

1. Solve  $\frac{3}{5}x - \frac{x}{4} + \frac{1}{2} = \frac{6}{5}$  LCD 20

$$12x - 5x + 10 = 24$$

$$7x + 10 = 24$$

$$\frac{-10}{-10} \quad \frac{-10}{-10}$$

$$7x = 14$$

$x = 2$

2. a) Rewrite as a single power of 7.

$$\sqrt[4]{7} = 7^{1/4} \quad \sqrt[3]{7} = 7^{1/3}$$

$$\sqrt[2]{7^3} = 7^{3/2} \quad \sqrt[3]{49} = \sqrt[3]{7^2} = 7^{2/3}$$

b) Rewrite in radical form.

$$5^{1/2} = \sqrt{5} \quad 5^{1/3} = \sqrt[3]{5}$$

$$5^{-1/4} = \frac{1}{5^{1/4}} = \frac{1}{\sqrt[4]{5}} \quad 5^{3/2} = \sqrt{5^3}$$

3. Solve  $3|x + 4| - 2 = 28$

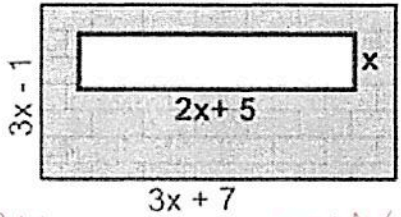
$$\frac{3}{3}|x + 4| = \frac{30}{3}$$

$$|x + 4| = 10$$

$$x + 4 = 10 \quad \text{or} \quad x + 4 = -10$$

$x = 6$       $x = -14$

4. In the diagram at the right, the dimensions of the large rectangle are  $(3x - 1)$  by  $(3x + 7)$  units. The dimensions of the cut-out rectangle are  $x$  by  $2x + 5$  units. Write an expression to represent the area of the shaded region, in square units?



BIG  $(3x-1)(3x+7)$      SMALL  $x(2x+5)$

$$(9x^2 + 18x - 7) + (2x^2 + 5x)$$

$$7x^2 - 13x - 7$$

5. a) If  $f(1) = 3$  and  $f(n) = -2f(n-1) + 1$ , then  $f(5) =$

A. -5     B. 11     C. 21     **D. 43**

$$f(2) = -2(3) + 1 = -5$$

$$f(3) = -2(-5) + 1 = 11$$

$$f(4) = -2(11) + 1 = -21$$

$$f(5) = -2(-21) + 1 = 43$$

b) If a sequence is defined recursively by  $f(0) = 2$  and  $f(n+1) = -2f(n) + 3$  for  $n \geq 0$ , then  $f(2)$  is equal to

A. -11     B. 1     **C. 5**     D. 17

$$f(1) = -2(2) + 3 = -1$$

$$f(2) = -2(-1) + 3 = 5$$

6. a) The table shows the amount of bacteria growing in a lab. Write a function to model this situation.

Day	0	1	2	3
Bacteria	50	100	200	400

$y_{int} \quad r = 2$

$$y = 50(2)^x$$

b) The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is  $a_1$ , which is an equation for the  $n$ th term of this sequence?

A.  $a_n = 8n + 10$      B.  $a_n = 8n - 14$      C.  $a_n = 16n + 10$      D.  $a_n = 16n - 38$

$a_n = -6 + 8(n-1)$       $a_n = 8n - 14$

7. a) Graph  $f(x) = 2(x+3)(x-1)$ .

$(0, -6)$       $v: (-1, 8)$

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

$$\frac{-4}{2(2)} = -1$$

$$2 - 4 - 6 = -8$$

8. The system  $\begin{cases} Px + Qy = R \\ Fx + Gy = H \end{cases}$  has the solution  $(3, -1)$ , where F, G, H, P, Q, and R are nonzero real numbers. Select all the systems that are also guaranteed to have the solution  $(3, -1)$ .

**A.**  $\begin{cases} (P + F)x + (Q + G)y = R + H \\ Fx + Gy = H \end{cases}$

~~B.  $\begin{cases} (P + F)x + Qy = R + H \\ Fx + (G + Q)y = H \end{cases}$~~

~~C.  $\begin{cases} Px + Qy = R \\ (3P + F)x + (3Q + G)y = 3H + R \end{cases}$~~

**D.**  $\begin{cases} Px + Qy = R \\ (F - 2P)x + (G - 2Q)y = H - 2R \end{cases}$

**E.**  $\begin{cases} Px + Qy = R \\ 5Fx + 5Gy = 5H \end{cases}$

9. a. Numbers that can be represented as  $\frac{a}{b}$ , where  $a$  and  $b$  are integers and  $b \neq 0$ , are called Rational  $\frac{2}{3}, 5, 2.3$

b. Numbers that cannot be represented in this form are called Irrational

c. The square root of a real number that is not a perfect square is Irrational  $\sqrt{10}$

d. Terminating decimals and repeating decimals are Rational  $0$

e. Decimals that do not terminate, do not repeat and do not have a pattern are Irrational

f. Demonstrate that the product of a non-zero rational number and an irrational number is irrational.

$\sqrt{10}; \pi$

Solve  $\frac{2}{3}n = \frac{4n}{3} - \frac{10}{3}n - \frac{1}{2}$

$$4n = 24n - 20n - 3$$

$$4n = 4n - 3$$

$$-4n - 4n$$

$$0 = -3 \text{ No SOL}$$

10. Let  $a$  and  $b$  be rational numbers and  $c$  and  $d$  be irrational numbers. Consider the operations below and choose whether the result can be rational, irrational, or both.

