# Review of The Straight Line

$$y = mx + c$$

gradient

y-intercept

Can have $ax + by + c = 0$

or $ax + by = c$

as other forms of straight line

Examples

$$y = 2x + 3$$

or $2x - y + 3 = 0$

or $2x - y = -3$

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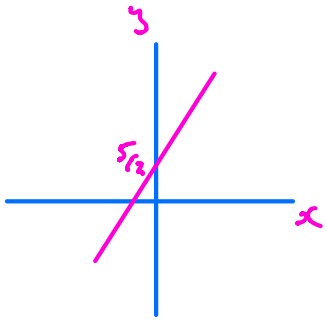
Ex 2 $3x - 2y + 5 = 0$

$$3x + 5 = 2y$$

$$\frac{3}{2}x + \frac{5}{2} = y$$

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Exercise Write in form $y = mx + c$ and sketch graph

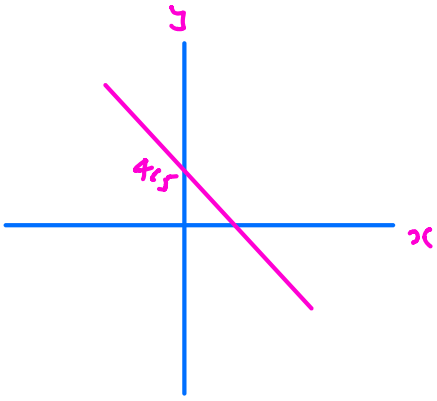
1)

$$5y + 5x = 4$$

$$5y = -5x + 4$$

$$y = -\frac{5}{5}x + \frac{4}{5}$$

$$y = -x + \frac{4}{5}$$

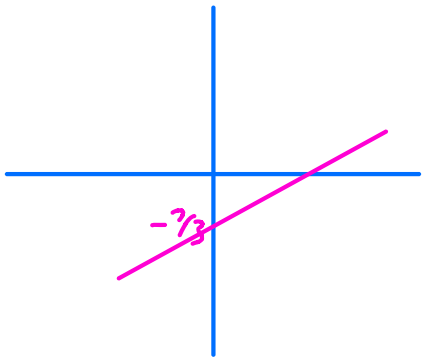



2)

