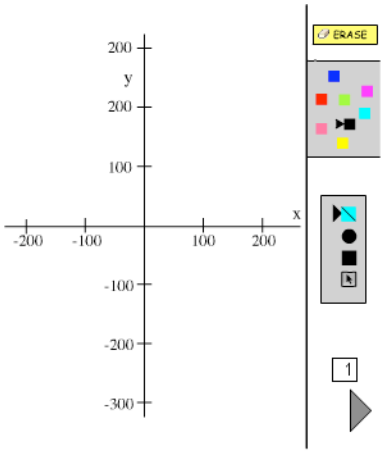
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$



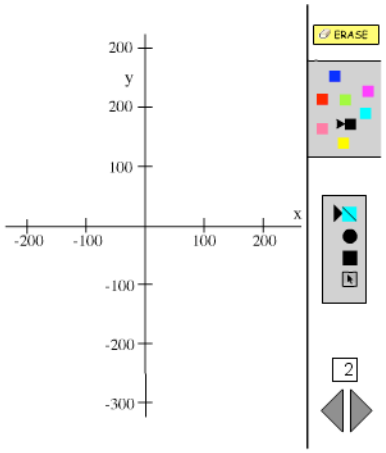
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

The problem asks that all points (x, y) that satisfy $3x + 6y \geq 600$ be darkened in. Equivalently the Venn diagram for

$\{(x, y): 3x + 6y \geq 600\}$

is to be sketched where the universal set is the entire x, y-plane.



Lecture 24

GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

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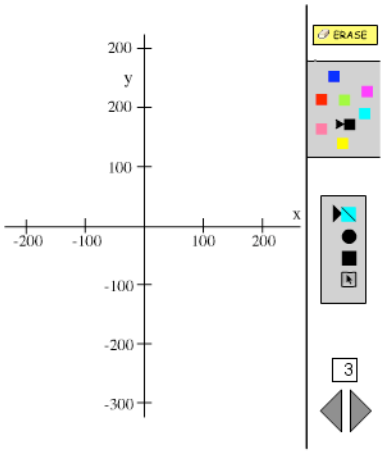
$\{(x, y): 3x + 6y \geq 600\}$

is to be sketched where the universal set is the entire x, y-plane.

Note that all points that satisfy

$3x + 6y = 600$

also satisfy the inequality and are therefore part of the graph.



GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

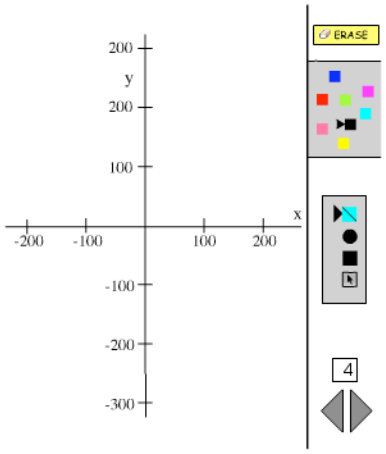
Graph of $3x + 6y = 600$

This is a straight line. It runs thru:

$\underline{x = 0}$: $3\cdot0 + 6y = 600 \Rightarrow 6y = 600$
$\Rightarrow y = 100$
$(0, 100)$ is on the line.

$\underline{y = 0}$: $3x + 6\cdot0 = 600 \Rightarrow 3x = 600$
$\Rightarrow x = 200$
$(200, 0)$ is on the line.

PLOT THESE POINTS



GRAPHING LINEAR INEQUALITIES

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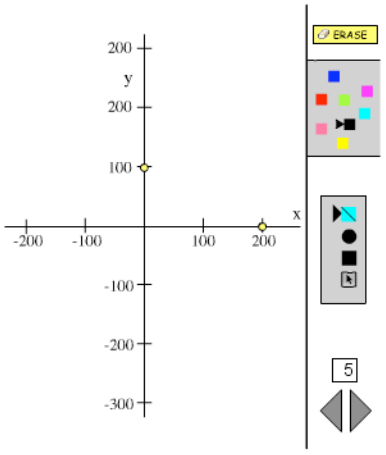
DRAW THE LINE



GRAPHING LINEAR INEQUALITIES

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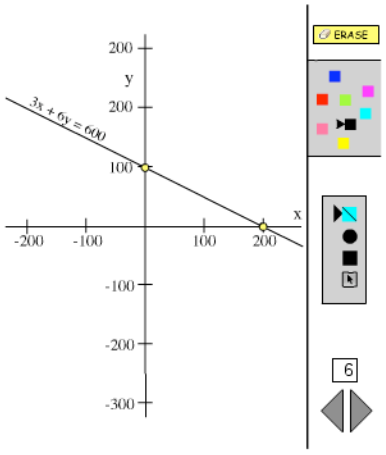
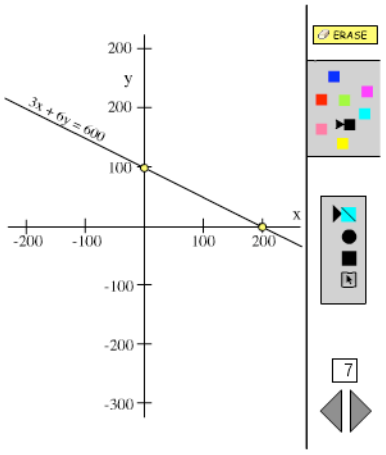


GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?



