

Chapter 1 – Analytic Geometry

1. Find the coordinates of the midpoint of the line segment \overline{AB} whose endpoints are A(5, 4) and B(-3, -4)
2. N (-2, 1) and D (8, 5) are the endpoints of the diameter of a circle.
 - a) What are the coordinates of the centre C of this circle?
 - b) What is the radius of the circle? Round your answer to the nearest tenth of a cm.
3. Find the coordinates of the endpoint F of the line segment \overline{EF} whose midpoint is M(6, 8) and endpoint is E(3, 5).
4. The table below indicates the ratio in which point P divides line \overline{GH} .

Transform the ratio into the appropriate fraction.

Ratio	Fraction
2:5	
1:1	
3:8	
2:1	

5. Find the coordinates of the point of division
 - a) that divides segment \overline{JK} in a ratio of 2:3 from J (1,-10) to K (6, 5).
 - b) at $\frac{3}{4}$ of the way on segment \overline{LM} from L (-4, -2) to M (20, 6)

Find the equation of the line. Show your work on loose-leaf. Graph lines 1-7

	Coordinates of A	Coordinates of B	Find the slope	Find the y intercept (b)	Write the Equation
1	(2,6)	(4,-2)			
2	(-3,0)	(12,30)			
3	(-5, 3)	(2,-18)			
4	(2,5)	(4,6)			
5	(0,5)	(5,0)			
6	(0,5)	(10,0)			
7	(-1,9)	(5,9)			

8. The y intercept is 8, and goes through (4,10).

Hint: $y = ax + b$. $b = 8$ $x = 4$ $y = 10$ Plug them in and solve for a.

9. The y intercept is -2, and goes through (5, 8)

10. Find the x and y intercepts of the following equations. Show your work.

Hint: For the x intercepts replace y with 0 and solve for x. For the y intercept replace x with 0 and solve for y.

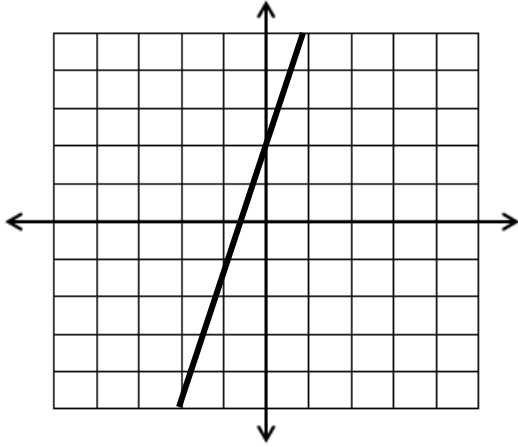
a) $10x + 15y = 300$

b) $2x - 6y = 18$

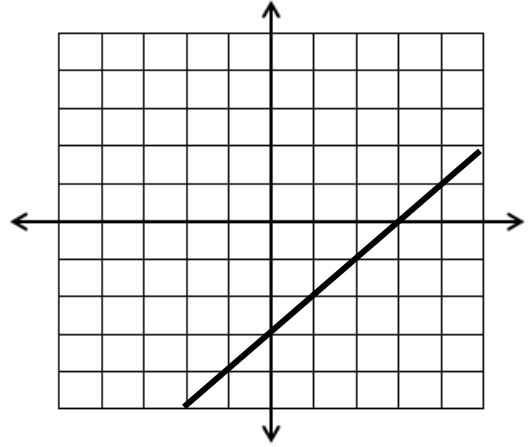
c) $5x + 20y + 120 = 0$

Find the equation of the each line.

