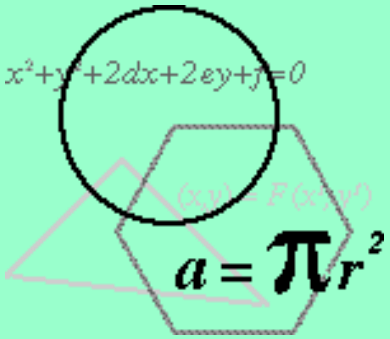
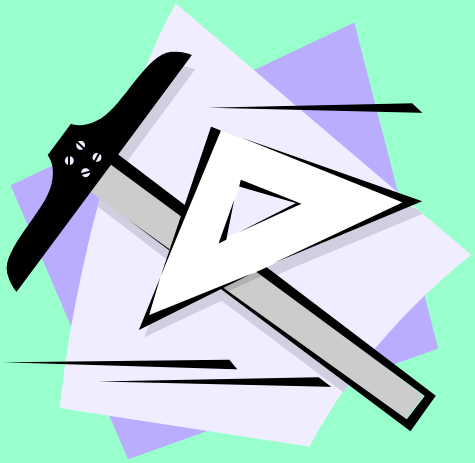
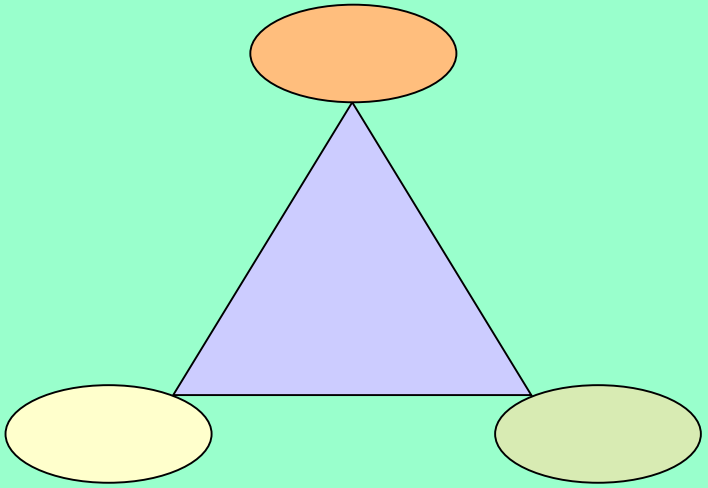


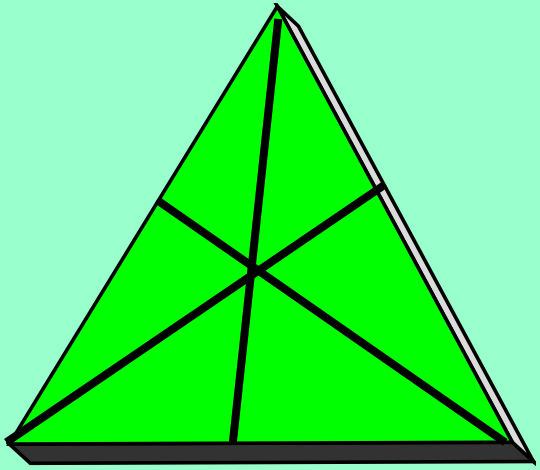




9.

Concurrence

3 or more lines meeting at a point

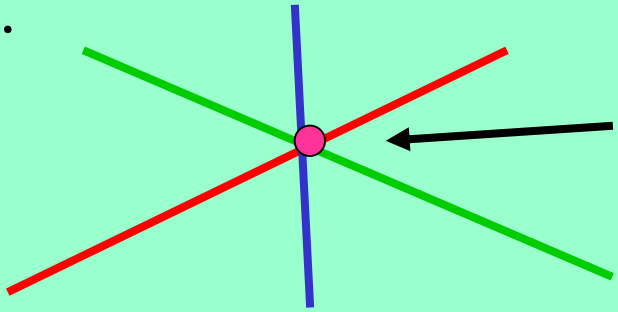


Concurrence

Copy the following:

Intersection deals with two lines meeting at a common point.

Concurrence deals with three or more lines passing through a common point.



Common Point

To prove that lines are concurrent:

1. Take the equations of two of the lines to set up and solve a simultaneous equation.

2. Prove that the solution to part 1 also lies on the other line(s).

Example 1

Show that the following lines are concurrent:

x + y - 9 = 0 2x + 3y = 23 3x - y = 7

All in form
Ax + By = C

Solution :

1. Take one pair of equations and solve to find point of intersection

$$\left.\begin{aligned} x+y&=9 \\ 2x+3y&=23 \end{aligned}\right\}$$

Point of Intersection $\longrightarrow (4,5)$

Example 1

Show that the following lines are concurrent:

x + y - 9 = 0 **2x + 3y = 23** **3x - y = 7**

Solution :

2. Show that the point you have just found also lies on the other line(s)

Point of Intersection $\longrightarrow (4, 5)$

Sub x = 4 & y = 5 in :

