

## Pre-Calc 11 Unit 1 Pre-test

Questions #1-20 should be done without a calculator.

1. Which of the following numbers is irrational?

A.  $\sqrt{\frac{64}{81}}$

C.  $\sqrt{\frac{1}{9}}$

B.  $\sqrt{\frac{24}{6}}$

D.  $\sqrt{\frac{24}{4}}$

2. Evaluate  $125^{\frac{1}{3}}$  without using a calculator.

A. 5

B. 11.18

C. -5

D.  $41\frac{2}{3}$

3. Write  $43^{\frac{3}{2}}$  as a radical.

A.  $(\sqrt[3]{43})^2$

B.  $(\sqrt{43})^3$

C.  $\sqrt[1.5]{43}$

D.  $\sqrt[3]{43^2}$

4. Write  $\sqrt{\left(\frac{5}{2}\right)^7}$  as a power.

A.  $\left(\frac{5}{2}\right)^{\frac{7}{2}}$

B.  $\left(\frac{5}{2}\right)^{\frac{2}{7}}$

C.  $\left(\frac{2}{5}\right)^{-\frac{2}{7}}$

D.  $\left(\frac{5}{2}\right)^{\frac{7}{2}}$

5. Evaluate  $(-243)^{0.6}$ .

A. -27

B. 27

C. 9462.5994...

D. does not exist

6. Evaluate  $4^{2.5}$ .

A. 18

B. 32

C. 1.741 101...

D. 40

7. Evaluate  $8^{-\frac{4}{3}}$  without using a calculator.

A.  $\frac{3}{32}$

B.  $-\frac{1}{16}$

C.  $\frac{1}{16}$

D. -16

8. Evaluate  $49^{-0.5}$  without using a calculator.

A.  $\frac{1}{49}$

B.  $\frac{2}{49}$

C.  $\frac{1}{7}$

D. 7

9. Simplify  $(27a^6b^9)^{\frac{2}{3}}$ .

A.  $9a^9b^6$

B.  $27a^4b^6$

C.  $9a^4b^6$

D.  $9a^4b^9$

10. Evaluate  $\frac{0.64^{\frac{5}{2}}}{0.64^4}$ .
- A.  $\frac{3}{2}$                       B. 18.1899...                      C.  $\frac{64}{125}$                       D.  $\frac{125}{64}$
11. Evaluate:  $\sqrt{(-9 - (-17))^2}$
- A. 26                      B. 2.83                      C. 8                      D. 64
12. Which expression cannot be evaluated?
- A.  $\sqrt[3]{-81}$                       C.  $9^{-\frac{2}{3}}$   
 B.  $-64^{\frac{2}{3}}$                       D.  $\sqrt{-25^3}$
13. Write this mixed radical as an entire radical:  $-7\sqrt{2}$
- A.  $\sqrt{98}$                       B.  $\sqrt{-14}$                       C.  $-\sqrt{98}$                       D.  $\sqrt{196}$
14. Write this mixed radical as an entire radical:  $-\frac{4}{3}\sqrt[3]{\frac{5}{6}}$
- A.  $\sqrt[3]{-\frac{160}{41}}$                       B.  $\sqrt[3]{-\frac{160}{81}}$                       C.  $\sqrt[3]{\frac{81}{160}}$                       D.  $\sqrt[3]{41}$
15. Write this entire radical as a mixed radical:  $\sqrt{150}$
- A.  $10\sqrt{6}$                       B.  $10\sqrt{12}$                       C.  $5\sqrt{36}$                       D.  $5\sqrt{6}$
16. Write this entire radical as a mixed radical:  $\sqrt[4]{80}$
- A.  $4\sqrt[4]{10}$                       B.  $2\sqrt[4]{25}$                       C.  $2\sqrt[4]{5}$                       D.  $4\sqrt[4]{5}$
17. Write this entire radical as a mixed radical:  $\sqrt[3]{-\frac{54}{125}}$
- A.  $-2\sqrt[3]{\frac{3}{5}}$                       B.  $\sqrt[3]{-\frac{6}{5}}$                       C.  $-\frac{5\sqrt[3]{2}}{3}$                       D.  $-\frac{3\sqrt[3]{2}}{5}$
18. For which values of the variable,  $x$ , is this radical defined?  
 $\sqrt{-38x^3}$
- A.  $x \leq 0$                       C.  $x \geq 0$   
 B.  $x \in \mathbb{R}$                       D.  $x < 0$
19. Write this radical in simplest form:  $\sqrt{63a^9b^8}$   
 Then state the values of the variables,  $a$  and  $b$ , for which the radical is defined.
- A.  $3a^4b^4\sqrt{7a}$ ;  $a \in \mathbb{R}, b \geq 0$                       C.  $3ab\sqrt{7a^4b^4}$ ;  $a \in \mathbb{R}, b \geq 0$   
 B.  $3ab\sqrt{7a^4b^4}$ ;  $a \geq 0, b \in \mathbb{R}$                       D.  $3a^4b^4\sqrt{7a}$ ;  $a \geq 0, b \in \mathbb{R}$

