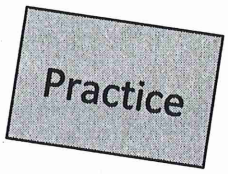
Test: Unit7
Radicals



There are 20 questions in this quiz, each of equal value.
Standard time for the quiz is 40 minutes .

Four operations calculator is allowed.

'Calculator' replacement:

$2^0 = 1$; $2^1 = 2$; $2^2 = 4$; $2^3 = 8$; $2^4 = 16$; $2^5 = 32$; $2^6 = 64$;
$2^7 = 128$; $2^8 = 256$; $2^9 = 512$; $2^{10} = 1024$
$3^0 = 1$; $3^1 = 3$; $3^2 = 9$; $3^3 = 27$; $3^4 = 81$; $3^5 = 243$
$4^0 = 1$; $4^1 = 4$; $4^2 = 16$; $4^3 = 64$; $4^4 = 256$; $4^5 = 1024$
$5^0 = 1$; $5^1 = 5$; $5^2 = 25$; $5^3 = 125$; $5^4 = 625$
$6^0 = 1$; $6^1 = 6$; $6^2 = 36$; $6^3 = 216$
$7^0 = 1$; $7^1 = 7$; $7^2 = 49$; $7^3 = 343$
$8^0 = 1$; $8^1 = 8$; $8^2 = 64$; $8^3 = 512$
$9^0 = 1$; $9^1 = 9$; $9^2 = 81$; $9^3 = 729$

Simplify:

1. $\sqrt{128r^2x^3n^8}$

$64 \quad 2$

$8|r|x n^4 \sqrt{2x}$

2. $\sqrt[4]{128x^7y^8w^4}$

$128 = 2^7$

$\sqrt[4]{2^7} = 2^1\sqrt[4]{2^3}$ $\quad 64 \quad 2$ $\quad 32 \quad 2$

$2x y^2 |w| \sqrt[4]{8x^3}$

3. $\sqrt{12y} \cdot 2\sqrt{24y}$

$24 \cdot y \cdot \sqrt{2}$

4. $(-7 + \sqrt{3x}) \cdot (4 + \sqrt{3x})$

$-28 - 3\sqrt{3x} + 3x$

5. $(\sqrt{3} + \sqrt{5x})(\sqrt{3} - 5\sqrt{5x})$

$3 - \sqrt{3}\cdot 5\sqrt{5x} + \sqrt{5x}\cdot\sqrt{3} - 5\cdot 5x$

$= 3 - 5\sqrt{15x} + \sqrt{15x} - 25x =$

$= 3 - 4\sqrt{15x} - 25x$

6. $(7 + \sqrt{6})(1 + \sqrt{6})$

$7 + 8\sqrt{6} + 6 = 13 + 8\sqrt{6}$

7. $-\sqrt[3]{320} - 4\sqrt[3]{5} + 2\sqrt[3]{135} + 2\sqrt[3]{16}$

$4^3 = 64 \quad 3^3 = 27$ $\quad 5 \quad 5$

$-\sqrt[3]{4^3 \cdot 5} - 4\sqrt[3]{5} + 2\sqrt[3]{3^3 \cdot 5} + 2\sqrt[3]{2^3 \cdot 2}$

$= \sqrt[3]{5}\cdot(-4 - 4 + 6) + 4\sqrt[3]{2} = -2\sqrt[3]{5} + 4\sqrt[3]{2}$

8. $-2\sqrt{45} - 3\sqrt{20} - 2\sqrt{6}$

$9 \quad 5$ $\quad 4 \quad 5$

$= -2\sqrt{3^2 \cdot 5} - 3\sqrt{2^2 \cdot 5} - 2\sqrt{6}$

$= -6\sqrt{5} - 6\sqrt{5} - 2\sqrt{6} = -12\sqrt{5} - 2\sqrt{6}$

9. $\sqrt[6]{(-2)^6}$

2

10. $\sqrt[5]{(-7)^5}$

-7

Simplify:

11. $\sqrt[8]{64}$

$\sqrt[8]{64}$

12. $\dfrac{\sqrt{15}}{\sqrt{12}}$

$\sqrt{\frac{15}{12}} = \sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{2}$

13. Rationalize denominator

$$\frac{\sqrt{3}}{-1-\sqrt{5}}$$

$\frac{\sqrt{3}}{(-1-\sqrt{5})} \cdot \frac{(-1+\sqrt{5})}{(-1+\sqrt{5})} = \frac{-\sqrt{3}+\sqrt{15}}{1-5} =$

