Well done Mr. S.!!

| K	24 /24	A	14 /14	T	18 /18	C	10 /10

Multiple Choice K[5]

Identify the choice that best completes the statement or answers the question.

1. ___C___ For the line with equation $4x - 3y - 12 = 0$, which statement is true? $y=0 \rightarrow 4x - 12 = 0 \rightarrow x = 3$

   a. The x-intercept is 3, and the y-intercept is 4.   b. The x-intercept is 4, and the y-intercept is 3.

   c. The x-intercept is 3, and the y-intercept is –4.   d. The x-intercept is 4, and the y-intercept is –3.
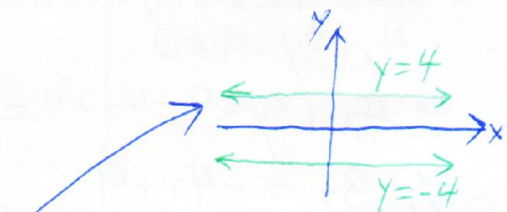
$$x = 0 \rightarrow -3y - 12 = 0 \rightarrow y = -4$$

2. ___C___ What are the slope and y-intercept of the line shown below?

   a. $m = \dfrac{3}{2}, b = 3$ *Slope must be negative*

   b. $m = \dfrac{2}{3}, b = 3$

   c. $m = -\dfrac{3}{2}, b = 3$

   d. $m = -\dfrac{2}{3}, b = 3$

$b = 3$ $(2,0)$ $(0,3)$
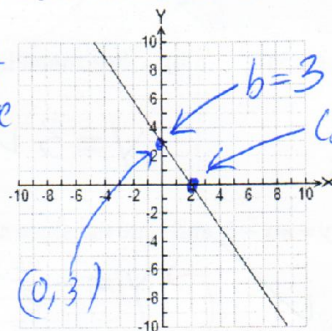
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0-3}{2-0} = -\frac{3}{2}$$
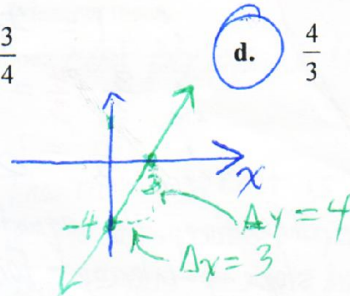
$y = 4$ $y = -4$

3. ___C___ The lines in which of the following pairs are *parallel*?

   a. $y = 3x - 1$ $y = 2x - 1$

   b. $y = 3x - 1$ $y = -\dfrac{1}{3}x - 7$

   c. $y = 4$ $y = -4$

   d. $y = 2x - 3$ $y = \dfrac{1}{2}x + 6$

4. ___a___ The lines in which of the following pairs are *perpendicular*?

   a. $y = -\dfrac{2}{5}x - 7$ $y = \dfrac{5}{2}x + 9$

   b. $y = -\dfrac{2}{5}x - 7$ $y = \dfrac{2}{5}x - 7$

   c. $y = 5x - 16$ $y = \dfrac{1}{5}x - 13$

   d. $y = \dfrac{2}{5}x - 7$ $y = \dfrac{2}{5}x - 7$

5. ___d___ What is the slope of the line with an x-intercept of 3 and a y-intercept of –4?

   a. $-\dfrac{3}{4}$ b. $-\dfrac{4}{3}$ c. $\dfrac{3}{4}$ **d.** $\dfrac{4}{3}$

slope is positive

$\Delta y = 4$ $\Delta x = 3$

1

Matching K[4]

6. Match each item with the correct statement below.

   a. perpendicular lines   e. standard form
   b. slope   f. y-intercept
   c. parallel lines   g. reciprocals
   d. x-intercept   h. point of intersection

   (handwritten: $x = \frac{1}{2}$ mark)

   b For a horizontal line, this is zero.

   a These lines meet at 90°.

   f For the line $y = 3x + 6$, this is 6.

   e This is the name for an equation of a line in the form $Ax + By + C = 0$.

   e These lines have the same slope.

   h This is where two lines meet.

