Math 10 — Unit 2 Quick Check

Mr. Merrick

Instructions. Answer each question. For numeric response, write your final value clearly in the box.

A. Multiple Choice

Select *one* option.

1. Simplify $\dfrac{(3\,x^2y^{-1})^2}{(x^{-2}y^3)^2}$ and write with positive exponents.

(A) $\dfrac{9\,x^8}{y^8}$ (B) $\dfrac{9}{x^8y^8}$ (C) $9x^8y^8$ (D) $\dfrac{9\,x^4}{y^2}$

2. Which equals $\dfrac{1}{\left(a^{-3}b^2\right)^{-1}c^{-2}}$ for $a, b, c \neq 0$?

(A) $\dfrac{b^2c^2}{a^3}$ (B) $\dfrac{a^3}{b^2c^2}$ (C) $a^{-3}b^2c^{-2}$ (D) $\dfrac{b^{-2}}{a^3c^2}$

3. Compute $(3.20 \times 10^{-2})(4.50 \times 10^5)$ in scientific notation.

(A) 1.44×10^4 (B) 14.40×10^3 (C) 14.40×10^4 (D) 1.44×10^3

4. Compute $\dfrac{0.45 \times 10^{-6}}{6.0 \times 10^2}$ in scientific notation.

(A) 7.5×10^{-10} (B) 0.75×10^{-9} (C) 7.5×10^{-8} (D) 0.75×10^{-7}

5. $(32)^{\frac{3}{5}}$ equals

(A) 8 (B) 4 (C) 6 (D) 10

6. Simplify $\sqrt{72\,x^5y^4}$ for $x, y \geq 0$.

(A) $6x^2y^2\sqrt{2x}$ (B) $6xy^2\sqrt{2x}$ (C) $\sqrt{72\,x^5y^4}$ (D) $6x^2y^2\sqrt{2y}$

7. Write $a^{3/4}b^{1/4}$ as a single radical $(a, b \geq 0)$.

(A) $\sqrt[4]{a^3b}$ (B) $\sqrt{ab}$ (C) $\sqrt[3]{ab}$ (D) $\sqrt[4]{ab}$

8. Which is *not* in proper scientific notation?

(A) 9.99×10^0 (B) 1.01×10^9 (C) 12.0×10^{-4} (D) 6.2×10^{-3}

9. Simplify $\dfrac{x^{1/2}y^{-1}z^{3}}{x^{-3/2}y^{2}z^{-1}}$ and write with positive exponents.

(A) $\dfrac{x^2z^4}{y^3}$ (B) $\dfrac{xz^2}{y^3}$ (C) $\dfrac{x^2}{yz^4}$ (D) $\dfrac{x^2y^3}{z^4}$

10. Simplify $(27\,a^9b^6)^{2/3}$ for $a, b > 0$.

(A) $9a^6b^4$ (B) $3a^6b^4$ (C) $9a^3b^2$ (D) $\sqrt[3]{27a^9b^6}$

11. Write $a^{2/5}b^{3/5}$ as a single radical $(a, b \geq 0)$.

(A) $\sqrt[5]{a^2b^3}$ (B) $\sqrt{ab}$ (C) $\sqrt[2]{a^5b^5}$ (D) $\sqrt[3]{ab}$

12. Convert to a *simplified* mixed radical: $\sqrt{200\,x^3y}$ for $x, y \geq 0$.

(A) $10xy\sqrt{2x}$ (B) $10x\sqrt{2xy}$ (C) $5x\sqrt{8xy}$ (D) $4xy\sqrt{50x}$

13. Evaluate $\sqrt[3]{-125\,x^7}$ for $x \geq 0$ and write in simplest radical form.

(A) $-5x^2\sqrt[3]{x}$ (B) $-5x^2\sqrt{x}$ (C) $-5x^{7/3}$ (D) $5x^{7/3}$

14. Choose the simplest *equivalent* form of $(a^4b^5)^{1/2}$ for $a, b \geq 0$.

(A) $a^2b^2\sqrt{b}$ (B) $ab^2\sqrt{ab}$ (C) $a^2\sqrt{b^5}$ (D) $\sqrt{a^4b^5}$

15. Which is **improper** scientific notation?

(A) 7.1×10^{-3} (B) 0.91×10^{7} (C) 9.99×10^{0} (D) 1.0×10^{-9}

16. Evaluate $\left(5.0 \times 10^{3}\right)\left(2.0 \times 10^{-3}\right)x^0$, $x > 0$.

(A) 10 (B) 1 (C) 0 (D) 10^0

B. Numeric Response

Write your final answer clearly in the box.

