

## Day 9 Homework: Direct, Inverse, and Joint Variation

1. Describe how you determine if a function is a direct variation.
2. Describe how you determine if a function is an inverse variation.

For 3-8 state whether the problem is inverse, direct or neither. If the problem is inverse or direct variation, state the constant of variation.

3.  $y = 7x$

4.  $y + x = 4$

5.  $\frac{y}{x} = 9$

6.  $xy = 12$

7.  $y = \frac{4}{x}$

8.

X	Y
4	8
16	2
1	32
10	3.2

9. If  $x$  and  $y$  vary inversely and  $x = 1$  when  $y = 11$ , find  $x$  when  $y = 5.5$ .
10. If  $x$  and  $y$  vary inversely and  $x = 2.5$  when  $y = 100$  find  $x$  when  $y = 25$ .
11. Heart rates and life spans of most mammals are inversely related. A cat lives for about 15.2 years on average and has a heart rate of 126 beats per minute.
  - a. What is the constant of variation?
  - b. A hamster has a heart rate of about 634 beats per minute. About how long will a hamster live?
  - c. An elephant live for about 70 years. About how many times per minute does an elephant's heart beat?

12. Two gears are used to operate a machine. Gear A has 60 teeth and Gear B has 45 teeth. The speed at which you turn Gear A is 5400 rpm. The number of teeth and speed in rpm are inversely related.
- What is the constant of variation?
  - At what speed will Gear B turn?
13. The grade you earn in math varies inversely with the number of minutes per night you watch television. If you watch 90 minutes per night, you get a 60 in math.
- What is the constant of variation?
  - How much television can you watch if you want to make a 70?
  - You cut back on your television to only 75 minutes a night, what grade will you make in math?
  - What is the maximum amount of television you can watch and still make a 100?
14. The amount of water that has leaked from a faucet varies directly with time. In 2 hours, 10 gallons of water leak.
- Describe what happens to the amount of water as time increases.
  - What is the constant of variation?
  - How much water leaks in 100 hours?
  - How long does it take for 100 gallons to leak?

Write an equation for each statement. Then solve the equation.

15. Find  $y$  when  $x = 6$ , if  $y$  varies directly as  $x$  and  $y = 8$  when  $x = 2$ .
16. Find  $x$  when  $y = 5$ , if  $y$  varies inversely as  $x$  and  $x = 6$  when  $y = -18$
17. Find  $y$  when  $x = 12$  and  $z = 2$ , if  $y$  varies jointly as  $x$  and  $z$  and  $y = 24$  when  $z = 2$  and  $x = 1$
18. Find  $x$  when  $y = 3$ , if  $y$  varies inversely as  $x$  and  $x = 4$  when  $y = 16$

Answer each of the following questions.

19. The current  $I$  in an electrical conductor varies inversely with the resistance  $R$  of the conductor. The current is  $\frac{1}{3}$  amps when the resistance is  $360 \Omega$ . Use this information to write an equation to model the relationship.
20. Suppose you spin a circular weight on the end of a string. The force  $F$  on the string varies directly with the square of the velocity  $v$  of the weight. The force  $F$  varies inversely with the radius  $r$  of the circle. What happens to the force when:
- The length of the string is doubled.
  - The velocity is tripled.
  - The length of the string is halved and the velocity is increased by 50%

## Day 10 Homework: Solving Rational Equations

1-9) Solve each rational equation.

1.  $\frac{x}{5} = \frac{7}{3}$

2.  $\frac{10}{y} = \frac{5}{14}$

3.  $\frac{4}{12} = \frac{7}{2w}$

4.  $\frac{x}{6} = \frac{6}{x}$

5.  $\frac{2x}{16} = \frac{2}{x}$

6.  $\frac{3}{x+4} = \frac{x-4}{16}$

7.  $\frac{x-3}{7} = \frac{5}{2}$

8.  $\frac{4}{x-5} = \frac{2}{x+8}$

9.  $\frac{x}{x+24} = \frac{2}{x}$

10-22) Find the Least Common Denominator for each equation. Solve each rational equation by multiplying through by the LCD. Watch out for extraneous solutions.

