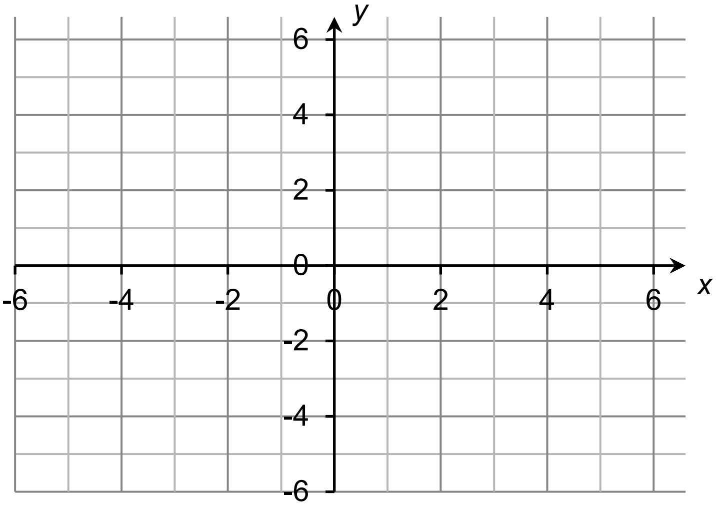
GCSE (9–1)
MATHEMATICS

Foundation Check In - 7.02 Straight line graphs

1. Sketch the graph of $y = 3x - 5$ on the grid.



2. The point (p, 0) lies on the line with equation $y = 4x + 3$. Write down the value of p.

3. Which of the following lines are parallel to $3x - 6y = -4$?

$y = -2x + 1$ $\qquad$ $y = \frac{1}{2}x + 2$ $\qquad$ $y = \frac{9}{2} - \frac{1}{2}x$ $\qquad$ $2y = x + 3$

4. A straight line has gradient 2 and passes through the point (0, 5). Write down the equation of the line parallel to this line which passes through the point (-1, -3).

5. What is the y-intercept of the straight line that passes through the point (5, 12) and cuts the x-axis at 1?

6. Alison says that the line $3y - 6x + 3 = 0$ is parallel to the line $4x = 6 - 2y$. Explain why Alison is wrong.

7. The line with equation $y = ax - 5$ passes through the point (6, 13). Show that the equation of the line is $y = 3x - 5$.

8. A straight line passes through the points (1, 8) and (5, 4). Show that the y-coordinate of the point on the line when $x = -3$ is 12.

9. The line passing through the points (-1, 4) and (5, w) is parallel to $10x = \frac{5}{2} - 5y$.

   Find the value of w.

10. A regular hexagon is drawn on a coordinate grid so that every vertex is the same distance from the origin. Two vertices are marked at (0, 4) and (0, $^-4$).
Find the equations of the six straight lines that would intersect to make this hexagon.

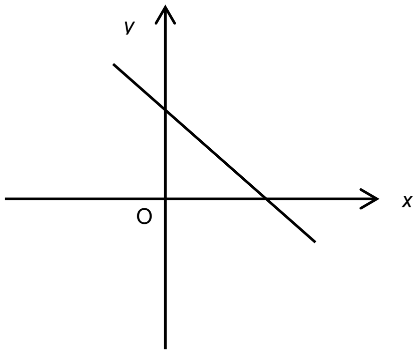
Extension

Match up the following equations with their sketch graphs marking any *x*- and *y*-intercepts on the graphs.

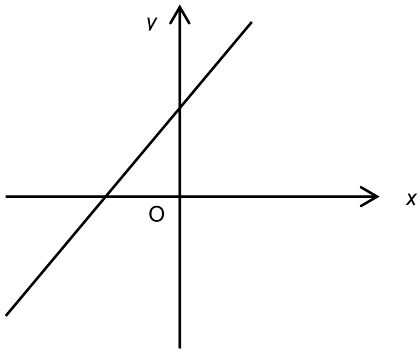
A: $y = 5x - 3$ **B:** $2y = x - 6$ **C:** $3y = 6x + 15$

D: $4x - y = -5$ **E:** $6 - 3x = y$ **F:** $x + y = 5$

1.



2.



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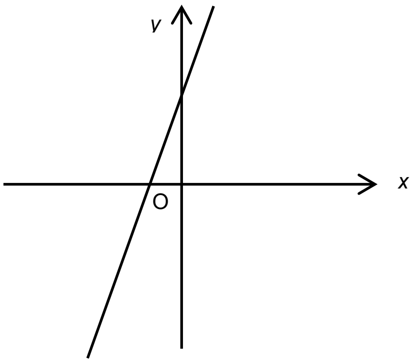

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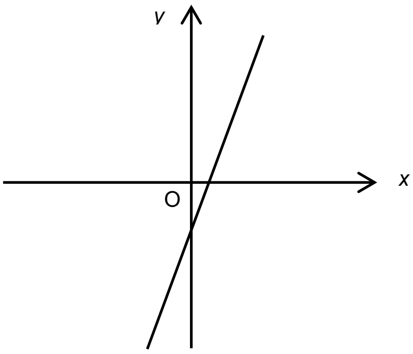