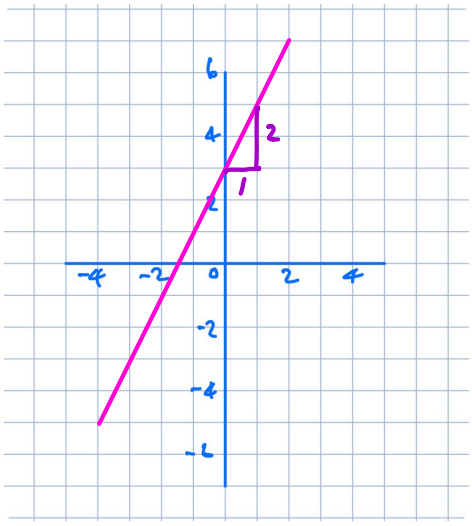
$$3y - 2x + 7 = 0$$

$$3y = 2x - 7$$

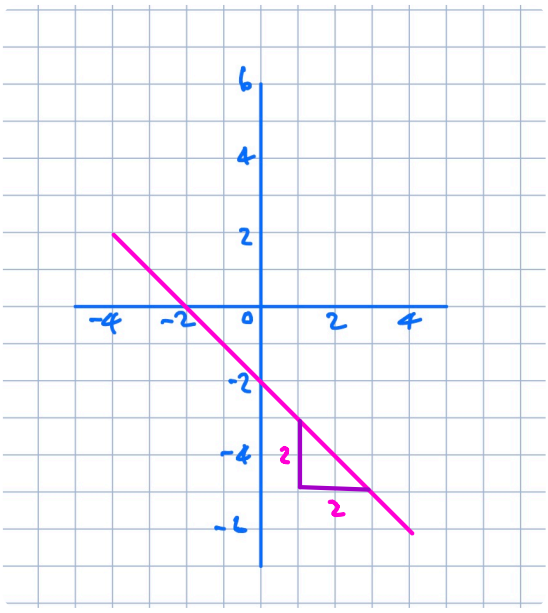
$$y = \frac{2}{3}x - \frac{7}{3}$$




Graph Recognition

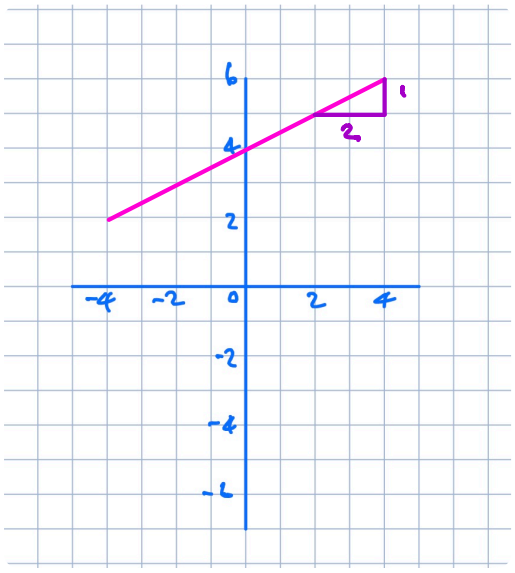



$$y = 2x + 3$$



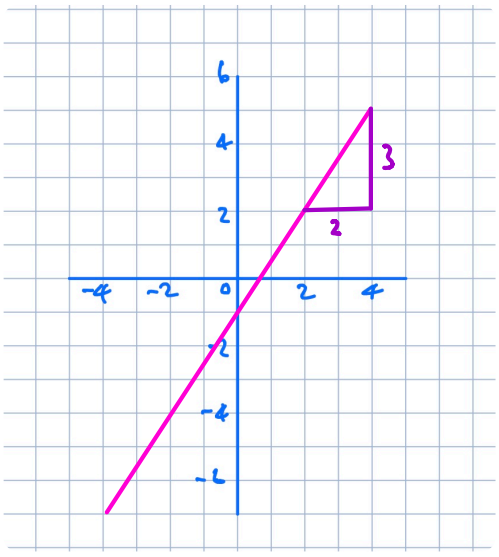

$$y = mx + c$$

$$y = -x - 2$$




$$y = mx + c$$

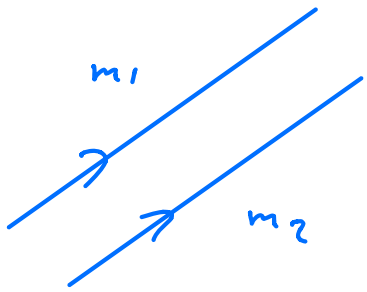
$$y = \frac{1}{2}x + 4$$




$$y = mx + c$$

$$y = \frac{3}{2}x - 1$$

# Parallel and Perpendicular Lines




Parallel Lines have the same gradient

$$m_1 = m_2$$

Find eqn of a line parallel to $y = 3x - 5$ passing through $(7, 4)$

Line is of form $y = 3x + c$

Sub in line $4 = 3(7) + c$

$$4 = 21 + c$$

$$4 - 21 = c$$

$$-17 = c$$

$$y = 3x - 17$$

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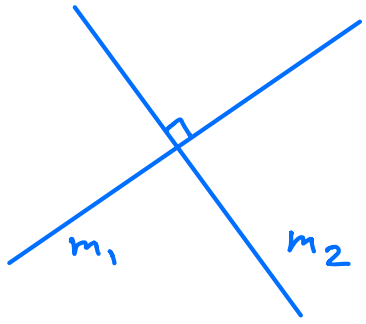


Perpendicular Lines have gradients which multiply to $-1$

$$m_1 \times m_2 = -1$$

$$m_1 = -\frac{1}{m_2}$$

# Examples of Perpendicular Gradients

| $m_1$ | $m_2$ |
|---|---|
| $\frac{1}{2}$ | $-\frac{2}{1} = -2$ |
| $-\frac{4}{5}$ | $+\frac{5}{4}$ |
| $\frac{3}{2}$ | $-\frac{2}{3}$ |
| $6 = \frac{6}{1}$ | $-\frac{1}{6}$ |

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Exercise

| | |
|---|---|
| $\frac{3}{4}$ | $-\frac{4}{3}$ |
| $-4$ | $+\frac{1}{4}$ |
| $1$ | $-1$ |
| $-\frac{2}{5}$ | $+\frac{5}{2}$ |
| $0$ | $\infty$ |

Find eqn of line $\perp$ to $y = 2x + 6$ passing through $(8, 10)$

Line is of the form $y = -\frac{1}{2}x + c$

Sub in line

$$10 = -\frac{1}{2}(8) + c$$
$$10 = -4 + c$$
$$10 + 4 = c$$
$$14 = c$$

$$\underline{y = -\frac{1}{2}x + 14}$$

Exercise

1) Find eqn of line parallel to $y = -5x + 1$ passing through $(4, 1)$

Of form $y = -5x + c$

Sub in line $1 = -5(4) + c$

$1 + 20 = c$

$+21 = c$

$$\underline{y = -5x + 21}$$

2) Find eqn of line perpendicular to $y = -\frac{2}{3}x + 4$ passing through $(8, -2)$

Of form $y = \frac{3}{2}x + c$

Sub in line $-2 = \frac{3}{2}(8) + c$

$-2 = 12 + c$

$-2 - 12 = c$

$-14 = c$

$$\underline{y = \frac{3}{2}x - 14}$$

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Composite Functions

Let $f(x) = x^2$

$g(x) = 2x + 3$

$h(x) = \frac{1}{x}$

$f(1) = 1^2 = 1$

$g(2) = 2(2) + 3 = 4 + 3 = 7$

$$h(3) = \frac{1}{3}$$

$$fg(x) = f(2x+3) = (2x+3)^2 = 4x^2 + 12x + 9$$

$$gf(x) = g(x^2) = 2x^2 + 3$$

$$hfg(x) = hf(2x+3) = h(2x+3)^2 = \frac{1}{(2x+3)^2}$$

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