Fractional Exponents Practice

Use the following information to answer the first question.

Consider the following statements.	
Statement 1	$100^{\frac{1}{2}} = 50$
Statement 2	$100^{\frac{1}{2}} = 10$
Statement 3	$100^{\frac{1}{2}} = \sqrt{100}$

1. Which of the following is the most accurate?
   A) Statements 1 and 2 are true.
   B) Statements 1 and 3 are true.
   C) Statements 2 and 3 are true.
   D) All of the statements are true.

2. Which expression is equivalent to $7^{\frac{w}{k}}$?

   A) $\frac{1}{\left(\sqrt[k]{7}\right)^{w}}$ B) $\frac{1}{\left(\sqrt[w]{7}\right)^{k}}$ C) $\left(\sqrt[w]{7}\right)^{k}$ D) $\left(\sqrt[k]{7}\right)^{w}$

3. An equivalent form of $16^{\frac{3}{4}} \times 16^{\frac{3}{4}}$ is

   A) $\left(\sqrt{16}\right)^{3}$ B) $\left(\sqrt[4]{16}\right)^{3}$ C) $\left(\sqrt{16}\right)^{4}$ D) $\left(\sqrt[3]{16}\right)^{4}$

4. Which of the following has the smallest value?

   A) $64^{\frac{1}{6}}$ B) $(0.5)^{\frac{3}{4}}$ C) $(-27)^{\frac{2}{3}}$ D) $\left(\frac{1}{4}\right)^{\frac{1}{2}}$

5. Rewrite the following powers with their radical equivalents, and determine the final value.

$$32^{\frac{7}{5}} + 121^{\frac{1}{2}} - 1^{\frac{2}{3}}$$

6. The circulation time is the average time it takes for all the blood in the body to circulate once and return to the heart. The circulation time for a mammal can be estimated from the formula, $T \cong 17.4m^{\frac{1}{4}}$, where T is the circulation time in seconds and m is the body mass in kilograms. Estimate the circulation time, to the nearest hundredth, for a mammal with a mass of 78 kg.

Fractional Exponents PracticeSolutions

Use the following information to answer the first question.

Consider the following statements.	
Statement 1	$100^{\frac{1}{2}} = 50$
Statement 2	$100^{\frac{1}{2}} = 10$
Statement 3	$100^{\frac{1}{2}} = \sqrt{100}$

1. Which of the following is the most accurate?

A) Statements 1 and 2 are true.

B) Statements 1 and 3 are true.

C) Statements 2 and 3 are true.

D) All of the statements are true.

Solution

$100^{\frac{1}{2}}$ is the same as the square root of 100. The square root of 100 is 10. Statement 1 is false, while statements 2 and 3 are true.

The correct answer is C.

2. Which expression is equivalent to $7^{\frac{w}{k}}$?

A) $\frac{1}{\left(\sqrt[k]{7}\right)^{w}}$ B) $\frac{1}{\left(\sqrt[w]{7}\right)^{k}}$ C) $\left(\sqrt[w]{7}\right)^{k}$ Ans → D) $\left(\sqrt[k]{7}\right)^{w}$

Solution

Options A and B are not possible because there is no need to write the power as one divided by a radical.

The denominator of the fractional exponent is the index. This number goes to the left of the radical sign. [Note: although the index for a square root is 2, this number is not written, but implied.] In this question, k is the index.

The correct answer is D.

3. An equivalent form of $16^{\frac{3}{4}} \times 16^{\frac{3}{4}}$ is

A) $\left(\sqrt{16}\right)^3$ Ans B) $\left(\sqrt[4]{16}\right)^3$ C) $\left(\sqrt{16}\right)^4$ D) $\left(\sqrt[3]{16}\right)^4$

Solution

When multiplying two powers with the same base, keep the base and **add** the exponents. $\frac{3}{4}+\frac{3}{4}=\frac{6}{4} or \frac{3}{2}$.

Therefore, $16^{\frac{3}{4}} \times 16^{\frac{3}{4}} = 16^{\frac{3}{2}}$, which is equal to $\left(\sqrt{16}\right)^3$.

The correct answer is A.

4. Which of the following has the smallest value?

A) $64^{\frac{1}{6}}$ B) $(0.5)^{\frac{3}{4}}$ C) $(-27)^{\frac{2}{3}}$ D) $\left(\frac{1}{4}\right)^{\frac{1}{2}}$ Ans

Solution

$64^{\frac{1}{6}} = \sqrt[6]{64} = 2$. The value of A is 2.

$(0.5)^{\frac{3}{4}} = \left(\sqrt[4]{0.5}\right)^3 \cong 0.5946$ The approximate value of B is 0.5946.

$(-27)^{\frac{2}{3}} = \left(\sqrt[3]{-27}\right)^2 = 9$ The value of C is 9.

$\left(\frac{1}{4}\right)^{\frac{1}{2}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$. The value of D is 0.5.

The smallest value is D.

5. Rewrite the following powers with their radical equivalents, and determine the final value.

$$32^{\frac{7}{5}} + 121^{\frac{1}{2}} - 1^{\frac{2}{3}}$$

Solution

$$32^{\frac{7}{5}} = \left(\sqrt[5]{32}\right)^7$$

$= (2)^7$

$= 128$

$$121^{\frac{1}{2}} = \sqrt{121}$$

$= 11$

$$1^{\frac{2}{3}} = \left(\sqrt[3]{1}\right)^2$$

$= (1)^2$

$= 1$

$128 + 11 - 1 = 138$

The final value is 138.

6. The circulation time is the average time it takes for all the blood in the body to circulate once and return to the heart. The circulation time for a mammal can be estimated from the formula, $T \cong 17.4m^{\frac{1}{4}}$, where T is the circulation time in seconds and m is the body mass in kilograms. Estimate the circulation time, to the nearest hundredth, for a mammal with a mass of 78 kg.

Solution

$T \cong 17.4m^{\frac{1}{4}}$

Substitute 78 for m.

$T \cong 17.4(78)^{\frac{1}{4}}$

Convert the fractional exponent to its radical equivalent.

$T \cong (17.4)(\sqrt[4]{78})^1$

T $\cong$ 51.71 seconds.

For a mammal with a mass of 78 kg, the circulation time is about 51.71 seconds.