

**Section 5.1 – Practice Problems**

Determine whether the given ordered pair is a solution to the following equation:

1.  $(2, 3); 3x - 5y = -9$   
 $3 \times (2) - 5 \times (3) = -9,$   
 $6 - 15 = -9$  Yes  
 $-9 = -9$

2.  $(0, 4); y = -\frac{1}{3}x + 4$   
 $4 = -\frac{1}{3} \times (0) + 4$   
 $4 = 0 + 4$  Yes  
 $4 = 4$

3.  $(1, -1); 3y = 5 - 2x$   
 $3 \times (-1) \neq 5 - 2 \times (1)$   
 $-3 \neq 5 - 2$   
 $-3 \neq 3$  NO

4.  $(6, 8); \frac{1}{3}x - \frac{1}{4}y = 4$   
 $\frac{1}{3} \times (6) - \frac{1}{4} \times (8) \neq 4$   
 $2 - 2 \neq 4$   
 $0 \neq 4$  NO

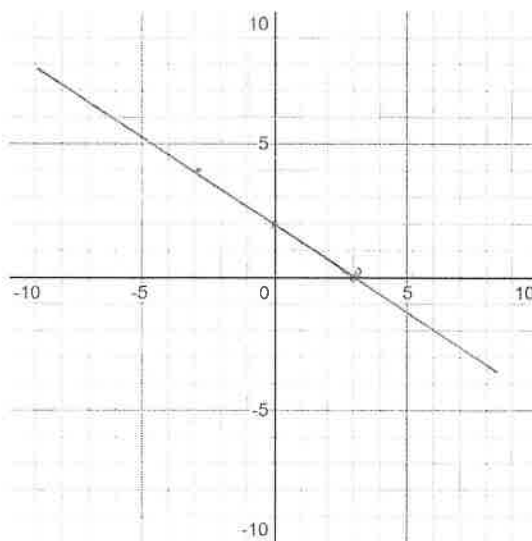
5.  $(4, 2); x = 4$   
 $(4) = 4$   
 Yes

