Parallel and Perpendicular Lines - Worksheet

Skill

Group A - Parallel Lines

State the equation of a line that is parallel to the given equation.

1) $y = 2x$

2) $y = 4x + 5$

3) $y = 7x - 3$

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

5) $y = -x + 3$

6) $y = -5x - 3$

7) $y = 6 - x$

8) $y = 3 - 2x$

9) $y = \frac{x}{5} + 7$

10) $2y - 9 = x$

11) $3y + 4x = 10$

12) $2(x - y) = 15$

Group B - Perpendicular Lines

State the gradient that is perpendicular to the given equation.

1) $y = x$

2) $y = 4x$

3) $y = 6x + 1$

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

5) $y = -3x$

6) $y = -2x + 7$

7) $y = -\frac{1}{5}x$

8) $y = \frac{2}{5}x$

9) $y = 0.6x + 0.25$

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

11) $y = -2\frac{3}{4}x$

12) $y = -3.6x + 5$

Group C - Parallel or Perpendicular

Show that the two straight line equations are parallel, perpendicular or neither.

1) $y = 2x + 4$
$y = 2x + 9$

2) $y = 4x + 3$
$y = -x + 3$

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

4) $y = 3x + 5$
$y = 3 + 5x$

5) $y = 4x + 6$
$2y = 8x + 18$

6) $y = 4 - x$
$y = x - 4$

7) $y = \frac{2}{3}x + 2$
$y = 6 - \frac{3}{2}x$

8) $3y = 4x + 1$
$y = -\frac{1}{12}x + 8$

9) $x + y = 1$
$x - y = 1$

10) $3y = 6 - \frac{x}{2}$
$5y = 10 - \frac{x}{2}$

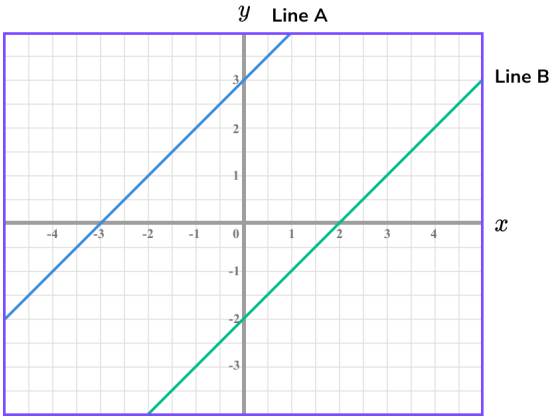
11) $y - 0.6x = 17$
$y = \frac{3}{5}x + 14$

12) $5y = -2x + 6$
$y = 2.5x + 7$

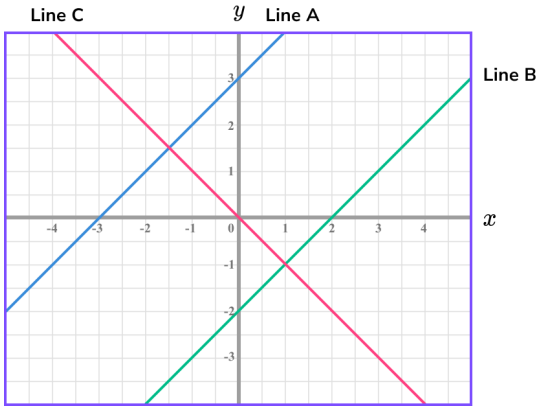
Parallel and Perpendicular Lines - Worksheet

Applied

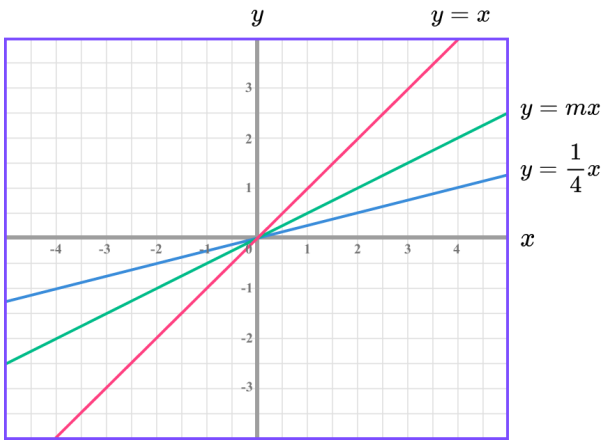
1) a) Given that the two lines A and B are parallel and the equation of line A is $y = 3 + x$, state the equation of line B.

