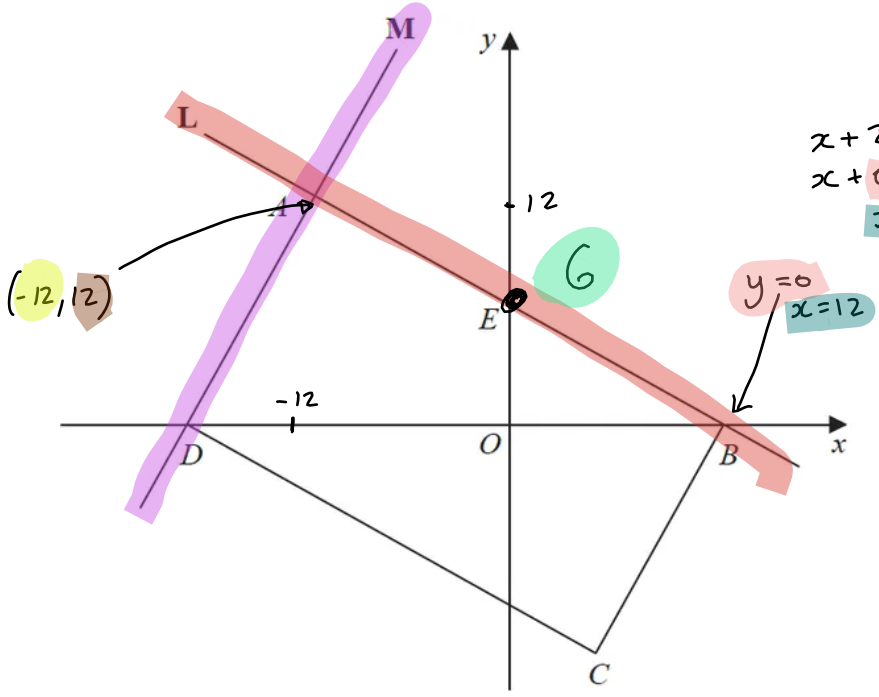
Name: SOLUTIONS

GCSE (1 - 9) Parallel and Perpendicular Lines	Solutions:

These questions represent all of the times that this topic has appeared in unlocked Pearson Edexcel GCSE maths papers as of July 2023. More questions can be found at examq.co.uk

Question	Where the question appeared
1	Edexcel, GCSE, Autumn 2017, Paper 1H, Q19
2	Edexcel, GCSE, Autumn 2017, Paper 2H, Q19
3	Edexcel, GCSE, Autumn 2019, Paper 2H, Q25
4	Edexcel, GCSE, Autumn 2020, Paper 1H, Q15
5	Edexcel, GCSE, Summer 2017, Paper 1H, Q6
6	Edexcel, GCSE, Summer 2017, Paper 1H, Q18
7	Edexcel, GCSE, Summer 2018, Paper 1H, Q19
8	Edexcel, GCSE, Summer 2019, Paper 2H, Q16
9	Edexcel, GCSE, Autumn 2021, Paper 2H, Q11

1



$x + 2y = 12$
$x + 0 = 12$
$x = 12$

ABCD is a rectangle.

A, *E* and *B* are points on the straight line **L** with equation $x + 2y = 12$
A and *D* are points on the straight line **M**.

$AE = EB$

Find an equation for **M**.

$x + 2y = 12$

$2y = -x + 12$

$y = -\frac{1}{2}x + 6$ (gradient $= -\frac{1}{2}$) (y intercept $= 6$)

Line M gradient $= 2$ (perpendicular gradient)

$y = 2x + c$

$12 = 2(-12) + c$

$12 = -24 + c$

$c = 36$

$y = 2x + 36$

(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Autumn 2017, Paper 1H, Q19]