20. For which values of the variable,  $x$ , is this radical defined?

$$\sqrt{-22x^4}$$

- A.  $x \geq 0$   
B.  $x \in \mathbb{R}$

- C.  $x \leq 0$   
D.  $x = 0$

21. Write this radical in simplest form:  $\sqrt[4]{\frac{625y^5}{512}}$

Then state the values of the variable,  $y$ , for which the radical is defined.

A.  $\frac{5y}{2} \sqrt[4]{\frac{y}{2}}; y \geq 0$

C.  $\frac{5y}{4} \sqrt[4]{\frac{y}{2}}; y \geq 0$

B.  $\frac{5y}{4} \sqrt[4]{\frac{1}{2}}; y \in \mathbb{R}$

D.  $\frac{y}{4} \sqrt[4]{\frac{5y}{2}}; y \geq 0$

22. Simplify:  $\left( \frac{8^{\frac{5}{6}}}{8^{\frac{2}{3}} \cdot 8^{\frac{4}{9}}} \right)^6$

- A. 8  
B. 32

- C.  $\frac{1}{32}$   
D. -32

23. Arrange these radicals in order from greatest to least.

i)  $3\sqrt[3]{5}$

ii)  $\sqrt[3]{375}$

iii)  $4\sqrt[3]{3}$

iv)  $\sqrt[3]{40}$

- A. iv, i, iii, ii  
B. ii, iii, i, iv

- C. iii, ii, i, iv  
D. ii, iv, i, iii

24. Which statement is true?

i)  $\sqrt{-475x^7} = (-5x^3)\sqrt{19x}$ ; for  $x \in \mathbb{R}$

ii)  $\sqrt{-475x^7} = 5|x^3|\sqrt{-19x}$ ; for  $x \leq 0$

iii)  $\sqrt{-475x^7} = 5|x^3|\sqrt{-19x}$ ; for  $x \geq 0$

iv) There are no values of  $x \in \mathbb{R}$  for which  $\sqrt{-475x^7} = 5|x^3|\sqrt{-19x}$