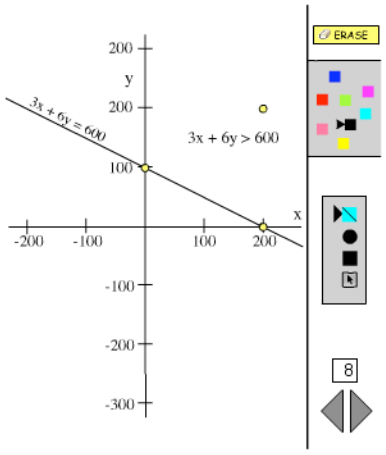
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?

The point $(200, 200)$ satisfies the inequality:

$3\cdot200 + 6\cdot200 \geq 600$



GRAPHING LINEAR INEQUALITIES

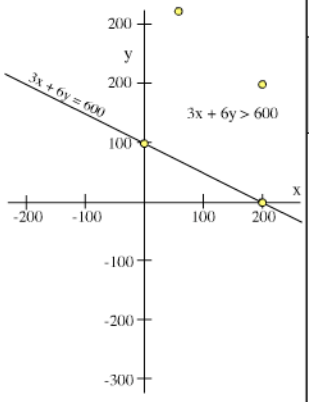
PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?

The point (200, 200) satisfies the inequality:

$3 \cdot 200 + 6 \cdot 200 \geq 600$

Consider another point on the SAME SIDE of line given by $3x + 6y = 600$.



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GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

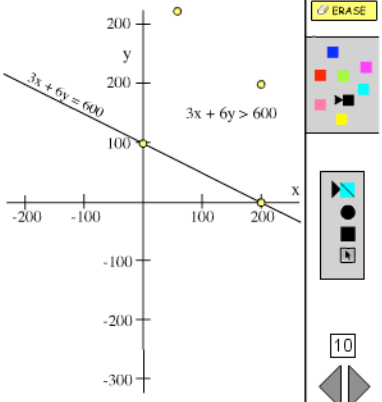
What about the inequality?

The point (200, 200) satisfies the inequality:

$3 \cdot 200 + 6 \cdot 200 \geq 600$

Consider another point on the SAME SIDE of line given by $3x + 6y = 600$.

Suppose $3x + 6y \leq 600$ for this other point.



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Lecture 24

GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

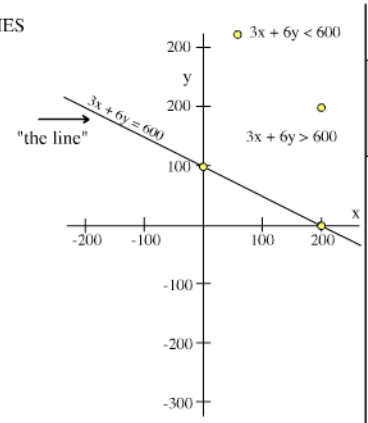
What about the inequality?

The point (200, 200) satisfies the inequality:

$3 \cdot 200 + 6 \cdot 200 \geq 600$

Consider another point on the SAME SIDE of line given by $3x + 6y = 600$.

Suppose $3x + 6y \leq 600$ for this other point. Then $3x + 6y < 600$ at this point since equality would imply that it is on the line.



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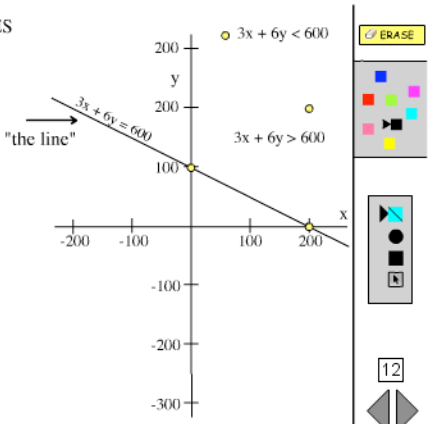
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?

Now consider a line segment that runs from one point to the other.