	Rational	Irrat.	Example
$a + b$	✓		$\frac{1}{2} + \frac{3}{4} = \frac{5}{4}$
$a - c$		✓	$5 - \sqrt{2}$
$a \cdot b$	✓		$\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$
$a \cdot c$	$\sqrt{2} \cdot \sqrt{2} = 2$ ✓	✓	$5 \cdot \sqrt{2} = 5\sqrt{2}$
$\frac{c}{d}$	✓	✓	
$c + d$	✓	✓	
$a \cdot b \cdot c$	✓	✓	$0 \cdot \frac{1}{2} \cdot \sqrt{2} = 0$

11. a. Consider  $x \cdot y = z$ . If  $z$  is an irrational number, what can be said about  $x$  and  $y$ ? Provide examples to support your answer.

at least one # is irrational

b) Demonstrate that the sum of a rational and an irrational number is irrational.

$$7 + \sqrt{2} = 7 + \sqrt{2}$$

12. Every day commuting to and from work, Jay drives his car a total of 45 miles. His car already has 2,700 miles on it. Which function shows the total number of miles Jay's car will have been driven after  $n$  more days?

- A.  $d(n) = 60$       B.  $d(n) = 60n$   
C.  $d(n) = 45 + 2,700n$       D.  $d(n) = 2,700 + 45n$

b) Solve the system  $\begin{cases} y = x + 5 \\ y = -3x + 1 \end{cases}$

$$\begin{array}{r} -3x + 1 = x + 5 \\ +3x \quad +3x \\ \hline 1 = 4x + 5 \\ -5 \quad -5 \\ \hline -4 = 4x \\ -1 = x \end{array}$$

$y = -1 + 5$   
 $y = 4$   
 $(-1, 4)$

13. Let  $f(x) = -4(x + 1)^2 + 9$

a) Find the Vertex and A.O.S.

V:  $(-1, 9)$       A.O.S:  $x = -1$

b) Find the y-intercept.

let  $x = 0$   
 $-4(0+1)^2 + 9 = 5$        $(0, 5)$

c) When does  $f(x) = 0$

$$0 = -4(x+1)^2 + 9$$

$$-9 = -4(x+1)^2$$

$$\frac{-9}{-4} = \frac{-4(x+1)^2}{-4}$$

$$\frac{9}{4} = (x+1)^2$$

$$\sqrt{\frac{9}{4}} = \sqrt{(x+1)^2}$$

$$\frac{3}{2} = x+1$$

$$x+1 = \frac{3}{2} \Rightarrow x = \frac{1}{2}$$

$$x+1 = -\frac{3}{2} \Rightarrow x = -\frac{5}{2}$$

d) Does the graph of this function has a maximum or a minimum and what is its value?

Max  $y = 9$  (y value of vertex)

14. Let  $f(x) = x^2$ , be the parent function.

a. Write the function for  $f(x + 2)$  and describe its transformation from the parent function.

$f(x+2) = (x+2)^2$   
H.T 2 Left       $x^2 + 2x + 4$

b. Write the function for  $f(x) - 5$  and describe its transformation from the parent function.

$f(x) - 5 = x^2 - 5$   
VT down 5

c. Write the function for  $\frac{1}{2}f(x)$  and describe its transformation from the parent function.

$\frac{1}{2}f(x) = \frac{1}{2}(x^2) = \frac{1}{2}x^2$   
V compression by  $\frac{1}{2}$

15. Let  $f(x) = \left(\frac{1}{5}\right)^x$ , be the parent function.

a. Write the function for  $-4f(x)$  and describe its transformation from the parent function.

$f(x) = -4\left(\frac{1}{5}\right)^x$   
V stretch by 4  
Reflection over x-axis

b. Write the function for  $f(x - 2)$  and describe its transformation from the parent function.

$f(x-2) = \left(\frac{1}{5}\right)^{x-2}$   
HT 2 right

c. Write the function for  $f(x) - 4$  and describe its transformation from the parent function.

$f(x) - 4 = \left(\frac{1}{5}\right)^x - 4$   
VT down 4

16. Write the function  $y = a(x-h)^2 + k$   $f(x) = x^2 - 4x - 2$  in vertex form.

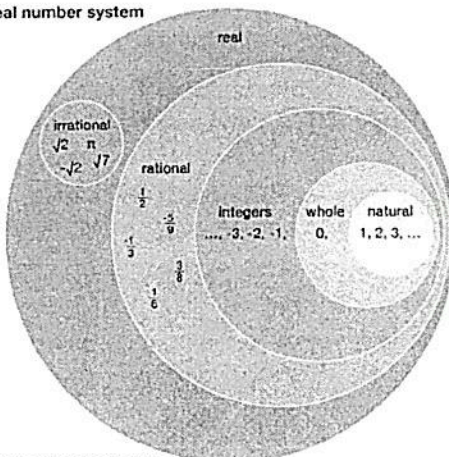
$x = -\frac{b}{2a} = -\frac{-4}{2(1)} = 2$

$4 - 8 - 2 = -6$

V:  $(2, -6)$

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

Real number system



Real Numbers

