

Mathematics 2200 TEST
Unit 5: Radicals

Total = _____ / 30 = _____ %

Name: Key**Part A: Multiple Choice.**

Write the letter of the correct response in the blank to the right. (10 marks)

1. Simplify: $3\sqrt{18} - (2\sqrt{27} - 3\sqrt{12})$

1. C

A) $4\sqrt{3}$

B) $6\sqrt{2}$

C) $9\sqrt{2}$

D) $18\sqrt{2} - 6\sqrt{3}$

2. Which mixed radical is equal to $\sqrt{486a^4b}$?

2. B

A) $3a^2\sqrt{54b}$

B) $9a^2\sqrt{6b}$

C) $2ab\sqrt{86}$

D) $2ab\sqrt{243}$

3. Which expression represents $5ab^2\sqrt{5}$?

3. P

A) $ab^2\sqrt{25}$

B) $25a^2b^3$

C) $\sqrt{125ab^2}$

D) $\sqrt{125a^2b^4}$

4. Simplify: $\frac{\sqrt{2}}{2\sqrt{3y}}$

4. B

A) $\frac{\sqrt{5y}}{5y}$

B) $\frac{\sqrt{6y}}{6y}$

C) $\frac{\sqrt{6y}}{5y}$

D) $\frac{\sqrt{5y}}{3y}$

5. Simplify $\sqrt[3]{160u^{10}r^{15}}$ completely.

5. A

A) $2u^2r^3(\sqrt[3]{5})$

B) $2u^2r^2(\sqrt[3]{5})$

C) $4u^2r^3(\sqrt[3]{5})$

D) $10u^2r^3(\sqrt[3]{4})$

6. Expand and simplify completely: $(4\sqrt{7} - \sqrt{5})^2$

6. D

7. Simplify: $(\sqrt{15n^2})(\sqrt{10n^3})$

7. P

- A) $\sqrt{150n^5}$
- B) $\sqrt{150n^6}$
- C) $5\sqrt{6n^5}$
- D) $5n^2\sqrt{6n}$

8. Simplify: $\frac{\sqrt{24x^5}}{\sqrt{8x}}$

8. B

- A) $4x^2$
- B) $x^2\sqrt{3}$
- C) $\sqrt{16x^4}$
- D) $\sqrt{3x^4}$

9. What are the restrictions of $\frac{3}{\sqrt{x+5}}$?

9. A

- A) $x > -5$
- B) $x \geq -5$
- C) $x > 5$
- D) $x \geq 5$

10. What are the restrictions of $9x^2y\sqrt[3]{3x^5}$

10. C

- A) $x \in \mathbb{R}$
- B) $x > 0$
- C) $x \geq 0$
- D) $x \geq 3$

11. Solve: $6 = \sqrt{v-2}$

11. D

- A) $v = 4$
- B) $v = 8$
- C) $v = 34$
- D) $v = 38$

12. The volume, V , in cubic units, of a cylinder is given by $V = \pi r^2 h$, where r is the radius and h is the height, both in the same units. What is the exact radius, in cm, of a cylinder with a height of 64 cm and a volume of $576\pi \text{ cm}^3$ in simplest form?

12. B

- A) $\frac{1}{\sqrt{64}}$
- B) 3
- C) 8
- D) 2

$$\frac{576\pi}{\pi} = \frac{\pi(r^2)(64)}{\pi}$$

$$\frac{576}{64} = \frac{64r^2}{64}$$

$$9 = r^2$$

$$r = 3$$

Part B: Constructed Response. Answer all questions in the space provided and **SHOW ALL WORKINGS.** Be sure to **completely simplify** all answers. (18 marks)

