Different types of line equations	Season	01
	Episode	17
	Time frame	55 mins

Prerequisites : Line equations.

Objectives :
- Discover different types of line equations, and how they can be used.
- Practise the computations to switch from one kind to another.

Materials :
- *Slideshow.*
- *Lesson.*
- *Answer sheet.*

The class is divided into four teams. Each team is given an answer sheet where answers will be written for the three parts. The two first parts are turn by turn games. The thrid part is a speed game.

1 – Recognize a form — 20 mins

Turn by turn, each team is given (orally) an equation and has to find out what type it is and win points for every good answer. If a team gives a wrong answer, the next team can answer and win 3 points, and so on.

Δ_1	$y = -4x$	Δ_2	$\frac{x}{-2} + \frac{y}{5} = 1$
Δ_3	$7x + 3y - 8 = 0$	Δ_4	$y - 5 = -3(x - 2)$
Δ_5	$\frac{x}{\frac{1}{3}} + \frac{y}{-3} = 1$	Δ_6	$x + \sqrt{5}y - 3 = 0$
Δ_7	$y + 1 = -\frac{1}{2}(x + 5)$	Δ_8	$y = -7(x + 8)$

2 – Switch from one form to another — 25 mins

Four line equations are given. Teams have 10 minutes or so to convert these equations to, the three other forms. Teams are then asked to fill one line, turn by turn, one line for each team. Four points are awarded for every good answer. If a team gives a wrong answer, the next team can answer and win 3 points, and so on.

	General form	Slope-intercept form	Point-intercept form	Intercept form
d_1	$\star\ 3x - 3y + 3 = 0$	$y = x + 1$	$y + 1 = 1(x - (-2))$	$\frac{x}{-1} + \frac{y}{1} = 1$
d_2	$x - y - 3 = 0$	$y = x - 3$	$y - 0 = 1(x - 3)$	$\star\ \frac{x}{3} + \frac{y}{-3} = 1$
d_3	$2x + 5y - 10 = 0$	$y = -\frac{2}{5}x + 2$	$y - 0 = -\frac{2}{5}(x - 5)$	$\star\ \frac{x}{5} + \frac{y}{2} = 1$
d_4	$6x - y - 11 = 0$	$\star\ y = 6x - 11$	$y - 1 = 6(x - 2)$	$\frac{x}{\frac{11}{6}} + \frac{y}{-11} = 1$

3 – Computations – Speed game — Remaining time.

Four questions are asked about the lines in the previous part. The first team to rise all their hands can answer and get 10 points. If the answer is wrong, another team and answer and win 8 points, and so on.

1. Draw the lines d_1 and d_2 on a coordinate graph.
2. Find two points on each of the lines d_3 and d_4.
3. Compute the x-intercept of the lines d_1 and d_2.
4. Are there two parallel lines among these eight lines ?

Different types of line equations

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Document	Lesson

Every straight line has an infinite number of cartesian equations, all equivalent but sometimes very different in the way they look and the information they directly present. Here are the main kinds of equations. Only the two first kinds are commonly used in France, but the others are quite interesting too.

- The general form : $ax+by+c=0$, where a, b and c are three real numbers. Any line has an equation of this form, and indeed many as it's always possible to apply a coefficient to the whole equation.
- Slope-intercept form : $y=mx+p$, where m and p are real numbers, m being the slope and p the intercept. This form is unique for any line not parallel to the y-axis.
- Point-slope form : $y-y_0=m(x-x_0)$, where m is a real number, the slope, and (x_0,y_0) is a couple of real numbers, the coordinates of a point on the line. This form is not unique, as any point on the line can be used.
- Intercept form : $\frac{x}{q}+\frac{y}{p}=1$, where p and q are real nonzero numbers, respectively the y-intercept and the x-intercept.

It's easy to switch from one form to another, as illustrated in the example below :

$$\begin{aligned}
4x+2y-6 &= 0 \text{ (General form)}\\
2y &= -4x+6\\
y &= -2x+3 \text{ (Slope-intercept form)}\\
y &= -2(x-1)+1\\
y-1 &= -2(x-1) \text{ (Point-slope form)}\\
2x+y &= 3\\
\frac{2x}{3}+\frac{y}{3} &= 1\\
\frac{x}{\frac{3}{2}}+\frac{y}{3} &= 1 \text{ (Intercept form)}
\end{aligned}$$

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Part 1 – Recognize a form

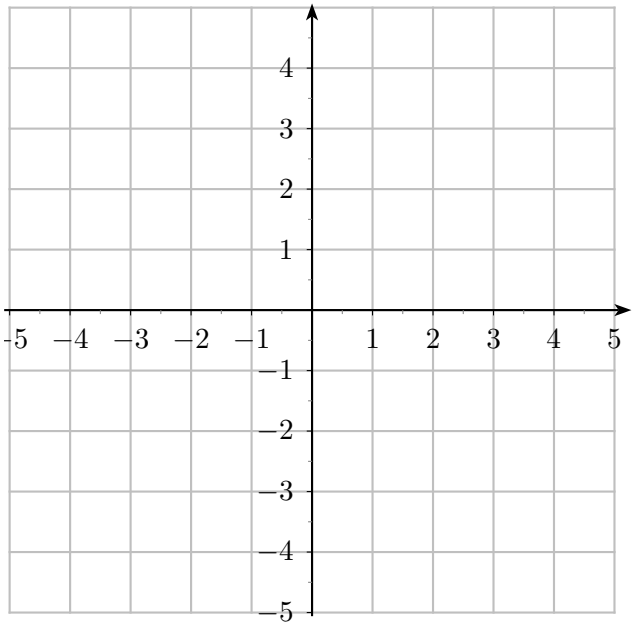
Line	Form
Δ_1	
Δ_2	
Δ_3	
Δ_4	
Δ_5	
Δ_6	
Δ_7	
Δ_8	

Part 2 – Switch from one form to the others

Line	General form	Slope-intercept form	Point-slope form	Intercept form
d_1				
d_2				
d_3				
d_4				

Part 3 – Use the best form to carry out a computation

1. Coordinate graph :



2.

d_3		
d_4		

3.

d_1		
d_2		

4. . . . . .