

1. Simplify: a)  $\frac{2x^3 + 32x^2 + 128x}{9x^4 + 90x^3 + 144x^2}$

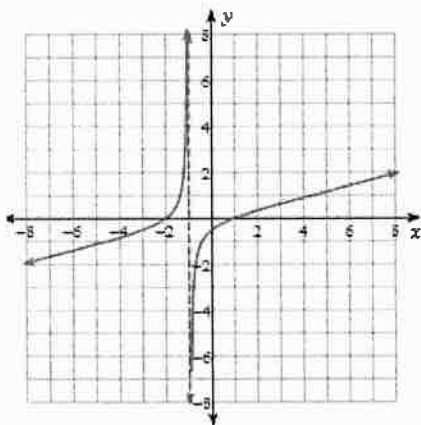
b)  $\frac{4n + 12}{n^2 - 7n - 30}$

2. Solve: a)  $\frac{6}{x+2} = \frac{x-7}{x-4}$

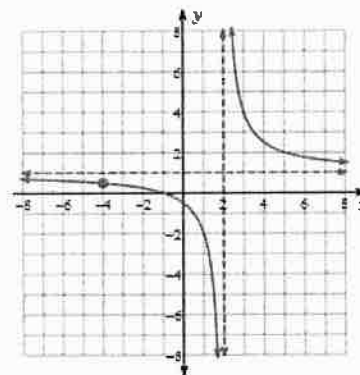
b)  $\frac{x^2 - 10x + 25}{x^2 - 8x + 12} = \frac{1}{x^2 - 8x + 12} + \frac{1}{x - 2}$

3. What is the domain and range of each function:

a)  $f(x) = \frac{x^2 + x - 2}{4x + 4}$



b)  $f(x) = \frac{x^2 + 5x + 4}{x^2 + 2x - 8}$



# FINAL EXAM REVIEW SHEET (SOLUTIONS) ALG 2B

$$\textcircled{1} \text{ a) } \frac{2x^3 + 32x^2 + 128x}{9x^4 + 90x^3 + 144x^2} = \frac{2x(x^2 + 16x + 64)}{9x^2(x^2 + 10x + 16)}$$

$$= \frac{\cancel{2x}(x+8)(x+8)}{\cancel{9x^2}(x+8)(x+2)} = \boxed{\frac{2(x+8)}{9x(x+2)}}$$

$$\text{b) } \frac{4n+12}{n^2-7n-30} = \frac{\cancel{4(n+3)}}{(n-10)\cancel{(n+3)}} = \boxed{\frac{4}{n-10}}$$

$$\textcircled{2} \text{ a) } \frac{6}{x+2} = \frac{x-7}{x-4}$$

MULTIPLY BY LCD...

$$\cancel{(x+2)}\cancel{(x-4)} \frac{6}{x+2} = \frac{x-7}{x-4} \cancel{(x+2)}\cancel{(x-4)}$$

OR,  
JUST CROSS  
MULTIPLY

$$6(x-4) = (x+2)(x-7)$$

$$6x - 24 = x^2 - 5x - 14$$

$$x^2 - 11x + 10 = 0$$

$$(x-10)(x-1) = 0$$

$$\boxed{x = 10, 1}$$

BOTH WILL CHECK

$$\textcircled{2} \text{ b) } \frac{x^2 - 10x + 25}{x^2 - fx + 12} = \frac{1}{x^2 - fx + 12} + \frac{1}{x - 2}$$

$$\frac{x^2 - 10x + 25}{(x-6)(x-2)} = \frac{1}{(x-6)(x-2)} + \frac{1}{x-2}$$

$$x^2 - 10x + 25 = 1 + x - 6$$

$$x^2 - 11x + 30 = 0$$

$$(x-5)(x-6) = 0$$

$$x = 5, 6$$

NOTE:  $x = 6$  IS  
EXTRANEOUS AS  
 $(x-6)$  IS IN DENOMINATOR

$$\boxed{x = 5}$$

$$\textcircled{3} \text{ a) } f(x) = \frac{x^2 + x - 2}{4x + 4} = \frac{(x+2)(x-1)}{4(x+1)}$$

