Mathematics 4SN
Systems of Linear Equations

1 The perimeter of a rectangle is 120 cm. If the width is tripled, it will be 4 cm more than the length.

Let x : the length
       y : the width

This situation can be represented by the following system of linear relations:

$$2x + 2y = 120$$
$$3y = x + 4$$

What is the length of this rectangle?

A)   14 cm   C)   44 cm

B)   16 cm   D)   46 cm

2 During the summer season 310 sailboats docked at the Starward Marina. There were 4 times as many one mast sailboats as sailboats with 2 masts that visited the marina.

Given x : the number of sailboats with one mast
       y : the number of sailboats with two masts

which system of equations expresses this situation?

A) $x = y - 310$ C) $x = 310 - y$
      $x = 4y$ $x = 4y$

B) $y = x - 310$ D) $y = 310 - x$
      $y = 4x$ $y = 4x$

3 An architect dreams of a city without any visible electric wires. He plans to bury the electricity cables underground before the streets and buildings are constructed.

This is his proposed plan.
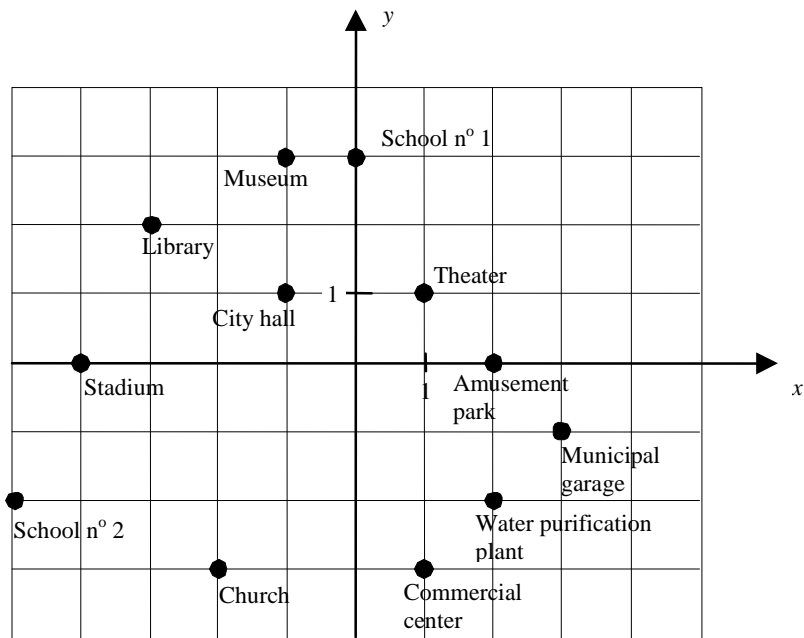
The location of cable A is given by the equation :
$$4x - 2y = -6$$

The location of cable B is given by the equation :
$$3x + y = -2$$

Under which building will the two cables cross?

A) School n° 1

C) City hall

B) Theater

D) Library

4 Mary collected $50 for charity. The money comprised 35 items which were either $1 coins or $2 coins.

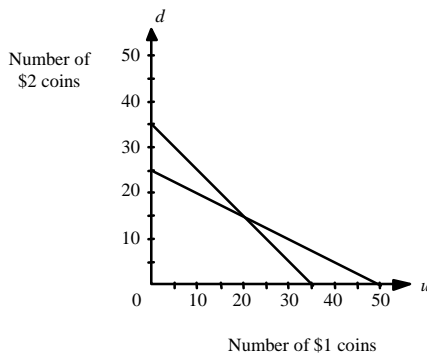This situation is represented by the following system of equations.
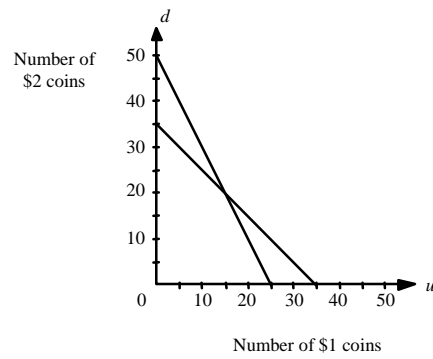
$$x + y = 35$$
$$x + 2y = 50$$

where x represents the number of $1 coins
and y represents the number of $2 coins