1. Evaluate $(64)^{\frac{3}{6}}$. $\boxed{}$

2. Evaluate $(81)^{-\frac{1}{4}}$. $\boxed{}$

3. Compute $(3.20 \times 10^6) + (4.50 \times 10^5)$ in scientific notation. $\boxed{}$

4. Compute $\dfrac{7.2 \times 10^3}{8.0 \times 10^{-2}}$ in scientific notation. $\boxed{}$

5. If $(2^{x-1})(2^{2x+5}) = 2^{25}$, find x. $\boxed{}$

6. Evaluate $\dfrac{(6 \times 10^{-1})^2}{3 \times 10^{-4}}$ in scientific notation. $\boxed{}$

C. Written Response

Show full reasoning; express final answers with positive exponents and/or radicals.

1. Simplify completely:

$$\frac{18\,x^{4}y^{-2}}{9\,x^{-1}y^{3}}.$$

2. Write the product in scientific notation and name the exponent rule used:

$$(3.2\times 10^{3})(4.5\times 10^{2}).$$

3. Write $4\sqrt{6}$ as an *entire* radical.

4. Rewrite using radicals and simplify (assume $x, y \geq 0$):

$$x^{\frac{7}{3}}\,y^{\frac{5}{4}}.$$

5. Simplify $\left(144\,x^{10}y^{7}\right)^{1/2}$ for $x, y \geq 0$.

6. Rationalize and simplify: $\dfrac{7}{3\sqrt{5}}$.

7. Order from least to greatest:

$$0.00034, \qquad 3.4\times 10^{-4}, \qquad 5.0\times 10^{-5}.$$

8. Solve for $t > 0$: $\quad t^{3/2} = 16\sqrt{t}$.

9. A bacterium has diameter 2.8×10^{-6} m. Using $\pi \approx 3.14$, express the area of its circular cross-section in scientific notation.

10. Simplify

$$\frac{(27a^{-3}b^{6})^{1/3}}{(3a^{-1}b^{2})^{2}} \qquad (a, b \neq 0).$$

11. If $x^{3}y^{2} = 2^{7}3^{6}$ and $\dfrac{x}{y} = 2^{-1}3^{2}$, find x and y in prime-power form.

12. The power model $y = ax^r$ passes through $(2, 12)$ and $(5, 75)$. Find r.

13. Solve for integers x, y: $\quad 2^{x+1} + 2^x = 3^{y+1} - 3^y$.

14. Let $f(x) = 2^{4x-6}$. Compute $f(x)\, f(3-x)$ and explain briefly.

15. Solve: $\quad 3^{x+1} + 2^{x+2} + 2^x = 2^{x+3} + 3^x$.

16. Evaluate the following expression:

$$\frac{3^9 + 3^8}{3^6 + 3^6 + 3^6}.$$

17. Arrange the numbers below in ascending order:

$$2^{30}, \quad 3^{24}, \quad 6^{12}, \quad 5^{18}.$$

18. Simplify the following expressions:

(a) $\left(\dfrac{\sqrt[3]{x^3 y^6}}{16\, x^8 y^{-2}} \right)^{-\frac{2}{5}}, \quad x, y > 0$

(b) $\sqrt[3]{\dfrac{9a^2b}{4c^3} \left(\dfrac{4c^3}{9a^2b} \right)^4}, \quad a \neq 0,\ b \neq 0,\ c \neq 0$

19. Simplify (assume $m \neq 0$).

(a) $y^5 \div y^{-2} \times y$

(b) $\dfrac{42a^{-3}b^2c}{-14a^2b^{-1}c^{-2}}$

(c) $\dfrac{m \cdot m \cdot m \cdot m}{m + m + m + m + m}$