

# Unit 1 class Review - KEY

Wednesday, February 7, 2024 10:36 AM

Pre-Calculus 11

Chapter 1 Review -- NO CALCULATORS

Name KEY

Show work for multiple choice questions (except #1 and #2)

1. Which of the following statements are true? (Note: more than one are true)

I.	A whole number is an integer.
II.	A rational number is a real number.
III.	A repeating decimal is an irrational number.
IV.	A rational number can be expressed as a fraction.

2. Which of the following statements is always true?

- A. All radicals are rational numbers.
- B. All rational numbers are integers.
- C. The quotient of any two integers is always an integer.
- D. The difference of any two whole numbers is always an integer.

3. Simplify:  $\sqrt{x^3} \div \sqrt[3]{x^4}$

- A.  $\sqrt[6]{x}$
- B.  $\sqrt[3]{x^9}$
- C.  $\sqrt[9]{x^8}$
- D.  $\sqrt[12]{x}$

4. Simplify:  $\frac{(2a^2b)^5}{(4a^2b^3)^2} = \frac{32a^{10}b^5}{16a^4b^6}$

- A.  $\frac{5a^6}{4b}$
- B.  $\frac{2a^6}{b}$
- C.  $\frac{2a^3}{b}$
- D.  $\frac{1}{2b}$

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5. Which expression is equivalent to  $(-c)^{\left(-\frac{1}{3}\right)}$ ?  $= (-c)^{-\frac{2}{3}} = \frac{1}{\sqrt[3]{-c^2}}$

A.  $\frac{1}{\sqrt[3]{-c^2}}$

B.  $\frac{1}{\sqrt[3]{c^2}}$

C.  $\frac{1}{\sqrt{-c^3}}$

D.  $\sqrt[3]{c^2}$

6. Simplify:  $\frac{(6x^{-1}y)^{-2}}{(xy^{-1})^2}$

A.  $\frac{1}{12y^4}$

B.  $\frac{1}{36y^4}$

C.  $\frac{1}{12}$

D.  $\frac{1}{36}$

7. Simplify:  $\left[\left(a^{\frac{5}{4}}\right)\left(a^{\frac{7}{3}}\right)\right]^{-\frac{1}{2}}$

A.  $-a^{\frac{43}{24}}$

B.  $a^{-\frac{43}{24}}$

C.  $a^{-\frac{35}{24}}$

D.  $a^{\frac{37}{12}}$

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8. Simplify :  $(-7a^{-2}b^3c^{-1})^{-3} = (-7)^{-3} (a^{-2})^{-3} (b^3)^{-3} (c^{-1})^{-3}$   
 $= -\frac{a^6 c^3}{343 b^9}$