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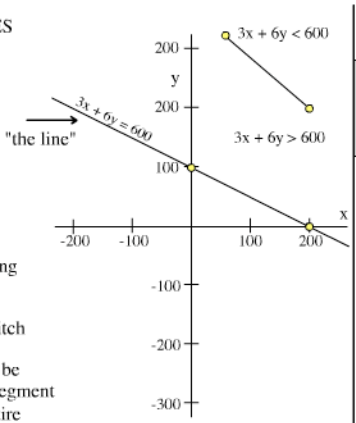
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?

Now consider a line segment that runs from one point to the other.

A traveller on the line segment moving from (200, 200) to the second point and evaluating 3x +6y at every point along the way would see $3x + 6y$ switch from being > 600 to being < 600. Somewhere in between, there would be a point with $3x + 6y = 600 \Rightarrow$ the segment hits the line. IMPOSSIBLE. The entire segment lies on one side of the line.



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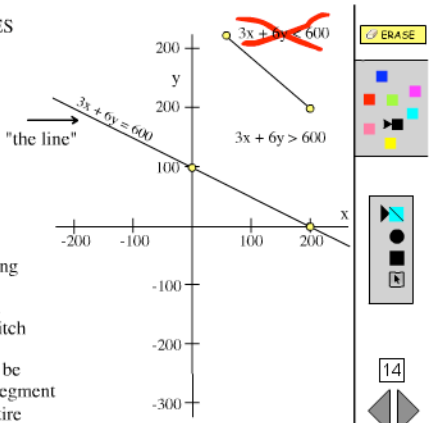
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

What about the inequality?

It must be that $3x + 6y > 600$ at this second point a well.

A traveller on the line segment moving from (200, 200) to the second point and evaluating 3x +6y at every point along the way would see $3x + 6y$ switch from being > 600 to being < 600. Somewhere in between, there would be a point with $3x + 6y = 600 \Rightarrow$ the segment hits the line. IMPOSSIBLE. The entire segment lies on one side of the line.



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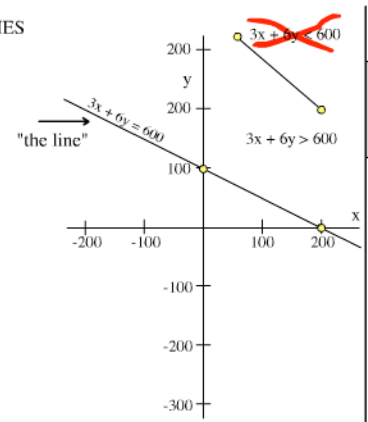
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

CONCLUSION:

$3x + 6y > 600$ for all points on the same side of the line as the point (200,200).

The same reasoning will show that $3x + 6y < 600$ for all points on the other side of the line.



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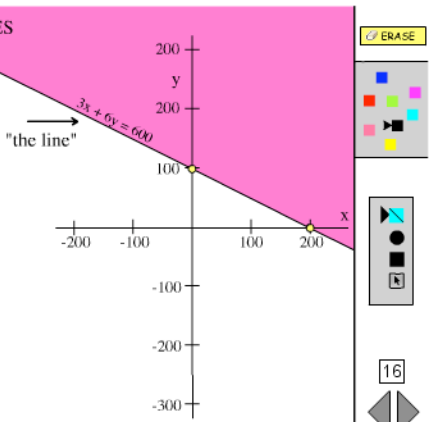
GRAPHING LINEAR INEQUALITIES

PROBLEM: GRAPH
$3x + 6y \geq 600$

Here is the graph.

It includes the graph of $3x + 6y = 600$ and the entire purple region which extends infinitely far to the left, right and upwards and includes all points "above" the line.



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GRAPHING LINEAR INEQUALITIES

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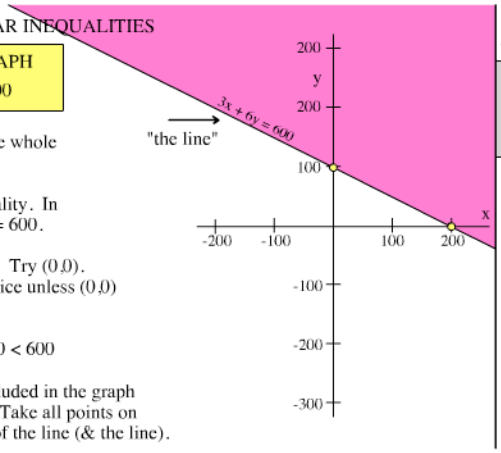

Easy way to do the whole thing:

1) Graph the equality. In this case $3x + 6y = 600$.

2) Test one point: Try (0,0). This is a good choice unless (0,0) is on the line:

$3 \cdot 0 + 6 \cdot 0 = 0 < 600$

So (0,0) is not included in the graph of the inequality. Take all points on the OTHER side of the line (& the line).

ERASE

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ERASE

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Lecture 24

ERASE

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