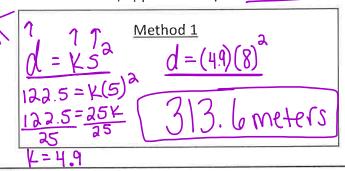
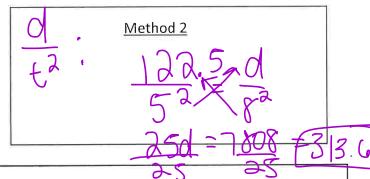
Math 2
Unit 4 - Radical & Rational Functions
Lesson 6 → Types of Variations

Name	
Date	Pd

- DIRECT VARIATION: Linear function with a y-intercept of 0. In a direct variation, both of the quantities are either increasing or both are decreasing.
- > There are two methods for solving a direct variation problem:
 - 1) Equation of Variation: y = kx where k is called the **constant of variation**
 - 2) Proportion: $\frac{y_1}{x_1} = \frac{y_2}{x_2}$
- #1: The distance that a body near Earth's surface will fall from rest varies directly as the **square** of the number of seconds it has been falling. If a boulder falls from a cliff a distance of 122.5 *m* in 5 seconds, approximately how far will it fall in 8 seconds?





- > JOINT VARIATION: more than two quantities in a direct variation relationship
- \Rightarrow Equation of Variation: y = kxz where k is called the **constant of variaton**
- #2: If y varies jointly, as x and z, and $y = \frac{1}{2}$ when x = 27 and $z = \frac{-2}{3}$ find y when x = 9 and z = 18.

$$y = 4xz$$
 $y = -\frac{1}{3}$
 $y = (-\frac{1}{3})$
 $y = -\frac{1}{3}$
 $y = -\frac{1}{3}$

- y = (-1/36)(9)(18) y = \(-9/2 \) or -4.5
- Rational function with vertical and horizontal asymptotes. In an inverse variation, one of the quantities is increasing while the second quantity is decreasing.
- Equation of Variation: $y = \frac{k}{x}$ where k is called the **constant of variation**
- #3: The time of a trip varies inversely as the speed of the car. If a car being driven at 55 mph takes 2 hours to get from Wake Forest to Greensboro, how fast is the car traveling if the trip takes 2.5 hours?

$$t = \frac{K}{5}$$



$$\frac{2.5}{1} = \frac{110}{5}$$

COMPOUND VARIATION:

Both Inverse and Direct Variation in the same problem

 $y = \frac{kx}{z}$ where k is called the **constant of variation** Equation of Variation:

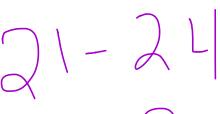
The volume of gas varies directly with Kelvin temperature and inversely with pressure. If a certain gas #4: has a volume of 342 cubic meters at a temperature of 300 Kelvin degrees under a pressure of 200 KPa (kilopascals), what will be the volume of the same gas at a temperature of 320 Kelvin degrees under a pressure of 400 kPA?

$$342 = \frac{(300)}{(300)} = 228$$

State whether each equation represents a direct) inverse, joint or compound variation. Then state the constant of variation.

6. $z = \frac{xy}{x}$ 7. $y = \frac{3}{2}xz$ 8. $y = \frac{1}{2}x$ 9. $z = \frac{x}{12y}$ 10. $y = \frac{1}{2}x$	
6. $z = \frac{xy}{15}$ 7. $y = \frac{3}{4}xz$ 8. $y = \frac{1}{3}x$ 9. $z = \frac{x}{12y}$ 10. $y = \frac{1}{3}$	<u>x</u> 5

- Write a function for each variation relationship:
 - 11. W varies directly as the square of d.
 - 12. V varies inversely as J.
 - 13. V varies inversely as p and directly as T.
 - 14. F varies jointly as A and the square of v.
 - 15. L varies directly as the fourth power of d and inversely as the square root of h.



Write an equation for each statement and then solve:

1. If y varies directly as x and y = 15 when x = 3, find y when x = 12.

$$y = kx$$

 $15 = k(3)$
 $k = 5$
 $y = 60$

- 2. If y varies directly as x and x = 36 when y = 4, find x when y = 24.
- 3. If y varies directly as x^2 and y = 12 when x = 4, find y when x = 6.