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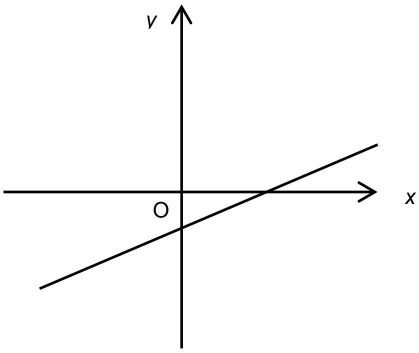

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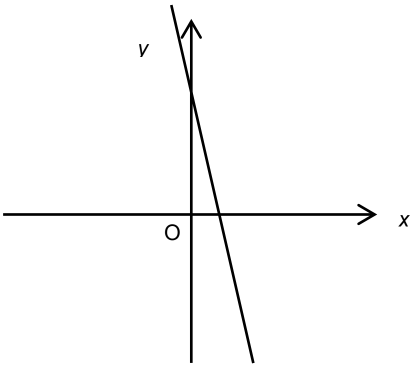
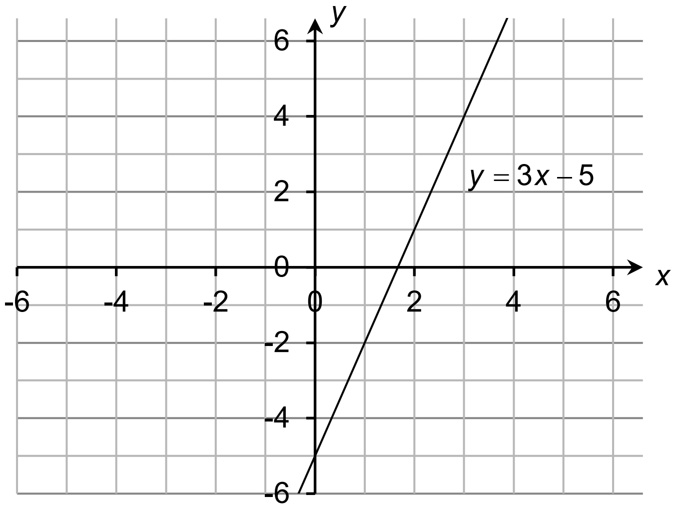


Answers

1.



2. $-\frac{3}{4}$

3. Gradient $= \frac{1}{2}$ so the parallel lines are $y = \frac{1}{2}x + 2$ and $2y = x + 3$.

4. $y = 2x - 1$

5. Gradient $= \frac{12 - 0}{5 - 1} = \frac{12}{4} = 3$ so $y = 3x + c$. Substituting one of the coordinates and solving gives $c = -3$.

6. The line $3y - 6x + 3 = 0$ has gradient 2 whereas the line $4x = 6 - 2y$ has gradient -2. Parallel lines must have the same gradient so Alison is wrong.

7. $y = ax - 5$

   When $x = 6$ and $y = 13$, $13 = a \times 6 - 5$
   $18 = 6a$
   $a = 3$ therefore the equation is $y = 3x - 5$

8. The gradient of the line is $\frac{4 - 8}{5 - 1} = \frac{-4}{4} = -1$ so the equation of the line is $y = -x + c$.
   If the line goes through (1, 8), when $x = 1$, $y = 8$ so $8 = -1 + c$
   $9 = c$
   The equation is $y = -x + 9$ so when $x = -3$, $y = 3 + 9 = 12$

9. $w = -8$

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

Extension

A: $y = 5x - 3$ is graph 4

$(0, -3)$ and $\left(\frac{3}{5}, 0\right)$

B: $2y = x - 6$ is graph 5

$(0, -3)$ and $(6, 0)$

C: $3y = 6x + 15$ is graph 2

$(0, 5)$ and $\left(-\frac{5}{2}, 0\right)$

D: $4x - y = 5$ is graph 3

$(0, 5)$ and $\left(-\frac{5}{4}, 0\right)$

E: $6 - 3x = y$ is graph 6

$(0, 6)$ and $(2, 0)$

F: $x + y = 5$ is graph 1

$(0, 5)$ and $(5, 0)$

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

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AO1	1	Sketch an equation of a straight line			
AO1	2	Find the intercept of a straight line using $y = mx + c$			
AO1	3	Identify equations of parallel lines			
AO1	4	Find the equation of a parallel line given the gradient and a point on the line			
AO1	5	Find the y-intercept of a straight line that passes through two given points			
AO2	6	Apply knowledge of equations of parallel lines			
AO2	7	Find the equation of a straight line using $y = mx + c$ and a point on the line			
AO2	8	Find a y-coordinate of a point on a straight line that passes through two given points			
AO3	9	Solve a problem involving the equation of a straight line that passes through two given points			
AO3	10	Solve a geometric problem by identifying equations of lines			

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