**Multiple Choice: You may write on this test but only the answer sheet will be graded. You must shade in the box on the answer sheet containing the letter associated with your answer. Circled answers are not accepted. Assume no variable will cause an expression to be undefined. Your answer should contain only positive exponents.**

**Simplify each expression**

1) $\dfrac{2^4 \cdot 2^4}{\left(2^{-3}\right)^{-2}}$

A) $\dfrac{1}{2^{16}}$     B) $\dfrac{1}{2^3}$     C) $2^2$     D) $2^3$

2) $\dfrac{ab^{-4} \cdot a^0 \cdot -a^{-3}b^2}{\left(a^{-1}b^3\right)^5}$

A) $\dfrac{a^{11}}{b^7}$     B) $a^{16}b^{12}$     C) $a^{11}b^3$     D) $-\dfrac{a^3}{b^{17}}$

3) $\left(-9r^4 + 5 + 2r^3\right) - \left(-12 + 11r^4 + 3r^5\right)$

A) $-3r^5 - 23r^4 + 2r^3 - 8$     B) $-3r^5 - 20r^4 + 2r^3 + 17$
C) $-3r^5 - 20r^4 + 2r^3 + 6$     D) $-3r^5 - 23r^4 + 2r^3 + 6$

4) $\sqrt[3]{24} + \sqrt[3]{3}$

A) $5\sqrt[3]{3}$     B) $3\sqrt[3]{3}$     C) $2\sqrt[3]{3}$     D) $4\sqrt[3]{3}$

5) $\dfrac{2x}{2x + \sqrt{3x^2}}$

A) $\dfrac{2x + |x|\sqrt{3}}{2x}$     B) $\dfrac{2\sqrt{5} - \sqrt{10}}{5}$     C) $\dfrac{15 + 5\sqrt{2}}{7}$     D) $4 - 2\sqrt{3}$

6) $9\sqrt[4]{128a^5b^3}$

A) $-6a^2b\sqrt[4]{10a}$     B) $18a\sqrt[4]{8ab^3}$     C) $8a^2b\sqrt[4]{10a}$     D) $-6\sqrt[4]{150b^3}$

7) $\left(-4 + \sqrt{3}\right)\left(-2 + \sqrt{3}\right)$

A) $3\sqrt{3} + 5$     B) $6 + 2\sqrt{6}$     C) $11 - 6\sqrt{3}$     D) $11$

8) $\dfrac{4y}{4x} - \dfrac{3x}{3}$

   A) $\dfrac{2y}{3}$       B) $\dfrac{5x + 6y}{3\left(2y^2 + 1\right)}$       C) $\dfrac{4y - 2x}{4x - 3}$       D) $\dfrac{-x^2 + y}{x}$

9) $\dfrac{4k}{k - 3} + \dfrac{6k}{k + 7}$

   A) $\dfrac{37k + 3 + 20k^2}{7\left(5k - 1\right)\left(k + 1\right)}$       B) $\dfrac{31k^2 + 10k - 21}{6k\left(k - 3\right)}$       C) $\dfrac{11k^2 + 17k}{\left(k - 3\right)\left(k + 7\right)}$       D) $\dfrac{10k^2 + 10k}{\left(k - 3\right)\left(k + 7\right)}$

10) $\dfrac{n^2 + 9n + 8}{n^2 - 1}$

   A) $\dfrac{n - 8}{n - 7}$       B) $\dfrac{n - 7}{n - 8}$       C) $\dfrac{n + 8}{n - 1}$       D) $\dfrac{n - 1}{n + 8}$

11) $\dfrac{10b^2 - 20b}{b^2 - 12b + 20}$

   A) $\dfrac{b - 10}{2b}$       B) $\dfrac{7\left(b + 1\right)}{5b - 8}$       C) $\dfrac{5b - 8}{7\left(b + 1\right)}$       D) $\dfrac{10b}{b - 10}$

12) $\dfrac{\dfrac{x^2}{5y}}{\dfrac{5}{y} - \dfrac{1}{5}}$

   A) $\dfrac{x^2}{25 - y}$       B) $\dfrac{5x^3}{y^2x - y^2}$       C) $\dfrac{x}{x + y^2}$       D) $\dfrac{x^2}{5y - x^2}$

13) $\left(8 - 4i\right) - \left(-5 + 4i\right)$

   A) $3$       B) $13$       C) $13 - 8i$       D) $-3 + 8i$

14) $\dfrac{-10 + 9i}{4 - 9i}$

   A) $\dfrac{10}{3} - 3i$       B) $-\dfrac{109}{97} - \dfrac{27i}{97}$       C) $\dfrac{13}{3} - 3i$       D) $-\dfrac{121}{97} - \dfrac{54i}{97}$

15) $\left(8 + 4i\right)^2$

   A) $48 - 64i$       B) $169$       C) $121$       D) $48 + 64i$

16) $\begin{bmatrix} -3 & 4 & -3 \\ -2 & -4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 2 \\ -4 \end{bmatrix}$

A) $\begin{bmatrix} -3 & -4 & -2 \\ -8 & -3 & 2 \end{bmatrix}$    B) Undefined    C) $\begin{bmatrix} -3 & -5 & -3 \\ 2 & -4 & 4 \end{bmatrix}$    D) $\begin{bmatrix} -2 & 4 & 2 \\ -8 & -6 & -3 \end{bmatrix}$

