Name _____ Key Date _____

Chapter 5 (Part 2) Test Review — Honors Algebra 2

***Part 1: Multiple Choice***

1) Which expression is equal to $\frac{\sqrt{xy^3z^5}}{\sqrt[4]{x^5y^3z}}$?

B

A $x^{\frac{-1}{2}}y^{\frac{1}{2}}z^{2}$

(B) $x^{\frac{-3}{4}}y^{\frac{3}{4}}z^{\frac{9}{4}}$

C $x^{\frac{7}{4}}y^{\frac{9}{4}}z^{\frac{11}{4}}$

D $x^{\frac{1}{4}}y^{\frac{3}{4}}z^{\frac{5}{4}}$

$\frac{\sqrt{xy^3z^5}}{\sqrt[4]{x^5y^3z}} = \frac{(xy^3z^5)^{1/2}}{(x^5y^3z)^{1/4}} = \frac{x^{1/2}y^{3/2}z^{5/2}}{x^{5/4}y^{3/4}z^{1/4}} = x^{-3/4}y^{3/4}z^{9/4}$

2) Which is equal to an integer?

J

F $\sqrt[3]{9}\left(\sqrt[3]{243}\right) = 3\sqrt{21}$

G $\sqrt{27}\left(\sqrt[3]{81}\right) =$ $(3^3)^{1/2}(3^4)^{1/3} = (3^{3/2})(3^{4/3}) = 3^{17/6}$

H $\sqrt[3]{81}\left(\sqrt[4]{243}\right) = (3^4)^{1/3}(3^5)^{1/4} = (3^{4/3})(3^{5/4}) = 3^{31/12}$

(J) $\sqrt[4]{27}\left(\sqrt[4]{243}\right) = \sqrt[4]{6561} = 9$

3) Which is an extraneous solution to $\sqrt{3x-1} = 3x-7$?

D

A $x = \frac{5}{3}$

B $x = \frac{10}{3}$

C $x = \frac{5}{3}$ and $x = \frac{10}{3}$ are both extraneous solutions.

(D) There is no extraneous solution.

$\left(\sqrt{3x-1}\right)^2 = (3x-7)^2$

$3x-1 = 9x^2-42x+49$

$0 = 9x^2-45x+50$

$0 = (9x^2-15x)(-30x+50)$

$0 = 3x(3x-5)(-10)(3x-10)$

$0 = (3x-5)(3x-10)$

$x = 5/3 \quad x = 10/3$

4) What is the solution set to the equation $(6x-1)^{\frac{1}{3}} = (2x+1)^{\frac{1}{2}}$?

J

F $\varnothing$

G $\{0\}$

H $\{1.5\}$

(J) $\{0, 1.5\}$

5) Which could be the equation for the graph?

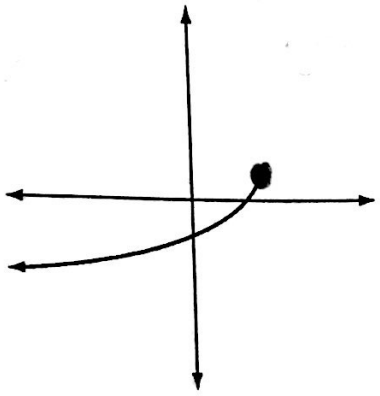
D

A $f(x) = -\sqrt{2-x}+1$

B $f(x) = \sqrt{2-x}+1$

C $f(x) = -\sqrt{x-2}+1$

(D) $f(x) = -\sqrt{-(x+2)}+1$



Reflection over y-axis
Reflection over x-axis
Translate horizontally 2 units right
Translate vertically 1 unit up

***Part 2: Open-ended***

***Simplify each expression. Assume that all variables are positive.***

6) $3\sqrt[4]{16x^4y^6z}$

$3(\sqrt[4]{16})(\sqrt[4]{x^4})(\sqrt[4]{y^6})(\sqrt[4]{z})$

$3(2)(x)(y\sqrt[4]{y^2})(\sqrt[4]{z})$

$\boxed{6xy\sqrt[4]{y^2z}}$

8) $\sqrt[4]{81x^{12}}$

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

$3x^3$

7) $-2\sqrt{48a^2b^3c^4}$

$-2(\sqrt{48})(\sqrt{a^2})(\sqrt{b^3})(\sqrt{c^4})$

$-2(4\sqrt{3})(a)(b\sqrt{b})(c^2)$

$\boxed{-8abc^2\sqrt{3b}}$

9) $\sqrt[3]{\frac{8x^3}{3}} = \frac{\sqrt[3]{8x^3}}{\sqrt[3]{3}} = \frac{\sqrt[3]{8}\sqrt[3]{x^3}}{\sqrt[3]{3}} =$