RANGE: ALL REALS (FROM VISUAL LOOK AT GRAPH)

$$\boxed{x \neq -1}$$

$$\text{b) } f(x) = \frac{x^2 + 5x + 4}{x^2 + 2x - 8} = \frac{(x+1)(x+4)}{(x+4)(x-2)}$$

$$\boxed{x \neq -4, 2}$$

OR, LOOK FOR LOCATIONS OF VERTICAL ASYMPTOTES  
AND/OR "HOLES". RANGE:  $y \neq 1$  (Horiz Asymp)  $y \neq \frac{1}{2}$  "HOLE"

$$\textcircled{4} \text{ VERT ASYMP: } x = -1$$

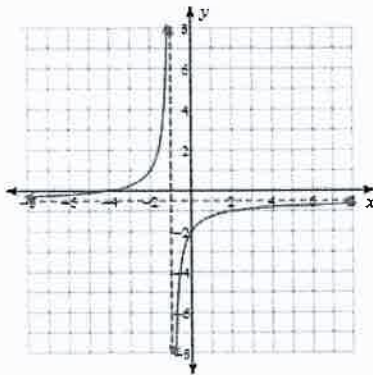
$$\text{a) } \text{HORIZ ASYMP: } y = -\frac{1}{2}$$

$$y_{\text{INT}}: -2$$

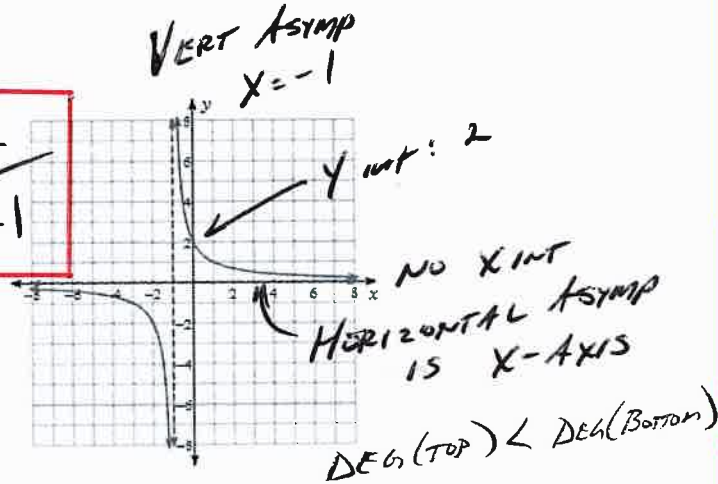
$$x_{\text{INT}}: -4$$

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

4. Write a function that could represent the graphs?



$$f(x) = \frac{2}{x+1}$$



$$f(x) = \frac{(x+3)(x-2)}{3(x-3)(x+3)} = \frac{x-2}{3(x-3)}$$

"Hole" at  $x = -3$   
 So, no VERT ASY AT  $x = -3$

5-6) Given the functions a)  $f(x) = \frac{x^2 + x - 6}{3x^2 - 27}$

b)  $f(x) = \frac{-3x - 12}{x^2 - x - 6} = \frac{-3(x+4)}{(x-3)(x+2)}$

5. Where is/are the vertical asymptote(s)?

a)  $x = 3$

b)  $x = 3, x = -2$

6. Where is/are the horizontal asymptote(s)?

a) DEG TOP = DEG BOTTOM  
 $y = \frac{1}{3}$

b)  $x$ -AXIS ( $y = 0$ )  
 DEG TOP < DEG BOTTOM

7. Find the removable point of discontinuity (hole) for the function  $f(x) = \frac{x^2 + 2x - 3}{x^2 - 9}$

$$f(x) = \frac{(x+3)(x-1)}{(x+3)(x-3)}$$

HOLE AT  $x = -3$

$$\left(-3, \frac{2}{3}\right)$$

AT  $x = -3$   
 $f(-3) = \frac{-4}{-6}$

8. Evaluate: a)  $\log_4 \frac{1}{16}$       b)  $\log_7 49$       c)  $\log_4 64$

a) -2      b) 2      c) 3

9. Solve: a)  $7^x = 74$

b)  $e^x = 28$

a)  $7^x = 74$   
 $\log 7^x = \log 74$   
 $x \log 7 = \log 74$

$x = \frac{\log 74}{\log 7}$

OR  $7^x = 74$   
 $\log_7 7^x = \log_7 74$   
 $x = \log_7 74$

b)  $e^x = 28$   
 $\ln e^x = \ln 28$

$x = \ln 28$

10. What is the asymptote of the function of  $f(x) = \log_4(x+3) - 2$ ?

SINCE YOU CAN'T TAKE THE LOG OF 0 OR LOG (NEG NUMBER)  
 THEN  $x+3 \neq 0$ . SO ASYMPTOTE AT  $x = -3$

