STRAIGHT LINE COORDINATE GEOMETRY

GRADIENTS AND INTERCEPTS

Question 1

For each of the following lines find its gradient, its y intercept and its x intercept.

a) $y=2x+3$

b) $x=4-2y$

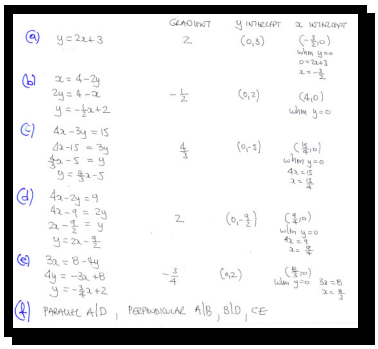
c) $4x-3y=15$

d) $4x-2y=9$

e) $3x=8-4y$

f) Which of the above lines are parallel or perpendicular to each other?

$$\boxed{\begin{matrix}m=2\\(0,3)\\\left(-\frac{3}{2},0\right)\end{matrix}},\ \boxed{\begin{matrix}m=-\frac{1}{2}\\(0,2)\\(4,0)\end{matrix}},\ \boxed{\begin{matrix}m=\frac{4}{3}\\(0,-5)\\\left(\frac{15}{4},0\right)\end{matrix}},\ \boxed{\begin{matrix}m=2\\\left(0,-\frac{9}{2}\right)\\\left(\frac{9}{4},0\right)\end{matrix}},\ \boxed{\begin{matrix}m=-\frac{3}{4}\\(0,2)\\\left(\frac{8}{3},0\right)\end{matrix}},\ \boxed{\begin{matrix}a\perp b\\b\perp d\\a\parallel d\\c\perp e\end{matrix}}$$



Question 2

For each of the following lines find its gradient, its y intercept and its x intercept.

a) $y=3x+2$

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

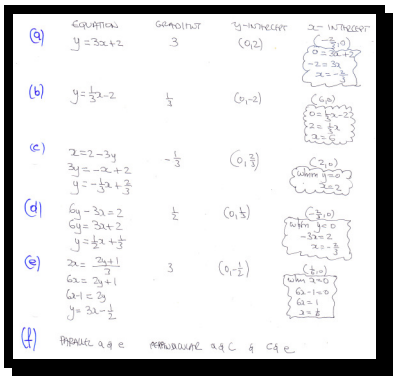
c) $x=2-3y$

d) $6y-3x=2$

e) $2x=\frac{2y+1}{3}$

f) Which of the above lines are parallel or perpendicular to each other?

$$\boxed{\begin{matrix}m=3\\(0,2)\\\left(-\frac{2}{3},0\right)\end{matrix}},\ \boxed{\begin{matrix}m=\frac{1}{3}\\(0,-2)\\(6,0)\end{matrix}},\ \boxed{\begin{matrix}m=-\frac{1}{3}\\\left(0,\frac{2}{3}\right)\\(2,0)\end{matrix}},\ \boxed{\begin{matrix}m=\frac{1}{2}\\\left(0,\frac{1}{3}\right)\\\left(-\frac{2}{3},0\right)\end{matrix}},\ \boxed{\begin{matrix}m=3\\\left(0,-\frac{1}{2}\right)\\\left(\frac{1}{6},0\right)\end{matrix}},\ \boxed{\begin{matrix}a\perp c\\a\parallel e\\c\perp e\end{matrix}}$$



USING STANDARD FORMULAE

Question 1

Given the points $A(4,6)$ and $B(8,18)$ find …

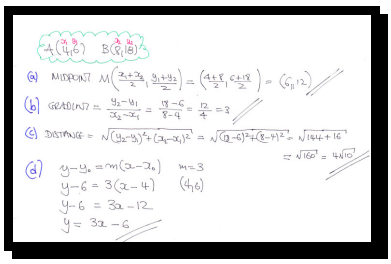
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the exact distance AB.

d) … the equation of the straight line which passes through A and B, giving the answer in the form $y = mx + c$, where m and c are constants.

$\boxed{M(6,12)}$, $\boxed{m = 3}$, $\boxed{d = 4\sqrt{10}}$, $\boxed{y = 3x - 6}$



Question 2

Given the points $A(5,-1)$ and $B(3,5)$ find …

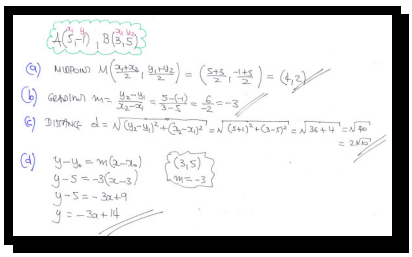
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the exact distance AB.

d) … the equation of the straight line which passes through A and B, giving the answer in the form $y=mx+c$, where m and c are constants.