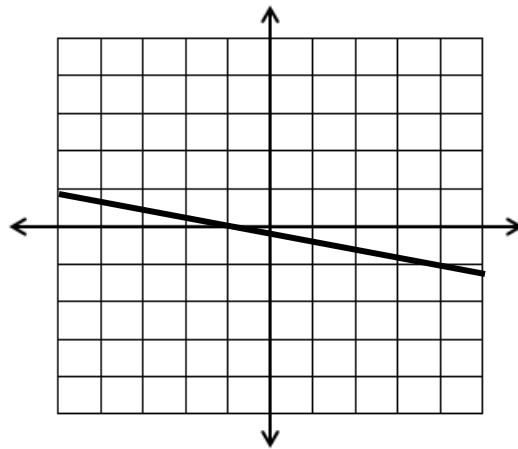
1)



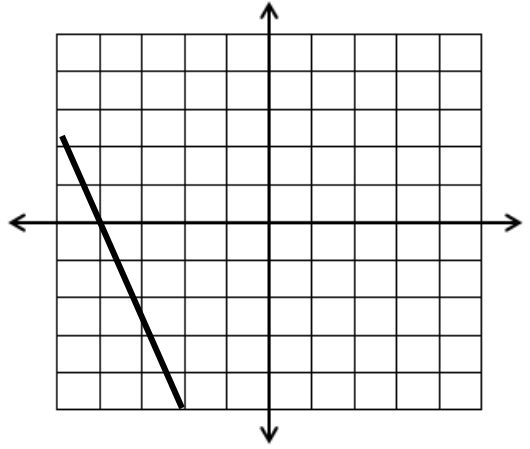
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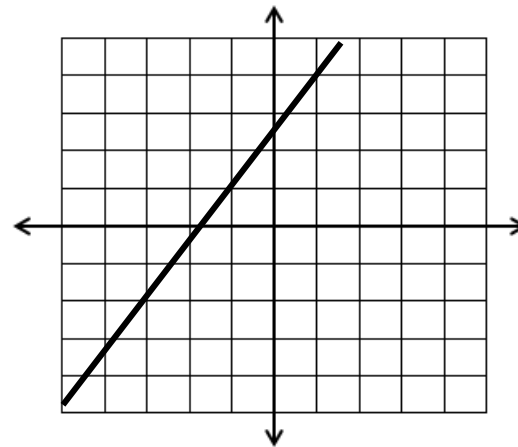
3)



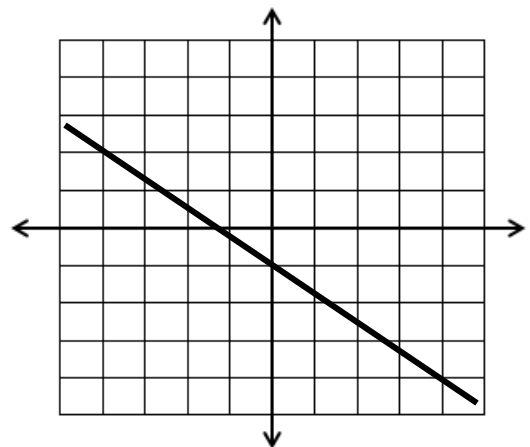
4)



5)



6)



Equation of a Line - Special Cases

Parallel Lines

When lines are parallel they have the same _____

Find the equation of a line passing through the given point and parallel to the given equation. Write your answer in the standard form.

1) (2, 4) and $y = 3x + 8$	2) (4, 7) and $y = \frac{1}{2}x - 10$
3) (-3, -2) and $y = x + 8$	4) (0, 0) and $y = \frac{3}{8}x + 2$
5) (0, 1) and $y = \frac{3}{2}x + 12$	6) (-50, -20) and $y = -\frac{3}{5}x + 500$

Perpendicular Lines

Take the slope from the rule and transform it into a slope of a line that is perpendicular (*Flip the fraction and change the sign*)

<i>Equation of a line</i>	<i>Slope of a parallel line</i>	<i>Slope of a perpendicular line</i>
7) $y = \frac{3}{4}x + 10$		
8) $y = -\frac{2}{3}x - 2$		
9) $y = 2x + 5$		
10) $y = -3x + 8$		
11) $y = \frac{2}{5}x + 12$		
12) $4y - 2x + 12 = 0$		
13) $2y + x - 6 = 0$		

Coincidental Lines

Coincidental lines have the same _____ and the same _____.