- 4. If y varies inversely as x and y = 2 when x = 8, find x when y = 14.
- 5. If y varies inversely as x and x = 7 when y = 21, find y when x = 42.
- 6. If y varies inversely as x^3 and y = 6 when $x = \frac{-3}{4}$, find y when x = 3.

- 7. Supposey varies jointly with x and z. If y = 20 when x = 2 and z = 5, find y when x = 14 and z = 8.
- 8. Suppose z varies jointly with x and y. If x = 3 and y = 2 when z = 12, find z when x = 4 and y = 5.
- 9. Suppose m varies jointly as n and p. If n=4 and p=5 when m=60, find m when n=12 and p=2.

- 10. Suppose that y varies directly as x and inversely as z. If y = 5 when x = 3 and z = 4, find y when x = 6 and z = 8.
- 11. Suppose y varies directly as \sqrt{x} and inversely as z. If y = 10 when x = 9 and z = 12, find y when x = 16 and z = 10.
- 12. Suppose x varies directly as y^3 and inversely as \sqrt{z} . If x = 7 when y = 2 and z = 4, find x when y = 3 and z = 9.

MR 4 - Radical & Rational Functions essen 7 → Types of Variations HOM	EWORK	Date	Pd			
Write an equation for each statement and then color						
If y varies directly as x and $y = 15$ when $x = 3$, find y when $x = 12$. y = 4 $y = 5$	2. If y varies direct and x = 36 who x when y = 24. Y = 4.4	en y = 4, find	3. If y varies directly as x^2 and $y = 12$ when $x = 4$, find y when $x = 6$. $y = 4 \times 2$ 12 = 164 10 = 16 3/4 = 4			
4. If y varies inversely as x and $y = 2$ when $x = 8$, find x when $y = 14$. $ y = \frac{V}{X} U = \frac{ U }{X} $ $ \lambda = \frac{V}{2} U = \frac{ U }{X} $ $ \lambda = \frac{V}{2} U = \frac{ U }{X} $ Suppose y varies jointly with x and x. If $y = 20$ when $x = 2$ and $x = 5$, find y when $x = 14$ and $x = 8$. $ y = V_{1}X_{2} y = (2)(V)(y) $ $ \lambda = \lambda V =$	5. If y varies ixen x = 7 when y = 42. y = \frac{V}{x} 21 = \frac{V}{x} 31 = \frac{V}{x} 41 = \frac{V}{x} 8. Suppose z varies x and y. it x = y = 2 when z when x = 4 an 2 = V-X9 12 = V-X9 13 = V(3)(2) 12 = V-X9	= 21, find y \(\frac{1}{42}\) = 3.5 Its fointly with 3 and = 12, find z dy = 5. \(\frac{7}{2}\) \(\frac{1}{2}\) \(\frac{1}{2	6. If y varies inversely as x^3 and $y = 6$ when $x = \frac{-3}{3}$, find y when $x = 3$. $\frac{91}{3}$ $y = \frac{1}{2}$ $\frac{1}{3}$			
20. Suppose that y varies directly as x and inversely as z, if y = 5 when x = 3 and z = 4, find y when x = 6 and z = 8. Y = $\frac{(\lambda_0)}{2}$ $\frac{\lambda_0}{3}$ $\frac{\lambda_0}{3}$ $\frac{\lambda_0}{3}$ $\frac{\lambda_0}{3}$ $\frac{\lambda_0}{3}$ $\frac{\lambda_0}{3}$	11. Suppose y variation of the second of the	rsely as z. If c = 9 and	12. Suppose x varies directly as y^3 and inversely as x^2 . If $x = 7$ when $y = 2$ and $z = 4$, find x when $y = 3$ and $z = 9$. $x = \frac{x + y}{12} = \frac{9}{x} = \frac{(344)(3^3)}{3}$ $7 = \frac{y(x)^3}{3} = \frac{47.25}{3}$ $7 = \frac{9}{3} = \frac{9}{3} = \frac{15.75}{3}$ $14 = 9$			