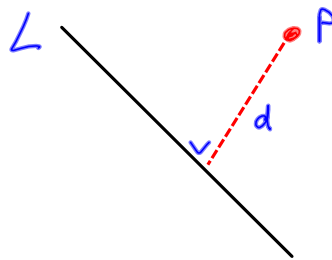


# Coordinate Geometry: The Line

chapter

1

## Section 1.6 Perpendicular distance from a point to a line



PROJECT MATHS – STRAND 2  
**Text & Tests** 4  
LEAVING CERTIFICATE  
HIGHER LEVEL

1. Perpendiculars to a line from points on the same side of the line have the same sign.
2. Perpendiculars from points on opposite sides of a line have different signs.

### Example 2

Investigate whether the points  $(5, -2)$  and  $(3, -3)$  lie on the same side of the line  $5x - 4y - 30 = 0$ .

$$d = \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}}$$

If  $ax_1 + by_1 + c$   
has different signs  
pts are on opposite

$$\begin{aligned} a &= 5 \\ b &= -4 \\ c &= -30 \end{aligned}$$

$$\begin{aligned} \text{for } (5, -2) &\Rightarrow 5(5) - 4(-2) - 30 \\ &= 25 + 8 - 30 \\ &= +3 \end{aligned}$$

$$\begin{aligned} \text{for } (3, -3) &\Rightarrow 5(3) - 4(-3) - 30 \\ &= 15 + 12 - 30 \\ &= -3 \end{aligned}$$

$\Rightarrow$  Different sides

**Example 3**

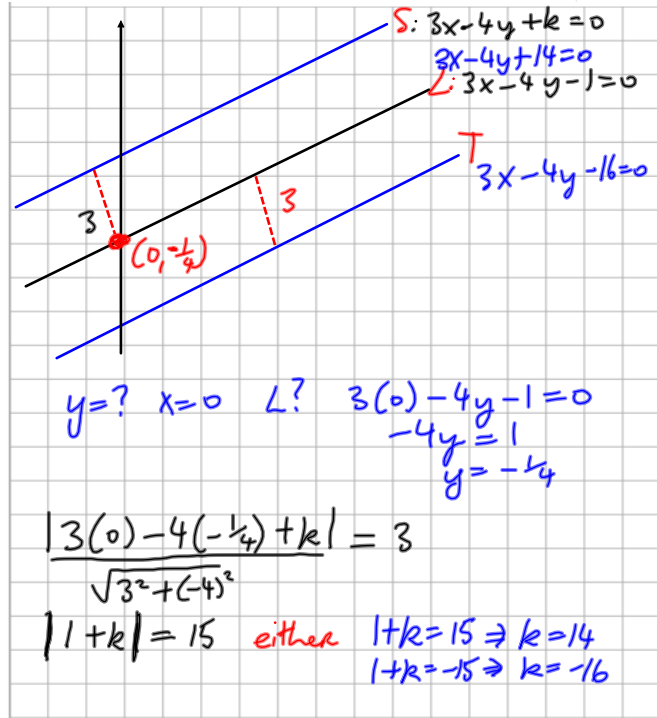
Find the equations of the two lines which are parallel to the line  $3x - 4y - 1 = 0$  and 3 units from it.

//  $3x - 4y + k = 0$

pt  $(0, -\frac{1}{4})$

$a=3$   $b=-4$   $c=k$

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$



13. Write down the equation of any line parallel to  $4x + 3y + 1 = 0$ .  
Hence find the equations of the two lines which are parallel to the line  $4x + 3y + 1 = 0$  and two units from it.

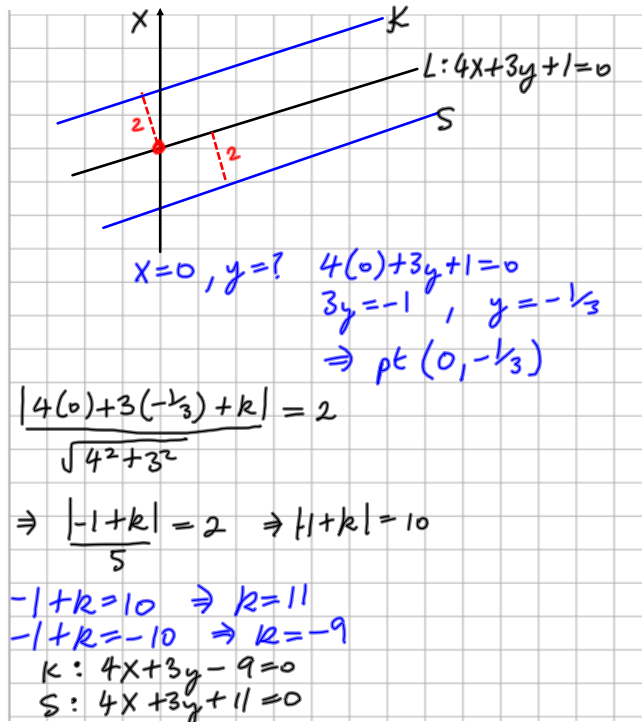
equation parallel line is

$4x + 3y + k = 0$

Point on L?

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

distance  $(0, -\frac{1}{3})$  to K?



H.W. Q14, Q17