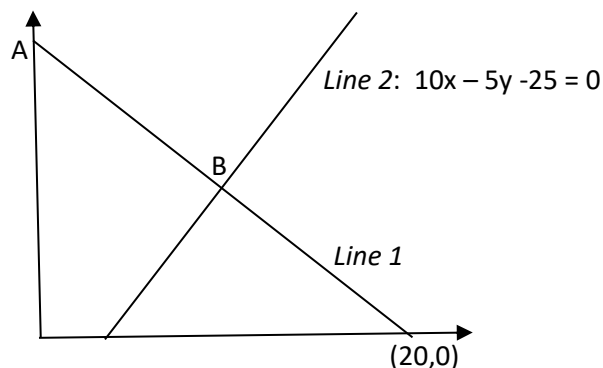
Find the slope of a line perpendicular to the line that goes through the points.

- 1) (2,6) and (4, 10)
- 2) (25, 20) and (20,35)
- 3) (1,1) and (5,5)
- 4) (0,6) and (4,0)

Find the equation of a line passing through the given point and **perpendicular** to the given equation. Write your answer in the standard form

5) (12, -4) and $y = \frac{6}{5}x + 12$	6) (4, 0) and $y = \frac{2}{3}x + 5$
7) (12, 5) and $y = -\frac{3}{7}x - 6$	8) (9, -2) and $y = \frac{3}{5}x - 1$
9) (0, 3) and $y = \frac{3}{2}x + 1$	10) (1, 3) and $y = -2x$
11) (8, -2) and $y = 4x - 10$	12) (-2, 1) and $y = -4x + 4.5$

- 13) Find the equation of a line:
 - a) that is parallel to $3x + 2y - 6 = 0$ and goes through (12, 4)
 - b) that is perpendicular to $3x + 2y - 6 = 0$ and goes through (15, 8)
- 14) Find the distance between point A and B. A is on the y-axis and rests on *Line 1*. B is where *Line 1* and *Line 2* intersect. Lines 1 and 2 are perpendicular. Scale is in km. Round answer to the nearest tenth.



Systems of Linear Relations

1. Consider the system of linear relations below.

$$y_1 = 3x + 10$$

$$y_2 = 3x + 8$$

Which of the following statements is TRUE?

- A) The lines intersect and the system has a single solution.
- B) The lines are parallel and distinct; the system has no solution.
- C) The lines coincide and the system has an infinite number of solutions.
- D) The lines are parallel and distinct; the system has an infinite number of solutions.

2. Consider the system of linear relations below.

$$y_1 = 3x + 10$$

$$2y_2 = 6x + 20$$

Which of the following statements is TRUE?

- A) The lines intersect and the system has a single solution.
- B) The lines are parallel and distinct; the system has no solution.
- C) The lines coincide and the system has an infinite number of solutions.
- D) The lines are parallel and distinct; the system has an infinite number of solutions.

3. Consider the system of linear relations below.

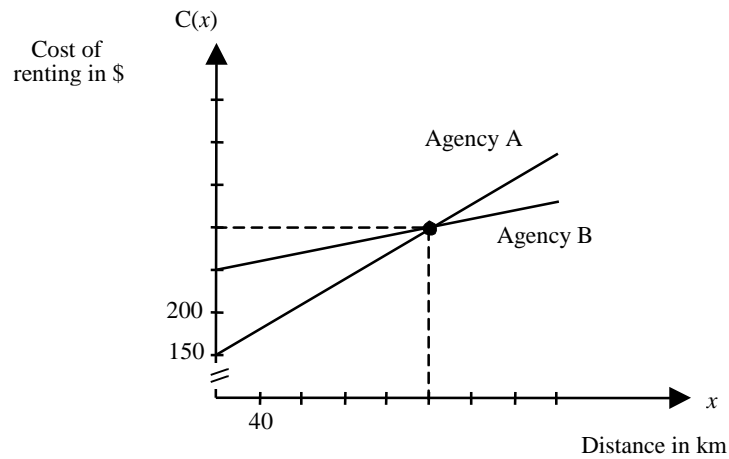
$$y_1 = 3x + 10$$

$$y_2 = 6x - 20$$

Which of the following statements is TRUE?