A.  $\frac{a^6 c^3}{343 b^9}$

B.  $-\frac{a^6 c^3}{343 b^9}$

C.  $-\frac{1}{343 a^6 c^9}$

D.  $-\frac{343 a^6 c^3}{b^9}$

9. Simplify :  $\left(\frac{a^4}{16}\right)^{-\frac{3}{4}}$

A.  $-\frac{8}{a^3}$

B.  $\frac{8}{a^3}$

C.  $-\frac{a^3}{8}$

D.  $\frac{a^3}{8}$

10. Simplify :  $(-48x^{-2}y^{-5}) \div (6x^3y^{-3})$

A.  $-\frac{8}{x^5 y^2}$

B.  $-\frac{8}{x y^2}$

C.  $-\frac{8}{x y^8}$

D.  $-\frac{8x^5}{y^8}$

11. Simplify :  $(-27x)^{\frac{2}{3}}$

A.  $9x^{\frac{2}{3}}$

B.  $-9x^{\frac{2}{3}}$

C.  $-18x^{\frac{2}{3}}$

D.  $-27x^{\frac{2}{3}}$

12. Simplify :  $\frac{(x^{a-1})^3}{(x^{2a})(x)}$

A.  $x^a$

B.  $x^{a-2}$

C.  $x^{a-3}$

D.  $x^{a-4}$

13. Which of the following is equivalent to

$(-a^{\frac{2}{3}})^{\frac{2}{3}}$

A.  $a^2$

B.  $-\frac{1}{a^2}$

C.  $-a^{\frac{2}{3}}$

D.  $\frac{1}{a^2}$

14. Name the sets of numbers to which each of the following belong.

(a)  $2.5$   
 ~~$\mathbb{R}, \mathbb{Q}$~~

(b)  $\sqrt{7}$   
 ~~$\mathbb{R}, \mathbb{Q}$~~

(c)  $-3.312456\dots$   
 ~~$\mathbb{R}, \mathbb{Q}$~~

(d)  $-\sqrt{16} = -4$   
 ~~$\mathbb{R}, \mathbb{Q}, \mathbb{I}$~~

15. Simplify the following.

a)  $\frac{12p^3q^{-7}}{15pq^6}$   

$$= \frac{4p^2}{5q^{13}}$$

b)  $(81x^{12})^{\frac{3}{4}}$   

$$= \sqrt[4]{81}^{\frac{3}{4}} (x^{\frac{12}{4}})^{\frac{3}{4}}$$
  

$$= \sqrt[4]{27x^9}$$

c)  $\frac{(-4m^{-3}n^2x^4 \cdot mx^4n^{-1})^2}{2mn^{-4}x^{-2}}$   

$$= \frac{16m^{-4-1}n^{2-(-4)}x^{16-(-2)}}{2}$$
  

$$= \frac{8n^6x^{18}}{m^5}$$

d)  $\left(\frac{5}{2}a^{-4}b^7\right)^{-3}$   

$$= \left(\frac{5}{2}\right)^{-3} (a^{-4})^{-3} (b^7)^{-3}$$
  

$$= \frac{8a^{12}}{125b^{21}}$$

16. Express the following mixed radicals as entire radicals: (Note that brackets have been used to avoid confusion on whether the small number is an exponent or an index to the radical.)

a)  $3\sqrt{5}$   

$$= \sqrt{9 \cdot 5}$$
  

$$= \sqrt{45}$$

b)  $2(\sqrt[4]{3})$   

$$= \sqrt[4]{16 \cdot 3}$$
  

$$= \sqrt[4]{48}$$

c)  $3x(\sqrt[3]{2})$   

$$= \sqrt[3]{54x^3}$$

d)  $4m^2n\sqrt{3}$   

$$= \sqrt{48m^4n^2}$$

e)  $-2(\sqrt[4]{6xy^3})$   

$$= -\sqrt[4]{96xy^3}$$

f)  $2m^4(\sqrt[5]{3m^2})$   

$$= \sqrt[5]{96m^{22}}$$

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17. Express the following entire radicals as mixed radicals

a)  $\sqrt{162}$   
 $= \sqrt{81 \cdot 2}$  ✓  
 $= \boxed{9\sqrt{2}}$  ✓

b)  $\sqrt[3]{72}$   
 $= \boxed{2\sqrt[3]{9}}$

c)  $\sqrt{\frac{32}{50}} \rightarrow \frac{\sqrt{16 \cdot 2}}{\sqrt{25 \cdot 2}} = \boxed{\frac{4}{5}}$

d)  $\sqrt[3]{16x^3y}$   
 $= \boxed{2x\sqrt[3]{2y}}$

e)  $\sqrt{2m^5n^4}$   
 $= \boxed{m^2n^2\sqrt{2m}}$

f)  $\sqrt[3]{\frac{375n^6}{24m^3}} = \frac{\sqrt[3]{125 \cdot 3 \cdot n^6}}{\sqrt[3]{8 \cdot 3 \cdot m^3}} = \frac{5n^2}{2m}$