$\frac{2x}{\sqrt[3]{3}} \cdot \frac{\sqrt[3]{3^2}}{\sqrt[3]{3^2}} = \frac{2x\sqrt[3]{9}}{\sqrt[3]{3^3}} = \boxed{\frac{2x\sqrt[3]{9}}{3}}$

10) $\sqrt[4]{\frac{a^4}{9}} = \frac{\sqrt[4]{a^4}}{\sqrt[4]{9}} = \frac{a}{\sqrt[4]{3^2}} \cdot \frac{\sqrt[4]{3^2}}{\sqrt[4]{3^2}} =$

$\frac{a\sqrt[4]{9}}{\sqrt[4]{3^4}} = \boxed{\frac{a\sqrt[4]{9}}{3}}$

11) $\frac{\sqrt{xy^3}}{\sqrt[3]{x^2y}} = \frac{(xy^3)^{1/2}}{(x^2y)^{1/3}} = \frac{x^{1/2}y^{3/2}}{x^{2/3}y^{1/3}} =$

$\frac{x^{3/6}y^{9/6}}{x^{4/6}y^{2/6}} = \boxed{x^{-1/6}y^{7/6}}$

12) $(\sqrt{2})(\sqrt[3]{4})(\sqrt[6]{32})$

$(\sqrt{2})(\sqrt[3]{2^2})(\sqrt[6]{2^5})$

$(2^{1/2})(2^{2/3})(2^{5/6}) =$

$(2^{3/6})(2^{4/6})(2^{5/6}) = 2^{12/6} = 2^2 = \boxed{4}$

***Write each expression by using rational exponents. Assume that all variables are positive.***

13) $\sqrt[4]{20x^3}$

$(20x^3)^{1/4}$

$20^{1/4}x^{3/4}$

14) $\sqrt{(5x)^7}$

$((5x)^7)^{1/2}$

$(5x)^{7/2}$

$5^{7/2}x^{7/2}$

15) $(\sqrt[5]{-9\sqrt[3]{x}})^4$

$(-9)^{1/5}(x^{1/3})^4$

$\boxed{(-9)^{4/5}(x)^{4/3}}$

16) $(\sqrt[4]{11x^8})^6$

$((11x^8)^{1/4})^6$

$(11x^8)^{6/4} = (11x^8)^{3/2} =$

$11^{3/2} \times x^{24/2} = \boxed{11^{3/2} x^{12}}$

***Simplify each expression and write it by using a radical. Assume that all variables are positive.***

17) $(-12x^{15})^{\frac{3}{5}}$

$(-12)^{3/5}(x^{15})^{3/5}$

$(-12^{3/5})(x^9) = \boxed{x^9\sqrt[5]{(-12)^3}}$

18) $(a^2b^4)^{\frac{1}{3}}$

$\sqrt[3]{a^2b^4} = \sqrt[3]{a^2}\sqrt[3]{b^4} =$

$(\sqrt[3]{a^2})(b\sqrt[3]{b}) =$

$\boxed{b\sqrt[3]{a^2b}}$

19) $\left(\frac{a^4}{b}\right)^{\frac{1}{4}} = \sqrt[4]{\frac{a^4}{b}} = \frac{\sqrt[4]{a^4}}{\sqrt[4]{b}} = \frac{a}{\sqrt[4]{b}} \cdot \frac{\sqrt[4]{b^3}}{\sqrt[4]{b^3}} =$

$\frac{a\sqrt[4]{b^3}}{\sqrt[4]{b^4}} = \boxed{\frac{a\sqrt[4]{b^3}}{b}}$

20) $a^{\frac{3}{4}}(4b^6)^{\frac{1}{4}}$

$\sqrt[4]{a^3}\sqrt[4]{4b^6} =$

$\sqrt[4]{a^3}\sqrt[4]{4}\sqrt[4]{b^6} = \sqrt[4]{a^3}\sqrt[4]{4}\,b\sqrt[4]{b^2} =$

$\boxed{b\sqrt[4]{4a^3b}}$

***Explain whether each statement is sometimes, always, or never true for nonzero values of the variables.***

21) $\sqrt[3]{x^6} = x^2$

$(x^6)^{1/3} = x^2$

$(x^{6/3}) = x^2$ ✓

This is always true. No matter what the values of the variables may be, we will always have positive answers

22) $-\sqrt[3]{x} < 0$ → sometimes.