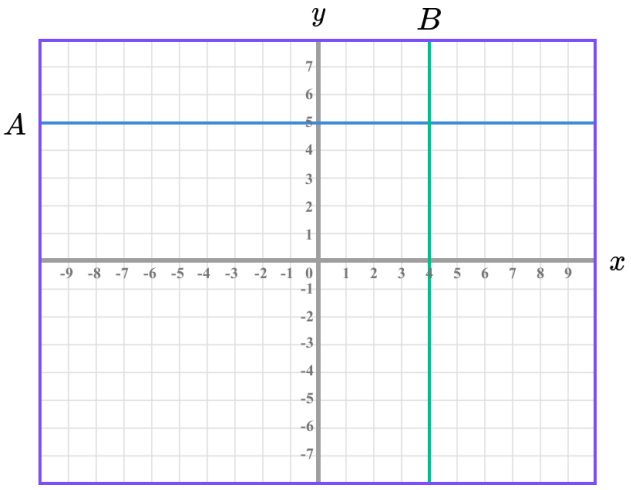
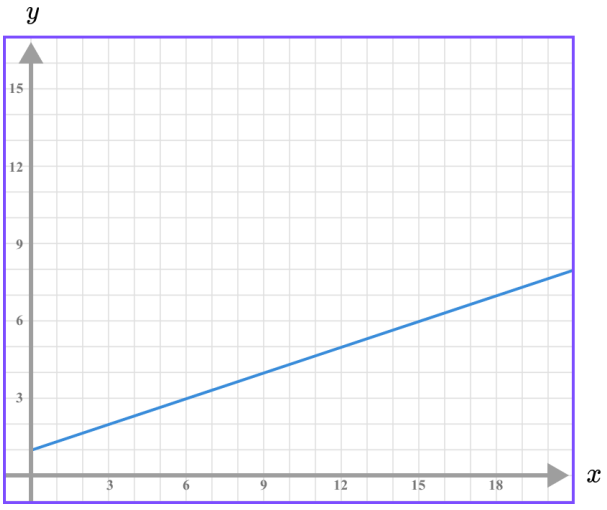


b) Show that line C is perpendicular to lines A and B.



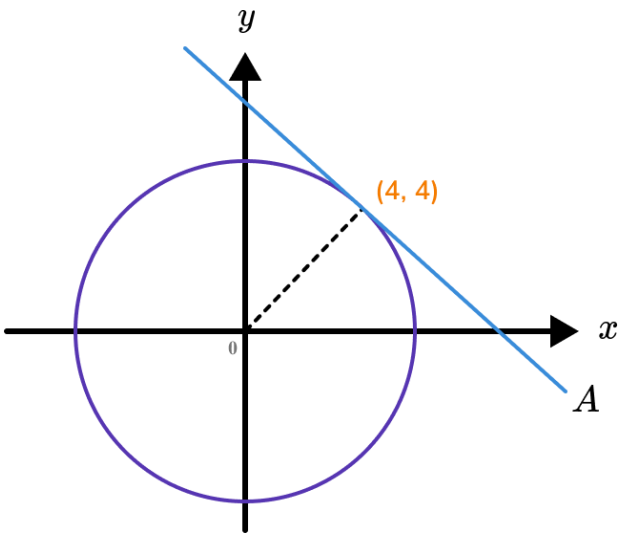
2) a) Use the lines $y = x$ and $y = \frac{1}{4}x$ to state the value of m for the line $y = mx$.



	b)	Draw the line that is perpendicular to the line $y = mx$ at the origin using your answer to part a) to help you.
3)	**a)**	Line A is parallel to the x axis. State the equation of line A. 
	b)	Line B is perpendicular to line A at the point (4,5). State the equation of line B.
4)	**a)**	Construct the perpendicular to the line $y = \frac{1}{3}x + 1$ on the set of axes below going through the coordinate (9,4). 
	b)	Hence calculate the gradient of the perpendicular.

Parallel and Perpendicular Lines - Exam Questions

1) **(a)** The line A is the tangent to the circle of centre O. The tangent meets the circle at the coordinate (4,4). Calculate the gradient of the tangent.