10.  $\frac{2}{3} + \frac{x}{3} = \frac{-13}{3}$

11.  $\frac{1y}{4y} + \frac{4}{4y} = \frac{3y}{4y}$

10 LCD \_\_\_\_\_

Answer \_\_\_\_\_

11 LCD \_\_\_\_\_

Answer \_\_\_\_\_

12.  $\frac{a^2}{5a} - \frac{2}{5a} = \frac{14}{5a}$

13.  $\frac{2}{x-3} + \frac{x}{x-3} = \frac{5}{x-3}$

12 LCD \_\_\_\_\_

Answer \_\_\_\_\_

13 LCD \_\_\_\_\_

Answer \_\_\_\_\_

14.  $\frac{1}{n-8} - 1 = \frac{7}{n-8}$

15.  $\frac{1}{r-2} + \frac{1}{r^2-7r+10} = \frac{6}{r-2}$

## Day 11 HW: Solving Harder Rational Equations

1)  $1 = \frac{v+2}{v-4} + \frac{7v-42}{v-4}$

2)  $\frac{r-4}{5r} = \frac{1}{5r} + 1$

3)  $1 + \frac{x^2 - 5x - 24}{3x} = \frac{x-6}{3x}$

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

5)  $\frac{n+5}{n+8} = 1 + \frac{6}{n+1}$

6)  $\frac{r+5}{r^2 - 2r} - 1 = \frac{1}{r^2 - 2r}$

7)  $\frac{1}{x^2 - 5x} = \frac{x+7}{x} - 1$

8)  $\frac{a-2}{a+3} - 1 = \frac{3}{a+2}$

9)  $\frac{m}{m+9} = \frac{9}{m+9} + 2$

10)  $\frac{1}{x-4} + \frac{1}{x+4} = \frac{22}{x^2 - 16}$

9) LCD \_\_\_\_\_

Answer \_\_\_\_\_

10) LCD \_\_\_\_\_

Answer \_\_\_\_\_

$$11) \quad \frac{x}{x-11} - 1 = \frac{22}{x^2 - 5x - 66}$$

$$12) \quad \frac{2x}{x+3} - \frac{x}{x+7} = \frac{x^2 - 1}{x^2 + 10x + 21}$$

11) LCD \_\_\_\_\_

Answer \_\_\_\_\_

12) LCD \_\_\_\_\_

Answer \_\_\_\_\_

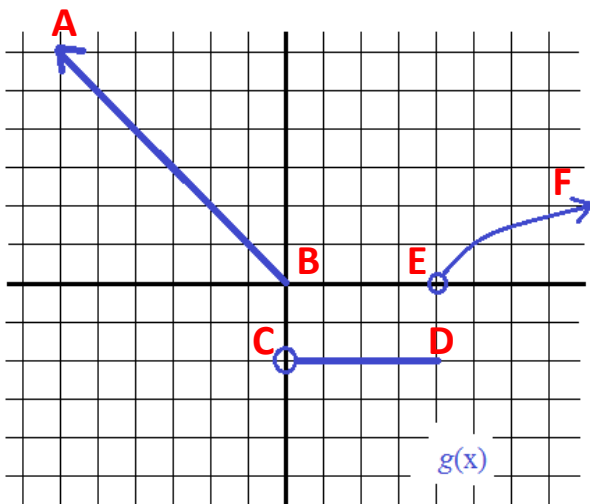
$$13) \quad \frac{w}{w+4} + \frac{1}{3} = \frac{-12}{w+4}$$

13) LCD \_\_\_\_\_

Answer \_\_\_\_\_

### Piecewise Practice and Review

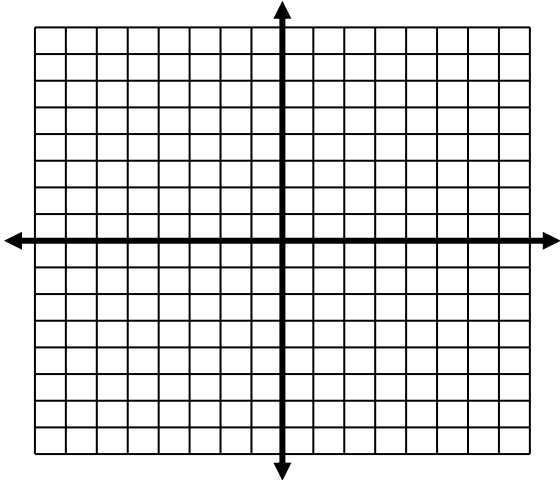
14) For the following function  $g$ , decide if each of the statements is true or false. If it is false, fix the equation or restriction.