$\boxed{M(4,2)}$, $\boxed{m=-3}$, $\boxed{d=2\sqrt{10}}$, $\boxed{y=-3x+14}$



Question 3

Given the points $A(3,1)$ and $B(-6,22)$, find …

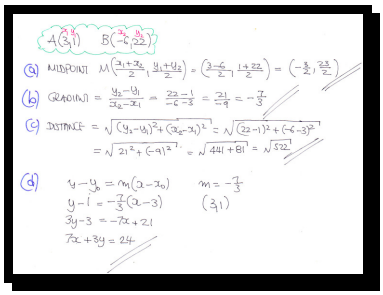
a) …. the exact coordinates of the midpoint of AB.

b) … the exact gradient of AB.

c) … the exact distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by=c$, where a, b and c are integers.

$$\boxed{M\left(-\frac{3}{2},\frac{23}{2}\right)},\ \boxed{m=-\frac{7}{3}},\ \boxed{d=\sqrt{522}=3\sqrt{58}},\ \boxed{7x+3y=24}$$



Question 4

Given the points $A(-6,1)$ and $B(2,7)$, find …

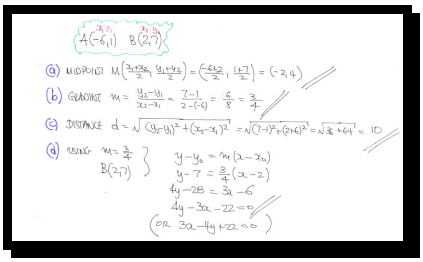
a) … the coordinates of the midpoint of AB.

b) … the exact gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M(-2,4)}$, $\boxed{m=\frac{3}{4}}$, $\boxed{d=10}$, $\boxed{3x-4y+22=0}$



Question 5

Given the points $A(4,9)$ and $B(-4,-11)$, find …

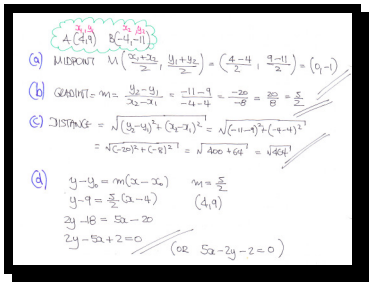
a) … the coordinates of the midpoint of AB.

b) … the exact gradient of AB.

c) … the exact distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M(0,-1)}$, $\boxed{m=\frac{5}{2}}$, $\boxed{d=\sqrt{464}=4\sqrt{29}}$, $\boxed{5x-2y-2=0}$



Question 6

Given the points $A(-1,8)$ and $B(5,-2)$, find …

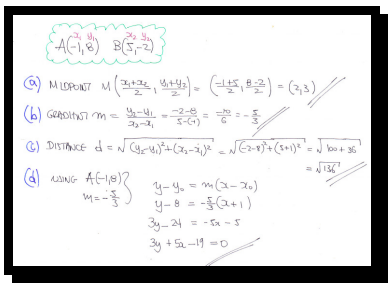
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the exact distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M(2,3)}$, $\boxed{m=-\frac{5}{3}}$, $\boxed{d=\sqrt{136}=2\sqrt{34}}$, $\boxed{5x+3y-19=0}$



Question 7

Given the points $A(4,6)$ and $B(-1,9)$, find …

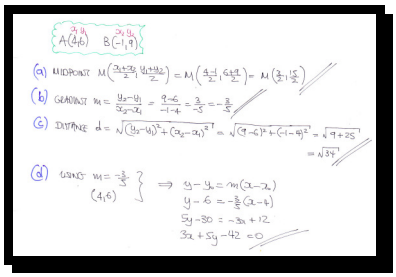
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the exact distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M\left(\frac{3}{2},\frac{15}{2}\right)}$, $\boxed{m=-\frac{3}{5}}$, $\boxed{d=\sqrt{34}}$, $\boxed{3x+5y-42=0}$