$= \frac{\sqrt{3}-\sqrt{15}}{4}$

14. Rationalize denominator

$$\frac{2-\sqrt{3}}{-2-\sqrt{5}}$$

$\frac{(2-\sqrt{3})}{(-2-\sqrt{5})} \cdot \frac{(-2+\sqrt{5})}{(-2+\sqrt{5})} = \frac{-4+2\sqrt{3}+2\sqrt{5}-\sqrt{15}}{4-5}$

$= 4-2\sqrt{3}-2\sqrt{5}+\sqrt{15}$

15. $(9r^4)^{-0.5}$

$= \frac{1}{(9r^4)^{0.5}} = \frac{1}{3r^2}$

16. $36^{\frac{3}{2}}$

$(36^{\frac{1}{2}})^3 = (6)^3 = 216$

17. $(64n^{12})^{-\frac{1}{6}}$

$= \frac{1}{64^{\frac{1}{6}}(n^{12})^{\frac{1}{6}}} = \frac{1}{2 \cdot n^2}$

18. $\sqrt[7]{y^5 \cdot 128 \cdot x^{14} \cdot \sqrt[4]{y^8}}$

2^7 $\quad$ y^2

$= 2 \cdot x^2 \sqrt[7]{y^5 \cdot y^2} = 2x^2y$

19. Solve: $\sqrt{8k} = k$
(Show your work!)

$(\ )^2 \Rightarrow \quad 8k = k^2$

$k^2 - 8k = 0$

$k(k-8) = 0$ → $k = 0$ or $k = 8$

Check:

$8 \quad \sqrt{8 \cdot 8} \stackrel{?}{=} 8$

$8 = 8$ ✓

$0 \quad \sqrt{8 \cdot 0} \stackrel{?}{=} 0$

✓

$k = 0$ or $k = 8$

20. Solve: $\sqrt[3]{16k} = k$
(Show your work!)

$(\ )^3 \Rightarrow \quad 16k = k^3$

$k^3 - 16k = 0$

$k(k^2 - 16) = 0$

$k(k+4)(k-4) = 0$

Check: $k = 0$

$0 \stackrel{?}{=} 0$ ✓

$k = 4$

$\sqrt[3]{64} \stackrel{?}{=} 4$

✓

$k = -4$

$\sqrt[3]{-64} \stackrel{?}{=} -4$

✓

$k = 0$ or $k = 4$ or $k = -4$

21. Solve: $\sqrt{3x - 6} + 10 = 4$
(Show your work!)

$\sqrt{3x-6} = -6$

$(\ )^2 \quad 3x - 6 = 36$

$3x = 42$

$x = 14$

$x = 14$

Check:

$\sqrt{3 \cdot 14 - 6} + 10 \stackrel{?}{=} 4$

$\sqrt{42 - 6} + 10 \stackrel{?}{=} 4$

$6 + 10 \stackrel{?}{=} 4$

$\times$.

break

Simplify:

NO solution

Simplify:

22. $(\sqrt{-4})(\sqrt{-3})$

$2i \cdot i\sqrt{3} = \boxed{-2\sqrt{3}}$

23. $\sqrt[3]{-16}$

$\sqrt[3]{-8 \cdot 2} = \boxed{-2\sqrt[3]{2}}$

24. $(x + 2i)(5 - i \cdot x)$

$5x - ix^2 + 10i - 2ix$ $+2x$

$= \boxed{7x + i(10 - x^2)}$

25. $5(3 + 2i) - 4i$

$15 + 10i - 4i$

$= \boxed{15 + 6i}$

26. $\sqrt{-3} \cdot (i \cdot 4 - \sqrt{-3})$

$i\sqrt{3}$ $i\sqrt{3}$

$4i^2\sqrt{3} - i^2\sqrt{3}\cdot\sqrt{3} =$

$= \boxed{-4\sqrt{3} + 3}$

27. $\dfrac{-3 + 10i}{-6i}$

$\dfrac{-3+10i}{-6i} \cdot \dfrac{6i}{6i} = \dfrac{(-3+10i)\cdot i}{-6i^2} =$

$= \boxed{\dfrac{-10 - 3i}{6}}$

28. $\dfrac{i}{-2 - 8i}$

$\dfrac{i}{-2-8i} \cdot \dfrac{(-2+8i)}{(-2+8i)} = \dfrac{-8 - 2i}{4 + 64} =$

$= \boxed{\dfrac{-4 - i}{32}}$

29. Solve using the quadratic equation:

$-2x^2 + 3x + 9 = 0$

$\sqrt{81}$

$\dfrac{-3 \pm \sqrt{9 + 4 \cdot 2 \cdot 9}}{-4} = \dfrac{-3 \pm 9}{-4} =$

$= \boxed{-1\frac{1}{2}}$ or $\boxed{3}$

=== End of test