1. The range of this function is  $[-2, \infty)$ 2. The equation for the line from point A to B is  $g(x) = -2x$ 3. From C to D the equation is  $g(x) = -2$ 4. The restriction from C to D is  $0 \leq x < 5$ 5. The equation for E to F is  $g(x) = \sqrt{x} + 4$

Day 12 HW: Unit 4 Advanced Functions Test Review

For each equation, draw a graph, indicating at least 5 points. Then tell its domain and range, and how it was changed from its parent graph.

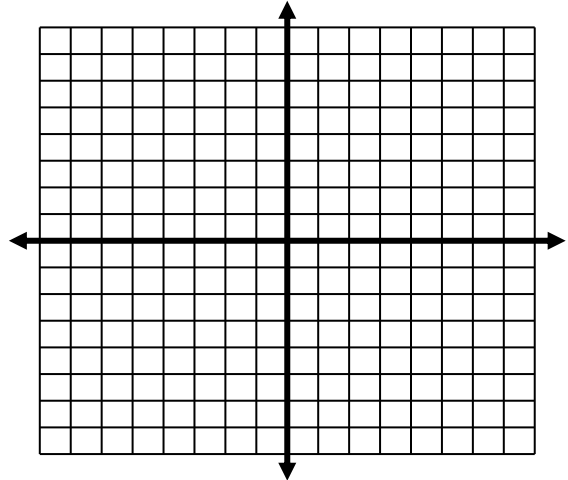
1.  $y = 3|x - 4| - 2$



D: \_\_\_\_\_ R: \_\_\_\_\_

Changed: \_\_\_\_\_

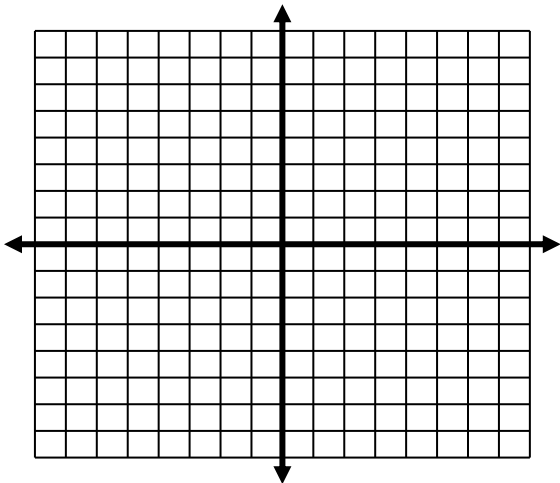
2.  $y = 2[x - 1]$



D: \_\_\_\_\_ R: \_\_\_\_\_

Changed: \_\_\_\_\_

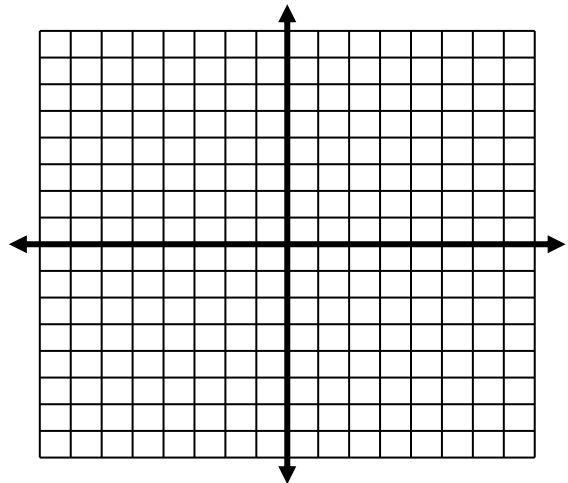
3.  $f(x) = \sqrt[3]{x+4} - 2$



D: \_\_\_\_\_ R: \_\_\_\_\_

Changed: \_\_\_\_\_

4.  $f(x) = -2\sqrt{x+3} + 1$



D: \_\_\_\_\_ R: \_\_\_\_\_

Changed: \_\_\_\_\_

Evaluate each expression

5. $\lceil 4.7 \rceil =$	6. $ 4.7  =$	7. $\sqrt{64} =$	8. $\sqrt[3]{64} =$
9. $\lfloor -4.7 \rfloor =$	10. $ -4.7  =$	11. $\sqrt{-64} =$	12. $\sqrt[3]{-64} =$