Question 8

Given the points $A(-12,7)$ and $B(-6,-3)$, find …

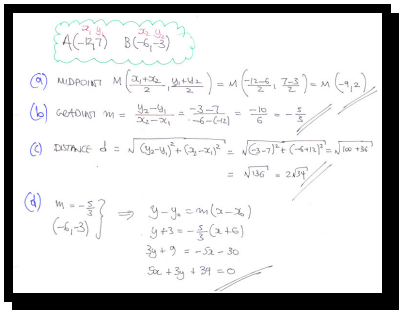
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M(-9,2)}$, $\boxed{m=-\frac{5}{3}}$, $\boxed{d=\sqrt{136}=2\sqrt{34}}$, $\boxed{5x+3y+39=0}$



Question 9

Given the points $A(-3,2)$ and $B(4,-7)$, find …

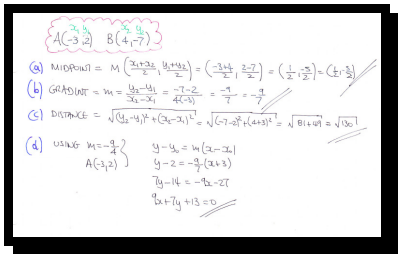
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M\left(\frac{1}{2},-\frac{5}{2}\right)}$, $\boxed{m=-\frac{9}{7}}$, $\boxed{d=\sqrt{130}}$, $\boxed{9x+7y+13=0}$



Question 10

Given the points $A(-4,9)$ and $B(2,-1)$, find …

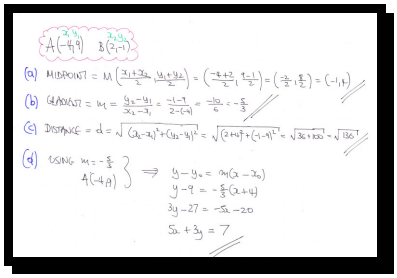
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by=c$, where a, b and c are integers.

$\boxed{M(-1,4)}$, $\boxed{m=-\frac{5}{3}}$, $\boxed{d=\sqrt{136}=2\sqrt{34}}$, $\boxed{5x+3y=7}$



Question 11

Given the points $A(5,-2)$ and $B(7,5)$, find …

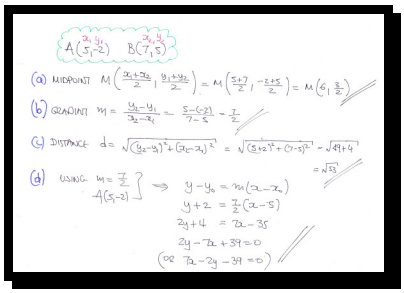
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by+c=0$, where a, b and c are integers.

$\boxed{M\left(6,\frac{3}{2}\right)}$, $\boxed{m=\frac{7}{2}}$, $\boxed{d=\sqrt{53}}$, $\boxed{7x-2y-39=0}$



Question 12

Given the points $A(-5,8)$ and $B(15,-8)$, find …

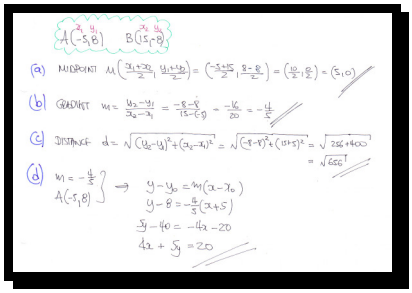
a) … the coordinates of the midpoint of AB.

b) … the gradient of AB.

c) … the distance AB.

d) … an equation of the straight line which passes through A and B, giving the answer in the form $ax+by=c$, where a, b and c are integers.

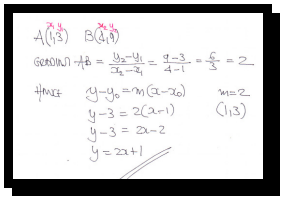
$\boxed{M(5,0)}$, $\boxed{m=-\frac{4}{5}}$, $\boxed{d=\sqrt{656}=4\sqrt{41}}$, $\boxed{4x+5y=20}$



Question 13

Find an equation of the straight line that passes through the points $A(1,3)$ and $B(4,9)$, giving the answer in the form $y=mx+c$, where m and c are constants .

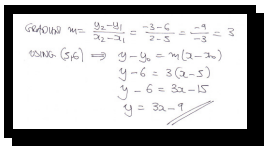
$\boxed{y=2x+1}$



Question 14

Determine the equation of the straight line that passes through the points $A(5,6)$ and $B(2,-3)$, giving the answer in the form $y=mx+c$, where m and c are constants .

