REVISE THIS TOPIC

Parallel Lines

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

Show that these two lines are parallel. **[3 marks]**

$y = 3x + 4$ $2y - 6x = 20$
gradient = 3 $2y = 20 + 6x$
                                          $y = 10 + 3x$
                                          gradient = 3

Both lines have same gradient so are parallel

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

Show that these two lines are parallel. **[3 marks]**

$y = 4x - 5$ $3y - 12x - 6 = 0$
gradient = 4 $3y = 12x + 6$
                                      $y = 4x + 2$
                                      gradient = 4

Both lines have same gradient so are parallel

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3 The equation of line **L₁** is $y = 9 - 4x$
The equation of line **L₂** is $2y + 8x = 10$

Show that these two lines are parallel.

[3 marks]

$y = 9 - 4x$

$\text{gradient} = -4$

$2y + 8x = 10$

$2y = 10 - 8x$

$y = 5 - 4x$

$\text{gradient} = -4$

Both lines have same gradient so are parallel

4 The equation of line **L₁** is $y = \frac{1}{2}x + 1$

The equation of line **L₂** is $6y - 3x = 30$

[3 marks]

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

5 The equation of line **L₁** is $y = 4 - x$
The equation of line **L₂** is $5y - 5x - 50 = 0$

Show that these two lines are **not** parallel. **[3 marks]**

$y = 4 - x$

$\text{gradient} = -1$

$5y - 5x - 50 = 0$

$5y = 5x + 50$

$y = x + 10$

$\text{gradient} = 1$

gradients are <u>not</u> equal so lines not parallel

6 The equation of line L_1 is $y = kx + 4$
The equation of line L_2 is $10y + 5x = 80$

Lines L_1 and L_2 are parallel. Work out the value of k. **[3 marks]**

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

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

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

Lines L_1 and L_2 are parallel. Work out the value of k. **[3 marks]**

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

$k = \quad -4$

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

Lines L_1 and L_2 are parallel. Work out the value of k. **[3 marks]**

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

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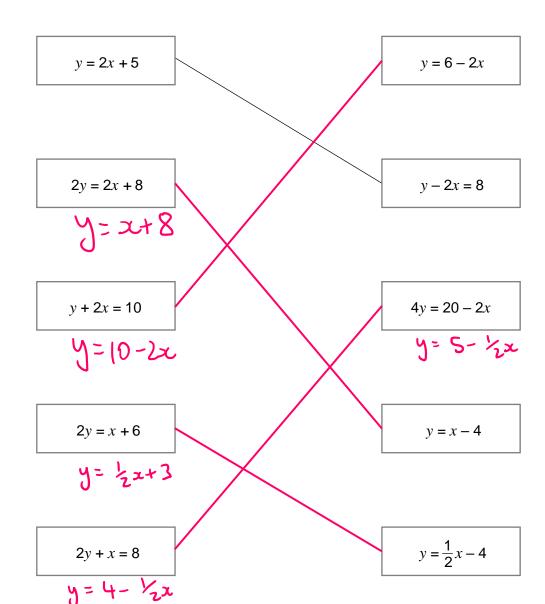
$k = \quad \tfrac{1}{2}$

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Turn over ▶

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9 Here are some equations of straight lines.
Match each equation on the left with one on the right so that the lines with those two equations are parallel.

One has been done for you. **[3 marks]**

$y = 2x + 5$

$y = 6 - 2x$

$2y = 2x + 8$

$y = x + 8$

$y - 2x = 8$

$y + 2x = 10$

$y = 10 - 2x$

$4y = 20 - 2x$

$y = 5 - \frac{1}{2}x$

$2y = x + 6$

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

$y = x - 4$

$2y + x = 8$

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

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

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.

[4 marks]

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

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

$= 3$ $= 3$

Both lines have same gradient so are parallel

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

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

[4 marks]

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

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

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

$k - 5 = 40$

$k = $ _____ 45 _____

12 The equation of line **L$_1$** is $y = 3x + 1$
The equation of line **L$_2$** is $y + kx = 20$ where k is an integer.
The equation of line **L$_3$** is $2y = 3x + c$ where c is an integer.

Tick the correct box for each statement below. **[3 marks]**

	Must be true	Could be true	Cannot be true
Lines **L$_1$** and **L$_2$** are parallel	☐	✓ *eg k = –3*	☐
Lines **L$_2$** and **L$_3$** are parallel	☐	☐	✓
Lines **L$_1$** and **L$_3$** are parallel	☐	☐	✓

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