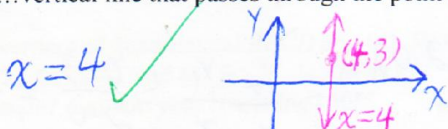   **g** The numbers 3 and 1/3 are examples.

   d For a vertical line, the value of x is constant and equal to this.

Short Answers

7. What is the equation of the… K[2]

   a) …vertical line that passes through the point (4, 3)?

   $x = 4$ ✓

   b) …horizontal line that passes through the point (4, 3)?

   $y = 3$ ✓ $y = 3$

8. Write the equation $4x + 3y - 9 = 0$ in the form $y = mx + b$ and state the slope and y-intercept. K[4]

   $4x + 3y - 9 = 0$

   $\therefore 4x + 3y - 9 - 4x + 9 = 0 - 4x + 9$

   $\therefore 3y = -4x + 9$

   $\therefore \frac{3y}{3} = \frac{-4x}{3} + \frac{9}{3}$

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

   Therefore, the slope of the line is $-\frac{4}{3}$ and the y-intercept is 3.

9. Find an equation in **standard form** for the line that passes through the points (2, 1) and (-4, -3). K[6]
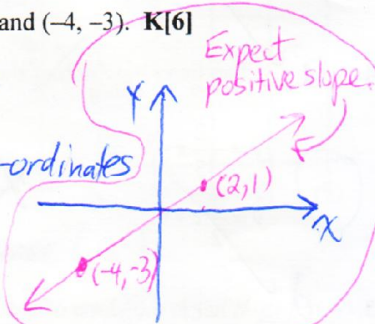
   (handwritten: Expect positive slope.)

   $m = \frac{\Delta y}{\Delta x}$

   $= \frac{y_2 - y_1}{x_2 - x_1}$

   $= \frac{1 - (-3)}{2 - (-4)}$

   $= \frac{4}{6}$

   $= \frac{2}{3}$ ✓

   Therefore, the equation of the line takes the form $y = \frac{2}{3}x + b$.

   Since (2, 1) lies on the line, its co-ordinates must satisfy the equation.

   $\therefore 1 = \frac{2}{3}\left(\frac{2}{1}\right) + b$ ✓

   $\therefore 1 = \frac{4}{3} + b$

   $\therefore \frac{3}{3} - \frac{4}{3} = \frac{4}{3} + b - \frac{4}{3}$

   $\therefore -\frac{1}{3} = b$ ✓

   Therefore, the equation in slope-y-intercept form is $y = \frac{2}{3}x - \frac{1}{3}$

   $\therefore 3y = \frac{3}{1}\left(\frac{2}{3}x\right) - \frac{3}{1}\left(\frac{1}{3}\right)$

   $\therefore 3y = 2x - 1$

   $\therefore 3y - 3y = 2x - 1 - 3y$

   $\therefore 0 = 2x - 3y - 1$

   $\therefore$ equation in standard form is $2x - 3y - 1 = 0$. ✓

10. Find an equation of the line with y-intercept 2 and perpendicular to the line $y = \frac{1}{4}x - 3$. **K[3]**
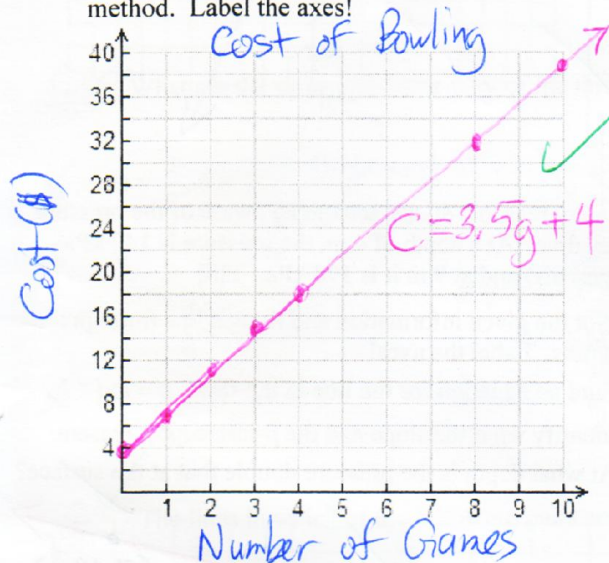
- $m = \frac{-4}{1} = -4$ because the required line is perpendicular to $y = \frac{1}{4}x - 3$
- $b = 2$ (given)