A. ii

B. i

C. iv

D. iii

25. Which radical expression simplifies to  $9\sqrt{2}$ ?

A.  $\sqrt{32} - 7\sqrt{2} + \sqrt{8}$

C.  $\sqrt{32} + 7\sqrt{8} - \sqrt{2}$

B.  $\sqrt{32} - \sqrt{8} + 7\sqrt{2}$

D.  $\sqrt{2} + 7\sqrt{8} - \sqrt{32}$

26. Which radical expression simplifies to  $-9\sqrt{x}$ ?

A.  $-8\sqrt{x} + 4\sqrt{x} - 5\sqrt{x}, x \geq 0$

C.  $-8\sqrt{x} - 4\sqrt{x} + 5\sqrt{x}, x \geq 0$

B.  $-8\sqrt{x} + 4\sqrt{x} - 5\sqrt{x}, x \in \mathbb{R}$

D.  $-8\sqrt{x} - 4\sqrt{x} + 5\sqrt{x}, x \in \mathbb{R}$

27. Simplify by adding or subtracting like terms:  $8\sqrt{13} - 7\sqrt{13} + 5\sqrt{13}$   
 A.  $6\sqrt{13}$                       B.  $\sqrt{78}$                       C.  $10\sqrt{13}$                       D.  $6\sqrt{10}$
28. Simplify by adding or subtracting like terms:  $\sqrt{243} + 4\sqrt{3} - \sqrt{27}$   
 A.  $16\sqrt{3}$                       B.  $8\sqrt{3}$                       C.  $10\sqrt{3}$                       D. 0
29. Simplify by adding or subtracting like terms:  $\sqrt{729} - \sqrt[3]{8} - \sqrt{81} + \sqrt[3]{512}$   
 A.  $18 - 6\sqrt[3]{2}$                       C.  $18\sqrt{3} - 6\sqrt[3]{2}$   
 B.  $6 - 18\sqrt{3}$                       D. 24
30. Simplify by adding or subtracting like terms:  $\sqrt[3]{729w^4} - 3w\sqrt[3]{w} - \sqrt[3]{27w^7} + 3w^2, w \in \mathbb{R}$   
 A.  $6w\sqrt[3]{w} - 3w^2\sqrt[3]{w} + 3w^2$                       C.  $6w\sqrt[3]{w}$   
 B.  $6w\sqrt[3]{w} + 6w^2$                       D.  $3w\sqrt[3]{w} + 3w^2$
31. Expand and simplify this expression:  $\sqrt{3}(\sqrt{2} + 4)$   
 A.  $3\sqrt{2} + 4\sqrt{3}$                       C.  $\sqrt{6} + \sqrt{12}$   
 B.  $2\sqrt{3} + \sqrt{12}$                       D.  $\sqrt{6} + 4\sqrt{3}$
32. Expand and simplify this expression:  $(\sqrt{5} + 7)^2$   
 A.  $54 + 14\sqrt{5}$                       C.  $5\sqrt{5} + 49$   
 B.  $5\sqrt{5} + 14\sqrt{5} + 54$                       D.  $54 + 5\sqrt{14}$
33. Rationalize the denominator:  $\frac{7}{7\sqrt{5}}$   
 A.  $\frac{7\sqrt{5}}{35}$                       B.  $\frac{35\sqrt{5}}{5}$                       C.  $\frac{7\sqrt{5}}{5}$                       D.  $\frac{49\sqrt{5}}{7}$
34. Expand and simplify this expression:  $(-5\sqrt{5} - 2\sqrt{3})(4\sqrt{5} + 8) + 2\sqrt{5}(3\sqrt{5} + 3\sqrt{3})$   
 A.  $-70 - 58\sqrt{15}$   
 B.  $-130 - 40\sqrt{5} + 16\sqrt{3} - 2\sqrt{15}$   
 C.  $-70 - 40\sqrt{5} - 16\sqrt{3} - 2\sqrt{15}$   
 D.  $-130 - 40\sqrt{5} - 16\sqrt{3} - 14\sqrt{15}$
35. Expand and simplify this expression:  $(2\sqrt{s} - 7\sqrt{t})(5\sqrt{s} - 7\sqrt{t}), s \geq 0, t \geq 0$   
 A.  $10s - 49\sqrt{st} + 49t$                       C.  $10s - 70\sqrt{st} + 49t$   
 B.  $10s - 28\sqrt{st} + 49t$                       D.  $-45st - 49\sqrt{st}$
36. Simplify this expression:  $\frac{-9\sqrt{5} - 3}{\sqrt{5}}$   
 A.  $\frac{-45 - 3\sqrt{5}}{5}$                       C.  $\frac{-9 - 15\sqrt{5}}{5}$   
 B.  $-225 - 3\sqrt{5}$                       D.  $\frac{-45\sqrt{5} - 15}{5}$