6.  $(-1, 3); y = -1$   
 $3 \neq -1$   
 No

Graph the following equations

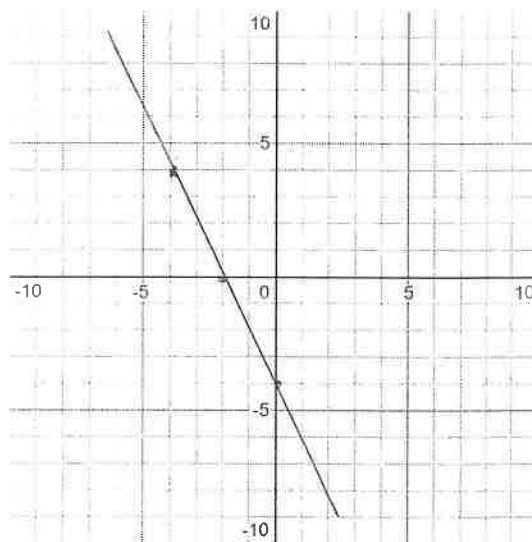
7.  $2x + 3y = 6$

x	y
0	2
3	0
-3	4



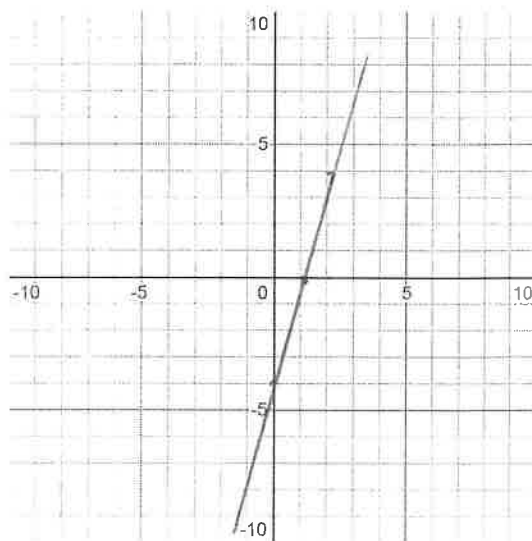
8.  $2x + y = -4$

x	y
0	-4
-2	0
-4	4



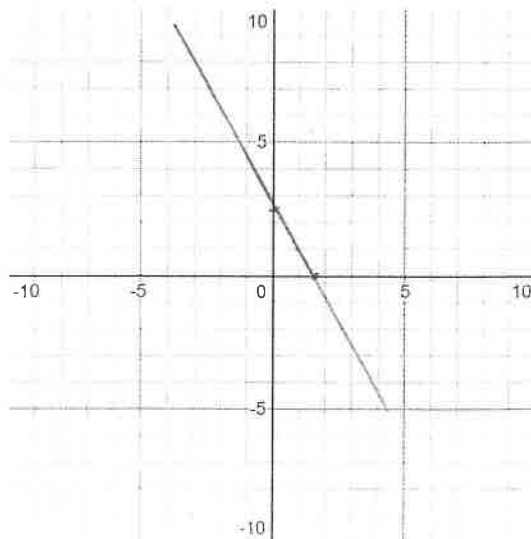
9.  $2x - \frac{1}{2}y = 2$

x	y
0	-4
1	0
2	4



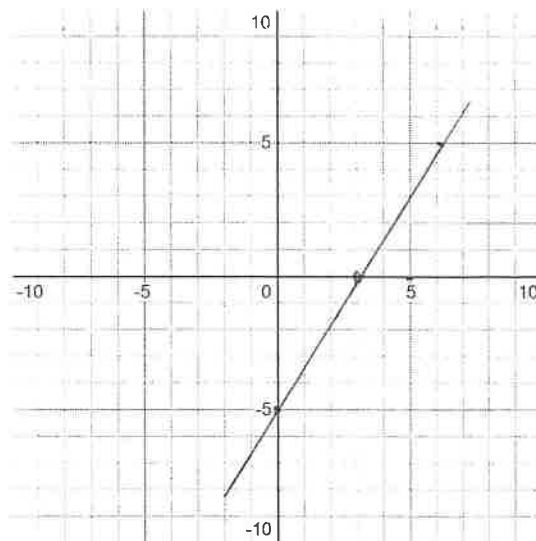
10.  $3x + 2y = 5$

x	y
0	2.5
$\frac{5}{3}$	0
1	1



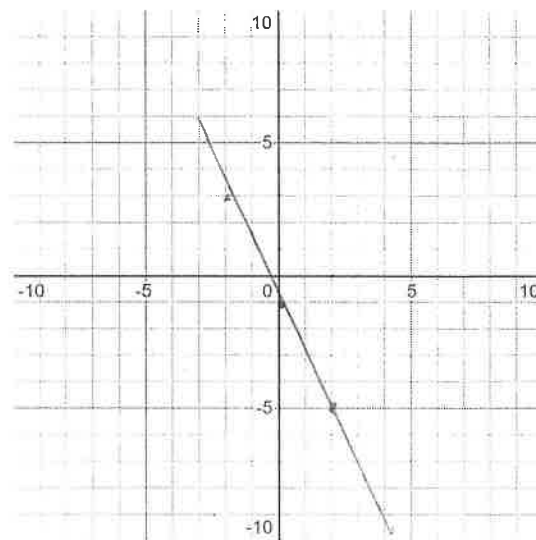
11.  $\frac{2}{3}x - 0.4y = 2$

x	y
0	-5
3	0
6	5



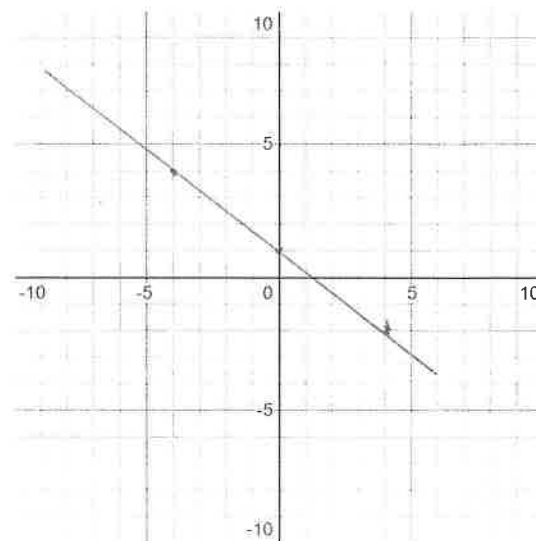
