5.2 – DIRECT VARIATION:

direct variation - answer changes by the same amount every time

$y = 2x$

A function in the form $y = kx$
k is the constant of variation. This is the coefficient of x.
k is a specific #. x is a variable whose value can change.
The constant of variation in $y = 2x$ is 2. $k = 2$

Is this a direct variation?:

$3x + 2y = 0$*** You use algebra to get it into $y = kx$ form. y is on one side and everything else on the other.

$3x - 3x + 2y = 0 - 3x$ The 0 disappears.

$2y = -3x$ y must be by itself with a positive 1 coefficient

June 03, 2011

$$y = kx \quad ; \; k$$

$$\frac{y}{x} = k$$

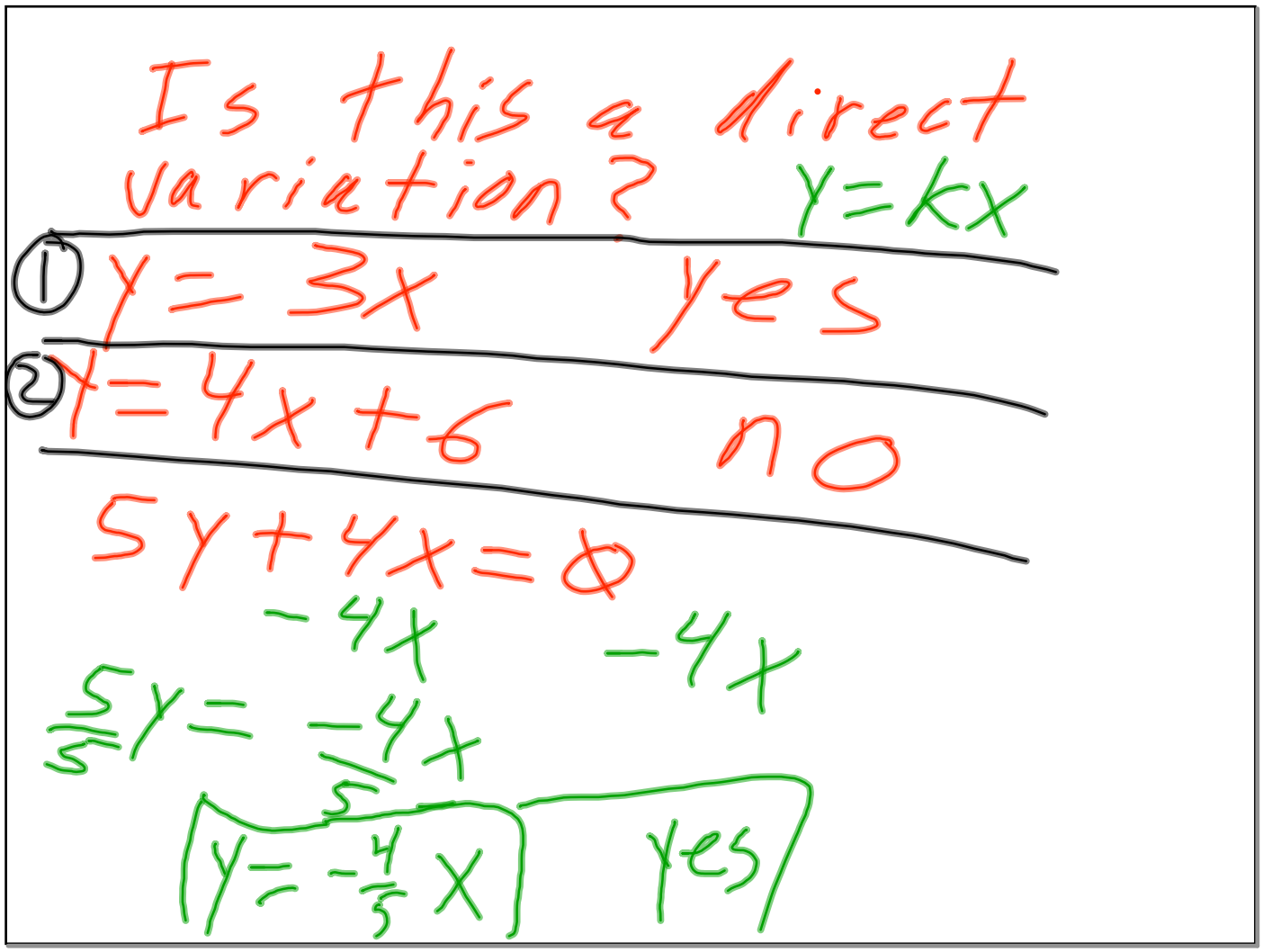
$y = kx$ Direct variation

$y = mx + b$

$+ \not{\phi}$

A direct variation is like $y = mx + b$, but $b = 0$

It is like $y = mx$


Is this a direct variation? y=kx
1) y = 3x yes
2) y = 4x + 6 no
5y + 4x = 0
- 4x - 4x
5y = -4x
y = -4/5 x yes

Is this a direct variation? If yes, write in direct variation form.