- A) The lines intersect and the system has a single solution.
- B) The lines are parallel and distinct; the system has no solution.
- C) The lines coincide and the system has an infinite number of solutions.
- D) The lines are parallel and distinct; the system has an infinite number of solutions.

4. The graph below represents the cost of renting a car $C(x)$ at two different car rental agencies as a function of the number of kilometres travelled.



At what distance, in kilometres, will the price be the same to rent a car from either Agency A or Agency B?

- A) 150
- B) 200
- C) 250
- D) 300

5. Suzie has \$30 in the bank and Stephan has \$60. Suzie plans to save an additional \$5 a week and Stephan an additional \$3 a week.

Hint: Write the rules. Create your own table for **each rule**: use the same x values as in the tables below.

Which table of values shows Suzie's and Stephan's savings?

A)

Number of weeks	0	2	4	6
Suzie's savings	0	10	20	30
Stephan's savings	0	6	12	18

C)

Number of weeks	0	2	4	6
Suzie's savings	5	65	125	185
Stephan's savings	3	123	243	363

B)

Number of weeks	0	2	4	6
Suzie's savings	30	32	34	36
Stephan's savings	60	62	64	66

D)

Number of weeks	0	2	4	6
Suzie's savings	30	40	50	60
Stephan's savings	60	66	72	78

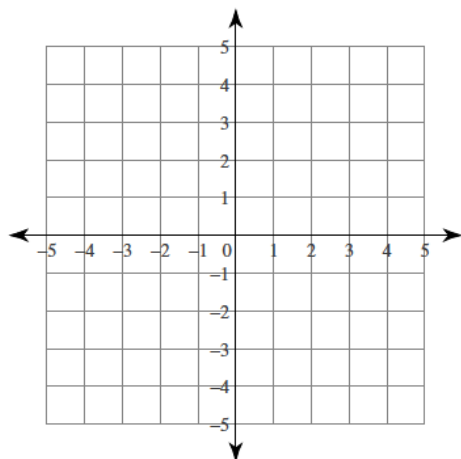
6. Julie and Rob took their 3 children to a circus. They paid \$35 for 2 adult tickets and 3 children's tickets.

Stephanie paid \$40 and bought 3 adult tickets and 2 children's tickets.

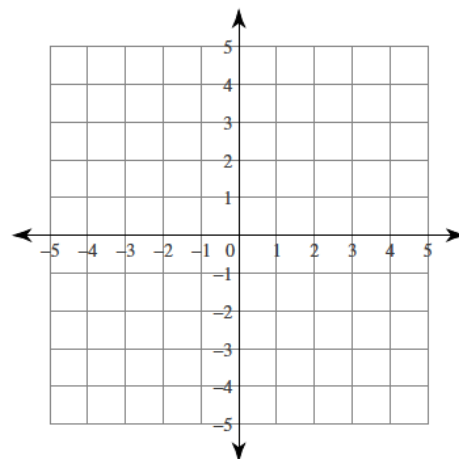
- How much did each adult ticket cost?
- How much did each child's ticket cost?
- If Lucy bought 1 adult ticket and 4 children's tickets, how much would she have to pay?

Graph the systems of equations below. Give the coordinates of the solution to the system.