12.  $y = -2x - 1$

x	y
0	-1
2	-5
-2	3



13.  $y = -\frac{3}{4}x + 1$

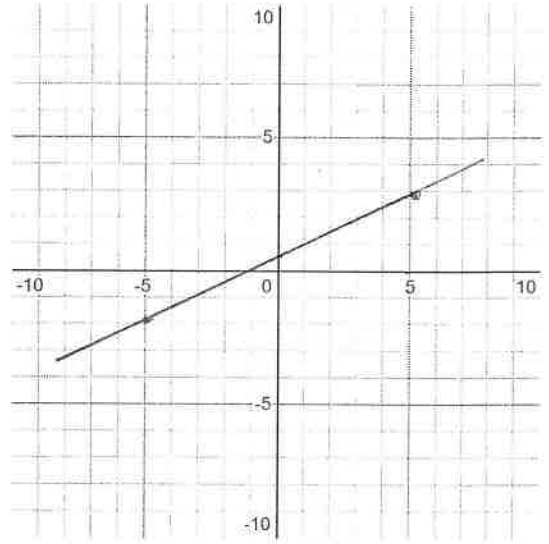
x	y
0	1
4	-2
-4	4



14.  $x = 2(y - 1) + 1$

x	y
0	$\frac{1}{2}$
5	3
-5	-2

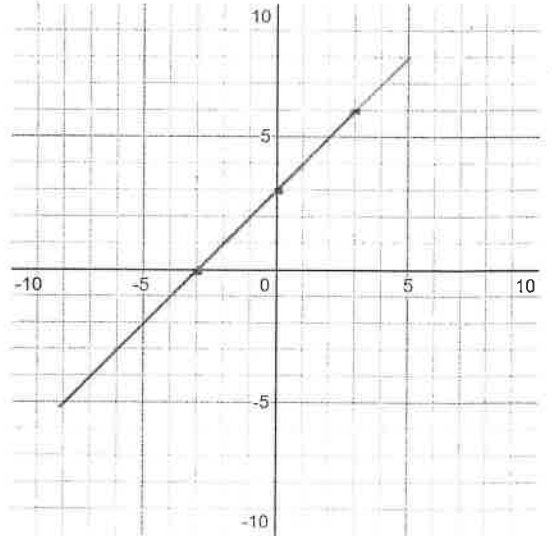
$x = 2y - 2 + 1$   
 $-2y = -x - 2 + 1$   
 $2y = x + 2 - 1$   
 $y = \frac{x}{2} + \frac{1}{2}$



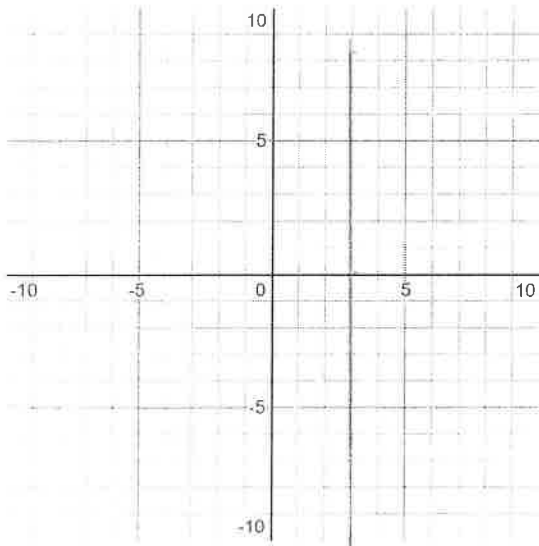
15.  $2(x - y) + 6 = 0$

x	y
0	3
-3	0
3	6

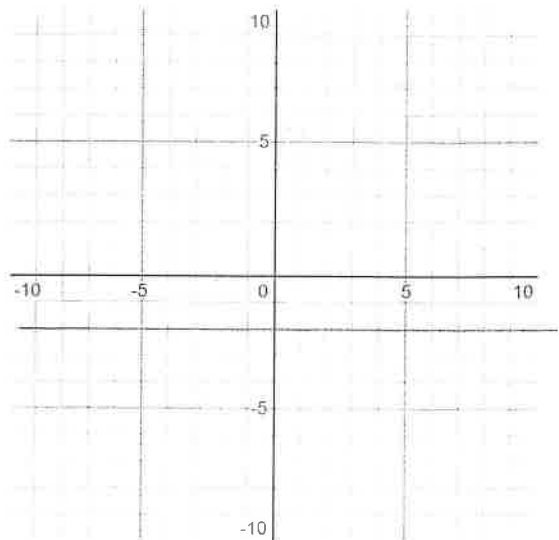
$2x - 2y + 6 = 0$   
 $-2y = -2x - 6$   
 $2y = 2x + 6$   
 $y = x + 3$