LHS: **3x - y**

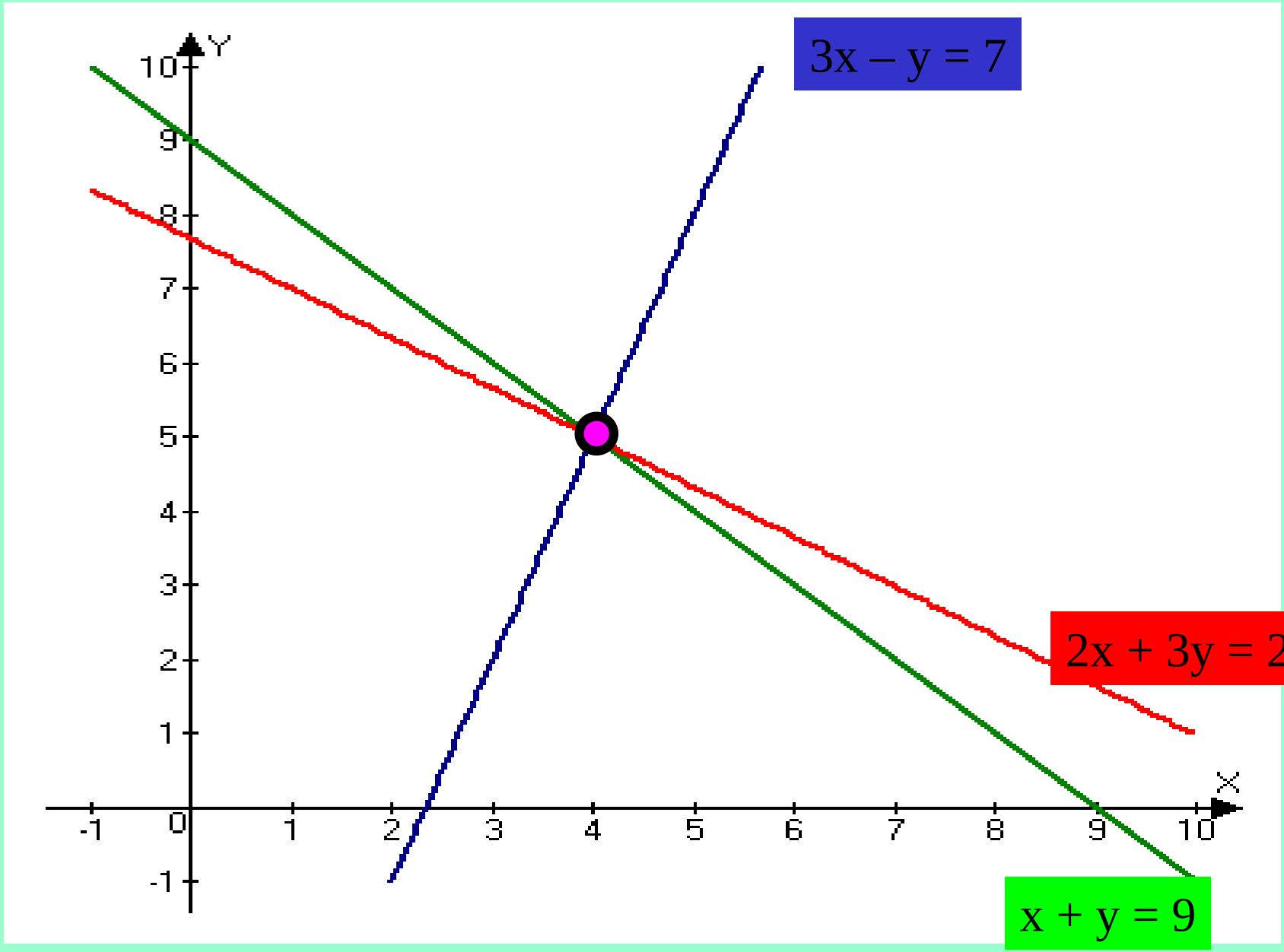
$= 3(4) - 5$

$= 7$

RHS: $= 7$

AS LHS=RHS lines are concurrent

3. Make a statement


3x – y = 7
2x + 3y = 23
x + y = 9
Y
X
10
9
8
7
6
5
4
3
2
1
-1
0
1
2
3
4
5
6
7
8
9
10
-1

Example 2

Find k if these lines are concurrent:

x + 4y = 7 **3x + y = 10** **x - 5y + k = 0**

All in form
Ax + By = C

Solution :

1. Take one pair of equations and solve to find point of intersection

$$\left.\begin{matrix} x+4y=7 \\ 3x+y=10 \end{matrix}\right\} \quad \begin{matrix} \times 3 \\ \times 1 \end{matrix} \left\{\begin{matrix} 3x+12y=21 \\ 3x+y=10 \end{matrix}\right.$$

$$11y = 11$$

$$y = 1$$

Sub y = 1 into x + 4y = 7

$$x+4(1)=7$$

$$x=3$$

Point of Intersection $\longrightarrow (3,1)$

Example 2

Find k if these lines are concurrent:

x + 4y = 7 **3x + y = 10** **x - 5y + k = 0**

Solution :

2. Points ARE concurrent so substitute into 3rd equation to find k.

Point of Intersection $\longrightarrow (3,1)$

Sub x = 3 & y = 1 in :

x - 5y + k = 0

$$\Rightarrow 3-5(1)+k=0$$

$$\Rightarrow -2+k=0$$

$$k=2$$