When $x = 8$, $-\sqrt[3]{8} < 0$ because $-2 <$

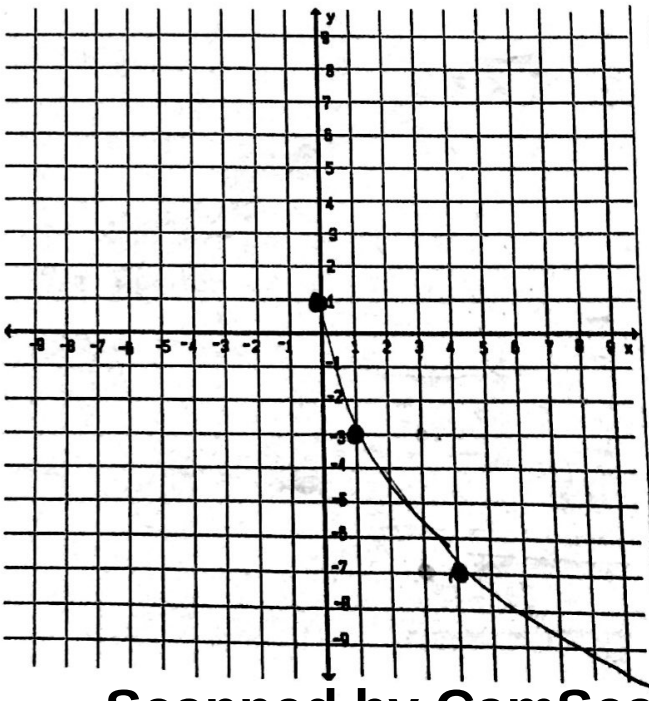
But when $x = -8$, $-\sqrt[3]{-8} > 0$ because $-(-2) > 0$.

***Using the graph of $f(x) = \sqrt{x}$ as a guide, describe the transformation and graph each function. Then, state the domain and range.***

23) $-4\sqrt{x} + 1$

- Reflect over x-axis
- Vertical stretch by a factor of 4
- Vertical translation up 1.

| → Reflect over x-axis | → Vert stretch by 4 | → Vert. trans. up 1 |
|---|---|---|
| (0,0) | (0,0) | (0,1) |
| (1,-1) | (1,-4) | (1,-3) |
| (4,-2) | (4,-8) | (4,-7) |
| (9,-3) | (9,-12) | (9,-11) |



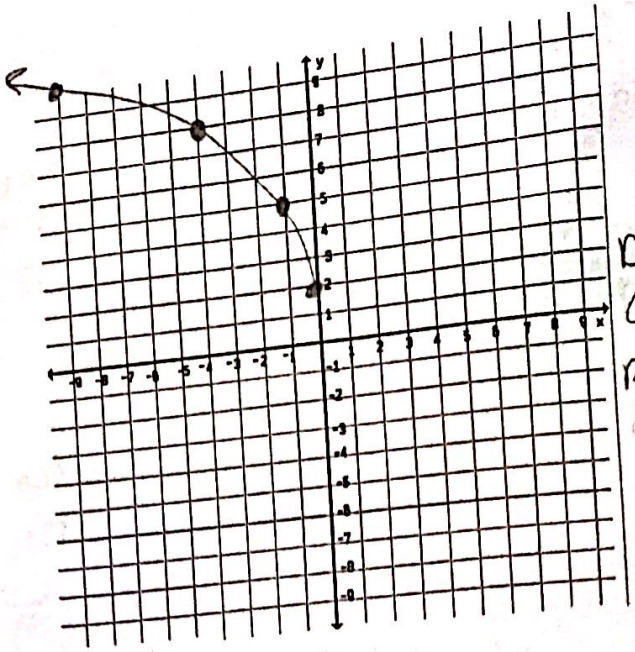
Domain: $[0, \infty)$

Range $[1, -\infty)$

24) $3\sqrt{-x}+2$

- Reflection over y-axis
- Vertical stretch by a factor of 3
- Vertical translation up 2

| $f(x)=\sqrt{x}$ → | Reflect over y-axis → | Vert. stretch by 3 → | Verti trans by 2 |
|---|---|---|---|
| (0,0) | (0,0) | (0,0) | (0,2) |
| (1,1) | (-1,1) | (-1,3) | (-1,5) |
| (4,2) | (-4,2) | (-4,6) | (-4,8) |
| (9,3) | (-9,3) | (-9,9) | (-9,11) |



