Straight Line 2
Parallel lines have the same gradient


Example
Find the equation of a line parallel to $y=3 x-2$ passing through $(4,3)$

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

$$
\operatorname{Sub}(4,3)
$$

$$
3=3(4)+c
$$

$$
3=12+c
$$

$$
3-12=c
$$

Answer $\quad y=3 x-9$ $-9=c$


Exercise

1) Find equ of line parallel to $y=2 x-1$ passing through $(4,1)$

$$
\begin{array}{rlr}
y & =2 x+c & \\
\text { Sub }(4,1) \quad & =2(4)+c \\
1 & =8+c & y=2 x-7 \\
1-8 & =c \\
-7 & =c &
\end{array}
$$

2) Find eq of line parallel to $y=-\frac{1}{2} x+3$ passing through ( 4,2 )

$$
\begin{aligned}
& y=-\frac{1}{2} x+c \\
& \operatorname{sub}(4,2) \quad=-\frac{1}{2}(4)+c \\
& 2=-2+c \\
& 2+2=c \\
& 4 \\
& 4
\end{aligned} \quad y=-\frac{1}{2} x+4
$$

Perpendicular Lines
If two lines are perpendicular with gradients $m_{1}$ and $m_{2}$ then

$$
m_{2}=-\frac{1}{m_{1}} \quad \text { or } \quad m_{1} m_{2}=-1
$$

Examples of perpendicular gradients

| $m_{1}$ | $m_{2}$ |
| :---: | :---: |
| $\frac{3}{4}$ | $-\frac{4}{3}$ |
| $-\frac{3}{5}$ | $+\frac{5}{3}$ |
| 2 | $-\frac{1}{2}$ |
| $-\frac{1}{4}$ | 4 or $+\frac{4}{1}$ |
| $-\frac{5}{5}$ | $-\frac{3}{2}$ |
| $\frac{2}{3}$ | $+\frac{9}{4}$ |
| $-\frac{4}{9}$ | $\infty$ |
| 0 | $-\frac{1}{6}$ |

Example
Find the eqn of a line perpendicular to $y=\frac{1}{3} x+7$ passing through $(2,3) \quad \perp \underset{=-3}{\text { gradient }}$

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

$$
\operatorname{sub}(2,3)
$$

$$
\begin{gathered}
3=-3(2)+c \\
3=-6+c \\
3+6=c \\
9=c
\end{gathered}
$$

Solution $y=-3 x+9$

