[15]{(j^{-3})^{-2}}$? Assume that j is positive.

(A) $j^{\frac{2}{5}}$

(B) $j^{\frac{1}{3}}$

(C) $j^{\frac{5}{2}}$

(D) $j^{\frac{2}{5}}$

3. Write $(\sqrt{uv^3})^5$ using rational exponents. Assume u and v are both positive.

(A) $u^{\frac{5}{2}}v^{\frac{15}{2}}$

(C) $u^{\frac{2}{5}}v^{\frac{2}{15}}$

(B) u^5v^{15}

(D) $u^{\frac{11}{2}}v^{\frac{13}{2}}$

Select all correct answers.

4. Which of the following are equal to $(p^{-3})^{\frac{2}{5}}$? Assume that p is positive.

(A) $\sqrt[5]{p^{-6}}$

(D) $\sqrt[5]{p^{-13}}$

(B) $\frac{1}{\sqrt{p^{15}}}$

(E) $\frac{1}{p^5\sqrt{p}}$

(C) $\frac{1}{p^{30}}$

(F) $\sqrt[10]{p^{-1}}$

CONSTRUCTED RESPONSE

5. Write $(c^{-9}d^{12})^{\frac{5}{6}}$ using only positive exponents. Assume c and d are both positive. Show all work.

6. Write the four expressions in descending order of resulting exponent when written in simplified rational exponent form. Assume t is positive.

$$\sqrt[6]{t} \cdot \sqrt[8]{t} \quad \frac{t}{t^{\frac{5}{7}}} \quad (\sqrt[3]{t^2})^{\frac{4}{7}} \quad \frac{1}{t^{\frac{2}{5}}}$$

7. Which values of d give the expression

$$\left[\left(d^{\frac{1}{3}} \right)^{\frac{1}{7}} \right]^{\frac{1}{4}}$$

a real number result when

simplified? Explain your answer.

8. Show that $\left(a^{\frac{1}{m}} \right)^{\frac{1}{n}} = \sqrt[mn]{a}$ for positive values of m , n , and a . Then use this

information to simplify $\left[\left(jk^4 \right)^{\frac{1}{5}} \right]^{\frac{1}{3}}$ for

positive values of j and k . Show all work.

9. On a recent exam, Terrell was asked to

simplify $\frac{x^{\frac{1}{3}}}{x^{\frac{2}{5}}}$, assuming that x is not

zero. His work is shown below.

$$\begin{aligned} \frac{x^{\frac{1}{3}}}{x^{\frac{2}{5}}} &= x^{\frac{1}{3} + \frac{2}{5}} \\ &= x^{\frac{1}{3} \cdot \frac{5}{2}} \\ &= x^{\frac{5}{6}} \\ &= \sqrt[6]{x^5} \end{aligned}$$

a. What mistake did Terrell make?

b. Find the correct answer. Show your work.

c. Are the original expression and the expression you found in part b equivalent when x is negative? Explain why or why not. (Hint: Check to see if both expressions have real number results with negative x .)

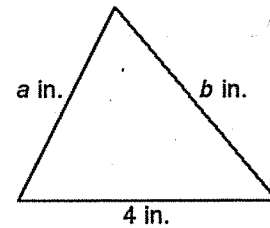
N.RN.3**SELECTED RESPONSE**

Select the correct answer.

- Which of the following is not a rational number?
 - The product of 2 and $0.\bar{3}$
 - The sum of $2 + \sqrt{3}$ and $5 - \sqrt{3}$
 - The sum of $\frac{3}{7}$ and $\frac{1}{2}$
 - The product of 2 and $\sqrt{2}$
- Which of the following is an irrational number?
 - The sum of 3 and 0.111....
 - The product of $2\sqrt{3}$ and width $\frac{1}{\sqrt{3}}$
 - The product of $\sqrt{16}$ and $\sqrt{9}$
 - The sum of $\sqrt{3}$ and $0.\bar{3}$
- Which of the following shapes has an area that's a rational number?
 - A triangle with base $\frac{22}{7}$ and height π
 - A rectangle with length $\sqrt{13}$ and width $\frac{1}{13}$
 - A square with side length $1.5\bar{8}\bar{3}$
 - A circle with diameter 8

Select all correct answers.

4. The perimeter of the triangle below is an irrational number.

Which of the following are possible values of a and b ?

- $a = 3 + \sqrt{7}$, $b = 5 - \sqrt{7}$
- $a = 4$, $b = \frac{1}{5}$
- $a = \sqrt{3}$, $b = 5$
- $a = 3$, $b = \sqrt{5}$
- $a = 13.\bar{3}$, $b = 16.\bar{6}$
- $a = \frac{8}{3}$, $b = \frac{5}{3}$

Select the correct answer for each lettered part.

- Determine whether each of the following are rational or irrational.
 - The product of $\sqrt{2}$ and 5 Rational Irrational
 - $f(x) = x^2 + 2$ evaluated at $x = \sqrt{7}$ Rational Irrational
 - The sum of $\sqrt{10}$ and $\sqrt{16}$ Rational Irrational
 - $f(r) = \pi r^2$ evaluated at $r = 3$ Rational Irrational

6. Classify $(5 - \sqrt{2})(10 + \sqrt{8})$ as rational or irrational. Explain your reasoning.

7. Explain why the area of a circle with a rational radius must be an irrational number.

8. Given that the set of rational numbers is closed under addition, prove that the sum of a nonzero rational number and an irrational number is an irrational number.

9. Given that the set of rational numbers is closed under multiplication, prove that the product of a nonzero rational number and an irrational number is an irrational number.