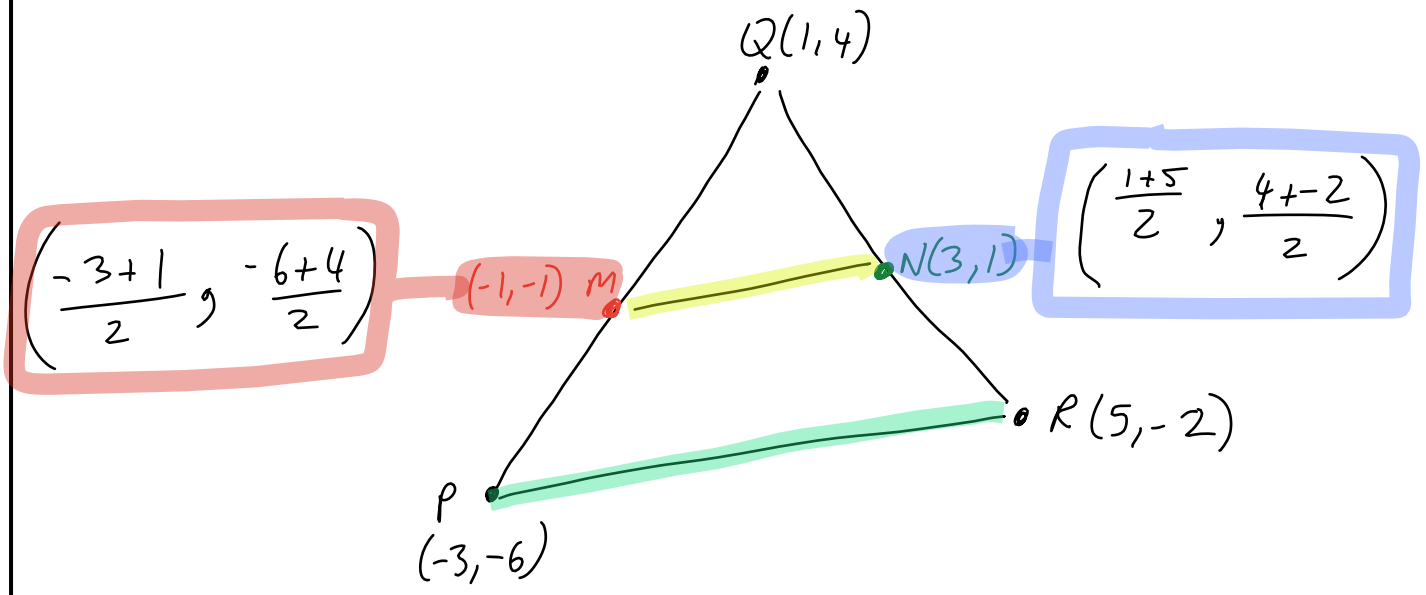
2

A triangle has vertices P, Q and R.

The coordinates of P are $(-3, -6)$
The coordinates of Q are $(1, 4)$
The coordinates of R are $(5, -2)$

M is the midpoint of PQ.
N is the midpoint of QR.

Prove that MN is parallel to PR.
You must show each stage of your working.



Gradient of PR $= \frac{-2--6}{5--3} = \frac{4}{8} = \frac{1}{2}$

Gradient of MN $= \frac{1--1}{3--1} = \frac{2}{4} = \frac{1}{2}$

MN and PR have the same gradient ($\frac{1}{2}$). So they are parallel.

(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Autumn 2017, Paper 2H, Q19]

3

The straight line **L** has equation $3x + 2y = 17$

The point A has coordinates $(0, 2)$
The straight line **M** is perpendicular to **L** and passes through A.

Line **L** crosses the y-axis at the point B.
Lines **L** and **M** intersect at the point C.

Work out the area of triangle ABC.
You must show all your working.