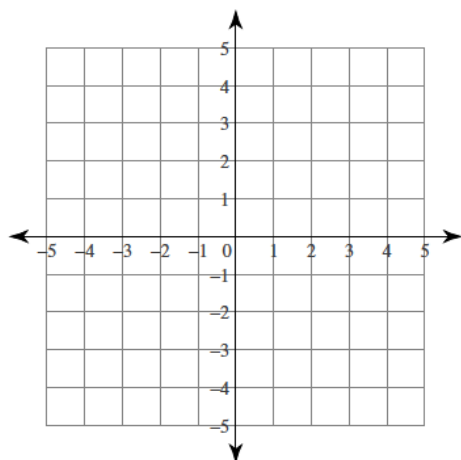
1) $4x + 3y = 9$
 $x = 3$



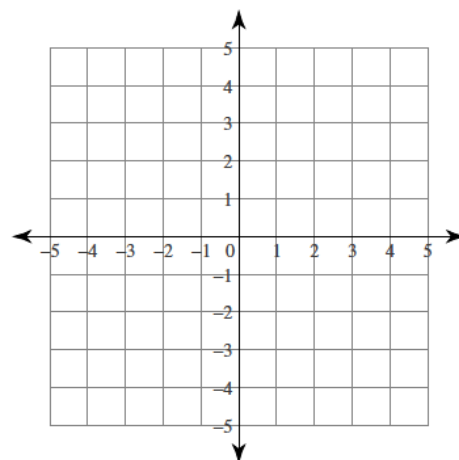
2) $x + 2y = 2$
 $x - 2y = -6$



3) $x - y = 3$
 $y = -4$



4) $x + y = -1$
 $2x - 3y = -12$



Word Problems involving 2 variables

Usually we use the elimination method.

Steps:

- 1) Identify what $x =$ (the # of, the \$(cost) of)
- 2) Identify what $y =$ (the # of, the \$(cost) of)
- 3) Make a table
- 4) Solve elimination style

x	Y	total

Example:

A local school was selling tickets for their variety show, called “Da Bomb”. The first night they sold 200 student tickets and 80 adult tickets for a total amount of \$1640. The second night they sold 180 student tickets and 100 adult tickets for a total amount of \$1700. How much were the tickets?

$x =$

$y =$

Make a table

x	y	total

Solve:

- 1) Two small pitchers and one large pitcher can hold 8 cups of water. One large pitcher minus one small pitcher constitutes 2 cups of water.



How many cups of water can each pitcher hold?

- 2) A test has twenty questions worth 100 points. The test consists of True/False questions worth 3 points each and multiple choice questions worth 11 points each. How many questions of each type are on the test?

- 3) 2000 tickets were sold in an exhibition on Saturday. The cost of a ticket for an adult is \$4 and for a child is \$2. The total amount collected on Saturday was \$6400. Find the number of adult tickets and child tickets sold on Saturday.

- 4) At the Reno Depot Sylvain buys 3 white tiles and 2 grey for \$66.50

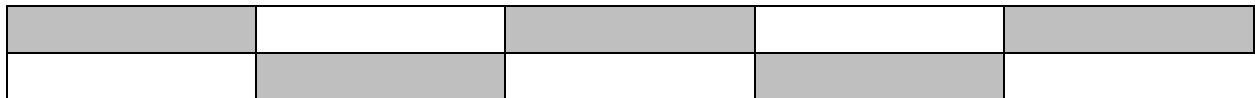
Julie buys 4 white tiles and 5 grey for \$122.50

How much are the grey tiles worth?

Sylvain: \$66.50



Julie: \$122.50



Methods for Solving Equations

1) Determine the solution set for the system of equations

- | | |
|------------------|---------------|
| a) Substitution: | $x = 2y + 5$ |
| b) Elimination: | $5x + 4y = 1$ |
| c) Comparison: | $y = 3x + 5$ |

2) In each of the following situations,

1. Identify the variables;
2. write a system of two-variable first degree equation;
3. determine the solution of the system.

- a) In a real estate project, there are three times as many condominiums as single-family houses. There is a total of 240 homes. How many condominiums are there?
- b) Jesse buys 5 granola bars and 4 chocolate bars for \$10.40. Amy buys 7 granola bars and 8 chocolate bars for \$17.20.
- c) A photocopy center charges \$2 to use the copy machines and 5 cents per copy. Another center charges \$1 to use the machines and 7 cents per copy. For what number of copies does the first store offer the better deal?
- d) The attendance at a baseball game is 45000. If there are 8 times as many home team fans as visiting team fans, how many people support the home team?
- e) A rectangular garden has a perimeter of 34 m. Its length is 2 m greater than three times its width. What are the dimensions of the garden?
- f) Jane purchased a number of 30¢ stamps and 50¢ stamps for \$7.60. If she bought 20 stamps altogether, how many of each type did she buy?