① $7y = 2x$

$\frac{7y}{7} = \frac{2x}{7}$

$y = \frac{2}{7}x$ yes

② $3x + 4y = 8$

$-3x \quad -3x$

$\frac{4y}{4} = \frac{-3x + 8}{4}$

$y = -\frac{3}{4}x + 2$ No

$$Y = kx$$

k is called the constant of variation. It is a number. It is the coefficient next to "x".

Is this a direct variation? If so, find the constant of variation.

$3x - 4y = 0$

$-3x \quad -3x$

$\frac{-4y}{-4} = \frac{-3x}{-4}$

$y = \frac{3}{4}x$

yes

$k = \frac{3}{4}$

(Green workbook, p. 65 answers)

① yes, $k = 5$

② yes, $k = -4$

③ no

④ no

⑤ yes, $k = 3$

⑥ yes, $k = \frac{3}{5}$

⑦ yes, $k = \frac{3}{2}$

⑧ no

⑨ no

⑩ yes, $k = 2$

⑪ no

⑫ yes, $k = -\frac{9}{5}$

Black workbook: p. 143, 1-4

① no

② yes, $k = \frac{2}{5}$

③ yes, $k = \frac{1}{8}$

④ no

Example: **Is this a direct variation?:**

4x + 2y = 8 ***** You use algebra to get it into y = kx form. y is on one side and everything else on the other.**

4x – 4x + 2y = 8 -4x **The 0 disappears.**

2y = 8 - 4x **y must be by itself with a positive 1 coefficient**

$$\frac{2y}{2} = \frac{8}{2} - \frac{4x}{2}$$

y = 4 – 2x **This is NOT a direct variation. It is not y = kx. It is y = kx +4 so no good.**

***** A direct variation cannot have a # added/subtracted to it.**

Suppose y varies directly with x, and y = 35 when x = 5. What direct variation equation relates x and y? What is the value of y when x = 9 ?

$y = 35$ when $x = 5$

Step 1 Put the given values into $y = kx$ and solve for "k"