$3x+2y=17$

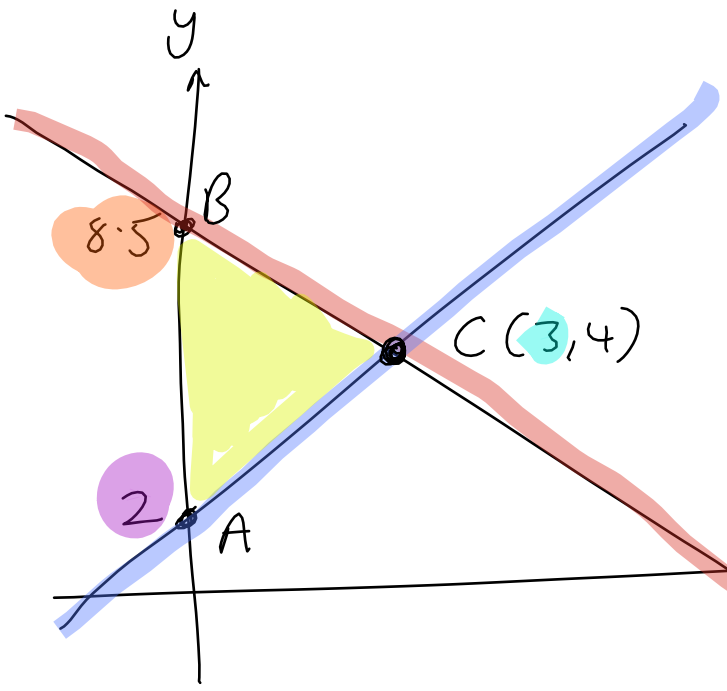
$2y=-3x+17$

L $y=-\frac{3}{2}x+8.5$

Line M is perpendicular so gradient is $\frac{2}{3}$

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

M passes through $(0,2)$ $y=\frac{2}{3}x+2$



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

$\frac{3}{2}x+2=-\frac{3}{2}x+8.5$

$4x+12=-9x+51$

$13x=39$

$x=3$

$y=-\frac{3}{2}x+8.5$

Area $=\frac{(8.5-2)\times 3}{2}=9.75$

9.75

(Total for Question 25 is 5 marks)

[Edexcel, GCSE, Autumn 2019, Paper 2H, Q25]

4

The straight line L_1 has equation $y = 3x - 4$
The straight line L_2 is perpendicular to L_1 and passes through the point (9, 5)

Find an equation of line L_2

L_2 $y = -\frac{1}{3}x + c$

$(5) = -\frac{1}{3}(9) + c$

$5 = -3 + c$

$c = 8$

L_1 $m = 3$

so

L_2 $m = -\frac{1}{3}$

as perpendicular

$y = -\frac{1}{3}x + 8$

(Total for Question 15 is 3 marks)

[Edexcel, GCSE, Autumn 2020, Paper 1H, Q15]

5

The equation of the line L_1 is $y = 3x - 2$
The equation of the line L_2 is $3y - 9x + 5 = 0$

Show that these two lines are parallel.

L_1 $y = 3x - 2$ gradient is 3

L_2 $3y - 9x + 5 = 0$

$3y = 9x - 5$

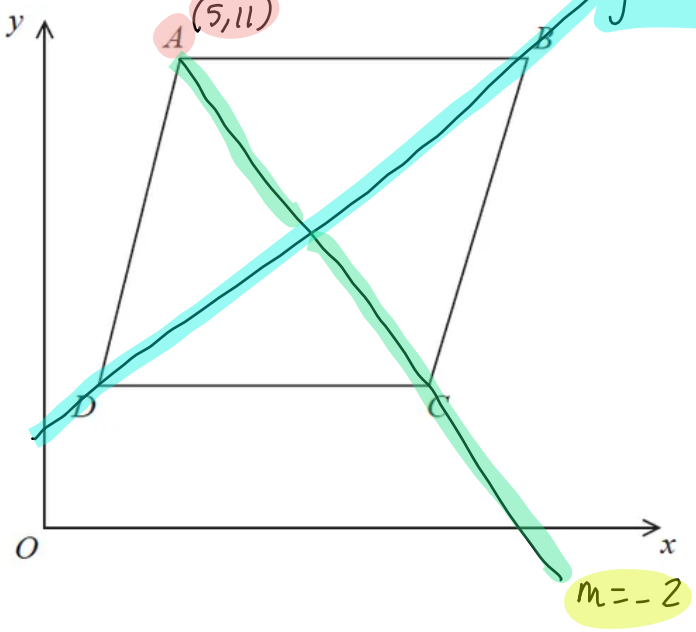
$y = 3x - 5/3$ gradient is also 3

L_1 and L_2 are parallel as L_1 and L_2 have the same gradient

(Total for Question 6 is 2 marks)

[Edexcel, GCSE, Summer 2017, Paper 1H, Q6]

6



m = ½

ABCD is a rhombus.
The coordinates of *A* are (5, 11)
The equation of the diagonal *DB* is $y = \frac{1}{2}x + 6$

Find an equation of the diagonal *AC*.

