Perpendicular Lines

Quickfire Questions

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| --- | --- |
| Gradient | Gradient of Perpendicular Line |
| $$2$$ |  |
| $$-3$$ |  |
| $$\frac{1}{4}$$ |  |
| $$5$$ |  |
| $$-\frac{2}{7}$$ |  |
| $$\frac{7}{5}$$ |  |

Problems

1. A line is goes through the point (9,10) and is perpendicular to another line with equation $y=3x+2$. What is the equation of the line?

2. A line $L\_{1}$ goes through the points $A\left(1,3\right)$ and $B\left(3,-1\right)$. A second line $L\_{2}$ is perpendicular to $L\_{1}$ and passes through point B. Where does $L\_{2}$ cross the x-axis?

3. Are the following lines parallel, perpendicular, or neither?

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

$$2x-y+4=0$$

Test Your Understanding

1. A line goes through the point (4,7) and is perpendicular to another line with equation $y=2x+2$. What is the equation of the line? Put your answer in the form $ax+by+c=0$, where $a,b,c$ are integers.

$$x$$

$$y$$

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

$$A$$

2. Determine the point $A$.

Extension

1. *[MAT 2004 1D]*

What is the reflection of the point $\left(3,4\right)$ in the line $3x+4y=50$?

2. *[MAT 2014 1D]* The reflection of the point $\left(1,0\right)$ in the line $y=mx$ has coordinates: (in terms of $m$)

3. *[STEP I 2004 Q6]* The three points $A,B,C$ have coordinates $\left(p\_{1},q\_{1}\right),\left(p\_{2},q\_{2}\right)$ and $\left(p\_{3},q\_{3}\right)$, respectively. Find the point of intersection of the line joining $A$ to the midpoint of $BC$, and the line joining $B$ to the midpoint of $AC$. Verify that this point lies on the line joining $C$ to the midpoint of $AB$.

The point $H$ has coordinates $\left(p\_{1}+p\_{2}+p\_{3},q\_{1}+q\_{2}+q\_{3}\right)$. Show that if the line $AH$ intersects the line $BC$ at right angles, then $p\_{2}^{2}+q\_{2}^{2}=p\_{3}^{2}+q\_{3}^{2}$, and write down a similar result if the line $BH$ intersects the line $AC$ at right angles.

Deduce that if $AH$ is perpendicular to $BC$ and also $BH$ is perpendicular to $AC$, then $CH$ is perpendicular to $AB$.

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