11. a) Solve:  $\ln x = 1$

$e^1 = x$

$x = e$

b) Solve:  $\ln x = 0$

$e^0 = x$

$x = 1$

$\ln x = 0$   
 $\log_e x = 0$   
 $e^0 = x$

12. a) Solve:  $\log_4 4x + \log_4 2 = 5$

b)  $\log_7 5 + \log_7 2x = 2$

$\log_4 8x = 5$

$4^5 = 8x$

$x = \frac{4^5}{8} = \frac{1024}{8} = 128$

$\log_7 10x = 2$

$7^2 = 10x$

$x = \frac{7^2}{10} = \frac{49}{10}$

13. Given that a gallon of milk today costs \$3.50, and the average annual inflation rate is 2.5%. What would you expect a gallon of milk to cost in 15 years?

EVERY YEAR, MULTIPLY BY 1.025

$$(3.50)(1.025)^{15} = \boxed{\$5.07}$$

14. Platinum prices hit an all time high of \$1,234 an ounce in 2010. For the next three years, the prices dropped to a 2013 price of \$900 an ounce.

What was the annual rate of depreciation for the price of platinum during this period of time?

LIKE ABOVE  $1234(x)^3 = 900 \rightarrow x = \sqrt[3]{\frac{900}{1234}} = 0.90$

$x^3 = \frac{900}{1234}$  SINCE DEPRECIATION, WE TAKE  $1 - .90 = .10$  **10%**

15. a) Find the sum of the first 12 terms of the geometric series:  $3 + 6 + 12 + 24 + \dots$

$$Sum = \frac{a_1(1-r^n)}{1-r} = \frac{3(1-2^{12})}{1-2} = \frac{3(1-4096)}{-1} = -3(-4095) = \boxed{12285}$$

- b) Find the sum of the first 8 terms of the geometric series:  $2 + 6 + 18 + 54 + \dots$

$$\frac{a_1(1-r^n)}{1-r} = \frac{2(1-3^8)}{1-3} = \frac{2(1-3^8)}{-2} = -1(1-3^8) = 3^8 - 1 = \boxed{6560}$$

16. A geometric series has terms  $a_3 = 5$ ,  $a_4 = 10$ , and  $a_5 = 20$ . What is  $a_1$ ? What is  $a_n$ ?

$a_5 = 20$   
 $a_4 = 10$   
 $a_3 = 5$

TAKING  $\frac{1}{2}$  OF PREVIOUS VALUE

So,  $a_2 = \frac{5}{2}$   
 $a_1 = \frac{5}{4}$

OR  $a_4 = a_3 r \rightarrow a_1 = \frac{5}{4}$   
 $10 = 5r$   
 $r = 2$

$$a_n = a_1 r^{n-1}$$

$$a_n = \frac{5}{4}(2)^{n-1}$$

$a_3 = a_1 r^2$   
 $5 = a_1(2)^2$

17. The graph of an exponential function,  $f$ , passes through  $(0, 1)$  and  $(2, 9)$  as shown. What is the value of  $f(4)$ ?