17) $-2 \cdot \left( \begin{bmatrix} 0 & 1 & -2 \\ -5 & -3 & 2 \end{bmatrix} \cdot \begin{bmatrix} 1 & -6 \\ 4 & -3 \\ -6 & -1 \end{bmatrix} \right)$

A) $\begin{bmatrix} -32 & 2 \\ 58 & 46 \end{bmatrix}$    B) $\begin{bmatrix} -32 & 2 \\ 38 & -74 \end{bmatrix}$    C) $\begin{bmatrix} -32 & 2 \\ 58 & -74 \end{bmatrix}$    D) $\begin{bmatrix} -32 & 2 \\ 38 & 46 \end{bmatrix}$

**Write the expression in radical form.**

18) $(3a)^{\frac{5}{2}}$

A) $\sqrt{2a}$    B) $\left(\sqrt[5]{3a^2}\right)^2$    C) $\left(\sqrt{3a}\right)^5$    D) $\left(\sqrt[5]{2a}\right)^4$

**Write the expression in exponential form.**

19) $\left(\sqrt{10b}\right)^3$

A) $(2b)^{\frac{5}{2}}$    B) $(10b)^{\frac{2}{5}}$    C) $(10b)^{\frac{3}{2}}$    D) $b^{\frac{1}{2}}$

**Factor each completely.**

20) $2m^2 - 8m + 8$

A) $2(m+2)^2$    B) $2(m+4)(m+1)$    C) $2(m-2)^2$    D) $2(m-2)(m+2)$

21) $5x^2 + 10x - 120$

A) $6x(x-3)$    B) $5(x-6)(x+4)$    C) $5(x+6)(x-4)$    D) $5(x+6)(x+4)$

**Find each product.**

22) $(6n+4)(6n-4)$

A) $49n^4 - 56n^2 + 16$    B) $36n^2 - 48n + 16$    C) $36n^2 - 16$    D) $36n^2 + 48n + 16$

23) $(4v-6)^2$

A) $16v^2 - 48v + 36$    B) $16v^2 - 36$    C) $16v^2 + 36$    D) $4 - 9v^2$

**Evaluate the function.**

24) $w(t) = t^2 - t$; Find $w(t - 4)$
   A) $t^2 - 9t + 20$     B) $t^2 + t$     C) $4t^2 + 2t$     D) $16t^2 - 4t$


**Perform the indicated operation.**

25) $f(x) = 2x - 4$
   $g(x) = x^3 + 5x^2$
   Find $(f + g)(3x)$
   A) $-12x^2 + 14x - 1$         B) $8x^3 + 20x^2 + 4x - 4$
   C) $27x^3 + 45x^2 + 6x - 4$   D) $-27x^3 + 45x^2 - 6x - 4$


26) $f(n) = 2n + 5$
   $g(n) = n^2 - 3$
   Find $(f - g)(1 + n)$
   A) $\dfrac{72 + 6n - n^2}{9}$     B) $-n^2 + 9$     C) $n^2 - 9$     D) $-n^2 - 4n + 5$


27) $g(t) = t^2 - 5$
   Find $g(g(t))$
   A) $-4t - 9$     B) $-t^4 - 8t^2 - 20$     C) $t^4 - 10t^2 + 20$     D) $-16t$


**Expand the logarithm.**

28) $\log_6 \left(\dfrac{x}{y^3}\right)^4$

   A) $\dfrac{\log_6 x}{3} + \dfrac{\log_6 y}{3} + \dfrac{\log_6 z}{3}$     B) $12\log_6 x - 4\log_6 y$

   C) $4\log_6 x - 12\log_6 y$     D) $3\log_6 z + \dfrac{\log_6 x}{3}$


**Condense the expression to a single logarithm.**

29) $18\ln 2 + 18\ln 11 - 6\ln 3$

   A) $\ln \dfrac{11^6}{2^6 \cdot 3^{18}}$     B) $\ln \dfrac{2^{18} \cdot 11^{18}}{3^6}$     C) $\ln \left(30\sqrt[3]{11}\right)$     D) $\ln \left(2^6 \cdot 3^{18} \cdot 11^6\right)$


30) Grandma baked 96 cookies and gave them to her grandchildren. One of the grandchildren, Cindy, received $c$ fewer cookies than she would have received had all of the cookies been evenly divided among the grandchildren. Write an expression to represent the amount of cookies Cindy received.

   A) $\dfrac{96 - c}{8}$     B) $\dfrac{96}{8} - c$     C) $\dfrac{96 - 8}{c}$     D) $\dfrac{96}{c} - 8$

| | | | |
|---|---|---|---|
| 1) C | 2) D | 3) B | 4) B |
| 5) D | 6) B | 7) C | 8) D |
| 9) D | 10) C | 11) D | 12) A |
| 13) C | 14) D | 15) D | 16) B |
| 17) C | 18) C | 19) C | 20) C |
| 21) C | 22) C | 23) A | 24) A |
| 25) C | 26) B | 27) C | 28) C |
| 29) B | 30) B | | |