

# MATH 10 — UNIT 2 QUICK CHECK

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

## A. Multiple Choice

Select *one* option.

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

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

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

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

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

(A)  $14.40 \times 10^3$                       (B)  $14.40 \times 10^4$                       (C)  $1.44 \times 10^3$                       (D)  $1.44 \times 10^4$

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

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

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

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

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

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

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)  $12.0 \times 10^{-4}$  (B)  $1.01 \times 10^9$  (C)  $9.99 \times 10^0$  (D)  $6.2 \times 10^{-3}$

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

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

10. Simplify  $(27a^9b^6)^{2/3}$  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)  $\sqrt{ab}$  (B)  $\sqrt[3]{ab}$  (C)  $\sqrt[5]{a^2b^3}$  (D)  $\sqrt[2]{a^5b^5}$

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

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

13. Evaluate  $\sqrt[3]{-125x^7}$  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)  $a^2\sqrt{b^5}$  (B)  $a^2b^2\sqrt{b}$  (C)  $ab^2\sqrt{ab}$  (D)  $\sqrt{a^4b^5}$

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

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

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

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

## C. Written Response

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

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

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

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

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

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

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

7. Simplify completely:

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

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

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

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

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

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

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

12. Rationalize and simplify:  $\frac{7}{3\sqrt{5}}$ .

**13.** Order from least to greatest:

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

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

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

**16.** Simplify

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

**17.** If  $x^3y^2 = 2^73^6$  and  $\frac{x}{y} = 2^{-1}3^2$ , find  $x$  and  $y$  in prime-power form.

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

**19.** Solve for integers  $x, y$ :  $2^{x+1} + 2^x = 3^{y+1} - 3^y$ .

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

**21.** Solve:  $3^{x+1} + 2^{x+2} + 2^x = 2^{x+3} + 3^x$ .

**22.** Evaluate the following expression:

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

**23.** Arrange the numbers below in ascending order:

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

**24.** Simplify the following expressions:

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

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

**25.** Simplify (assume  $m \neq 0$ ).

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

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

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