13. Solve the following equation for x and write in set notation:  $\left\lceil \frac{3}{2}x - 1 \right\rceil = 8$

14. Write the function so it would be easier to graph. Then, indicate how it's changed from the parent graph.  $f(x) = \sqrt{4x - 28}$

Evaluate given  $p(x) = \begin{cases} x & \text{if } 0 \leq x < 60 \\ 15 & \text{if } 60 \leq x \leq 90 \end{cases}$  and  $g(x) = \begin{cases} 4 - x & \text{if } x > 0 \\ -2x - 2 & \text{if } x < 0 \end{cases}$

15.  $p(30)$  \_\_\_\_\_

17.  $p(60)$  \_\_\_\_\_

19.  $p(75) - g(10)$  \_\_\_\_\_

16.  $p(80)$  \_\_\_\_\_

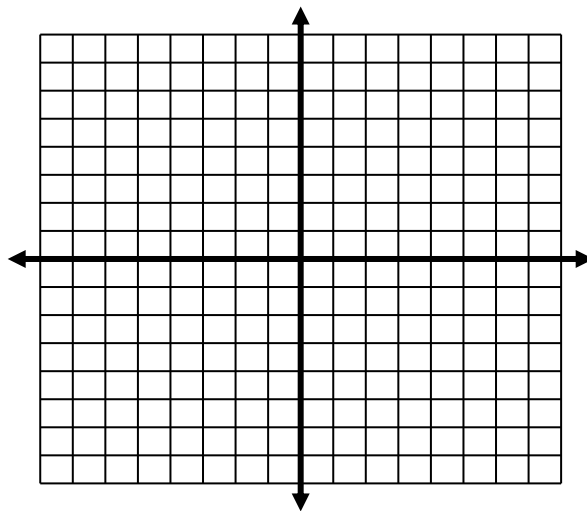
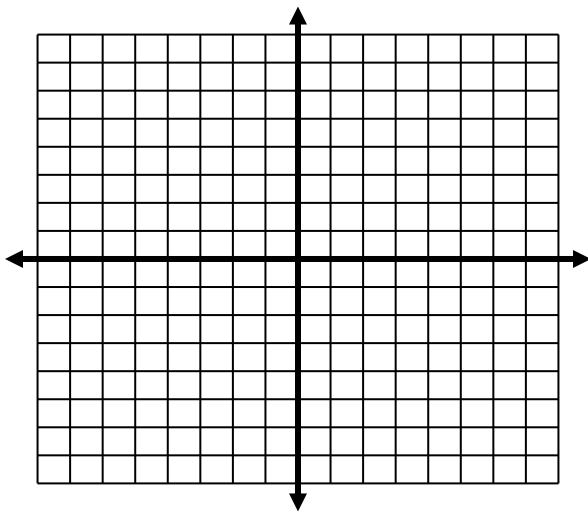
18.  $g(1)$  \_\_\_\_\_

20.  $p(5) - g(-5)$  \_\_\_\_\_

For each equation, draw a graph, indicating at least 5 points. Then tell its domain, its range, and other requested information.

21.  $g(x) = \begin{cases} x + 4 & \text{if } x \geq -1 \\ 2x + 1 & \text{if } x < -1 \end{cases}$

22.  $f(x) = \frac{-2}{x-3} + 1$



D: \_\_\_\_\_ R: \_\_\_\_\_

D: \_\_\_\_\_ R: \_\_\_\_\_

$g(-4) =$  \_\_\_\_\_  $g(4) =$  \_\_\_\_\_

Changed from parent: \_\_\_\_\_

$g(-1) =$  \_\_\_\_\_  $g(0) =$  \_\_\_\_\_

H.A.: \_\_\_\_\_ V.A.: \_\_\_\_\_

23. There is a relationship between the radius of an orbit and the time of one orbit for the moons of Saturn. The table below lists data for 11 of Saturn's 30 moons. Round answers to the hundredths place.