37. Simplify this expression:  $\frac{2\sqrt{3} + 9\sqrt{7}}{\sqrt{2} - 8}$

- A.  $\frac{-2\sqrt{3} - 18\sqrt{42} - 72\sqrt{7}}{-6}$   
 B.  $\frac{-2\sqrt{6} - 9\sqrt{14} - 16\sqrt{3} - 72\sqrt{7}}{62}$   
 C.  $\frac{-2\sqrt{3} - 18\sqrt{42} - 72\sqrt{7}}{62}$   
 D.  $\frac{-2\sqrt{6} - 9\sqrt{14} - 16\sqrt{3} - 72\sqrt{7}}{-6}$

38. Simplify this expression:  $\frac{\sqrt{7}}{\sqrt{12}} - \left( \frac{-7\sqrt{3}}{\sqrt{28}} \right)$

- A.  $\frac{2\sqrt{21}}{3}$       B.  $\frac{\sqrt{2}}{3}$       C.  $\frac{2\sqrt{21}}{7}$       D.  $\frac{21\sqrt{2}}{11}$

39. Solve this equation:  $9\sqrt{4x} = 72$

- A.  $x = 16$       B.  $x = 64$       C.  $x = \frac{1}{8}$       D.  $x = 8$

40. Solve this equation:  $9\sqrt{x} - 6 = 30$

- A.  $x = 4$       B.  $x = 16$       C.  $x = 9$       D.  $x = 8$

41. Solve this equation:  $\sqrt{-2 + 8x} = \sqrt{-44 + 2x}$

- A.  $x = \frac{1}{7}$       B.  $x = -5$       C.  $x = -6$       D. no real solution

42. Solve this equation:  $\frac{\sqrt{x}}{3} = 4$

- A.  $x = 144$       B.  $x = 12$       C.  $x = 7$       D.  $x = 3$

43. Solve this equation:  $5 = \sqrt[5]{5x - 8} + 3$

- A.  $x = -8$       B.  $x = \frac{32}{5}$       C.  $x = 40$       D.  $x = 8$

44. Is the following number rational or irrational? **Justify your answer!**

$$\sqrt{\frac{10}{160}}$$


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45. Evaluate  $\left(\frac{8}{27}\right)^{\frac{2}{3}}$  without using a calculator.

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46. Simplify  $\left(\frac{w^{-15}y^{12}}{-64x^3}\right)^{-\frac{1}{3}}$ .

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47. Simplify:  $\left(9^{\frac{1}{2}} + 9^{\frac{-1}{2}}\right)^{-3}$

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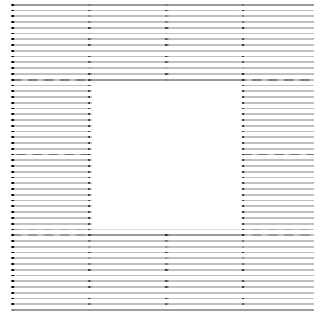
48. When 8 is added to an integer,  $x$ , the absolute value of the sum is 5. Determine a value for  $x$ . How many different values of  $x$  are possible? Show how you solved the problem.

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49. Sixteen congruent squares are placed together to form a large square. The 4 middle squares are removed. The final shape is a square within a square. The area of the large square is 80 square units.

- a) What is the area of the inner square?
- b) What is the difference between the perimeters of the outer square and the inner square?

Explain your work.



50. Expand and simplify this expression:  $(-5\sqrt{2} + 3\sqrt{3})(-6\sqrt{2} - 2\sqrt{3})$

Show your work.