13. Find the exact PERIMETER of the rectangle below in simplest radical form. ___ / 4

$$\begin{aligned}
 P &= 2(3\sqrt{32} + 9\sqrt{75}) + 2(6\sqrt{50} - 6\sqrt{48}) \quad (1/2) \\
 &= 6\sqrt{32} + 18\sqrt{75} + 12\sqrt{50} - 12\sqrt{48} \quad (1/2) \\
 &= 6(4\sqrt{2}) + 18(5\sqrt{3}) + 12(5\sqrt{2}) - 12(4\sqrt{3}) \quad (1/2) \\
 &= 24\sqrt{2} + 90\sqrt{3} + 60\sqrt{2} - 48\sqrt{3} \\
 &= 84\sqrt{2} + 42\sqrt{3}
 \end{aligned}$$

$3\sqrt{32} + 9\sqrt{75}$

$6\sqrt{50} - 6\sqrt{48}$

14. Rationalize the denominator for $\frac{6\sqrt{3} + \sqrt{2}}{2\sqrt{3} - \sqrt{2}}$ and simplify completely. ___ / 4

$$\begin{aligned}
 &\frac{6\sqrt{3} + \sqrt{2}}{2\sqrt{3} - \sqrt{2}} \times \frac{2\sqrt{3} + \sqrt{2}}{2\sqrt{3} + \sqrt{2}} \quad (1/2) \\
 &= \frac{12(3) + 6\sqrt{6} + 2\sqrt{6} + 2}{4(3) - 2\sqrt{6} + 2\sqrt{6} - 2} \quad (1) \\
 &= \frac{38 + 8\sqrt{6}}{10} \quad (1/2) \\
 &= \frac{19 + 4\sqrt{6}}{5} \quad (1/2)
 \end{aligned}$$

15. Simplify completely: $\frac{\sqrt{72y^5}}{2} - \sqrt{50y^5} + \frac{1}{3}\sqrt{162y^5}$ ___ / 3

$$\begin{aligned}
 &= \frac{6y^2\sqrt{24}}{2} - 5y^2\sqrt{24} + \frac{1}{3}(9y^2\sqrt{24}) \quad (1/2) \\
 &= 3y^2\sqrt{24} - 5y^2\sqrt{24} + 3y^2\sqrt{24} \quad (1/2)
 \end{aligned}$$

16. Solve $5 + \sqrt{3x-11} = x$. State any restrictions and verify your solution.

$$\begin{aligned} \sqrt{3x-11} &= x-5 \\ (\sqrt{3x-11})^2 &= (x-5)^2 \quad (11/2) \\ 3x-11 &= x^2-10x+25 \\ x^2-13x+36 &= 0 \quad (11/2) \\ (x-9)(x-4) &= 0 \\ x-9=0 & \quad x-4=0 \\ x=9 & \quad x=4 \\ (11/2) & \quad (11/2) \end{aligned}$$

restrictions:

$$\begin{aligned} 3x-11 &\geq 0 \\ 3x &\geq 11 \\ x &\geq \frac{11}{3} \quad (11/2) \end{aligned}$$

check:

$$\begin{aligned} 5 + \sqrt{3(9)-11} &= 9 \\ 5 + \sqrt{27-11} &= 9 \\ 5 + \sqrt{16} &= 9 \\ 5 + 4 &= 9 \\ 9 &= 9 \quad (1) \end{aligned}$$

$$LS = RS$$

$\therefore x=9$ is a solution.

$$\begin{aligned} 5 + \sqrt{3(4)-11} &= 4 \\ 5 + \sqrt{12-11} &= 4 \\ 5 + \sqrt{1} &= 4 \\ 5 + 1 &= 4 \\ 6 &= 4 \quad \times \quad (1) \end{aligned}$$

$$LS \neq RS$$

$\therefore x=4$ is not a solution.

17. Adam made an error while simplifying the expression $\sqrt{18x^3} + 2\sqrt{8x^3}$. Identify his error and correct the solution.

$$\sqrt{18x^3} + 2\sqrt{8x^3}$$

$$= 3\sqrt{2x^3} + 4\sqrt{2x^3}$$

$$= 7\sqrt{4x^6}$$

$$= 14x^3$$

* when adding you do (1)
NOT add the radicands.

$$3\sqrt{2x^3} + 4\sqrt{2x^3}$$

$$= 7\sqrt{2x^3} \quad (1)$$

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