THIS GRAPH IS NOT SHIFTED UP OR DOWN.

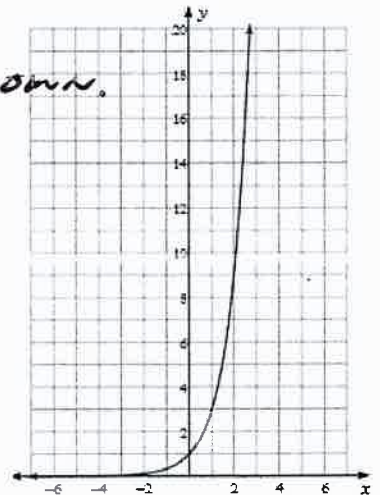
So,  $f(x) = a \cdot b^x$

For  $(0, 1)$   $1 = a \cdot b^0 \Rightarrow 1 = a$

NOW,  $f(x) = b^x$

For  $(2, 9)$   $9 = b^2 \Rightarrow b = 3$

So,  $f(x) = 3^x$ , THEN  $f(4) = 3^4 = \boxed{81}$





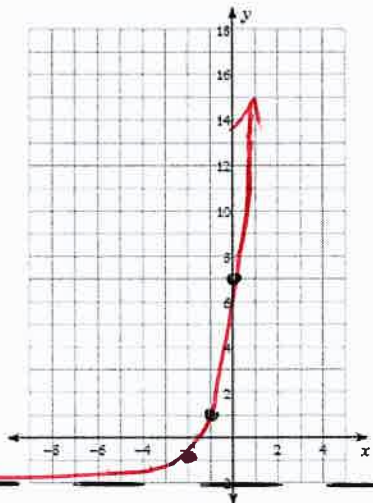
$(19, 1)$   
EXPONENTIAL GROWTH

Name \_\_\_\_\_

Period \_\_\_\_\_

18. Graph the following functions: a)  $y = 3^{x+2} - 2$

A.



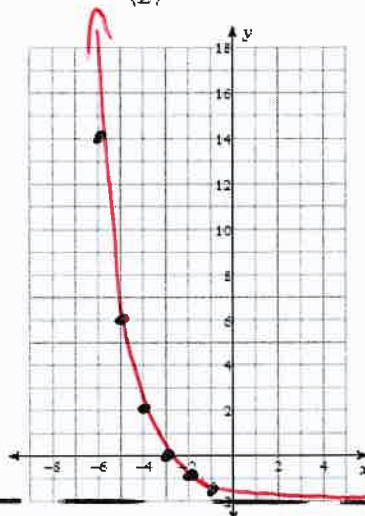
TAKE  $y = 3^x$  AND SHIFT  
LEFT 2  
DOWN 2

b)  $y = \left(\frac{1}{2}\right)^{x+2} - 2$

EXPONENTIAL

DECAY

B.



TAKE  $y = \left(\frac{1}{2}\right)^x$  AND SHIFT  
LEFT 2  
DOWN 2

19. A set of data has been collected. A new value is added to the set that is greater than the previous maximum. Complete the following statements with: increases, decreases, remains the same, or can not be determined.

The range INCREASES

The standard deviation INCREASES → INCREASES THE SPREAD OF DATA

The median CANNOT BE DETERMINED. → (2 2 2 (4)) (1 2 3 (4))  
SAME RAISES

The mean INCREASES

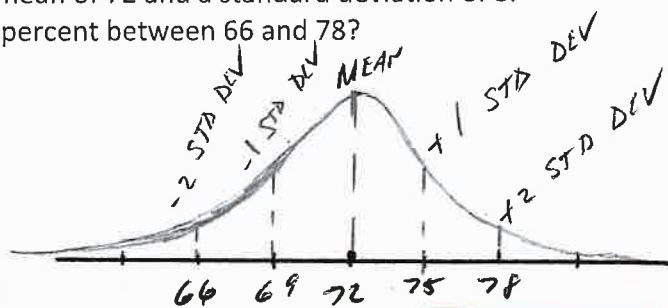
The mode REMAINS THE SAME → (NEW VALUE IS ONLY 1 UNIQUE VALUE.)