51. a) Identify the values of the variables for which this expression is defined.

b) Write the expression in simplest form. Show your work.

$$\frac{-5\sqrt{s} + 3\sqrt{t}}{4\sqrt{s} - 5\sqrt{t}}$$

52. Determine whether the given value of  $x$  is a root of this equation. Justify your answer.  
 $\sqrt{5x-5} = \sqrt{6x-8}; x = 9$

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53. Does this equation have a real root? If so, determine its value.  
 $6 = \sqrt{8-7x}$

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54. Solve this equation:  $4\sqrt{2x-2} = 2\sqrt{5x+4}$

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**Questions #1-20 should be done without a calculator.  
Answer Section**

- |     |  |                              |                |   |
|-----|--|------------------------------|----------------|---|
| 1.  | ANS: D   | PTS: 1                       |                |   |
| 2.  | ANS: A   | PTS: 1                       | DIF: Easy      | REF: 4.4 Fractional Exponents and Radicals  |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 3.  | ANS: B   | PTS: 1                       | DIF: Easy      | REF: 4.4 Fractional Exponents and Radicals  |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 4.  | ANS: D   | PTS: 1                       | DIF: Easy      | REF: 4.4 Fractional Exponents and Radicals  |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 5.  | ANS: A   | PTS: 1                       | DIF: Moderate  | REF: 4.4 Fractional Exponents and Radicals  |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 6.  | ANS: B   | PTS: 1                       | DIF: Moderate  | REF: 4.4 Fractional Exponents and Radicals  |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 7.  | ANS: C   | PTS: 1                       | DIF: Easy      | REF: 4.5 Negative Exponents and Reciprocals |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 8.  | ANS: C   | PTS: 1                       | DIF: Moderate  | REF: 4.5 Negative Exponents and Reciprocals |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 9.  | ANS: C   | PTS: 1                       | DIF: Easy      | REF: 4.6 Applying the Exponent Laws         |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 10. | ANS: D   | PTS: 1                       | DIF: Moderate  | REF: 4.6 Applying the Exponent Laws         |
|     | LOC: 10.AN3  | TOP: Algebra and Number      |                | KEY: Conceptual Understanding               |
| 11. | ANS: C   | PTS: 0                       | DIF: Moderate  | REF: 2.1 Absolute Value of a Real Number    |
|     | LOC: 11.AN1  | TOP: Relations and Functions |                |   |
|     | KEY: Conceptual Understanding   Procedural Knowledge |                              |                |   |
| 12. | ANS: D   | PTS: 1                       | DIF: C         | OBJ: Section 4.4                            |
|     | NAT: AN2   | TOP: Irrational Numbers      |                | KEY: irrational number                      |
| 13. | ANS: C   | PTS: 0                       | DIF: Easy      | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                | KEY: Procedural Knowledge                   |
| 14. | ANS: B   | PTS: 0                       | DIF: Moderate  | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                | KEY: Procedural Knowledge                   |
| 15. | ANS: D   | PTS: 0                       | DIF: Easy      | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                | KEY: Procedural Knowledge                   |
| 16. | ANS: C   | PTS: 0                       | DIF: Moderate  | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                | KEY: Procedural Knowledge                   |
| 17. | ANS: D   | PTS: 0                       | DIF: Moderate  | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                | KEY: Procedural Knowledge                   |
| 18. | ANS: A   | PTS: 0                       | DIF: Moderate  | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                |   |
|     | KEY: Conceptual Understanding   Procedural Knowledge |                              |                |   |
| 19. | ANS: D   | PTS: 0                       | DIF: Difficult | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                |   |
|     | KEY: Conceptual Understanding   Procedural Knowledge |                              |                |   |
| 20. | ANS: D   | PTS: 0                       | DIF: Moderate  | REF: 2.2 Simplifying Radical Expressions    |
|     | LOC: 11.AN2  | TOP: Relations and Functions |                |   |
|     | KEY: Conceptual Understanding   Procedural Knowledge |                              |                |   |

