Parallel Lines

1 The equation of line $\mathbf{L_1}$ is $y = 3x + 4$
The equation of line $\mathbf{L_2}$ is $2y - 6x = 20$

Show that these two lines are parallel.

$$y = 3x + 4$$
$$\text{gradient} = 3$$

$$2y - 6x = 20$$
$$2y = 20 + 6x$$
$$y = 10 + 3x$$
$$\text{gradient} = 3$$

Both lines have same gradient so are parallel

(Total for Question 1 is 2 marks)

2 The equation of line $\mathbf{L_1}$ is $y = 4x - 5$
The equation of line $\mathbf{L_2}$ is $3y - 12x - 6 = 0$

Show that these two lines are parallel.

$$y = 4x - 5$$
$$\text{gradient} = 4$$

$$3y - 12x - 6 = 0$$
$$3y = 12x + 6$$
$$y = 4x + 2$$
$$\text{gradient} = 4$$

Both lines have same gradient so are parallel

(Total for Question 2 is 2 marks)

1

3 The equation of line $\mathbf{L_1}$ is $y = 9 - 4x$
The equation of line $\mathbf{L_2}$ is $2y + 8x = 10$

Show that these two lines are parallel.

$y = 9 - 4x$
$\text{gradient} = -4$

$2y + 8x = 10$
$2y = 10 - 8x$
$y = 5 - 4x$
$\text{gradient} = -4$

Both lines have same gradient so are parallel

(Total for Question 3 is 2 marks)

4 The equation of line $\mathbf{L_1}$ is $y = \frac{1}{2}x + 1$

The equation of line $\mathbf{L_2}$ is $6y - 3x = 30$

Show that these two lines are parallel.

$y = \frac{1}{2}x + 1$
$\text{gradient} = \frac{1}{2}$

$6y - 3x = 30$
$6y = 30 + 3x$
$y = 5 + \frac{1}{2}x$
$\text{gradient} = \frac{1}{2}$

Both lines have same gradient so are parallel

(Total for Question 4 is 2 marks)

5 The equation of line $\mathbf{L_1}$ is $y = 4 - x$
The equation of line $\mathbf{L_2}$ is $5y - 5x - 50 = 0$

Show that these two lines are **not** parallel.

$y = 4 - x$
$\text{gradient} = -1$

$5y - 5x - 50 = 0$
$5y = 5x + 50$
$y = x + 10$
$\text{gradient} = 1$

gradients are not equal so lines not parallel

(Total for Question 5 is 2 marks)

1st

2

6 The equation of line $\mathbf{L_1}$ is $y = kx + 5$
The equation of line $\mathbf{L_2}$ is $10y + 5x = 80$

Lines $\mathbf{L_1}$ and $\mathbf{L_2}$ are parallel.
Work out the value of k.

$$10y + 5x = 80$$
$$10y = 80 - 5x$$
$$y = 8 - \tfrac{1}{2}x$$

$k = $ ....$-\tfrac{1}{2}$........

(Total for Question 6 is 2 marks)

7 The equation of line $\mathbf{L_1}$ is $y = kx - 7$
The equation of line $\mathbf{L_2}$ is $2y + 8x = 9$

Lines $\mathbf{L_1}$ and $\mathbf{L_2}$ are parallel.
Work out the value of k.

$$2y + 8x = 9$$
$$2y = 9 - 8x$$
$$y = \tfrac{9}{2} - 4x$$

$k = $ ....-4........

(Total for Question 7 is 2 marks)

8 The equation of line $\mathbf{L_1}$ is $y = 8 - 6x$
The equation of line $\mathbf{L_2}$ is $ky + 3x - 2 = 0$

Lines $\mathbf{L_1}$ and $\mathbf{L_2}$ are parallel.
Work out the value of k.

$$ky + 3x - 2 = 0$$
$$ky = 2 - 3x$$
$$y = \tfrac{2}{k} - \tfrac{3}{k}x$$

$$\frac{3}{k} = 6$$
$$k = \tfrac{1}{2}$$

$k = $ ....$\tfrac{1}{2}$........