16.  $x = 3$



17.  $y = -2$



Solve the Linear Systems Algebraically Using the Addition Method

18.  $3x + 5y = 17$

$4x - y = -8$

$\begin{cases} 3x + 5y = 17 \\ 5 \cdot 4x - 5 \cdot y = -8 \cdot 5 \end{cases}$

$\begin{cases} 3x + 5y = 17 \\ 20x - 5y = -40 \end{cases}$

$\begin{cases} 3x + 5y = 17 \\ 20x - 5y = -40 \end{cases}$

$\begin{cases} 3x + 5y = 17 \\ 20x - 5y = -40 \end{cases}$

$23x = -23$

$x = -1$

$\begin{cases} (-1) \cdot 4 - y = -8 \\ -4 - y = -8 \end{cases} \begin{cases} x = -1 \\ y = 4 \end{cases}$

20.  $7x - 3y = -5$

$3x + 5y = -21$

$\begin{cases} 7x \cdot (-5) - 3y \cdot (-5) = -5 \cdot (-5) \\ 3x \cdot (-3) + 5y \cdot (-3) = -21 \cdot (-3) \end{cases}$

$\begin{cases} 35x - 15y = -25 \\ 9x + 15y = -63 \end{cases}$

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$44x = -88$

$x = -2$

$-2 \cdot 3 + 5y = -21$

$5y = -15$

$y = -3$

22.  $5x - 3y = \frac{21}{2}$

$2x + 5y = -2$

$\begin{cases} 5x \cdot (-2) - 3y \cdot (-2) = \frac{21}{2} \cdot (-2) \\ 2x \cdot (-5) + 5y \cdot (-5) = -2 \cdot (-5) \end{cases}$

$\begin{cases} 5x \cdot (-2) - 3y \cdot (-2) = \frac{21}{2} \cdot (-2) \\ 2x \cdot (-5) + 5y \cdot (-5) = -2 \cdot (-5) \end{cases}$

$\begin{cases} 10x - 6y = 21 \\ 10x + 25y = -10 \end{cases}$

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$31y = -31$

$y = -1$

$2x - 5 = -2$

$2x = 3$

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

$\begin{cases} x = \frac{3}{2} \\ y = -1 \end{cases}$

19.  $4x + 3y = 1$

$3x + 2y = 2$

$\begin{cases} 4x - 2 + 3y - 2 = 1 \cdot 2 \\ 3x \cdot (-3) + 2y \cdot (-3) = 2 \cdot (-3) \end{cases}$

$\begin{cases} 4x - 2 + 3y - 2 = 1 \cdot 2 \\ 3x \cdot (-3) + 2y \cdot (-3) = 2 \cdot (-3) \end{cases}$

$\begin{cases} 8x + 6y = 2 \\ 9x + 6y = 6 \end{cases}$

$\begin{cases} 8x + 6y = 2 \\ 9x + 6y = 6 \end{cases}$

$x = 4$

$4 \cdot 3 + 2y = 2$

$12 + 2y = 2$

$2y = -10$

$\begin{cases} x = 4 \\ y = -5 \end{cases}$

21.  $5x + 2y = 8$

$3x + 5y = 20$

$\begin{cases} 5x \cdot (-5) + 2y \cdot (-5) = 8 \cdot (-5) \\ 3x \cdot 2 + 5y \cdot 2 = 20 \cdot (2) \end{cases}$

$\begin{cases} 5x \cdot (-5) + 2y \cdot (-5) = 8 \cdot (-5) \\ 3x \cdot 2 + 5y \cdot 2 = 20 \cdot (2) \end{cases}$

$\begin{cases} 25x + 10y = 40 \\ 6x + 10y = 40 \end{cases}$

$\begin{cases} 25x + 10y = 40 \\ 6x + 10y = 40 \end{cases}$

$19x = 0$

$x = 0$

$3 \cdot 0 + 5y = 20$

$5y = 20$

$y = 4$

$\begin{cases} x = 0 \\ y = 4 \end{cases}$

23.  $3x - 2y = 6$

$-6x + 4y = -6$

$\begin{cases} 6x - 4y = 12 \\ -6x + 4y = -6 \end{cases}$

$\begin{cases} 6x - 4y = 12 \\ -6x + 4y = -6 \end{cases}$

$0 = 6$

No solution.

parallel

24.  $3x - 2y = 6$   
 $-6x + 4y = -12$

$$\begin{cases} 3x - 2y = 6 \\ -6x + 4y = -12 \end{cases}$$

$$\begin{cases} 6x - 4y = 12 \\ -6x + 4y = -12 \end{cases}$$

$$0 = 0$$

infinite solution.