21. ANS: C           PTS: 0           DIF: Difficult       REF: 2.2 Simplifying Radical Expressions  
 LOC: 11.AN2       TOP: Relations and Functions  
 KEY: Conceptual Understanding | Procedural Knowledge
22. ANS: C           PTS: 1
23. ANS: B           PTS: 0           DIF: Moderate       REF: 2.2 Simplifying Radical Expressions  
 LOC: 11.AN2       TOP: Relations and Functions       KEY: Procedural Knowledge
24. ANS: A           PTS: 0           DIF: Difficult       REF: 2.2 Simplifying Radical Expressions  
 LOC: 11.AN2       TOP: Relations and Functions  
 KEY: Procedural Knowledge | Conceptual Understanding
25. ANS: B           PTS: 0           DIF: Easy  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
26. ANS: A           PTS: 0           DIF: Moderate  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
27. ANS: A           PTS: 0           DIF: Easy  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
28. ANS: C           PTS: 0           DIF: Easy  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
29. ANS: D           PTS: 0           DIF: Moderate  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
30. ANS: A           PTS: 0           DIF: Moderate  
 REF: 2.3 Adding and Subtracting Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
31. ANS: D           PTS: 0           DIF: Easy  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
32. ANS: A           PTS: 0           DIF: Easy  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
33. ANS: A           PTS: 0           DIF: Easy  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Procedural Knowledge
34. ANS: C           PTS: 0           DIF: Moderate  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
35. ANS: A           PTS: 0           DIF: Moderate  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
36. ANS: A           PTS: 0           DIF: Moderate  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge
37. ANS: B           PTS: 0           DIF: Moderate  
 REF: 2.4 Multiplying and Dividing Radical Expressions       LOC: 11.AN2  
 TOP: Relations and Functions       KEY: Conceptual Understanding | Procedural Knowledge

38. ANS: A                      PTS: 0                      DIF: Difficult  
 REF: 2.4 Multiplying and Dividing Radical Expressions                      LOC: 11.AN2  
 TOP: Relations and Functions                      KEY: Conceptual Understanding | Procedural Knowledge
39. ANS: A                      PTS: 0                      DIF: Easy                      REF: 2.5 Solving Radical Equations  
 LOC: 11.AN3                      TOP: Relations and Functions                      KEY: Procedural Knowledge
40. ANS: B                      PTS: 0                      DIF: Easy                      REF: 2.5 Solving Radical Equations  
 LOC: 11.AN3                      TOP: Relations and Functions                      KEY: Procedural Knowledge
41. ANS: D                      PTS: 0                      DIF: Moderate                      REF: 2.5 Solving Radical Equations  
 LOC: 11.AN3                      TOP: Relations and Functions  
 KEY: Conceptual Understanding | Procedural Knowledge
42. ANS: A                      PTS: 0                      DIF: Moderate                      REF: 2.5 Solving Radical Equations  
 LOC: 11.AN3                      TOP: Relations and Functions                      KEY: Procedural Knowledge
43. ANS: D                      PTS: 0                      DIF: Difficult                      REF: 2.5 Solving Radical Equations  
 LOC: 11.AN3                      TOP: Relations and Functions  
 KEY: Conceptual Understanding | Procedural Knowledge
44. ANS:

Rational because it simplifies to  $\sqrt{\frac{1}{16}}$  which is a perfect square. The square root of perfect squares are rational.

PTS: 1

45. ANS:

$$\frac{9}{4}$$

PTS: 1

DIF: Moderate                      REF: 4.5 Negative Exponents and Reciprocals

LOC: 10.AN3

TOP: Algebra and Number

KEY: Conceptual Understanding

46. ANS:

$$\frac{4w^5x}{y^4}$$

PTS: 1

DIF: Moderate                      REF: 4.6 Applying the Exponent Laws

LOC: 10.AN3

TOP: Algebra and Number

KEY: Conceptual Understanding

47. ANS:

$$\frac{27}{1000}$$

PTS: 1

48. ANS:

Write, then solve an equation:  $|x + 8| = 5$

Since  $|5| = 5$  and  $|-5| = 5$

then,  $x + 8 = 5$                       or                       $x + 8 = -5$

$x = -3$      $x = -13$

So, two values of  $x$  are possible:  $-3$  or  $-13$

PTS: 0

DIF: Difficult

REF: 2.1 Absolute Value of a Real Number

LOC: 11.AN1

TOP: Relations and Functions

KEY: Procedural Knowledge | Communication | Problem-Solving Skills

49. ANS:

a) The area of the large square is 80 square units.