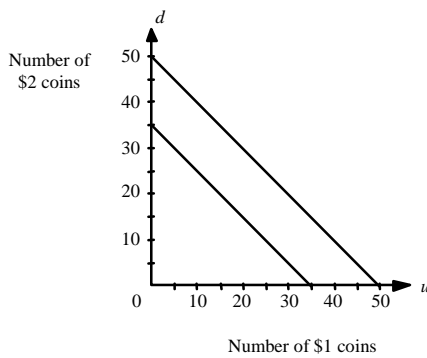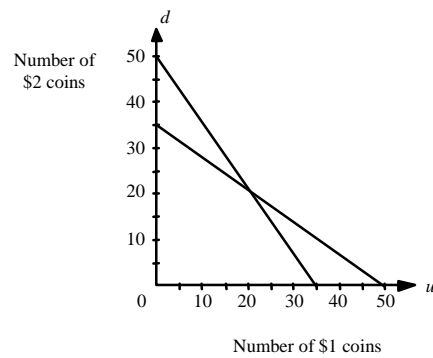Which one of the following graphs correctly represents this system?

A)

Number of
$2 coins

50
40
30
20
10
0   10   20   30   40   50 u

Number of $1 coins

C)

Number of
$2 coins

50
40
30
20
10
0   10   20   30   40   50 u

Number of $1 coins

B)

Number of
$2 coins

50
40
30
20
10
0   10   20   30   40   50 u

Number of $1 coins

D)

Number of
$2 coins

50
40
30
20
10
0   10   20   30   40   50 u

Number of $1 coins

5 Translate the following situations by a system of equations using the variables x and y.
Solve for x and y.

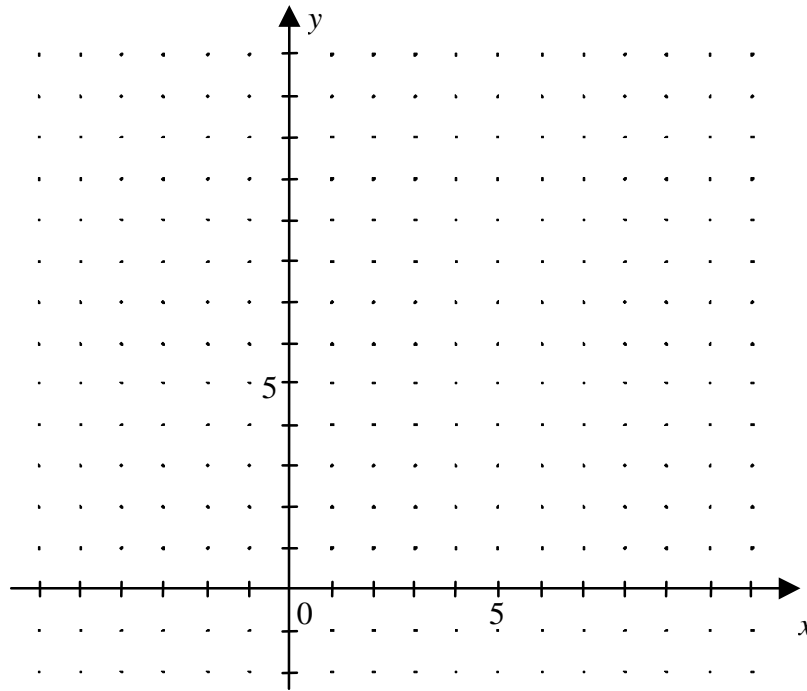a) The sum of two numbers is 54 and their difference is 30. What are the numbers?

b) Six records and four cassettes cost $116.00, whereas eleven records and four cassettes cost $183.00. Find the cost of a cassette.

a) _____

_____

b) _____

_____

6 Represent graphically the following system of equations.

$$3x - y = 2$$
$$x + y = 10$$

7 Read the following problem :

"Allan has a total of 26 chickens and sheep which altogether have 72 legs. How many chickens and how many sheep does he have?"