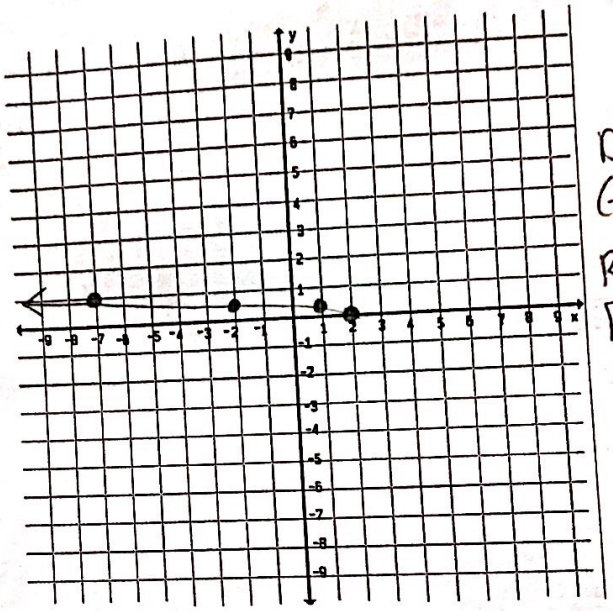
Domain: $(-\infty, 0]$

Range: $[2, \infty)$

25) $\frac{1}{3}\sqrt{-(x+2)}$

- Horizontal translation 2 units left
- Reflecton over y-axis
- Verti compression by a factor 1/3

| $f(x)=\sqrt{x}$ → | Horizontal trans 2 left → | Reflect over y-axis → | Verti comp. by 1/3 |
|---|---|---|---|
| (0,0) | (-2,0) | (2,0) | (2,0) |
| (1,1) | (-1,1) | (1,1) | $(1, 1/3)$ |
| (4,2) | (2,2) | (-2,2) | $(-2, 2/3)$ |
| (9,3) | (7,3) | (-7,3) | (-7,1) |



Domain: $(-\infty, 2]$

Range: $[0, \infty)$

***Use the description to write the square-root function g.***

26) If $f(x) = \sqrt{x}$ is transformed by translating it 3 units ~~to the~~ up, then stretching it vertically by a factor of 2, and then finally reflecting it over the y-axis, what will the resulting function be?

$f(x) = \sqrt{x}$

$f(x)+3 = \sqrt{x}+3$

$2(\sqrt{x}+3) = 2\sqrt{x}+6$

$g(x) = 2\sqrt{-x}+6$

27) If $f(x)=\sqrt{x}-1$ is transformed by translating it 2 units to the right, then stretching it horizontally by a factor of 2, and then finally reflecting it over the y-axis, what will the resulting function be?

$f(x-2) = \sqrt{(x-2)}-1$

$2f(x-2) = \sqrt{2(x-2)}-1$

$\sqrt{-2x-4}-1$

***Solve each equation.***

28) $(\sqrt{10x})^2 = (3\sqrt{x+1})^2$

$10x = 9(x+1)$

$10x = 9x + 9$

$\boxed{x = 9}$

$\boxed{x = 2 \quad x = 8}$

29) $(\sqrt{6x-12})^2 = (x-2)^2$

$6x - 12 = (x-2)^2$

$6x - 12 = (x-2)(x-2)$

$6x - 12 = x^2 - 4x + 4$

$0 = x^2 - 10x + 16$

$0 = (x-2)(x-8)$

30) $(\sqrt{x+16})^2 = (x - \sqrt{x+17})^2$

$x + 16 = (x - \sqrt{x+17})(x - \sqrt{x+17})$

$x + 16 = (x^2 - x\sqrt{x+17} - x\sqrt{x+17} + (x+17))$

$x + 16 = x^2 - 2x\sqrt{x+17} + x + 17$

$-x - 17 \qquad -x - 17$

$-1 = x^2 - 2x\sqrt{x+17}$

$-x^2 - 1 = -2x\sqrt{x+17}$

31) $\sqrt{\sqrt{x-3}} = \sqrt{x-15}$

(on extra sheet)

32) $(x)^2 = ((2x+35)^{\frac{1}{2}})^2$ (continued on extra sheet)

$x^2 = 2x + 35$

$x^2 - 2x - 35 = 0$

$(x-7)(x+5) = 0$

$\boxed{x = 7 \quad x = -5}$

33) $((x+3)^{\frac{1}{3}})^3 = (-6)^3$

$x + 3 = (-6)^3$

$x + 3 = -216$

$\boxed{x = -219}$

***Part 3: Word Problems***

34) The cube root of the square root of a real number $n$ is 16. What is the value of $n$?