25.  $\frac{x}{3} + \frac{y}{4} = 1$

$$\frac{x}{2} - \frac{y}{8} = \frac{7}{2}$$

$$\begin{cases} 12 \cdot \frac{x}{3} + \frac{y}{4} \times 12 = 12 \\ 4x - y = 28 \end{cases}$$

$$\begin{cases} 4x + 3y = 12 \\ 4x - y = 28 \end{cases}$$

$$\begin{aligned} 4y &= -16 \\ y &= -4 \end{aligned}$$

$$\begin{aligned} \frac{x}{3} + \frac{-4}{4} &= 1 \\ \frac{x}{3} + (-1) &= 1 \\ \frac{x}{3} &= 2 \end{aligned} \quad \begin{cases} x = 6 \\ y = -4 \end{cases}$$

**Solve Using The Substitution Method**

26.  $y = 3x + 4$   
 $2x - 3y = 2$

$$2x - 3(3x + 4) = 2$$

$$2x - 9x - 12 = 2$$

$$-7x = 14$$

$$x = -2$$

$$y = -2 \times 3 + 4$$

$$y = -2$$

$$\begin{cases} x = -2 \\ y = -2 \end{cases}$$

27.  $y = -2x$   
 $x + 4y = 21$

$$x + 4(-2x) = 21$$

$$x - 8x = 21$$

$$-7x = 21$$

$$x = -3$$

$$y = -2 \times (-3)$$

$$y = 6$$

$$\begin{cases} x = -3 \\ y = 6 \end{cases}$$

28.  $6x - y = 0$   
 $8x - 3y = 25$

$$-y = -6x$$

$$y = 6x$$

$$8x - 3(6x) = 25$$

$$-10x = 25$$

$$x = -2.5$$

$$6x(-2.5) - y = 0$$

$$-15 - y = 0$$

$$y = -15$$

$$\begin{cases} x = -2.5 \\ y = -15 \end{cases}$$

29.  $2s + t = -3$   
 $3s + 2t = -4$

$$t = -3 - 2s$$

$$3s + 2(-3 - 2s) = -4$$

$$3s - 6 - 4s = -4$$

$$-s = 2$$

$$s = -2$$

$$t = -3 - 2 \times (-2)$$

$$t = 1$$

$$\begin{cases} s = -2 \\ t = 1 \end{cases}$$

30.  $y = \frac{1}{3}x + 2$   
 $2x - 6y = -12$   
 $2x - 6(\frac{1}{3}x + 2) = -12$   
 $2x - 2x - 12 = -12$   
 $-12 = -12$   
 infinite solution

31.  $2x = 3y + 4$   
 $6x = 9y + 8$   
 $(3y+4) \times 3 = 9y + 8$   
 $9y + 12 = 9y + 8$   
 $12 \neq 8$   
 no solution

32.  $-3a + 2b = 4$   
 $5a - 3b = 1$   
 $2b = 4 + 3a$   
 $b = 2 + \frac{3}{2}a$   
 $5a - 3(2 + \frac{3}{2}a) = 1$   
 $5a - 6 = \frac{9}{2}a = 1$   
 $\frac{1}{2}a = 7$   
 $a = 14$   
 $14 \times 5 - 3b = 1$   
 $70 - 3b = 1$   
 $-3b = -69$   
 $b = 23$   
 $\begin{cases} a = 14 \\ b = 23 \end{cases}$

33.  $\frac{x}{3} - \frac{y}{4} = \frac{1}{12}$   
 $\frac{x}{6} - \frac{3y}{2} = -\frac{7}{8}$   
 $\begin{cases} 4x - 3y = 1 \\ 4x - 3by = -21 \end{cases}$   
 $4x = 1 + 3y$   
 $1 + 3y - 3by = -21$   
 $-33y = -22$   
 $y = \frac{2}{3}$   
 $4x - \frac{2}{3} \times 3 = 1$   
 $4x - 2 = 1$   
 $x = \frac{3}{4}$   
 $\begin{cases} x = \frac{3}{4} \\ y = \frac{2}{3} \end{cases}$