AC $y = -2x + c$ (5, 11)

$(11) = -2(5) + c$

$11 = -10 + c$

$c = 21$

$y = -2x + 21$

(Total for Question 18 is 4 marks)

[Edexcel, GCSE, Summer 2017, Paper 1H, Q18]

7

The point P has coordinates $(3, 4)$
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $3x + 2y = 7$

Find an expression for b in terms of a.

$3x+2y=7$

$2y=-3x+7$

$y=-\frac{3}{2}x+3.5$

PQ

$y=\frac{2}{3}x+c$ $\quad (3,4)$

$4=\frac{2}{3}(3)+c$

$4=2+c$

$c=2$

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

(a, b)

$b=\frac{2}{3}a+2$

$b=\frac{2}{3}a+2$

(Total for Question 19 is 5 marks)

[Edexcel, GCSE, Summer 2018, Paper 1H, Q19]

8

The straight line **L** has the equation $3y = 4x + 7$
The point A has coordinates $(3, -5)$

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

L

$3y = 4x + 7$

$y = \frac{4}{3}x + \frac{7}{3}$

Perpendicular

$y = -\frac{3}{4}x + c$ (3, −5)

$(-5) = -\frac{3}{4}(3) + c$

$-5 = -\frac{9}{4} + c$

$c = -5 + 2.25$

$c = -2.75$

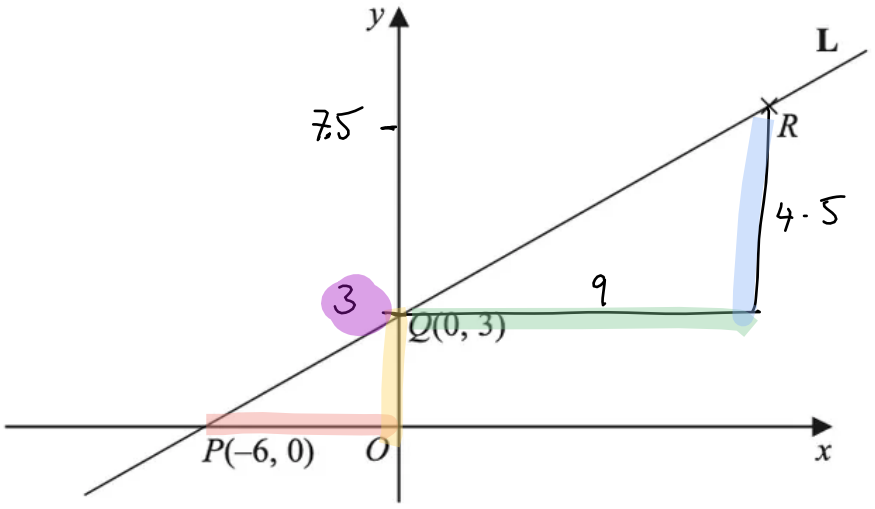
$y = -\frac{3}{4}x - 2.75$

(Total for Question 16 is 3 marks)

[Edexcel, GCSE, Summer 2019, Paper 2H, Q16]

9

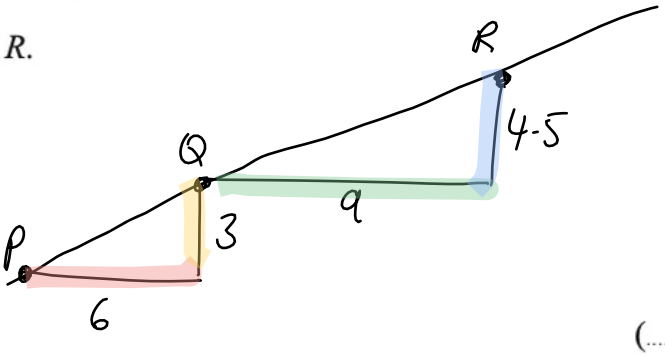
Here is a sketch of the line **L**.



The points $P(-6, 0)$ and $Q(0, 3)$ are points on the line **L**.

The point R is such that PQR is a straight line and $PQ : QR = 2 : 3$

(a) Find the coordinates of R.



(9 , 7.5)

(2)

(b) Find an equation of the line that is perpendicular to **L** and passes through Q.

gradient of L is $3/6 = \frac{1}{2}$

perpendicular gradient is -2

$y = -2x + 3$

(3)

(Total for Question 11 is 5 marks)

[Edexcel, GCSE, Autumn 2021, Paper 2H, Q11]