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Block: _____

Algebra 2H: Powers, Roots, and Complex Numbers
Group A

1. There are 40 multiple choice questions in this test. Each question is worth 1-point.
2. Extra-credit: There is one extra-credit question, worth 1pt as well. It is a harder question.
3. You have 50 minutes (one block) to complete the test (more if you have accommodations).
    a. If you are taking the test in two sittings (b/c of accommodations and time constraints), the test is divided into two equal parts.
    b. Solutions will be released on Wednesday noon. You will therefore need to finish the test (both parts) BEFORE Wednesday noon (Jan-25). You are welcome to get a head start early Tuesday (before school, lunch, etc), or anytime following that (lunch, after school, open blocks).
4. NOTE: On some questions, it is explicitly noted "Show your work". You have to show how you got to the answer on these items in order to get full credit.

Calculators are NOT allowed in this test.

Good luck!!
-Zachi

'Calculator' replacement:

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

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=== Start of test

1. Simplify: $\sqrt{75x^4y^2z^6w}$

(A) $5x^2|y \cdot z^3|\sqrt{3w}$ (B) $3x^2y \cdot z^3\sqrt{5w}$ (C) $25x^2|y \cdot z^3|\sqrt{3w}$ (D) $5x^2yz^4\sqrt{3w}$

(E) Other

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2. Simplify: $\sqrt[4]{x^5y^6 \cdot 32}$

(A) $8|x|y^2$ (B) $2x|y| \cdot \sqrt[4]{2xy^2}$ (C) $8\sqrt[4]{x^5y^6}$ (D) $2xy^2 \cdot \sqrt[4]{2xy^2}$

(E) Other

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3. Simplify: $\left(3\sqrt{5x}\right)\left(\sqrt{15x}\right)$

(A) $3\sqrt{20}|x|$ (B) $15x\sqrt{5}$ (C) $15x\sqrt{3}$ (D) $4\sqrt{20x}$ (E) Other

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4. Simplify: $\sqrt{(-5)^2}$

(A) 5 (B) -5 (C) ± 5 (D) $5i$ (E) Other

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5. Simplify: $\sqrt[3]{(-2)^3}$

(A) 2 (B) -2 (C) $2\ or -2$ (D) $2i$ (E) Other

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6. Simplify: $\sqrt[5]{-32}$

(A) 2 (B) -2 (C) $2\ or -2$ (D) $2i$ (E) Other

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7. Simplify: $\sqrt{\frac{9}{16}}$

(A) $\frac{3}{4}$ (B) $-\frac{3}{4}$ (C) $2\frac{1}{4}$ (D) $\frac{2}{3}$ (E) Other

8. Simplify: $\sqrt{45}$

(A) $5\sqrt{2}$ (B) $5\sqrt{3}$ (C) $3\sqrt{15}$ (D) $3\sqrt{5}$ (E) Other

9. Simplify: $\left(3-2\sqrt{5}\right)\left(2+\sqrt{45}\right)$

(A) -24 (B) $6-6\sqrt{5}$ (C) $6-2\sqrt{220}$ (D) $5\sqrt{5}-24$ (E) Other

10. Simplify: $2\sqrt{3}\left(3\sqrt{6}-\sqrt{2}\right)$

(A) $6\sqrt{3}-2\sqrt{6}$ (B) $18\sqrt{2}-2\sqrt{6}$ (C) $16\sqrt{2}$ (D) $18\sqrt{6}$ (E) Other

11. Simplify: $-2\sqrt{45}+3\sqrt{20}$

(A) $-6\sqrt{5}-\sqrt{20}$ (B) $4\sqrt{5}$ (C) $-18\sqrt{5}+2\sqrt{20}$ (D) 0 (E) Other

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12. Simplify: $5\sqrt{12} - 3\sqrt{48}$

(A) $-2\sqrt{3}$ (B) $18\sqrt{3}$ (C) $22\sqrt{3}$ (D) $8\sqrt{3}$ (E) Other

13. Rationalize the denominator: $\sqrt{\frac{3}{5}}$

(A) $\frac{3\sqrt{5}}{5}$ (B) $\frac{\sqrt{15}}{5}$ (C) $\frac{\sqrt{3}}{5}$ (D) $\frac{\sqrt{3}}{\sqrt{5}}$ (E) Other

14. Rationalize the denominator: $\frac{1}{3-2\sqrt{2}}$

(A) $\frac{3-2\sqrt{2}}{17}$ (B) $3 + 2\sqrt{2}$ (C) $3 - 2\sqrt{2}$ (D) $\frac{3+2\sqrt{2}}{17}$ (E) Other

15. Rationalize the denominator: $\frac{7}{5-3\sqrt{2}}$

(A) $25 - 9\sqrt{2}$ (B) $\frac{(35-21\sqrt{2})}{5-3\sqrt{2}}$ (C) $5 - 3\sqrt{2}$ (D) $5 + 3\sqrt{2}$ (E) Other

16. Find the equal to: $64^{\frac{2}{3}}$

(A) 32 (B) 16 (C) 8 (D) 256 (E) Other

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17. Find the equal to: $81^{\frac{3}{2}}$

(A) 729 (B) 27 (C) 9 (D) 3 (E) Other

18. Find the equal to: $\left(\frac{\sqrt[3]{x}}{\sqrt[4]{x}}\right)^6$

(A) $\sqrt{x}$ (B) $x^{\frac{13}{2}}$ (C) $x^{\frac{6}{14}}$ (D) x^2 (E) Other

19. Find the equal to: $\sqrt[5]{x^3 \cdot \sqrt[3]{x^4 x^2}}$

(A) $\sqrt[5]{x}$ (B) $\sqrt{x}$ (C) x (D) x^2 (E) Other

20. Solve: $\sqrt[3]{2x+5} + 3 = 2$

(Show your work!)