**Problem Solving with 2 and 3 variables**

34. Jean has \$50 000 to invest. He invests some in the stock market which earns 8%, and some in bonds that earns 6% on his investments. If the total interest earned was \$3500, how much did Jean invest in stock and how much in bonds?

$$\begin{cases} x+y=50000 \\ 0.08x+0.06y=3550 \\ y=50000-x \end{cases}$$

$$0.08x + 0.06(50000 - x) = 3550$$

$$0.08x + 3000 - 0.06x = 3550$$

$$0.02x = 550$$

$$\begin{cases} x = 27500 \\ y = 22500 \end{cases}$$

	Stocks	Bonds	total
invest	x	y	50000
interest	0.08x	0.06y	3550

\$27500 in stocks  
\$22500 in bonds.

35. Stephanie has 80 coins, consisting of dimes and quarters. If the total value of her coins is \$15.20, how many dimes does she have?

$$\begin{cases} x+y=80 & y=80-x \\ 0.10x+0.25y=15.20 \end{cases}$$

$$0.1x + 0.25(80 - x) = 15.20$$

$$0.1x + 20 - 0.25x = 15.2$$

$$-0.15x = -4.8$$

$$x = 32$$

	Dimes	quarters	total
No. of coins	x	y	80
value	0.10x	0.25y	15.20

$$y = 48$$

32 dimes and 48 quarters

36. A barrel of wine has 8% alcohol, another barrel has 15% alcohol. How much of each must be mixed to have 100 liters of 12.2% alcohol wine?

$$\begin{cases} x+y=100 \\ 0.08x+0.15y=12.2 \end{cases}$$

$$y = 100 - x$$

$$0.08x + 0.15(100 - x) = 12.2$$

$$0.08x + 15 - 0.15x = 12.2$$

$$-0.07x = -2.8$$

$$x = 40$$

$$y = 60$$

	8% <sub>al</sub>	15% <sub>al</sub>	12.2% <sub>al</sub>
L	x	y	100
Alcohol	0.08x	0.15y	0.122x100

40 L . 8% alcohol

60L 15% alcohol



37. A plane travels 2835km in 7 hours with a tailwind, but only 1827km with a headwind in the same time. Find the speed of the plane, and the speed of the wind.

$$\begin{cases} 7(x+y) = 2835 \\ 7(x-y) = 1827 \end{cases} \quad \begin{cases} y = 72 \\ x = 333 \end{cases}$$

$$\begin{cases} x+y = 405 \\ x-y = 261 \end{cases}$$

$$2x = 666$$

$$x = 333$$

	speed	Time	Distance
Tailwind	$x+y$	7	2835
Headwind	$x-y$	7	1827

plane speed, 333 km/h.  
wind speed 72 km/h

$$333 + y = 405 \quad y = 72$$

38. 50 – 50 Tickets for the Royals game are \$2.00 each or 3 for \$5.00. The girls Volleyball team sold 300 tickets and the total amount of money taken in was \$528.00. How many people bought only a single ticket?

$$\begin{cases} x + 3y = 300 \\ 2x + 5y = 528 \end{cases} \quad \begin{cases} x = 300 - 3y \\ x = 84 \end{cases}$$

$$x = 300 - 3y$$

$$2(300 - 3y) + 5y = 528$$

$$-y = -72$$

$$y = 72$$

	single tick	3-packs	total
No. sold	$x$	$3y$	300
cost	$2x$	$5y$	528

39. A car travels 480km in the same time that a truck travels 400km. The speed of the car is 16km/h faster than the truck. Determine the speed of the car and truck respectively.

$c$  = speed of car  
 $t$  = speed of truck  
 $c = t + 16$

$$\frac{480}{t+16} = \frac{400}{t}$$

$$480t = 400t + 6400$$

$$80t = 6400$$

$$t = 80 \text{ km/h}$$

$$c = 80 + 16 = 96 \text{ km/h}$$

	speed	Distance	time
car	$t+16$	480	$\frac{480}{t+16}$
truck	$t$	400	$\frac{400}{t}$