Moon	Atlas	Prometheus	Pandora	Epimetheus	Janus	Mimas	Enceladus	Tethys	Dione	Helene	Rhea
Radius (100,000 km)	1.38	1.39	1.42	1.51	1.51	1.86	2.38	2.95	3.77	3.77	5.27
Time (days)	0.60	0.61	0.63	0.69	0.70	0.94	1.37	1.89	2.74	2.74	4.52

a. Find the power function model for the data for orbital time versus radius. \_\_\_\_\_

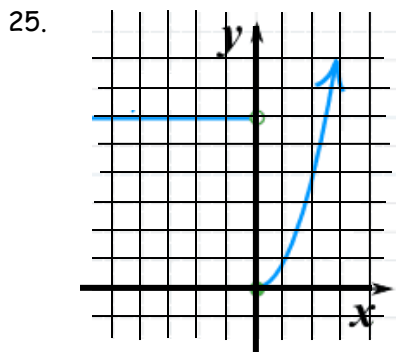
b. Predict the orbital radius of Titan, which has orbit time of 21.277 days. \_\_\_\_\_

c. Find the orbital time for Phoebe, which has an orbit radius of 12,952,000 km. \_\_\_\_\_

24. Write an equation for the translation of  $y = \frac{6}{x}$  that has the asymptotes  $x = -3$  and  $y = -7$ .

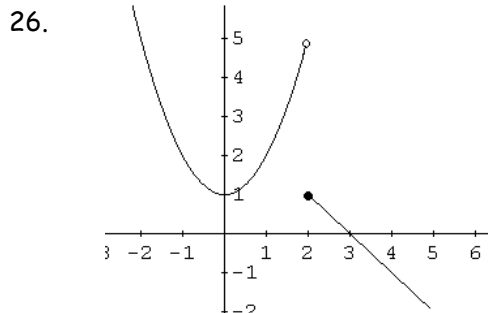


Write a piecewise function for the following graphs. Then determine their domain and range.



$$f(x) = \left\{ \begin{array}{l} \phantom{0} \\ \phantom{0} \\ \phantom{0} \end{array} \right.$$

D: \_\_\_\_\_ R: \_\_\_\_\_



$$f(x) = \left\{ \begin{array}{l} \phantom{0} \\ \phantom{0} \\ \phantom{0} \end{array} \right.$$

D: \_\_\_\_\_ R: \_\_\_\_\_

Solve the following. Show all your work! Use separate paper, if needed.

27.  $\sqrt{x+14} = x - 16$

28.  $(x+2)^{3/4} - 3 = 24$

29.  $\frac{5}{2x-2} = \frac{15}{x^2-1}$

30.  $\frac{x+3}{x} - \frac{7}{x+2} = \frac{14}{x^2+2x}$

31. Find  $x$  when  $y = 5$ , if  $y$  varies inversely as  $x$  and  $x = 6$  when  $y = -18$

32. The current  $I$  in an electrical conductor varies inversely with the resistance  $R$  of the conductor. The current is  $\frac{1}{3}$  amps when the resistance is 360.

Use this information to write an equation to model the relationship.

Identify the data in each table as a direct variation or an inverse variation. Then write an equation to model the data.

33. 

X	2	4	10	12.5
Y	4	8	20	25

34. 

X	0.2	1	3	10
Y	12	2.4	0.8	0.24

Given  $f(x) = 3x^2 - 4x$  and  $g(x) = 2x - 5$ , evaluate the following. Show all work! Use other paper, if needed.

35.  $f(-6) - 2g(7)$

36.  $f(2x - 7) + g(-4)$

37.  $f(x + 5) - 3g(x)$

Day 13 HW: Cumulative Review after Unit 4 Test
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For exercises 1-4, A is between B and C and  $AC = 5$ .

1) If  $AB = 4$ , what is  $BC$ ?

2) If  $BC = 6$ , what is  $AB$ ?

3) If A is the midpoint of  $\overline{BC}$ , what is  $AB$ ?

4) If  $AB = 2(AC)$ , what is  $AB$ ?

For exercises 5-7, simplify completely.