18. Order from smallest to largest.

$9\sqrt{2}, 3\sqrt{5}, -5\sqrt{5}, 7\sqrt{3}, 3\sqrt{7}$   
 " " " " "  
 12.7 6.7 -11.2 12.1 7.9  
 5 2 1 4 3

$\rightarrow \boxed{-5\sqrt{5}, 3\sqrt{5}, 3\sqrt{7}, 7\sqrt{3}, 9\sqrt{2}}$

19. Evaluate.

a)  $32^{\frac{2}{5}}$   
 $= (\sqrt[5]{32})^2$   
 $= (2)^2$   
 $= \boxed{4}$

b)  $-32^{\frac{2}{5}}$   
 $= \boxed{-4}$

c)  $(-32)^{\frac{2}{5}}$   
 $= \boxed{4}$

d)  $32^{-\frac{2}{5}}$   
 $= \boxed{\frac{1}{4}}$

e)  $81^{\frac{3}{4}}$   
 $= \boxed{27}$

f)  $-81^{\frac{3}{4}}$   
 $= \boxed{-27}$

g)  $(-81)^{\frac{3}{4}}$   
 $= \text{no solution}$   
 $(\sqrt[4]{-81})^3$

h)  $81^{-\frac{3}{4}}$   
 $= \boxed{\frac{1}{27}}$

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20. Simplify. Write using exponents.

a)  $\sqrt{n^3} \cdot \sqrt[5]{n^2}$   
 $= n^{\frac{3}{2}} + \frac{2}{5} = \frac{19}{10}$   
 $= \boxed{n^{\frac{19}{10}}}$

b)  $\sqrt[4]{256m^8}$   
 $= (\sqrt[4]{256} \cdot \sqrt[4]{m^{\frac{8}{2}}})^{\frac{1}{4}}$   
 $= (16m^4)^{\frac{1}{4}} \text{ or } \sqrt[4]{16} \cdot \sqrt[4]{m^{\frac{4}{4}}} = 1$   
 $= \boxed{2m}$

c)  $\sqrt[4]{64m^{12}} \sqrt[4]{16m^8}$   
 $= \sqrt[4]{4m^4} \cdot \sqrt[4]{4m^4}$   
 $= 2m^2 \cdot 2m^2$   
 $= \boxed{4m^4}$

21. Evaluate.

a)  $\frac{3^{-1+3-3}}{3^{-4}}$   
 $= \frac{3^{-1-(-4)}}{3^{-4}} + \frac{3^{-3-(-4)}}{3^{-4}}$   
 $= 3^3 + 3$   
 $= 27 + 3 = \boxed{30}$

b)  $(6-10)^{-3} (-4)^5 - \frac{(-7+3)^5}{(1-5)^3}$   
 $= (-4)^{-3+5} - \frac{(-4)^{5-3}}{(-4)^3}$   
 $= (-4)^2 - (-4)^2$   
 $= \boxed{0}$

22. Simplify the expression. Make sure all the powers have positive exponents

a)  $\frac{(-m^6n^3)^{-3}}{(2m^{-4}n^3)^5}$   
 $= \frac{-m^{-18}n^{-9}}{32m^{-20}n^{15}}$   
 $= \boxed{-\frac{m^2}{32n^{24}}}$

b)  $(32m^{10}n^5)^{\frac{2}{5}} (3m^4n)^2 = (32)^{\frac{2}{5}} (m^{10})^{\frac{2}{5}} (n^5)^{\frac{2}{5}} \cdot (3^2)(m^4)^2 (n)^2$   
 $= 4m^4n^2 \cdot 9m^8n^2$   
 $= \boxed{36m^{12}n^4}$

c)  $5\left(5^{3x} - \frac{1}{5^{-3x}}\right)$   
 $= 5(5^{3x} - 5^{3x})$   
 $= 5(0)$   
 $= \boxed{0}$

d)  $\left(\frac{25x^8y^4}{49x^{12}y^{-2}}\right)^{\frac{1}{2}}$   
 $= \boxed{\frac{7x^2}{5y^3}}$