$y = kx$

$\frac{35}{5} = \frac{5k}{5}$

$k = 7$

Direct variation

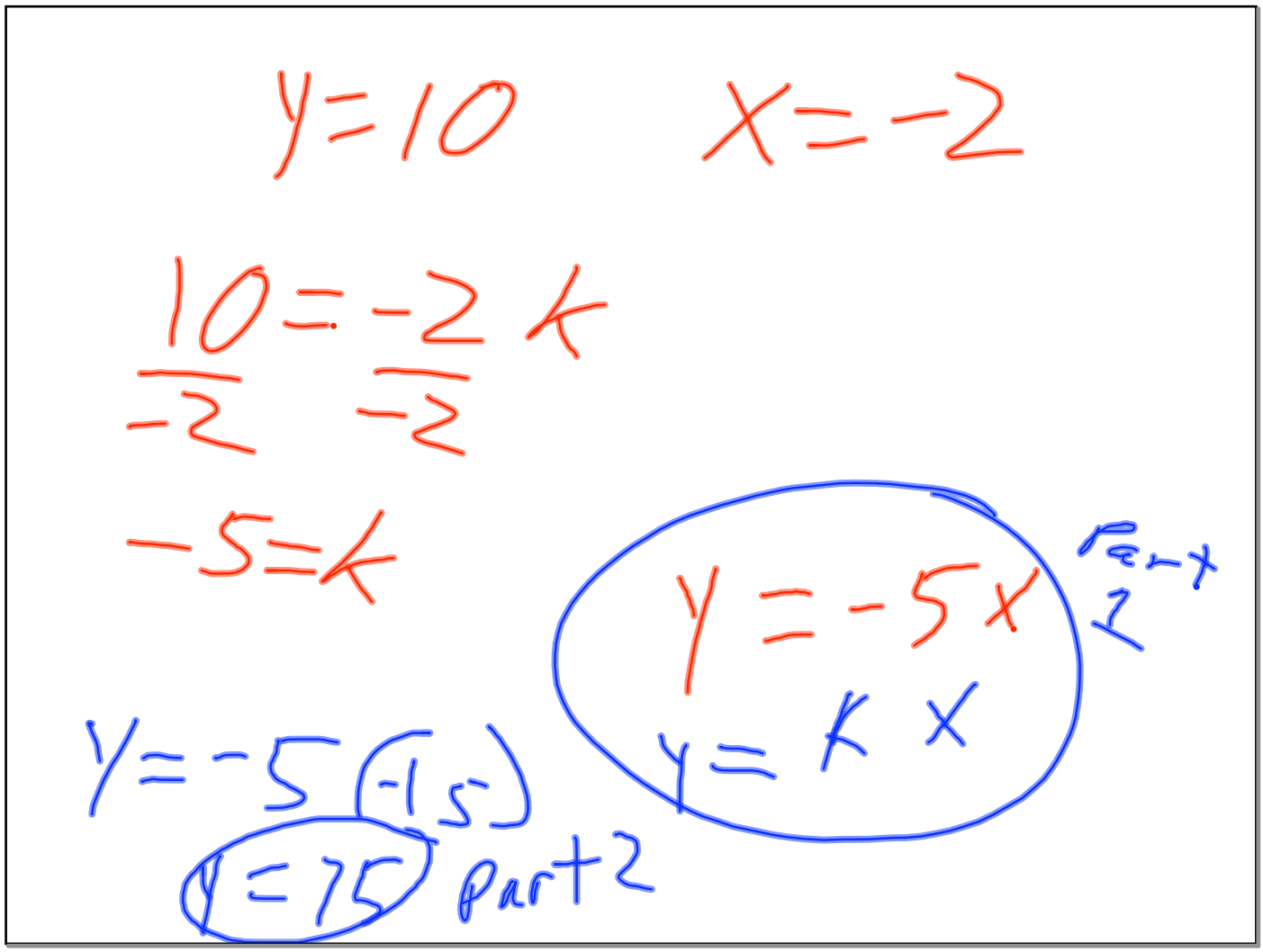
$y = 7x$

$y = 7x$ $\quad x = 9$

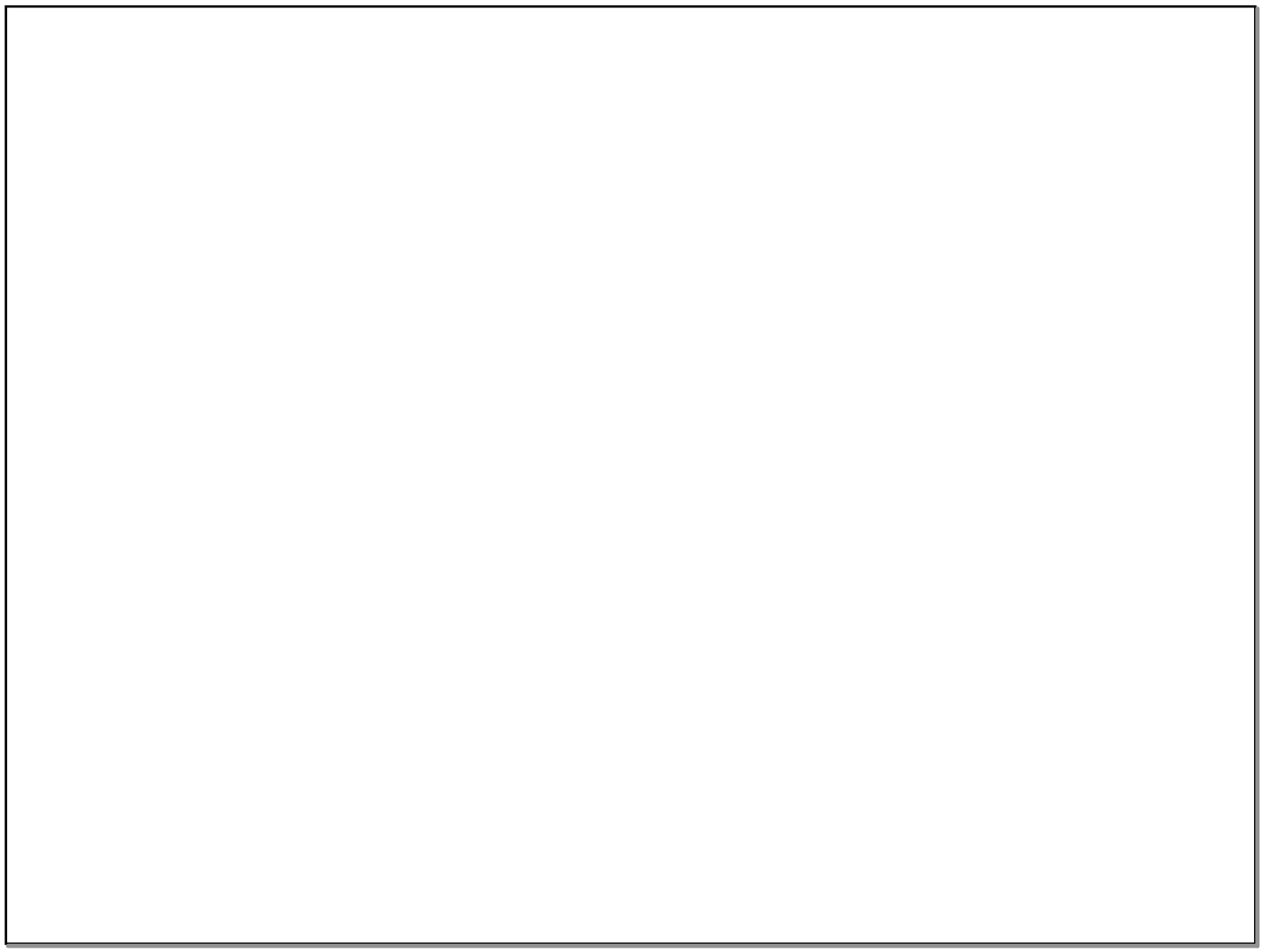
$y = 7 \cdot 9$

$y = 63$ when $x = 9$

Suppose y varies directly with x, and y = 10 when x = -2. What direct variation equation relates x and y? What is the value of y when x = -15?


y = 10
x = -2
10 = -2k
-2 -2
-5 = k
y = -5x
y = kx
Equation
y = -5(-15)
y = 75
part 2

June 03, 2011



The ordered pairs are for the same direct variation. Find each missing value.

$(6, y)$ $(3, 2)$

$y = kx$

$2 = 3k$

$\frac{2}{3} = \frac{3k}{3}$

$\frac{2}{3} = k$

$y = \frac{2}{3}x$

Direct Variation

$y = \frac{2}{3}(6)$

$y = 4$

$(3, 2)$ $(6, y)$

x y

$2 = 3k$

$\frac{2}{3} = k$

$y = \frac{2}{3}(6)$

$y = 4$

25

$\frac{y}{x} = k = 2$

$\frac{y}{x} = k$

$y = 2x$

$\frac{y}{x} = k$

June 03, 2011

Black Workbook, p. 143-144

⑤ $4 = 8k$

$\frac{4}{8} = k$

$\frac{1}{2} = k$

so

$y = \frac{1}{2}x$

$y = \frac{1}{2}(8)$

$y = 4$

⑥ $15 = 5k$

$3 = k$

$y = 3x$

$y = 3(8)$

$y = 24$

⑦ $3 = 8k$

$\frac{3}{8} = k$

$y = \frac{3}{8}x$

$y = \frac{3}{8}(8)$