(A) 60 (B) $x = 3$ (C) $x = -3$ (D) -1 (E) Other

21. Solve: $\sqrt{x-5} = 5 - \sqrt{x}$

(Show your work!)

(A) $x = 5$ (B) $x = 4$ (C) $x = 9$ (D) $x = 13$ (E) Other

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22. Solve: $\sqrt{3x-6} + 10 = 4$

(Show your work!)

(A) -14 (B) 14 (C) 0 (D) 2 (E) Other

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23. Simplify: $\left(\sqrt{-2}\right)\left(\sqrt{-8}\right)$

(A) -4 (B) 4 (C) $4i$ (D) $-4i$ (E) Other

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24. Simplify: $\left(\sqrt{-4}\right)^2$

(A) -4 (B) 4 (C) $4i$ (D) $-4i$ (E) Other

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25. Simplify: $4i(5-3i)$

(A) $-12+20i$ (B) $12-20i$ (C) $12+20i$ (D) $20+12i$ (E) Other

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26. Simplify: $(3+2i)(5-i)$

(A) 17 (B) $15-2i$ (C) $13+7i$ (D) $17+7i$ (E) Other

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27. Simplify: $(3i+2)(3i-2)$

(A) $-4+9i$ (B) 13 (C) -13 (D) $9i-13$ (E) Other

28. Simplify: $\sqrt{-3}\cdot\left(\sqrt{-6}\ -\ \sqrt{-3}\right)$

(A) $\sqrt{18}i-3$ (B) $3-3\sqrt{2}$ (C) $3-\sqrt{18}i$ (D) $3-i3\sqrt{2}$ (E) Other

29. Rationalize denominator: $\frac{5}{2-i}$

(A) $2+i$ (B) $\frac{2+i}{5}$ (C) $2-i$ (D) $\frac{2-i}{5}$ (E) Other

30. Rationalize denominator: $\frac{3+i}{3-i}$

(A) -10 (B) $8-6i$ (C) $8+6i$ (D) $0.8+0.6i$ (E) Other

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==== Review questions!!

31. Simplify: $\frac{2}{x-1} - \frac{2}{x-2}$

(A) -2 (B) $\frac{-2}{(x-1)(x-2)}$ (C) $\frac{-6}{(x-1)(x-2)}$ (D) -6 (E) Other

32. Factor: $2x^2 + 5x + 2$

(Show your work)

(A) $(2x+1)(x+2)$ (B) $(x+1)(2x+2)$ (C) $(x-1)(x+6)$ (D) $(x+1)(x+2)$ (E) Other

33. Solve: $\frac{2}{x} + \frac{3}{x-1} = \frac{4}{x-1}$

(Show your work)

(A) $x = -1$ (B) $x = 4$ (C) $x = 1$ (D) $x = 2$ (E) Other

34. Find the following sum:

(Show your work)

$$\sum_{n=1}^{10}(2-2n) = ?$$

(A) -81 (B) 81 (C) -90 (D) 90 (E) Other

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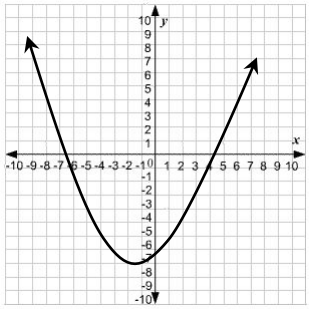
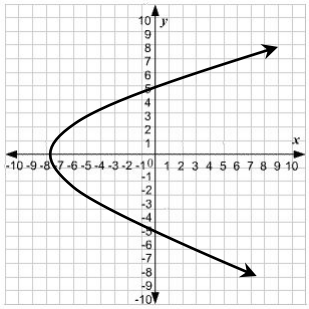
35. What is the most specific definition for the following:



(A) Relation (B) Function (C) One-to-One function

36. What is the most specific definition for the following:



(A) Relation (B) Function (C) One-to-One function

37. Solve: $x^2 + 2x = 0$

(Show your work)

(A) $x = 0$ or $x = -2$ (B) $x = 0$ (C) $x = -2$ (D) $x = 2i$ (E) Other

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38. Given the two function: $f(x) = \frac{x}{3x-2}$ and $g(x) = 3x + 2$ find $f(g(x))$

(A) $\frac{3x+2}{9x+4}$ (B) $\frac{x}{9x-4}$ (C) $\frac{3x+2}{3x-2}$ (D) $\frac{x}{9x-4}$ (E) Other

39. What is the slope of the line parallel to the line $2x + 3y = -5$?

(A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) -3 (D) $-\frac{2}{3}$ (E) Other

40. Solve for x and y (show your work!):

$$\begin{cases} 2x - 3y = 2 \\ 2x + 3y = 26 \end{cases}$$

(A) $(7,4)$ (B) $(7,-4)$ (C) $(-7,4)$ (D) $(-7,-4)$ (E) Other

Extra-credit

(NOT really that hard this time!!)

41. Is the expressions $2 \cdot \sqrt{\frac{2}{3}}$ (in words: Two times square-root of two over three) equal to, greater than, or smaller than, $\sqrt{2\frac{2}{3}}$ (in words: square-root of two and two thirds) ?
(Show your work).

(A) $2 \cdot \sqrt{\frac{2}{3}} = \sqrt{2\frac{2}{3}}$ (B) $2 \cdot \sqrt{\frac{2}{3}} > \sqrt{2\frac{2}{3}}$ (C) $2 \cdot \sqrt{\frac{2}{3}} < \sqrt{2\frac{2}{3}}$

=== End of test