

Name:	Date:
Topic:	Class:

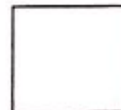
Main Ideas/Questions	Notes/Examples								
<h3 style="margin: 0;">Variation Models</h3>	<p style="text-align: center;">Variation is a special relationship between variables.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <th style="width: 33%; padding: 5px;">DIRECT VARIATION</th> <th style="width: 33%; padding: 5px;">JOINT VARIATION</th> <th style="width: 33%; padding: 5px;">INVERSE VARIATION</th> </tr> <tr> <td style="text-align: center; padding: 10px;"> $y = kx$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y is directly proportional to x"</div> </td> <td style="text-align: center; padding: 10px;"> $y = kxz$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y varies jointly as x and z"</div> </td> <td style="text-align: center; padding: 10px;"> $y = \frac{k}{x}$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y is inversely proportional to x"</div> </td> </tr> </table> <p style="text-align: center; margin: 0;">k is the CONSTANT OF VARIATION</p>	DIRECT VARIATION	JOINT VARIATION	INVERSE VARIATION	$y = kx$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y is directly proportional to x"</div>	$y = kxz$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y varies jointly as x and z"</div>	$y = \frac{k}{x}$ <div style="border: 1px solid black; border-radius: 50%; padding: 5px; width: fit-content; margin: 0 auto;">"y is inversely proportional to x"</div>		
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<h3 style="margin: 0;">Identifying Equations</h3>	<p>Directions: Determine whether the equation represents a direct, joint, or inverse variation. Identify the constant of variation.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <tr> <td style="width: 50%; padding: 5px;"> 1. $y = 2x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = 2$ </div> </td> <td style="width: 50%; padding: 5px;"> 2. $y = \frac{24}{x}$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> inverse $k = 24$ </div> </td> </tr> <tr> <td style="padding: 5px;"> 3. $y = 5xz$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = 5$ </div> </td> <td style="padding: 5px;"> 4. $\frac{3y}{3} = \frac{x}{3}$ $y = \frac{1x}{3} = \frac{1}{3}x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = \frac{1}{3}$ </div> </td> </tr> <tr> <td style="padding: 5px;"> 5. $\frac{xy}{x} = \frac{36}{x}$ $y = \frac{36}{x}$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> inverse $k = 36$ </div> </td> <td style="padding: 5px;"> 6. $y = xz$ $y = \frac{3}{4}xz$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = \frac{3}{4}$ </div> </td> </tr> <tr> <td style="padding: 5px;"> 7. $\frac{y}{5} = \frac{2}{5} \cdot x$ $y = \frac{2}{5}x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = \frac{2}{5}$ </div> </td> <td style="padding: 5px;"> 8. $\frac{2A}{2} = \frac{bh}{2}$ $A = \frac{bh}{2} = \frac{1}{2}bh$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = \frac{1}{2}$ </div> </td> </tr> </table>	1. $y = 2x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = 2$ </div>	2. $y = \frac{24}{x}$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> inverse $k = 24$ </div>	3. $y = 5xz$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = 5$ </div>	4. $\frac{3y}{3} = \frac{x}{3}$ $y = \frac{1x}{3} = \frac{1}{3}x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = \frac{1}{3}$ </div>	5. $\frac{xy}{x} = \frac{36}{x}$ $y = \frac{36}{x}$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> inverse $k = 36$ </div>	6. $y = xz$ $y = \frac{3}{4}xz$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = \frac{3}{4}$ </div>	7. $\frac{y}{5} = \frac{2}{5} \cdot x$ $y = \frac{2}{5}x$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> direct $k = \frac{2}{5}$ </div>	8. $\frac{2A}{2} = \frac{bh}{2}$ $A = \frac{bh}{2} = \frac{1}{2}bh$ <div style="display: flex; justify-content: space-around; margin-top: 10px;"> joint $k = \frac{1}{2}$ </div>
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<h3 style="margin: 0;">Direct Variation Examples</h3>	<p>9. If y is directly proportional to x and $y = 28$ when $x = 7$, find x when $y = 52$.</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> $y = kx$ $\frac{28}{7} = \frac{k(7)}{7}$ $4 = k$ </div> <div style="text-align: center;"> $y = 4x$ $\frac{52}{4} = \frac{4x}{4}$ $13 = x$ </div> </div> <p>10. If r is directly proportional to the square of s and $r = 72$ when $s = 12$, find r when $s = 8$.</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> $y = kx$ $r = ks^2$ $\frac{72}{144} = \frac{k(12)^2}{144}$ $\frac{1}{2} = k$ </div> <div style="text-align: center;"> $r = \frac{1}{2}(8)^2 = \frac{64}{2}$ $r = 32$ </div> </div> <p>11. The dollar amount d that Megan earns varies directly with the number of hours h that she works. In her last paycheck, she earned \$148.50 working 18 hours. If her next paycheck is \$90.75, how many hours did she work?</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> $\frac{148.50}{18} = \frac{k(18)}{18}$ $8.25 = k$ </div> <div style="text-align: center;"> $d = kh$ $\frac{90.75}{8.25} = \frac{8.25h}{8.25}$ 11 hours </div> </div>								

<p>Joint Variation Examples</p> <p style="text-align: right; font-size: 2em; transform: rotate(-15deg);"><u>SKIP</u></p>	<p>11. If y varies jointly with x and z and $y = 48$ when $x = 8$ and $z = 15$, find y when $x = 14$ and $z = 20$.</p>	<p>12. If p varies jointly as q and the cube of r, and $p = 270$ when $q = 6$ and $r = 3$, find p when $q = 3$ and $r = 5$.</p>
<p>Inverse Variation Examples</p>	<p>13. If y is inversely proportional to x and $y = 7.5$ when $x = 8$, find x when $y = 5$.</p> <p>$7.5 = \frac{k}{8}$ $60 = k$ $y = \frac{k}{x}$ $5 = \frac{60}{x}$ $5x = 60$ $\frac{5x}{5} = \frac{60}{5}$ $x = 12$</p>	<p>14. If m is inversely proportional to the square root of n and $m = 27$ when $n = 16$, find m when $n = 64$.</p> <p>$27 = \frac{k}{\sqrt{16}}$ $108 = k$ $m = \frac{k}{\sqrt{n}}$ $m = \frac{108}{\sqrt{64}} = \frac{108}{8}$ $m = 13.5$</p>
<p>Combined Variation</p> <p>Examples</p> <p style="text-align: right; font-size: 2em; transform: rotate(-15deg);"><u>SKIP</u></p>	<p>A combined variation is a relationship that contains both _____ and _____ variation.</p>	
	<p>16. "y varies directly as x and inversely as z."</p>	<p>17. "p varies inversely with q squared and directly with r cubed."</p>
	<p>18. a varies directly as b and inversely as c. If $a = 16$ when $b = 12$ and $c = 6$, find a when $b = 28$ and $c = 4$.</p>	

Name: _____

Key

Unit 8: Rational Functions



Date: _____

Bell: _____

Homework 10: Direct, Joint, and Inverse Variation

**** This is a 2-page document! ****

Directions: Identify the equation for each variation model.

DIRECT VARIATION	INVERSE VARIATION	JOINT VARIATION
$Y = KX$	$Y = \frac{K}{X}$	$Y = KXZ$

Directions: Translate into an equation to represent the relationship.

1. "w is directly proportional to v" $W = KV$	2. "a varies inversely with b" $a = \frac{K}{b}$
3. "f varies jointly with g and h" $f = Kgh$	4. "r is inversely proportional to s cubed" $r = \frac{K}{S^3}$
5. "y varies jointly with x and the square root of z." $Y = KX\sqrt{Z}$	6. "m varies directly with n squared and inversely with p" $m = \frac{Kn^2}{p}$

Directions: Determine whether the equation represents a direct, joint or inverse variation. Then, identify the constant.

7. $t = \frac{100}{s}$ inverse $K=100$	8. $\frac{y}{5} = x$ $y = 5x$ direct $K=5$	9. $\frac{p}{qr} = 4$ $p = 4qr$ Joint $K=4$
10. $C = 2\pi r$ direct $K=2\pi$	11. $V = \frac{1}{3}\pi r^2 h$ Joint $K = \frac{1}{3}\pi$	12. $xy = \frac{2}{5}$ $y = \frac{2}{5x}$ inverse $K = \frac{2}{5}$

Directions: Use the variation model to determine the missing value.

13. If y is directly proportional to x and y = 17.5 when x = 21, find y when x = 39. $y = Kx$ $\frac{17.5}{21} = \frac{K(21)}{21}$ $\frac{5}{6} = K$ $y = \frac{5}{6}(39)$ $y = 32.5$	14. If m varies directly with n and m = 209 when n = 22, find n when m = 361. $m = Kn$ $\frac{209}{22} = \frac{K(22)}{22}$ $9.5 = K$ $\frac{361}{9.5} = \frac{9.5n}{9.5}$ $38 = n$
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