5)  $\frac{4ab^2c^{-1}}{(ab^{-2}c^3)^4}$

6)  $\sqrt[3]{12x^4} \cdot \sqrt[3]{180x}$

7)  $\sqrt[3]{135x^4} + x\sqrt[3]{40x}$

8) Which point lies in the solution set for the system:  

$$2y - x \geq -6$$

$$2y - 3x < -6$$

A. (-4, -1)

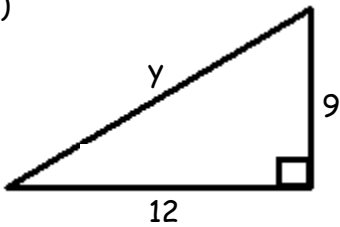
B. (3, 1)

C. (0, -3)

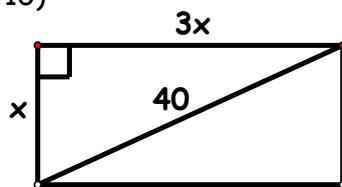
D. (4, 3)

Find the value of the variables. Give exact answers! (Hint: Pythagorean Theorem! ☺)

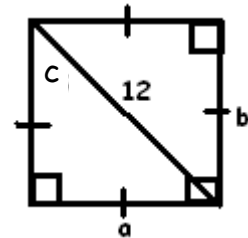
9)



10)



11)



Find the intersection of the two lines.

12)  $x + 2y = 5$

$4x - 2y = 10$

13)  $5x - 2y = -23$

$9x + 3y = -15$

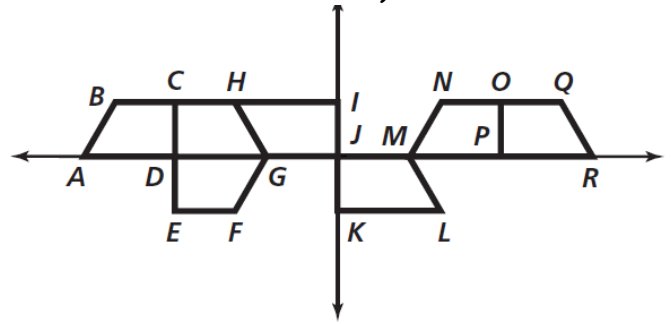
State whether each mapping is a reflection, rotation, translation, or glide reflection. Specifically describe each transformation. (Example:  $\triangle MNOP \rightarrow \triangle RQOP$  is a reflection over the line  $OP$ .)

14.  $\triangle ABCD \rightarrow \triangle GHCD$

15.  $\triangle HGJI \rightarrow \triangle LMJK$

16.  $\triangle GFED \rightarrow \triangle RQOP$

17.  $\triangle MNOP \rightarrow \triangle ABCD$



Solve using the appropriate method. Give exact answer(s).

18)  $-36 = 3m^2 - 31m$

19)  $2x^2 - 6x - 2 = 0$

20) Solve for x:  $4^{5x} = 48$

- A.  $x = 3 \log 12$       B.  $\log 48 - 5 \log 4$       C.  $x = \frac{\log 48}{5 \log 4}$       D.  $x = \frac{\log 12}{\log 4}$

21) Which is the inverse of the function  $f(x) = x - 5$ ?

- A.  $f^{-1}(x) = \frac{1}{x+5}$       B.  $f^{-1}(x) = x+5$       C.  $f^{-1}(x) = 5-x$       D.  $f^{-1}(x) = \frac{1}{x-5}$

22) Find the discriminant to determine the number and nature of the roots.  $2x^2 + 3x = 5$

- A. Two real rational roots      B. One real rational root  
C. Two imaginary roots      D. Two real irrational roots

23) In which direction is the graph of  $f(x) = \frac{3}{x+b}$  translated when b increases?

- A. down      B. up      C. right      D. left

24) The bacteria in a petri dish double every 4 hours. Initially there were 65 bacteria in the sample.

- a) Write an equation to represent this scenario.  
b) How many bacteria will there be after 24 hours?

25) Maria purchased a commercial property four years ago for \$125,000. The property is now worth \$192,000.

Assuming a steady annual percentage growth rate, what is the approximate yearly rate of appreciation?

- A. 1.0%      B. 11.3%      C. 13.4%      D. 34.9%