3 equations

1. We use the first 2 to solve for x and y.
2. Then, when can determine the outcome for equation 3.

Example:

At a bake sale Jay bought 5 cookies and 3 cupcakes. He paid \$4.75

Carly bought 2 cookies and 4 cupcakes. She paid \$4.00

How much did Sarah pay if she bought 3 cookies and 6 cupcakes?

1. Identify what the variables are
 x=
 Y=
2. Set up a table for the first 2 equations
3. Solve using elimination.
4. Use your answers to find out how much Sarah paid
 $3x + 6y = ?$

X	y	Total

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

$3x + 6y = 3(\underline{\hspace{1cm}}) + 6(\underline{\hspace{1cm}}) = \underline{\hspace{2cm}}$

- 1) At Husky Paint Ally bought 3 gallons of paint and 2 pints of paint for \$110.00 Bob bought 4 gallons and 5 pints of paint for \$170.00. Charlie bought 5 gallons and one pint. How much did Charlie pay?

- 2) *Husky's Landscaping* charges one rate for cutting grass and another rate for trimming Cedar Hedges. At Tom's house they spend 2 hours cutting grass and 2 hours trimming the hedge. At Mike's house they spend 3 hours cutting the grass and 1 hour trimming the hedge.

Tom pays \$100.00. Mike pays \$90.00. Yves hires *Husky's Landscaping* and they take 4 hours cutting the grass and 5 hours trimming the hedge (she has a big yard). How much will Yves pay?

- 3) While listening to Google Play, Ed buys 5 songs and 3 albums; he pays \$26.00. Jen buys 6 songs and 2 albums; she pays \$28.80. If Pat buys 10 songs and 1 album how much will he pay?

- 4) At a bake sale Alex buys 5 squares and 3 bags of caramel popcorn for \$8.25 Ann buys 2 squares and 4 bags of caramel popcorn for \$7.50. How much will Logan pay if he buys 3 squares and 2 bags of caramel popcorn?

- 5) The diagrams below represent 2 different types of tiles; they are not to scale. The grey tiles are all one length and the white tiles are another. Determine how long the third set is given the inform

a) Total length = 90cm



b) Total length = 85cm



c) Length ?



Answer Key

P.1

1. (1, 0)
2. a) (3, 3)
b) 5.4 cm
3. (9, 11)
- 4.

Ratio	Fraction
2:5	$\frac{2}{7}$
1:1	$\frac{1}{2}$
3:8	$\frac{3}{11}$
2:1	$\frac{2}{3}$

5. a) (3, -4)
b) (14, 4)

P.2

	Coordinates of A	Coordinates of B	Find the slope	Find the y intercept (b)	Write the Equation
1	(2,6)	(4,-2)	$-8/2 = -4$	14	$y = -4x + 14$
2	(-3,0)	(12,30)	$30/15 = 2$	6	$Y = 2x + 6$
3	(-5, 3)	(2,-18)	$-21/7 = -3$	-12	$Y = -3x - 12$
4	(2,5)	(4,6)	$1/2$	4	$Y = 1/2x + 4$
5	(0,5)	(5,0)	$-5/5$	5	$Y = -x + 5$
6	(0,5)	(10,0)	$-5/10 = -1/2$	5	$Y = -1/2x + 5$
7	(-1,9)	(5,9)	$0/6 = 0$	9	$Y = 9$

8. $10 = a * 4 + 8$ $a = \frac{1}{2} = 0.5$ $y = \frac{1}{2}x + 8$

9. $y = 2x - 2$

10. a) x intercept (30,0) and y intercept is (0,20)
b) (9,0) and (0,-3)
c) (-24,0) and (0,-6)

P.3

1) $y = \frac{7}{2}x + 2$

2) $y = x - 3$

3) $y = -\frac{1}{5}x - \frac{1}{5}$

4) $y = -\frac{5}{2}x - 10$

5) $y = \frac{3}{2}x + \frac{5}{2}$

6) $y = -\frac{3}{4}x - 1$

P.4

When lines are parallel, they have the same slope

1) $y = 3x - 2$	2) $y = \frac{1}{2}x + 5$
3) $y = x + 1$	4) $y = \frac{3}{8}x$
5) $y = \frac{3}{2}x + 1$	6) $y = -\frac{3}{5}x - 50$