$\sqrt[3]{\sqrt{n}} = 16 \Rightarrow \sqrt[3]{(n)^{1/2}} = 16 \Rightarrow (n^{1/2})^{1/3} = 16 \Rightarrow n^{1/6} = 16$

$n = 16,777,216$

**35) On Earth the distance, *d*, in kilometers, that one can see to the horizon is a function of altitude, *a*, in meters, and can be found using the function $d(a) = 3.56\sqrt{a}$. To find the corresponding distance to the horizon on Mars, the function must be stretched horizontally by a factor of about $\frac{9}{5}$**

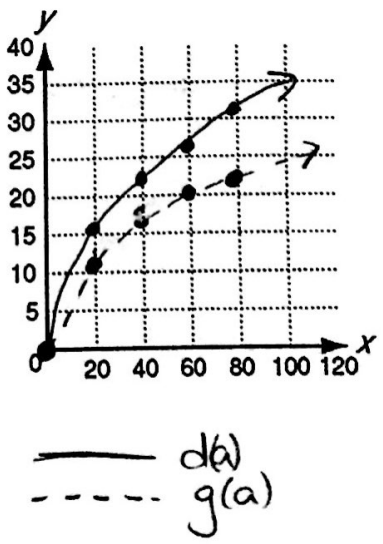
a. Write the function that corresponds to the given transformation. $d(\frac{5}{9}a) = 3.56\sqrt{\frac{5}{9}a}$

$g(a) = 3.56\sqrt{\frac{5}{9}a}$

b. Use a graphing calculator to graph the function and the parent function. Sketch both curves on the coordinate plane.

| a | d(a) |
|---|---|
| 0 | 0 |
| 20 | 15.921 |
| 40 | 22.515 |
| 60 | 27.576 |
| 80 | 31.842 |

| a | g(a) |
|---|---|
| 0 | 0 |
| 20 | 11.867 |
| 40 | 16.782 |
| 60 | 20.554 |
| 80 | 23.733 |



c. Use your graph to determine the approximate distance to the horizon from an altitude of 100 meters:

on Earth $3.56\sqrt{100} = 35.6\text{m}$

on Mars $3.56\sqrt{\left(\frac{5}{2}\right)(100)} = 26.5\text{m}$

**36) The formula $s = \sqrt{30fd}$ can be used to estimate the speed, $s$, in miles per hour that a car is traveling when it goes into a skid, where $f$ is the coefficient of friction and $d$ is the length of the skid marks in feet.**

Kody skids to a stop on a street with a speed limit of 35 mi/h. His skid marks measure 52 ft, and the coefficient of friction is 0.7. Kody says that he was driving only about 30 mi/h. Kody wants to prove that he was not speeding.

a. Solve the equation for $d$ in terms of $s$.

$s^2 = (\sqrt{30fd})^2$

$\frac{s^2}{30f} = \frac{30fd}{30f}$ $\quad \frac{s^2}{30f} = d$

b. How long would the skid marks be if he had been driving at a speed of 35 mi/h?

$\frac{(35)^2}{30(.7)} = 58.3\text{ ft}$

c. Was Kody speeding or not? Explain how you know.

Kody was not speeding. Since the skid marks were only 52 ft and the skid marks traveling at 35 mph would be 58 ft, he would not be speeding.

d. Find his actual speed.

$s = \sqrt{(30)(.7)(52)} = 33.05\text{ mph}$

**37) Rafael made a ceramic cube in art class. The cube has a volume of 336 $cm^3$. What is the side length of the cube to the nearest centimeter?**

$s^3 = \text{Volume}$

$\sqrt[3]{s^3} = \sqrt[3]{336\text{ cm}^3}$

$s = 6.95\text{ cm}$

(Key)

# 5.2 Puzzle Time

## Why Did The 25-Watt Bulb Flunk Out Of School?

Write the letter of each answer in the box containing the exercise number.