$\therefore$ the equation of the required line, in slope-y-intercept form, is $\boxed{y = -4x + 2}$

(handwritten diagram showing required line, $y = \frac{1}{4}x - 3$)
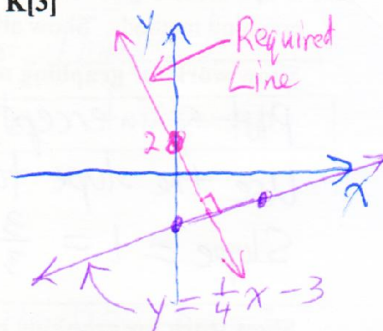
11. At a bowling alley, Angela rented shoes for \$4 and it cost her \$3.50 to bowl each game. **A[9]**

a) **Graph** the given situation using the table of values method. Label the axes!

Graph titled "Cost of Bowling", y-axis "Cost ($)" from 4 to 40, x-axis "Number of Games" 1 to 10, line labeled $C = 3.5g + 4$

Table of Values

g	C
0	4
1	7.50
2	11.00
3	14.50
4	18.00
⋮	

b) Find an equation, in the form $C = mg + b$, that represents the cost of bowling. C represents the cost and g represents the number of games bowled.

$$C = 3.5g + 4$$

c) How much did it cost her to bowl four games?

$g = 4$

$\therefore C = 3.5(4) + 4$
$= 14 + 4$
$= 18$

It cost \$18 to bowl four games

d) How many games can she bowl for \$150?

$C = 150, \quad g = ?$

$150 = 3.5g + 4$

$\therefore 150 - 4 = 3.5g + 4 - 4$

$\therefore 146 = 3.5g$

$\therefore \frac{146}{3.5} = \frac{3.5g}{3.5}$

$g \doteq 41.7$

She can bowl 41 games for \$150

e) Identify and explain what the **slope** and the **C-intercept** mean.

Slope: cost per game is \$3.50

C-intercept: The minimum cost is \$4.00. Even if no games are played, it still costs \$4.00 to rent bowling shoes.

3

12. Graph the lines with equations $y = x - 3$ and $3x + y = 1$ and find the point of intersection. Choose *two different* graphing methods. Show all work! **A[5]**

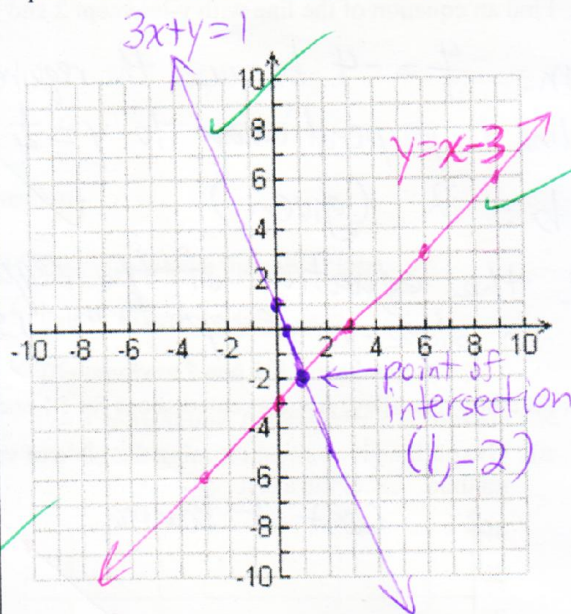**Show work for graphing method used to sketch** $y = x - 3$:

Plot y-intercept → b = -3
Use the slope to plot more points
Slope $= 1 = \frac{3}{3} = \frac{\Delta y}{\Delta x}$ ✓