<i>Equation of a line</i>	<i>Slope of a parallel line</i>	<i>Slope of a perpendicular line</i>
7) $y = \frac{3}{4}x + 10$	$a = \frac{3}{4}$	$a = -\frac{4}{3}$
8) $y = -\frac{2}{3}x - 2$	$a = -\frac{2}{3}$	$a = \frac{3}{2}$
9) $y = 2x + 5$	$a = 2$	$a = -\frac{1}{2}$
10) $y = -3x + 8$	$a = -3$	$a = \frac{1}{3}$
11) $y = \frac{2}{5}x + 12$	$a = \frac{2}{5}$	$a = -\frac{5}{2}$
12) $4y - 2x + 12 = 0$	$a = \frac{1}{2}$	$a = -2$
13) $2y + x - 6 = 0$	$a = -\frac{1}{2}$	$a = 2$

Coincidental lines have the same slope and the same y-intercept.

P. 5

1) $a = -\frac{1}{2}$

2) $a = \frac{1}{3}$

3) $a = -1$

4) $a = \frac{2}{3}$

5) $y = -\frac{5}{6}x + 6$	6) $y = -\frac{3}{2}x - 6$
7) $y = \frac{7}{3}x - 23$	8) $y = -\frac{5}{3}x + 1$
9) $y = -\frac{2}{3}x + 3$	10) $y = \frac{1}{2}x + \frac{5}{2}$ or $y = 0.5x + 2.5$
11) $y = -\frac{1}{4}x$	12) $y = \frac{1}{4}x + \frac{3}{2}$ or $y = 0.25x + 1.5$

13) a) $y = -\frac{3}{2}x + 22$

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

14) 6.7 km

P.6-8

1) B

2) C

3) A

4) B

5) D

6) a) \$10

b) \$5

c) \$30

P. 9

- 1) (3, -1)
- 2) (-2, 2)
- 3) (-1, 4)
- 4) (-3, 2)

P. 10

Ex. $x = \text{cost of a student ticket}$ $y = \text{cost of an adult ticket}$

x		y		total
$200x$	+	$80y$	=	1640
$180x$	+	$100y$	=	1700

$x = 5$ $y = 8$ \therefore the student tickets cost \$5 and the adult tickets cost \$8

P.11

- 1) # of cups of water in a small pitcher = 2 # of cups of water in a large pitcher = 4
- 2) # of true/false questions = 15 # of multiple questions = 5
- 3) # of adult tickets sold = 1200 # of children tickets sold = 800
- 4) white tiles = \$12.50 grey tiles = \$14.50

P.12

1.
 - a) (3,-1)
 - b) (-3,4)
 - c) (-3,-4)
2.
 - a) 180 condominiums, 60 single-family houses
 - b) granola bars = \$1.20, chocolate = \$1.10
 - c) $x = 50$ $y = 4.50$
 - d) $x = 40,000$ $y = 5000$
 - e) Length = 13.25 m Width = 3.75 m
 - f) 8 - 50 ¢ stamps, 12 - 30 ¢ stamps

P. 13

Ex. X = cost of a cookie y = cost of a cupcake

X		y		Total
$5x$	+	$3y$	=	4.75
$2x$	+	$4y$	=	4.00

$x = \underline{\$0.50}$ $y = \underline{\$0.75}$

$3x + 6y = 3(\underline{0.50}) + 6(\underline{0.75}) = \underline{\$6.00}$

P. 14

- 1) $x = 30$ $y = 10$ \therefore Charlie paid \$160.00
- 2) $x = 20$ $y = 30$ \therefore Yves will pay \$230.00
- 3) $x = 1.30$ $y = 6.50$ \therefore Pat will pay \$26.00
- 4) $x = 0.75$ $y = 1.50$ \therefore Logan will pay \$5.25
- 5) $x = 20$ $y = 15$ \therefore the third set is 95 cm