**Simplify the expression.**

1. $(8^2)^{1/3} = 8^{2/3} = \sqrt[3]{8}^2 = (2)^2 = 4$

2. $5^{3/4} \cdot 5^{1/2} = 5^{3/4} \cdot 5^{2/4} = 5^{5/4}$

3. $\left(\frac{64}{125}\right)^{1/3} = \frac{\sqrt[3]{64}}{\sqrt[3]{125}} = \frac{4}{5}$

4. $(2^4 \cdot 6^4)^{-1/4} = (2^4)^{-1/4} \cdot (6^4)^{-1/4} = 2^{-1} \cdot 6^{-1} = \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

5. $(3^{2/3} \cdot 5^{1/4})^6 = 3^{12/3} \cdot 5^{6/4} = 3^4 \cdot 5^{3/2} = 81\sqrt{5^3}$

6. $\frac{4^1}{4^{1/2}} = 4^{1/2} = \sqrt{4} = 2$

7. $\sqrt[3]{27} \cdot \sqrt[3]{729} = 3 \cdot 3^2 = 27$

8. $\frac{\sqrt[4]{32}}{\sqrt[4]{256}} = \left(\frac{32}{256}\right)^{1/4} = \left(\frac{1}{8}\right)^{1/4}$

9. $\frac{\sqrt[3]{24} \cdot \sqrt[3]{12}}{\sqrt[3]{2}} = \frac{\sqrt[3]{288}}{\sqrt[3]{2}} = \sqrt[3]{\frac{288}{2}} = \sqrt[3]{144} = 2\sqrt[3]{18}$

10. $\frac{25^{1/6} \cdot 25^{1/3}}{5^{6/5}} = \frac{(5^2)^{1/6} \cdot (5^2)^{1/3}}{5^{6/5}} = \frac{5^{2/6} \cdot 5^{4/6}}{5^{6/5}} = \frac{5^{6/6}}{5^{6/5}} = \frac{5^{30/30}}{5^{36/30}} = \frac{1}{5^{1/5}}$

11. $\frac{4}{8 - \sqrt{3}} \cdot \frac{(8+\sqrt{3})}{(8+\sqrt{3})} = \frac{32 + 4\sqrt{3}}{61}$

12. $10\sqrt[4]{5} - 3\sqrt[4]{5} = 7\sqrt[4]{5}$

13. $12(4^{3/4}) + 5(4^{3/4})$
$17(4^{3/4})$

14. $\sqrt[5]{3^5} = 3$

15. $(3^{2/5})^{1/2}$
$3^{2/10} = 3^{1/5} \cdot 3^{1/5}$

16. $-3(2^{1/5}) - 2(2^{1/5})$
$-5(2^{1/5})$

**Answers**

| | |
|---|---|
| E. $5^{5/4}$ | W. $\frac{4}{5}$ |
| H. 4 | A. $\frac{1}{12}$ |
| N. 2 | S. $81 \cdot 5^{3/2}$ |
| H. $3^{1/5}\ 3^{1/5}$ | T. $\left(\frac{1}{8}\right)^{1/4}$ |
| S. $2\sqrt[3]{18}$ | O. 27 |
| O. $\frac{1}{5^{1/5}}$ | R. $7\sqrt[4]{5}$ |
| G. 3 | I. $17(4^{3/4})$ |
| T. $-5(2^{1/5})$ | B. $\frac{32 + 4\sqrt{3}}{61}$ |

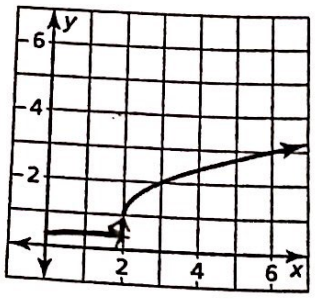
| 1 | 2 | | 3 | 4 | 5 | | 6 | 7 | 8 | | 9 | 10 | | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H | E | | W | A | S | | N | O | T | | S | O | | B | R | I | G | H | T |

# 5.3 Puzzle Time

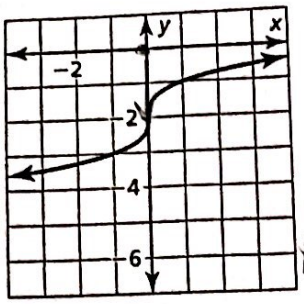
## What Has Lots Of Eyes But Can't See?

Write the letter of each answer in the box containing the exercise number.

**Match the graph with its function.**

1. 

A

2. 

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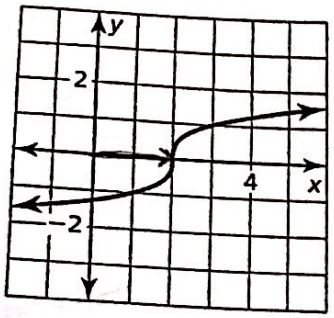
3. 

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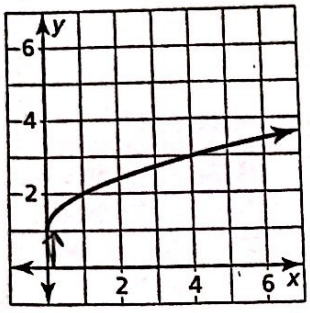
4. 

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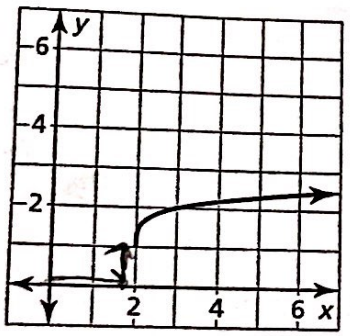
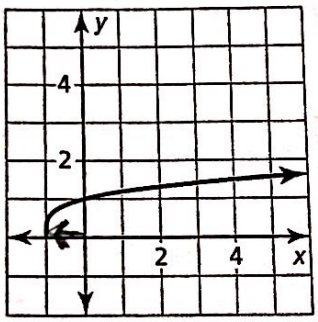
5. 

A

6. 

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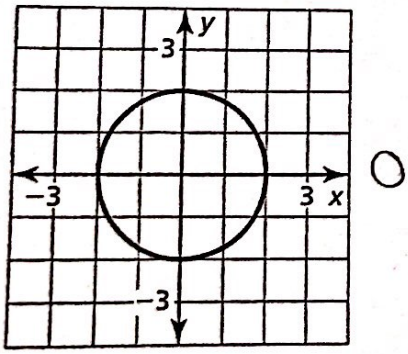

O

**Answers**

O. $f(x) = \sqrt[3]{x-2}$

A. $f(x) = \sqrt{x-2}+1$

T. $f(x) = x^{1/2}+1$

A. $f(x) = \sqrt[4]{x-2}+1$

~~O~~. $x^2+y^2=4$

T. $f(x) = (x+1)^{1/4}-2$

P. $f(x) = x^{1/3}-2$

| 1 | | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| A | | P | O | T | A | T | O |

Date _____

# 5.4 Puzzle Time

## What Did The Cucumber Say To The Vinegar?

| | | | | | |
|---|---|---|---|---|---|
| A Well | B This | C Is | D A | E Fine | F Pickle |
| G You've | H Gotten | I Us | J Into | | |

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

| | |
|---|---|
| x = 14 WELL | x = 43 PICKLE |
| x = 16 US | x = 6 INTO |
| x = 32 FINE | x = 8 IS |
| x = 128 A | x = −4 THIS |
| x = 4 YOU'VE | x = 5 GOTTEN |

**Solve the equation.**

A. $\sqrt{2x-3} = 5$

B. $\sqrt[3]{x-4} = -2$

C. $3\sqrt{2x} + 10 = 22$

D. $\frac{1}{4}\sqrt[3]{4x} - 1 = 1$

E. $2\sqrt[5]{x} + 6 = 10$

F. $\left(\sqrt{x-27}\right)^3 = 64$

G. $x = \sqrt{2x+8}$

H. $\sqrt{5x-3} = \sqrt{2x+12}$

I. $\sqrt{x-7} = 7 - \sqrt{x}$

J. $(x+30)^{1/2} = x$

A) $\left(\sqrt{2x-3}\right)^2 = (5)^2$
$2x-3 = 25$
$2x = 28$
$x = 14$

B) $\left(\sqrt[3]{x-4}\right)^3 = (-2)^3$
$x-4 = -8$
$x = -4$

C) $3\sqrt{2x} + 10 = 22$
$\frac{3\sqrt{2x}}{3} = \frac{12}{3}$
$\left(\sqrt{2x}\right)^2 = (4)^2$
$2x = 16$
$x = 8$

D) $\frac{1}{4}\sqrt[3]{4x} - 1 = 1$
$4\left(\frac{1}{4}\sqrt[3]{4x}\right) = (2)4$
$\left(\sqrt[3]{4x}\right)^3 = (8)^3$
$4x = 512$
$x = 128$

E) $2\sqrt[5]{x} + 6 = 10$
$2\sqrt[5]{x} = 4$
$\sqrt[5]{x} = 2$
$x = 32$

F) $\sqrt[3]{\left(\sqrt{x-27}\right)^3} = \sqrt[3]{64}$
$\sqrt{x-27} = 4$
$x - 27 = 16$
$x = 43$

G) $(x)^2 = \left(\sqrt{2x+8}\right)^2$
$x^2 = 2x + 8$
$0 = x^2 - 2x - 8$
$0 = (x-4)(x+2)$
$x = 4, x \neq -2$

H) $\left(\sqrt{5x-3}\right)^2 = \left(\sqrt{2x+12}\right)^2$
$5x - 3 = 2x + 12$
$3x = 15$
$x = 5$

I) $\left(\sqrt{x-7}\right)^2 = (7 - \sqrt{x})^2$
$x - 7 = 49 - 14\sqrt{x} + x$
$-56 = -14\sqrt{x}$
$4 = \sqrt{x}$
$x = 16$

J) $(x+30)^{1/2} = x$
$\left((x+30)^{1/2}\right)^2 = x^2$
$x + 30 = x^2$
$0 = x^2 - x - 30$
$0 = (x-6)(x+5)$
$x = 6 \quad x \neq -5$

Key

① $\dfrac{\sqrt{xy^3z^5}}{\sqrt[4]{x^5y^3z}} = \dfrac{(xy^3z^5)^{1/2}}{(x^5y^3z)^{1/4}} = \dfrac{x^{1/2}y^{3/2}z^{5/2}}{x^{5/4}y^{3/4}z^{1/4}} = x^{2/4}y^{6/4}z^{10/4} = x^{-3/4}y^{3/4}z^{9/4} \Rightarrow B$

② F) $\sqrt[3]{9}\cdot\sqrt[3]{243} = \sqrt[3]{2187}$ X

G) $\sqrt{3^3}\cdot\sqrt[3]{3^4} = (3^{3/2})(3^{4/3}) = (3^{9/6})(3^{8/6}) = 3^{17/6}$ X

H) $\sqrt[3]{3^4}\cdot\sqrt[4]{3^5} = (3^{4/3})(3^{5/4}) = (3^{16/12})(3^{15/12}) = 3^{31/12}$ X

J) $\sqrt[4]{27}\cdot\sqrt[4]{243} = \sqrt[4]{6561} = 9$ ✓ J

③ $(\sqrt{3x-1})^2 = (3x-7)^2$

$3x-1 = (3x-7)^2 \Rightarrow 3x-1 = 9x^2-42x+49 \Rightarrow$

$0 = 9x^2-45x+50$

$0 = (9x^2-15x)(-30x+50)$

$0 = 3x(3x-5)(-10)(3x-5)$ A

$0 = (3x-10)(3x-5)$

$x = \frac{10}{3}$ ✓ $x = 5/3$ X

(4) $(6x-1)^{1/3} = (2x+1)^{1/2}$

$\left((6x-1)^{2/6}\right)^6 = \left((2x+1)^{3/6}\right)^6$

$(6x-1)^2 = (2x+1)^3$

$36x^2-12x+1 = (2x+1)(4x^2+4x+1)$

$36x^2-12x+1 = 8x^3+12x^2+6x+1$

$0 = 8x^3-24x^2+18x$

$0 = 2x(4x^2-12x+9)$

$0 = 2x(4x^2-6x-6x+9)$

$0 = 2x(2x(2x-3)-3(2x-3))$

$0 = 2x(2x-3)^2$

$x=0 \quad x=\frac{3}{2}$

(31) $\left(\sqrt{\sqrt{x-3}}\right)^2 = \left(\sqrt{x-15}\right)^2$

$\left(\sqrt{x-3}\right)^2 = (x-15)^2$

$x-3 = (x-15)(x-15)$

$x-3 = x^2-30x+225$

$0 = x^2-31x+228$

$\frac{31 \pm \sqrt{(-31)^2-4(1)(228)}}{2(1)} = \frac{31 \pm \sqrt{961-912}}{2}$

$\frac{31 \pm \sqrt{49}}{2} = \frac{31 \pm 7}{2} = 19, 12$

$x=12$ is extraneous

$x=19$

J

30 continued

$\frac{-x^2-1}{-1} = \frac{-2x\sqrt{x+17}}{-1}$

$(x^2+1)^2 = (2x\sqrt{x+17})^2$

$(x^2+1)(x^2+1) = 4x^2(x+17)$

$x^4+2x^2+1 = 4x^3+68x^2$

$x^4-4x^3-66x^2+1=0$