So, the area of each small square is:  $\frac{80}{16}$ , or 5 square units.The inner square has the area of 4 small squares:  $4(5) = 20$ 

The area of the inner square is 20 square units.

b) The side length of a small square is the square root of its area:  $\sqrt{5}$  units

The perimeter of the outer square is equal to 16 times the side length of the small square:

$$16\sqrt{5} \text{ units}$$

The perimeter of the inner square is equal to 8 times the side length of the small square:

$$8\sqrt{5}$$

$$\text{Difference between perimeters: } 16\sqrt{5} - 8\sqrt{5} = 8\sqrt{5}$$

The difference between the perimeters of the outer square and the inner square is  $8\sqrt{5}$  units.

PTS: 0                      DIF: Moderate                      REF: 2.3 Adding and Subtracting Radical Expressions

LOC: 11.AN2                      TOP: Relations and Functions

KEY: Procedural Knowledge | Communication | Problem-Solving Skills

50. ANS:

$$\begin{aligned} & (-5\sqrt{2} + 3\sqrt{3})(-6\sqrt{2} - 2\sqrt{3}) \\ &= -5\sqrt{2}(-6\sqrt{2} - 2\sqrt{3}) + 3\sqrt{3}(-6\sqrt{2} - 2\sqrt{3}) \\ &= 60 + 10\sqrt{6} - 18\sqrt{6} - 18 \\ &= 42 - 8\sqrt{6} \end{aligned}$$

PTS: 0                      DIF: Easy                      REF: 2.4 Multiplying and Dividing Radical Expressions

LOC: 11.AN2                      TOP: Relations and Functions                      KEY: Procedural Knowledge | Communication

51. ANS:

a)  $s \geq 0$  and  $t \geq 0$ 

$$\begin{aligned} \text{b) } \frac{-5\sqrt{s} + 3\sqrt{t}}{4\sqrt{s} - 5\sqrt{t}} &= \frac{(-5\sqrt{s} + 3\sqrt{t})}{(4\sqrt{s} - 5\sqrt{t})} \cdot \frac{(4\sqrt{s} + 5\sqrt{t})}{(4\sqrt{s} + 5\sqrt{t})} \\ &= \frac{-20s - 25\sqrt{st} + 12\sqrt{st} + 15t}{(4\sqrt{s})^2 - (5\sqrt{t})^2} \\ &= \frac{-20s - 13\sqrt{st} + 15t}{16s - 25t} \end{aligned}$$

PTS: 0                      DIF: Moderate                      REF: 2.4 Multiplying and Dividing Radical Expressions

LOC: 11.AN2                      TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

52. ANS:

$$\begin{aligned} \text{L.S.} &= \sqrt{5x-5} & \text{R.S.} &= \sqrt{6x-8} \\ &= \sqrt{5(9)-5} & &= \sqrt{6(9)-8} \\ &= \sqrt{40} & &= \sqrt{46} \end{aligned}$$

Since the left side does not equal the right side,  $x = 9$  is not a root of the equation.

PTS: 0

DIF: Easy

REF: 2.5 Solving Radical Equations

LOC: 11.AN3

TOP: Relations and Functions

KEY: Procedural Knowledge | Communication

53. ANS:

Since  $8 - 7x \geq 0$ , then  $x \leq 1\frac{1}{7}$

$$6 = \sqrt{8-7x}$$

$$6^2 = (\sqrt{8-7x})^2$$

$$36 = 8 - 7x$$

$$28 = -7x$$

$$x = -4$$

Since  $x = -4$  lies in the set of possible values for  $x$ ,  $x = -4$  is a real root.

PTS: 0

DIF: Moderate

REF: 2.5 Solving Radical Equations

LOC: 11.AN3

TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

54. ANS:

$$x = 4$$

PTS: 0

DIF: Moderate

REF: 2.5 Solving Radical Equations

LOC: 11.AN3

TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge