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Class: Math 1301 Date: 3-8-13

Topic/Section: Direct Proportion Functions / Equations and Inequalities

Examples and Vocabulary	Notes/Comments/Questions
The quantity y is **proportional** (or **varies directly**) to the quantity x means $y = f(x) = mx$ But for historical reasons we usually write this formula as $y = kx$ The constant k (i.e. the slope) is called the **constant of proportionality** in this context.	

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Examples and Vocabulary	Notes/Comments/Questions

① The quantity y is directly proportional to the quantity x, and $y = 20$ when $x = 8$.

a. Find the constant of proportionality.

$y = mx = kx = \frac{5}{2}x$

$20 = k \cdot 8$

$\frac{5}{2} = \frac{20}{8} = k$

b. Find y when $x = 25$.

$y = \frac{5}{2}(25) = \frac{125}{2} = 62.5$

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Examples and Vocabulary	Notes/Comments/Questions

c. Find x when $y = 32$.

$\frac{2}{5} \cdot 32 = \frac{8}{2}x \cdot \frac{2}{8}$

$\frac{64}{5} = x$

(2)

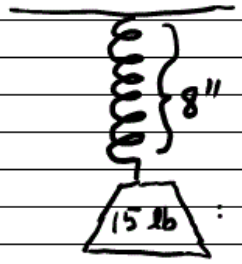
The distance a spring stretches y is directly proportional to the weight x attatched to the spring. Suppose a 15 lb weight stretches the spring 8 inches.

a. Find the constant of proportionality.

$y = kx = \frac{8}{15}x$

$8 = k \cdot 15$

$\frac{8}{15} = k$



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Examples and Vocabulary	Notes/Comments/Questions
b. How far will a 25 lb weight stretch the spring? $y = \frac{8}{15}(25) = \frac{8 \cdot 25}{15} = \frac{8 \cdot 5}{3} = \frac{40}{3} \approx 13.3$	
c. How heavy is a weight that stretches the spring 3.2 inches? $\frac{15}{8} \cdot 3.2 = \frac{8}{15} x \cdot \frac{15}{8}$ $6 = x$	

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Examples and Vocabulary	Notes/Comments/Questions

(3) Solve each equation.

a. $3(2x-5) = 10-(x+5)$

$6x-15 = 10-x-5$

$6x-15 = 5-x$

$+x \qquad +x$

$7x-15 = 5$

$+15 \qquad +15$

$\frac{7x}{7} = \frac{20}{7}$

$x = \frac{20}{7}$

b. $3(2x-5) = 10-(5-6x)$ no solutions

$6x-15 = 10-5+6x$

$-6x \qquad -6x$

$-15 = 10-5$

$-15 = 5$, false

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Examples and Vocabulary	Notes/Comments/Questions

c. $\frac{t-2}{4} - \frac{t}{3} = 5 - \frac{3-t}{12}$

$12 \cdot \frac{t-2}{4} - 12 \cdot \frac{t}{3} = 12 \cdot 5 - 12 \cdot \frac{3-t}{12}$

$3(t-2) - 4t = 60 - (3-t)$

$3t - 6 - 4t = 60 - 3 + t$

$-6 - t = 57 + t$

$+t \quad +t$

$-6 = 57 + 2t$

$-57 \quad -57$

$-63 = 2t$ → $\frac{-63}{2} = t$

④ Find the zeros (x-intercepts) of the function

$f(x) = \frac{4}{15} - \frac{2}{21}x$

$0 = \frac{4}{15} - \frac{2}{21}x$ → $\left(\frac{7}{21}\right)\left(\frac{2}{14}\right) = -\frac{2}{21} \times \left(\frac{-21}{2}\right)$

$105 \cdot 0 = 105 \cdot \frac{4}{15} - 105 \cdot \frac{2}{21}x$

$0 = 28 - 10x$ → $-28 = -10x$

$-28 \quad -28$

$\frac{14}{5} = \frac{-28}{-10} = x$

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Examples and Vocabulary	Notes/Comments/Questions
⑤ The per capita (per person) income y from 1970 to 2000 can be modeled by $y = 604.8(x - 1970) + 2280$ where x is the calendar year. Determine when the per capita income was \$16190.	

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Examples and Vocabulary	Notes/Comments/Questions
⑥ Solve each inequality.	
a. $2x-3 < \frac{x+2}{3}$	
b. $-3(4z-4) \geq 4-(z-1)$	

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Examples and Vocabulary	Notes/Comments/Questions
⑦ T = air temperature in Fahrenheit T_0 = air temperature at ground level x = altitude in miles $T = T_0 - 29x$ D = dew point temperature D_0 = dew point temperature at ground level $D = D_0 - 5.8x$ Determine the altitude where clouds may currently form.	

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Examples and Vocabulary	Notes/Comments/Questions
(8) Solve each compound inequality.	
a. $-4 \leq 5x+1 < 21$	
b. $\frac{1}{2} < \frac{1-2t}{4} < 2$	