(Total for Question 8 is 2 marks)

1st

3

9 Here are 4 graphs.

Graph A

Graph B
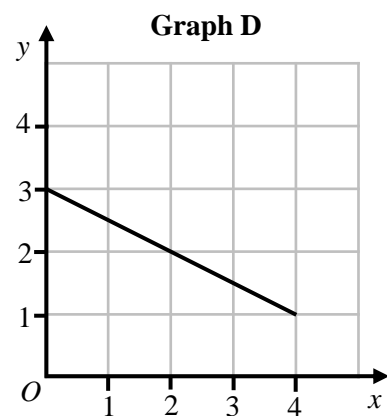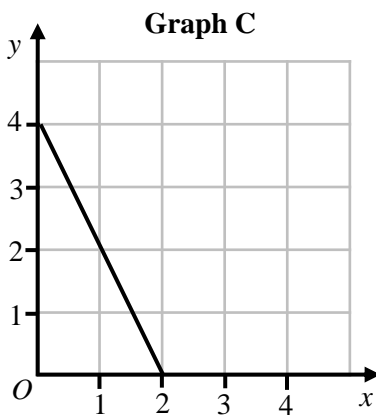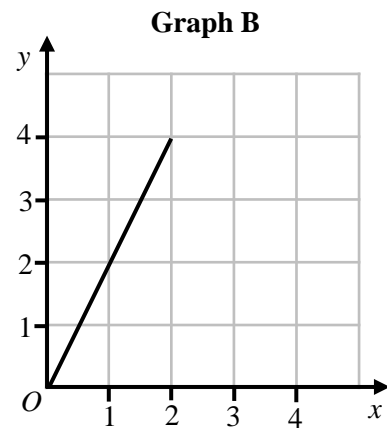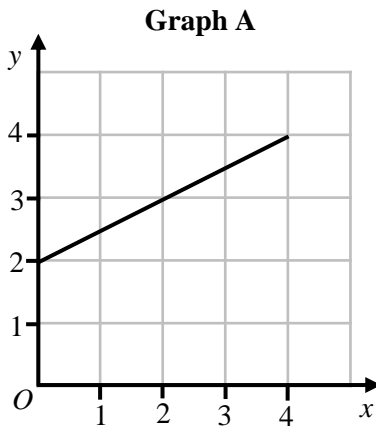
Graph C

Graph D

The table below contains four equations.
Each of the graphs above is parallel to one of the equations below.
Complete the table.

Equation	Graph Letter
$y = 2x + 5$	B
$y + 2x = 10$	C
$2y = x + 6$	A
$2y + x = 8$	D

(Total for Question 9 is 3 marks)

10 $A = (3, 4)$
$B = (5, 10)$
$C = (8, 10)$
$D = (5, 1)$

Show that *AB* is parallel to *CD*.
You **must** show your working.

gradient of AB $= \dfrac{10 - 4}{5 - 3}$ gradient of CD $= \dfrac{1 - 10}{5 - 8}$

$\qquad\qquad\qquad\; = \dfrac{6}{2} \qquad\qquad\qquad\qquad\qquad = \dfrac{-9}{-3}$

$\qquad\qquad\qquad\; = 3 \qquad\qquad\qquad\qquad\qquad\quad = 3$

Both lines have same gradient so are parallel

(Total for Question 10 is 4 marks)

11 $A = (1, -3)$
$B = (3, 5)$
$C = (-2, 5)$
$D = (8, k)$

AB is parallel to *CD*
Work out the value of *k*.

gradient of AB $= \dfrac{5 - -3}{3 - 1}$ gradient of CD $= \dfrac{k - 5}{8 - -2}$

$\qquad\qquad\qquad\; = \dfrac{8}{2} \qquad\qquad\qquad\qquad\qquad = \dfrac{k - 5}{10}$

$\qquad\qquad\qquad\; = 4$

$\qquad\qquad\qquad\qquad \dfrac{k - 5}{10} = 4$

$\qquad\qquad\qquad\qquad\quad k - 5 = 40$

$k = \underline{\qquad 45 \qquad}$

(Total for Question 10 is 4 marks)

1st

5