20. The scores for a math test are normally distributed with a mean of 72 and a standard deviation of 3. What percent of the scores are between 66 and 78? What percent between 66 and 78?

68% OF DATA FALL WITHIN 1 SD.

95% OF DATA FALL WITHIN 2 SD

99.7% OF DATA FALL WITHIN 3 SD



66-78 IS 2 STD DEV ON EACH SIDE OF MEAN.

95%





24. What is  $(2r)^{\frac{8}{5}}$  written in radical form?

$$\sqrt[5]{(2r)^8} = \sqrt[5]{256r^8}$$

What is  $(5m)^{\frac{3}{2}}$  written in radical form?

$$\sqrt[2]{(5m)^3} = \sqrt[2]{125m^3}$$

25. Solve: a)  $7 = \sqrt{x+8} + 3$

$$7 = \sqrt{x+8} + 3$$

$$\sqrt{x+8} = 4$$

$$(\sqrt{x+8})^2 = (4)^2$$

$$x+8 = 16$$

$$x = 8$$

b)  $4 + \sqrt{\frac{x}{10}} = 12$

$$\sqrt{\frac{x}{10}} = 8$$

$$\left(\sqrt{\frac{x}{10}}\right)^2 = (8)^2$$

$$\frac{x}{10} = 64$$

$$x = 64 \cdot 10$$

$$x = 640$$

26. Solve: a)  $-5(x-17)^{\frac{3}{2}} = -2560$

$$(x-17)^{\frac{3}{2}} = 512$$

$$\left[(x-17)^{\frac{3}{2}}\right]^{\frac{2}{3}} = [512]^{\frac{2}{3}}$$

$$x-17 = \left(\sqrt[3]{512}\right)^2$$

$$x-17 = 8^2$$

$$x-17 = 64$$

$$x = 81$$

b)  $2x^{\frac{2}{3}} - 3 = 15$

$$2x^{\frac{2}{3}} = 18$$

$$x^{\frac{2}{3}} = 9$$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = (9)^{\frac{3}{2}}$$

$$x = 27$$

27. Simplify: a)  $216^{\frac{2}{3}}$

$$\left(\sqrt[3]{216}\right)^2 = 6^2 = 36$$

b)  $49^{\frac{3}{2}}$

$$\left(\sqrt{49}\right)^3 = (7)^3 = 343$$

28. Graph each function:

a)  $y = \sqrt{x-2}$

b)  $y = \sqrt{x} + 2$

SHIFT  $y = \sqrt{x}$   
2 UNITS UP

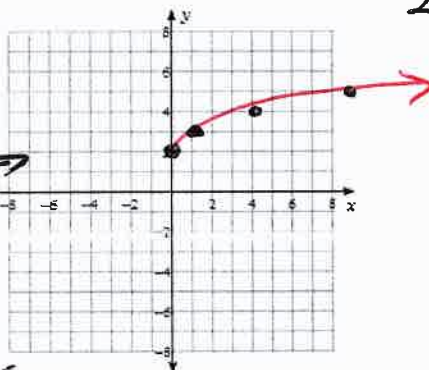
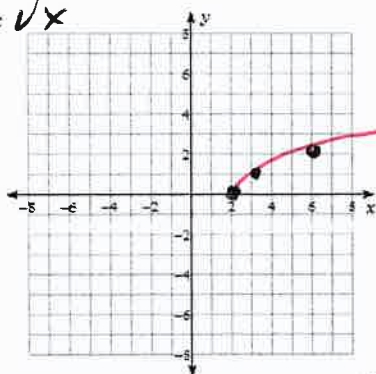
SHIFT  $y = \sqrt{x}$

2 UNITS  
RIGHT

OR

TABLE

X	Y
2	0
3	1
6	2



NOTE:  
SAME EXACT  
SHAPE.  
DIFFERENT  
TRANSLATIONS