Show work for graphing method used to sketch $3x + y = 1$:

y-intercept:
x = 0
∴ 3(0) + y = 1
∴ y = 1 ✓

x-intercept:
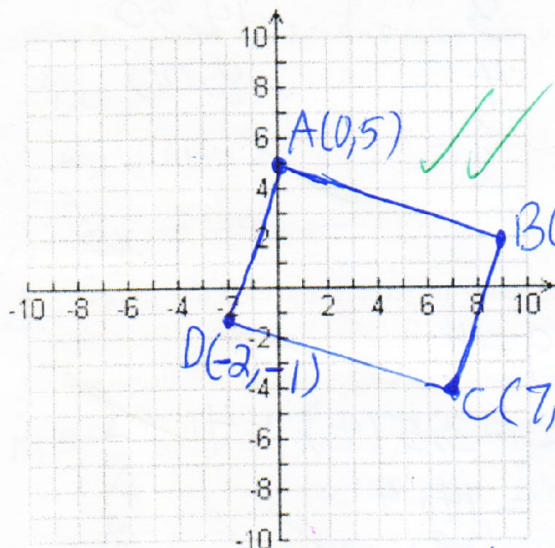y = 0
3x + 0 = 1
3x = 1
x = $\frac{1}{3}$ ✓

$3x + y = 1$

$y = x - 3$

point of intersection (1, -2)

State co-ordinates of point of intersection: (1, -2) ✓

Problems

13. The vertices of quadrilateral $ABCD$ are $A(0, 5)$, $B(9, 2)$, $C(7, -4)$, and $D(-2, -1)$. Is $ABCD$ a rectangle? Explain your reasoning. **T[8]**

A(0,5)

B(9,2)

D(-2,-1)

C(7,-4)

$m_{AB} = \frac{2-5}{9-0} = \frac{-3}{9} = -\frac{1}{3}$ ✓

$m_{DC} = \frac{-4-(-1)}{7-(-2)} = \frac{-3}{9} = -\frac{1}{3}$ ✓

$m_{AD} = \frac{5-(-1)}{0-(-2)} = \frac{6}{2} = 3$ ✓ neg. rec.

$m_{BC} = \frac{2-(-4)}{9-7} = \frac{6}{2} = 3$

∴ AB ∥ DC, AD ∥ BC and ✓✓
∠A = ∠B = ∠C = ∠D = 90° → ABCD is a rectangle

14. For safety reasons, divers need to be aware of the pressure as they dive. At a depth of 4 m, the pressure is 140 kPa (kilopascals) and at 9 m it is 190 kPa. **T[8]**

a) Plot the given information and draw a line through the points. Label the axes!

b) Find an equation for the line in the form $p = md + b$.

c) Identify what the slope and the p-intercept represent.

d) At what depth is the pressure double that at the surface?

(9, 190)

(4, 140)

labels ✓

Pressure (kPa)

Distance (m)

graph ✓
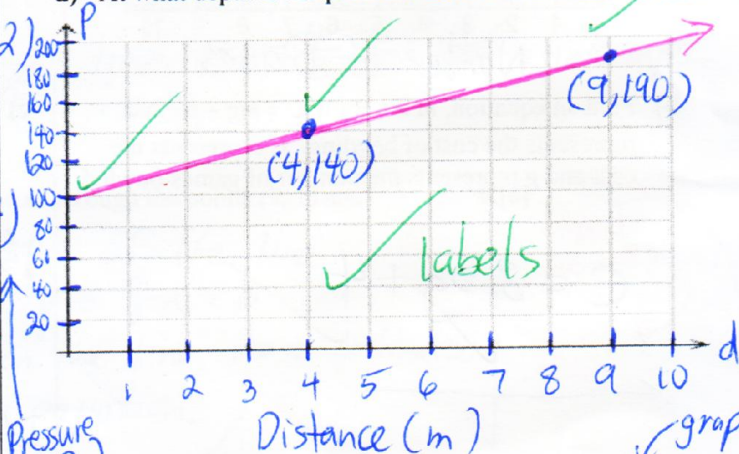
(b) $m = \frac{190-140}{9-4} = \frac{50}{5} = 10$, $b = 100$ ✓

∴ $p = 10d + 100$ ✓

(c) slope → pressure increases by 10 kPa/m
p-intercept → at 0 m, the pressure at the surface is 100 kPa ✓

(d) At 10 m below the surface, the pressure is 200 kPa ✓

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