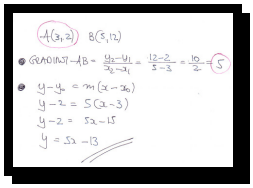
$$\boxed{y=3x-9}$$



Question 15

Determine the equation of the straight line that passes through the points $A(3,2)$ and $B(5,12)$, giving the answer in the form $y=mx+c$, where m and c are constants

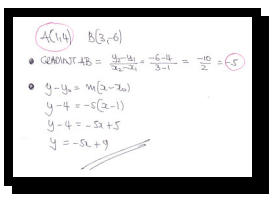
$$\boxed{y=5x-13}$$



Question 16

Determine the equation of the straight line that passes through the points $A(1,4)$ and $B(3,-6)$, giving the answer in the form $y=mx+c$, where m and c are constants

$$\boxed{y=-5x+9}$$



PARALLEL AND PERPENDICULAR LINES

Question 1

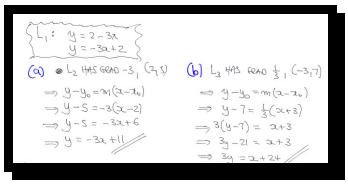
The straight line L_1 has equation

$$y = 2 - 3x .$$

a) Find an equation of the straight line L_2 which is parallel to L_1 and passes through the point with coordinates $(2,5)$.

b) Find an equation of the straight line L_3 which is perpendicular to L_1 and passes through the point with coordinates $(-3,7)$.

$\boxed{L_2 : \ y = -3x + 11}$, $\boxed{L_3 : \ 3y = x + 24}$



Question 2

The straight line L_1 has equation

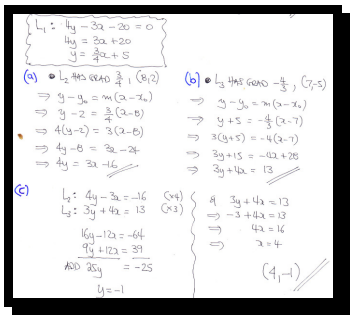
$$4y-3x-20=0.$$

a) Find an equation of the straight line L_2 which is parallel to L_1 and passes through the point with coordinates $(8,2)$.

b) Find an equation of the straight line L_3 which is perpendicular to L_1 and passes through the point with coordinates $(7,-5)$.

c) Find the coordinates of the point of intersection between L_2 and L_3.

$\boxed{L_2:\ 3x-4y-16=0}$, $\boxed{L_3:\ 3y+4x=13}$, $\boxed{(4,-1)}$



Question 3

The straight line L_1 has equation

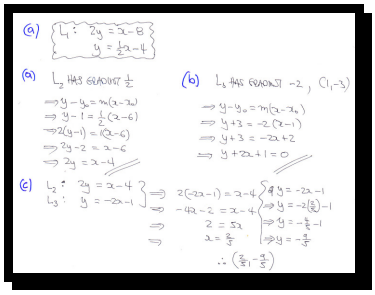
$$2y = x - 8 .$$

a) Find an equation of the straight line L_2 which is parallel to L_1 and passes through the point with coordinates $(6,1)$.

b) Find an equation of the straight line L_3 which is perpendicular to L_1 and passes through the point with coordinates $(1,-3)$.

c) Find the exact coordinates of the point of intersection between L_2 and L_3.

$$\boxed{L_2 :\ 2y = x - 4}\ ,\ \boxed{L_3 :\ y + 2x + 1 = 0}\ ,\ \boxed{\left(\frac{2}{5}, -\frac{9}{5}\right)}$$

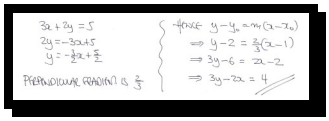


Question 4

Find an equation of the straight line that passes through the point $(1,2)$ and is perpendicular to the straight line with equation $3x + 2y = 5$.

