

Mathematics 1201 Final Exam Review
Roots and Powers



1. Which of these numbers is rational?

A) $\sqrt{48} = 16\sqrt{3}$ B) $\sqrt{8.1} \doteq 2.846\dots$ C) $\sqrt[3]{-16} \doteq -2.519\dots$ **D) $\sqrt{\frac{4}{169}} = \frac{2}{13}$**

2. Which of these numbers is irrational?

A) -68 **B) $\sqrt{48} = 16\sqrt{3}$** C) $\sqrt[3]{216} = 6$ D) $\sqrt{\frac{49}{16}} = \frac{7}{4}$

3. Determine which of these numbers is the least.

A) $\sqrt[4]{100} \doteq 3.2$ **B) $\sqrt[3]{30} \doteq 3.1$** C) $\sqrt{14} \doteq 3.7$ D) $\sqrt[3]{75} \doteq 4.2$

4. Which of these numbers is a natural number?

A) 9 B) 0 C) $1.\bar{8}$ D) -1

5. What is the index of $\sqrt[3]{2^7}$?

A) 2^7 **B) 3** C) 7 D) 2

6. What is the radicand of $\sqrt[6]{4^8}$?

A) 4 B) 4^8 C) 6 D) 8

7. Write $\sqrt{108}$ in simplest form. $\sqrt{36 \cdot 3} = 6\sqrt{3}$

A) $3\sqrt{12}$ **B) $6\sqrt{3}$** C) $36\sqrt{3}$ D) $3\sqrt{6}$

8. Write $3\sqrt[3]{4}$ as an entire radical. $\sqrt[3]{3 \cdot 3 \cdot 3 \cdot 4} = \sqrt[3]{108}$

A) $\sqrt[3]{108}$ B) $\sqrt[3]{144}$ C) $\sqrt[3]{36}$ D) $\sqrt[3]{192}$

9. A square has an area of 12 square inches. What is the side length of the square as a radical in simplest form. $S = \sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

A) $4\sqrt{3}$ in. B) $2\sqrt{6}$ in. C) $3\sqrt{2}$ in. **D) $2\sqrt{3}$ in.**

10. What is the value of $64^{\frac{1}{3}}$? $\sqrt[3]{64} = 4$

A) 8 **B) 4** C) -4 D) $21\frac{1}{3}$

11. What is $42^{\frac{5}{4}}$ as a radical? $\sqrt[4]{42^5}$

A) $\sqrt[5]{42^4}$ **B) $(\sqrt[4]{42})^5$** C) $\sqrt[4]{42}$ D) $(\sqrt[5]{42})^4$

12. What is $\sqrt[2]{\left(\frac{3}{4}\right)^9}$ as a power? $\left(\frac{3}{4}\right)^{\frac{9}{2}}$

A) $\left(\frac{3}{4}\right)^{\frac{-9}{2}}$ **B) $\left(\frac{3}{4}\right)^{\frac{9}{2}}$** C) $\left(\frac{4}{3}\right)^{\frac{-2}{9}}$ D) $\left(\frac{3}{4}\right)^{\frac{2}{9}}$

13. Write $2a^{-3}$ without a negative exponent. $\frac{2}{1} \times \frac{1}{a^3} = \frac{2}{a^3}$

A) $\frac{1}{2a^3}$ B) $\frac{a^{-3}}{2}$ **C) $\frac{2}{a^3}$** D) $\frac{2}{a^{-3}}$

14. $\left(\frac{3}{5}\right)^{-2}$ is equivalent to $\left(\frac{5}{3}\right)^2 = \frac{25}{9}$
- A) $\frac{25}{9}$ B) $\frac{9}{25}$ C) $\frac{6}{10}$ D) $\frac{10}{6}$
15. Simplify $\frac{12p^3q^{-7}}{15pq^6}$. Write using powers with positive exponents. $\frac{4}{5} p^2 q^{-13} = \frac{4p^2}{5q^{13}}$
- A) $\frac{4p^3}{5q^{13}}$ B) $\frac{p^2}{3q^{13}}$ C) $\frac{4p^2}{5q}$ D) $\frac{4p^2}{5q^{13}}$

Section B:

1. Simplify the following:

<p>A) $\frac{-12a^{-3}b^{-7}c^{-6}}{3a^{-6}b^{-3}c^{-3}}$</p> <p>$= -4a^3b^{-4}c^{-3}$</p> <p>$= \frac{-4a^3}{b^4c^3}$</p>	<p>B) $\frac{(8x^{-3}y^{-2})^2}{(2xy^7)^5}$</p> <p>$= \frac{64x^{-6}y^{-4}}{32x^5y^{35}}$</p> <p>$= 2x^{-11}y^{-39}$</p> <p>$= \frac{2}{x^{11}y^{39}}$</p>	<p>C) $(x^2)^{\frac{1}{4}}(x^7)^{\frac{1}{8}}$</p> <p>$x^{\frac{1}{2}}x^{\frac{7}{8}}$</p> <p>$x^{\frac{8}{8}}$</p> <p>$x$</p>
<p>D) $\frac{(3x^3y)^0(x^{-2}y^3)^5}{(x^{-7}y)^3}$</p> <p>$= \frac{1(x^{-10}y^{15})}{x^{-21}y^3}$</p> <p>$= x^{11}y^{12}$</p>	<p>E) $\sqrt[5]{p^3} \times \sqrt[3]{p}$</p> <p>$= p^{\frac{3}{5}} \cdot p^{\frac{1}{3}}$</p> <p>$= p^{\frac{9}{15} + \frac{5}{15}}$</p> <p>$= p^{\frac{14}{15}}$</p>	<p>F) $m^{-6}n^3p^{-4} \times m^{-2}np^{-2}$</p> <p>$= m^{-8}n^4p^{-6}$</p> <p>$= \frac{n^4}{m^8p^6}$</p>

2. Identify the errors in the following and write a correct solution.

$$\begin{aligned}
 (x^{-6}y^6)(x^{-3}y^5) &= x^{-6} \cdot x^{-3}y^6 \cdot y^5 \checkmark \\
 &= x^{18} \cdot y^{30} \quad \text{6+5} \\
 &= x^{-9}y^{11} \\
 &= \frac{y^{11}}{x^9}
 \end{aligned}$$