$y = 3$

(8) $7.92 = 2.2k$

$3.6 = k$

$y = 3.6x$

$y = 3.6(8)$

$y = 28.8$

(9) – (11) Graph by making a chart.

(13) yes

$y = 1.35x$

(14) no

(15) $-21 = 7k$

$-3 = k$

$y = -3x$

(16) $\frac{15}{2} = -5k$

$\frac{15}{2} \div -5 = \frac{-5}{-5}k$

$\frac{15}{2} \times \frac{-1}{5} = k$

$-\frac{3}{2} = k$

$y = -\frac{3}{2}x$

Green workbook, p. 65

(25) yes, $y = 2x$

(26) yes, $y = \frac{2}{3}x$

(27) no

(28) yes, $y = 1.4x$

14) $(-2, 8)$ $(x, 12)$

$8 = -2k$

$-4 = k$

$12 = -4x$

$x = -3$

15) $(4, y)$ $(16, 12)$

$12 = 16k$

$\frac{3}{4} = k$

$y = \frac{3}{4}(4)$

$y = 3$

17 (3, y) (9, 15)

$15 = 9k$

$\frac{5}{3} = k$

$y = \frac{5}{3} \cdot 3$

$y = 5$

(18) $(2, y)$ $(10, 15)$

$15 = 10k$

$\frac{3}{2} = k$

$y = \frac{3}{2} \cdot 2$

$y = 3$

5.2 - WRITING A DIRECT VARIATION FROM A TABLE:

Write the equation of direct variation that includes the point (4,6)
It needs to be in form y = kx

1) The point (4,6) represents x and y so substitute them in: 6 = k(4)

2) Get k by itself:

$$\frac{6}{4} = \frac{k(4)}{4}$$

$$\frac{6}{4} = k \qquad \frac{6}{4} \text{ can be reduced to } \frac{3}{2} \text{ or } 1.5$$