Give the answer in the form $ax + by = c$, where a, b and c are integers.

$$\boxed{3y - 2x = 4}$$



Question 5

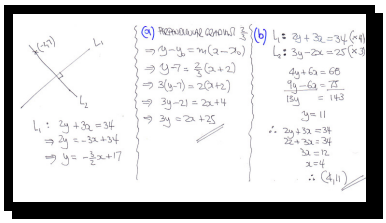
The straight line L_1 has equation

$$2y+3x=34\,.$$

a) Find an equation of the straight line L_2 which is perpendicular to L_1 and passes through the point with coordinates $(-2,7)$.

b) Find the coordinates of the point of intersection between L_1 and L_2.

$$\boxed{L_2:\ 3y=2x+25}\,,\ \boxed{(4,11)}$$



Question 6

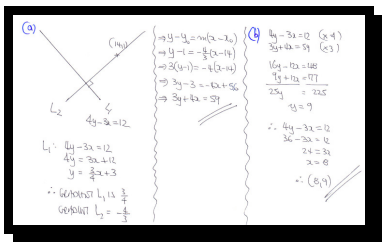
The straight line L_1 has equation

$$4y-3x=12\,.$$

a) Find an equation of the straight line L_2 which is perpendicular to L_1 and passes through the point with coordinates $(14,1)$.

b) Find the coordinates of the point of intersection between L_1 and L_2.

$$\boxed{L_2:\ 3y+4x=59}\,,\ \boxed{(8,9)}$$



Question 7

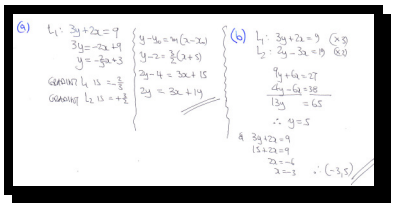
The line straight L_1 has equation

$$3y+2x=9\,.$$

a) Find an equation of the straight line L_2 which is perpendicular to L_1 and passes through the point with coordinates $(-5,2)$.

b) Find the coordinates of the point of intersection between L_1 and L_2.

$$\boxed{L_2:\ 2y=3x+19}\,,\ \boxed{(-3,5)}$$

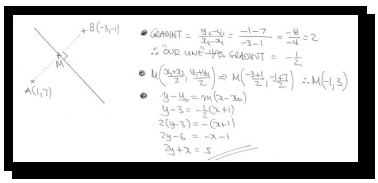


Question 8

The points A and B have coordinates $(1,7)$ and $(-3,-1)$, respectively.

Find an equation of the straight line that is perpendicular to the straight line AB, and passing through the midpoint of AB.

$$\boxed{2y+x=5}$$

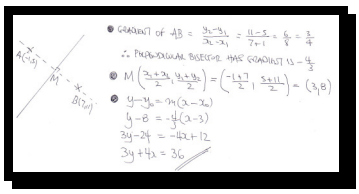


Question 9

The points A and B have coordinates $(-1,5)$ and $(7,11)$, respectively.

Show that the equation of the perpendicular bisector of AB is $4x+3y=36$.

proof

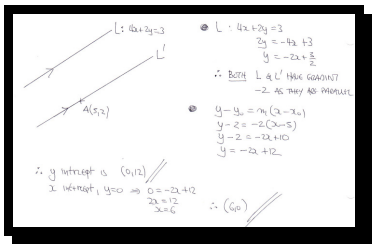


Question 10

A straight line L has equation $4x+2y=3$ and the point A has coordinates $(5,2)$.

Find the coordinates of the points where the straight line that is parallel to L and passing through A, crosses the coordinate axes.

$\boxed{(0,12),(6,0)}$

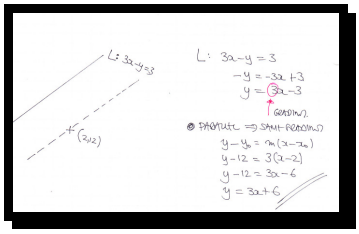


Question 11

A straight line L has equation $3x-y=3$ and the point A has coordinates $(2,12)$.

Find an equation of the straight line that passes through A and is parallel to L.

$$\boxed{y=3x+6}$$

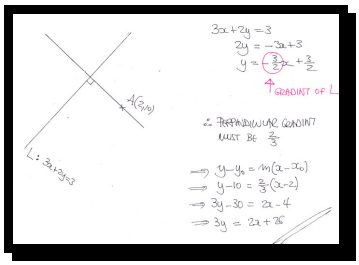


Question 12

A straight line L has equation $3x+2y=3$ and the point A has coordinates $(2,10)$.

Find an equation of the straight line that passes through A and is perpendicular to L.

$$\boxed{3y=2x+26}$$



Question 13

The points A and B have coordinates $(3,4)$ and $(7,-6)$, respectively.

Find an equation of the straight line that passes through A and is perpendicular to AB, giving the answer in the form $ax+by+c=0$ where a, b and c are integers.

$$\boxed{2x-5y+14=0}$$