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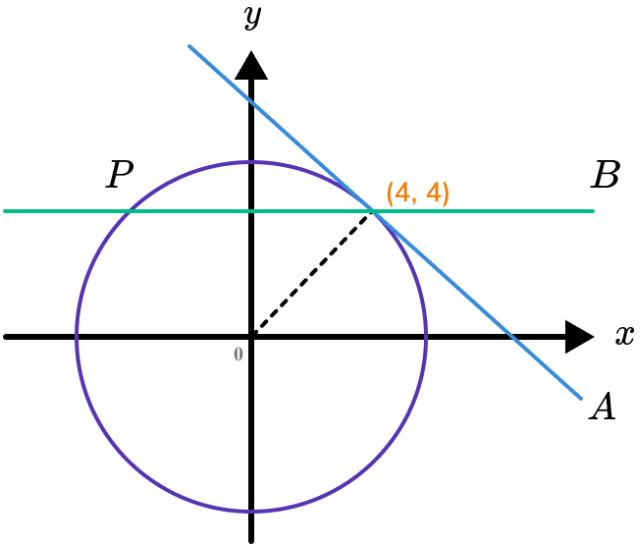
(2)

(b) Line B is parallel to the x axis going through the point (4,4). State the coordinate P.



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(1)

(3 marks)

2) **(a)** The equation of a line A is 2y+4x=11. Another line B is parallel to line A. What is the gradient of line B? Circle the correct answer.

4	2	$-\frac{1}{2}$	-2	$\frac{1}{2}$

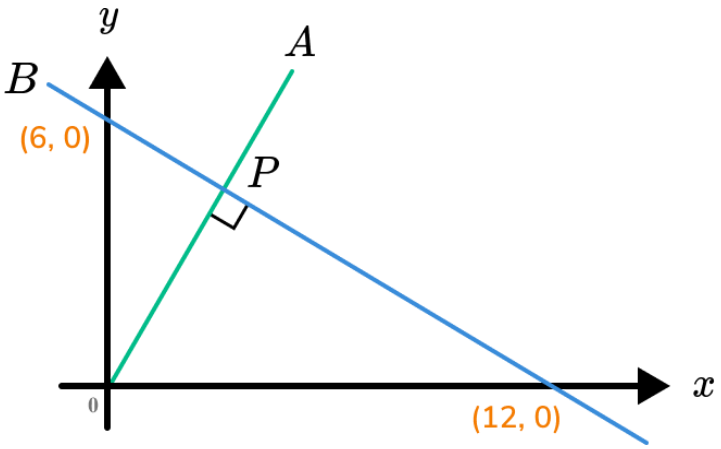
.....
(1)

(b) Line C is perpendicular to line A. What is the gradient of line C? Circle the correct answer.

4	2	$-\frac{1}{2}$	-2	$\frac{1}{2}$

.....
(1)
(2 marks)

3) Two lines A and B are perpendicular. They intersect at the point P. Calculate the coordinate P.



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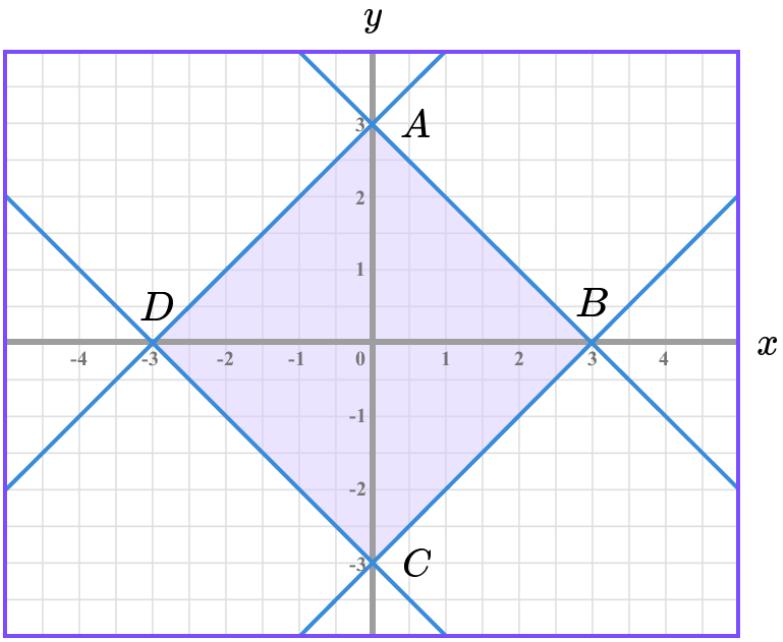
(8)

4) Show that the shape ABCD is a square using parallel and perpendicular lines.