To solve this problem the following system of equations is used:

x : number of chickens
y : number of sheep

$$x + y = 26$$
$$2x + 4y = 72$$

By means of this system of inequalities, calculate the number of chickens and the number of sheep.

There are _____ chickens and _____ sheep.

During an earthquake, an instrument in Ottawa records seismic waves following the direction given by the line $4x - 7y = 0$.

A similar instrument in Sherbrooke records waves from the same earthquake following the direction given by the line $x - y - 3 = 0$.

The solution of the system of equations formed by these two lines in the following Cartesian plane can be used to determine the city where the epicentre of the earthquake is located.

Find the city where the epicentre of the earthquake is located.
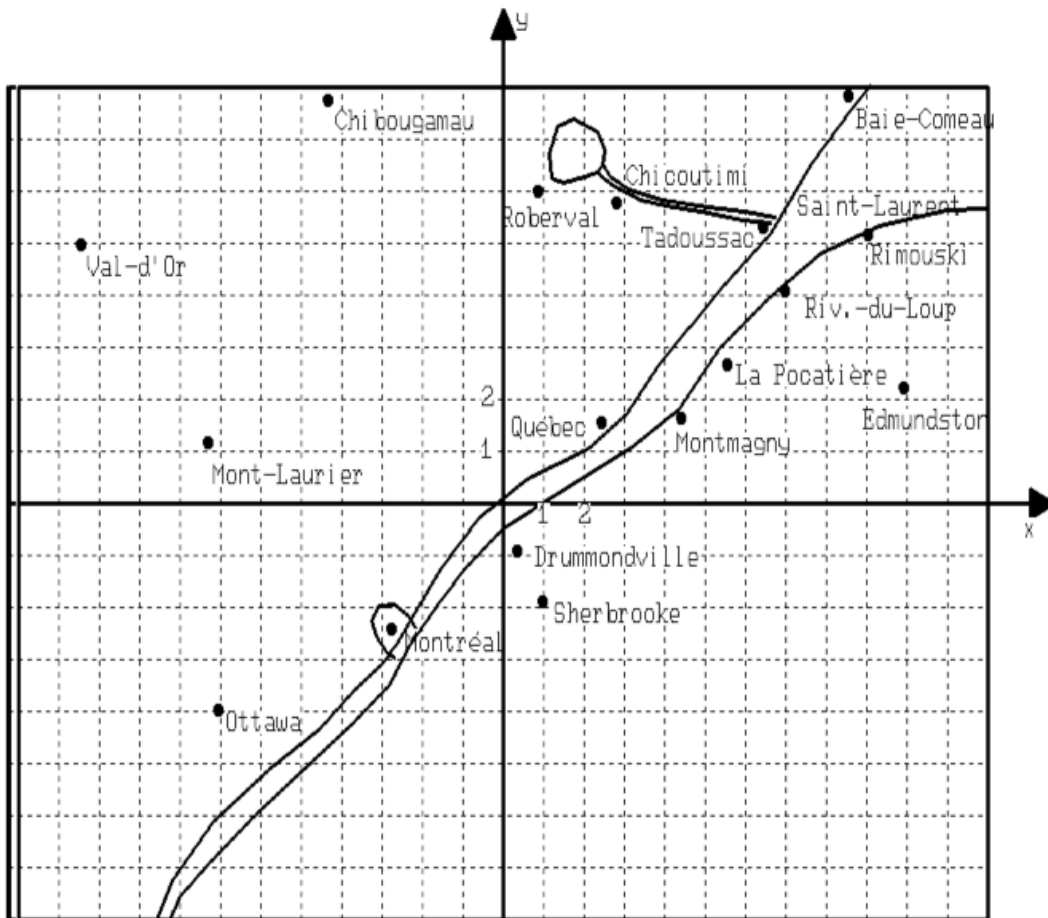
The epicentre is located in the city of _____.