Radical and Rational exponents answers and explanations

Answers

1. B 2. C 3. D 4. A 5. D 6. A 7. D 8. B 9. C 10.D

Answer Explanations

1. **B.** In this problem, we are given the expression $\left(x^3\right)^4 \times x^{-12}$ and asked to find an equivalent expression. Remember that exponential properties state that when finding the power of a power we multiply the two exponents together. Therefore, we get $\left(x^3\right)^4 \times x^{-12} \rightarrow x^{12} \times x^{-12} \rightarrow x^0 = 1$. Thus, answer choice (B) is correct.

2. **C.** In this problem, we are given the expression $4^{-\frac{1}{2}} \times 4^2$ and asked to find the value. Remember, that a negative exponent signifies how many times to divide by that number; therefore, we are given the following $4^{-\frac{1}{2}} \times 4^2 \rightarrow \frac{1}{\sqrt{4}} \times 16 \rightarrow \frac{1}{2} \times 16 = 8$. Thus, answer choice (C) is correct.

3. **D.** In this problem, we are given the expression $\frac{7}{\sqrt{8}}$ and asked to find an equivalent value. First, we can simplify our expression and then remove the radical from the denominator.
$\frac{7}{\sqrt{8}} \rightarrow \frac{7}{2\sqrt{2}} \rightarrow \frac{7}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \rightarrow \frac{7\sqrt{2}}{4}$. Thus, answer choice (D) is correct.

4. **A.** In this problem, we are given the equation $\sqrt{27} + \sqrt{243} = a\sqrt{3}$ and asked to find the value of *a*. First, we can rewrite our equation $\sqrt{27} + \sqrt{243} = a\sqrt{3} \rightarrow 3 \times 3^{1/3} + 3^2 \times 3^{1/3} = 3^{1/3} \times a$. Now we can divide our entire equation by $3^{1/3}$ and combine like terms to determine our value of *a*.
$3 \times 3^{1/3} + 3^2 \times 3^{1/3} = 3^{1/3} \times a \rightarrow 3 + 9 = a \rightarrow a = 12$. Thus, answer choice (A) is correct.

5. **D.** In this problem, we are given the expression $\frac{3+\sqrt{5}}{6-\sqrt{5}}$ and asked to find an equivalent expression. Remember, when there is a constant being subtracted/added from a radical in the denominator we must rationalize the denominator in order to further simplify.
$\frac{3+\sqrt{5}}{6-\sqrt{5}} \times \frac{6+\sqrt{5}}{6+\sqrt{5}} = \frac{\left(3+\sqrt{5}\right)\left(6+\sqrt{5}\right)}{36-5} \rightarrow \frac{18+3\sqrt{5}+6\sqrt{5}+5}{31} = \frac{23+9\sqrt{5}}{31}$ Thus, answer choice (D) is correct.

6. **A.** In this problem, we are given the expression $\sqrt[3]{7^2} + 3\sqrt[3]{7^2} = 4 \times 7^x$ and asked to find the value of *x*. First, we can rewrite our equation $7^{2/3} + 3 \times 7^{2/3} = 4 \times 7^x$. On the left side of our equation, we can factor out a $7^{2/3}$ giving us $7^{2/3}\left(1+3\right) = 4 \times 7^x \rightarrow 4 \times 7^{2/3} = 4 \times 7^x \rightarrow x = \frac{2}{3}$. Thus, answer choice (A) is correct.

7. **D.** In this problem, we are given the expression $\left(x^{\frac{3}{8}}\right)^{\frac{1}{3}}$ and asked to find an equivalent expression.
Remember that exponential properties state that when finding the power of a power we multiply the two

exponents together. $\left(x^{\frac{3}{8}}\right)^{\frac{1}{3}} \rightarrow x^{\frac{3}{24}} \rightarrow x^{\frac{1}{8}}$. Thus, answer choice (D) is correct.

8. **B.** In this problem, we are given the expression $\left(\frac{j^4}{16}\right)^{\frac{3}{4}}$ and asked to find an equivalent expression. Here, we must distribute the exponent to both the numerator and denominator and simplify our expression. $\left(\frac{j^4}{16}\right)^{\frac{3}{4}} \rightarrow \frac{j^{12/4}}{16^{3/4}} \rightarrow \frac{j^3}{\left(2^4\right)^{3/4}} \rightarrow \frac{j^3}{2^3} = \frac{j^3}{8}$. Thus, answer choice (B) is correct.

9. **C.** In this problem, we are given the expression $\left(3y^{10}z^5\right)^4$ and asked to find an equivalent expression. To make this problem less convoluted we can break down our expression and utilize exponential properties to find an equivalent expression. $(3)^4 \times \left(y^{10}\right)^4 \times \left(z^5\right)^4 \rightarrow 81y^{40}z^{20}$. Thus, answer choice (C) is correct.

10. **D.** In this problem, we are given the expression $\sqrt{9h^2+16h^2} + \sqrt[3]{h^2}$ and asked to find an equivalent expression. Here we can combine like terms in our radical and further simplify. $\sqrt{9h^2+16h^2} + \sqrt[3]{h^2} \rightarrow \sqrt{25h^2} + \sqrt[3]{h^2} \rightarrow 5h + \sqrt[3]{h^2}$.