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(8)

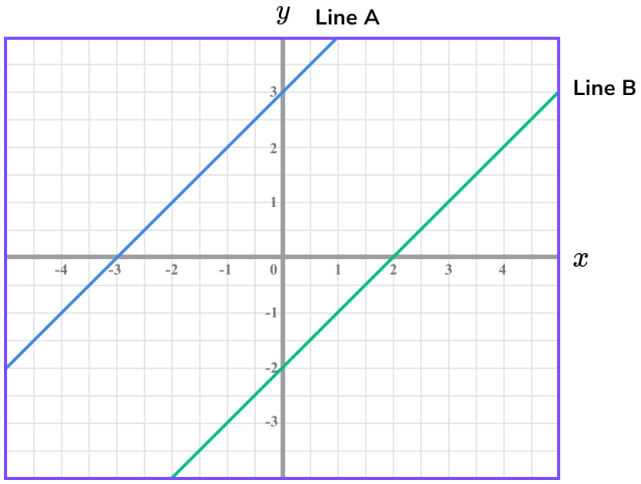
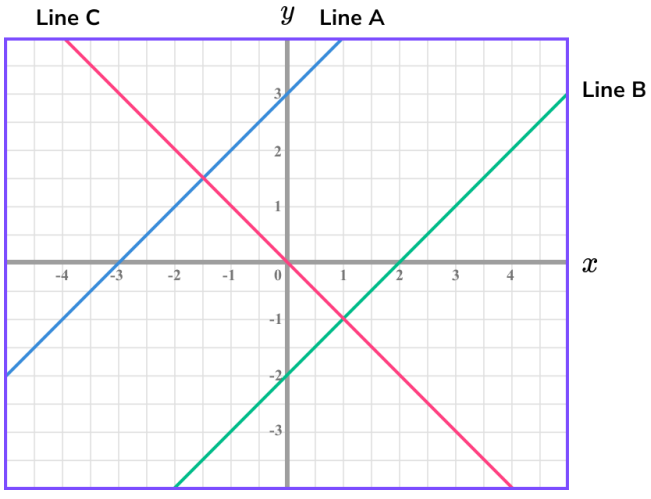
Parallel and Perpendicular Lines - Answers

	Question	Answer
Group A	Skill Questions	
	State the equation of a line that is parallel to the given equation. **1)** $y = 2x$ **2)** $y = 4x + 5$ **3)** $y = 7x - 3$ **4)** $y = \frac{1}{2}x + 4$ **5)** $y = -x + 3$ **6)** $y = -5x - 3$ **7)** $y = 6 - x$ **8)** $y = 3 - 2x$ **9)** $y = \frac{x}{5} + 7$ **10)** $2y - 9 = x$ **11)** $3y + 4x = 10$ **12)** $2(x - y) = 15$	**1)** $y = 2x + c$ **2)** $y = 4x + c$ **3)** $y = 7x + c$ **4)** $y = \frac{1}{2}x + c$ **5)** $y = -x + c$ **6)** $y = -5x + c$ **7)** $y = -x + c$ **8)** $y = -2x + c$ **9)** $y = \frac{1}{5}x + c$ **10)** $y = \frac{1}{2}x + c$ **11)** $y = -\frac{4}{3}x + c$ **12)** $y = x + c$
Group B	State the gradient that is perpendicular to the given equation. **1)** $y = x$ **2)** $y = 4x$ **3)** $y = 6x + 1$ **4)** $y = \frac{1}{2}x$ **5)** $y = -3x$ **6)** $y = -2x + 7$ **7)** $y = -\frac{1}{5}x$ **8)** $y = \frac{2}{5}x$ **9)** $y = 0.6x + 0.25$ **10)** $y = 1\frac{1}{2}x + 3$ **11)** $y = -2\frac{3}{4}x$ **12)** $y = -3.6x + 5$	**1)** $n = -1$ **2)** $n = -\frac{1}{4}$ **3)** $n = -\frac{1}{6}$ **4)** $n = -2$ **5)** $n = \frac{1}{3}$ **6)** $n = \frac{1}{2}$ **7)** $n = 5$ **8)** $n = -\frac{5}{2}$ **9)** $n = -\frac{5}{3}$ **10)** $n = -\frac{2}{3}$ **11)** $n = \frac{4}{11}$ **12)** $n = \frac{5}{18}$

Parallel and Perpendicular Lines - Answers

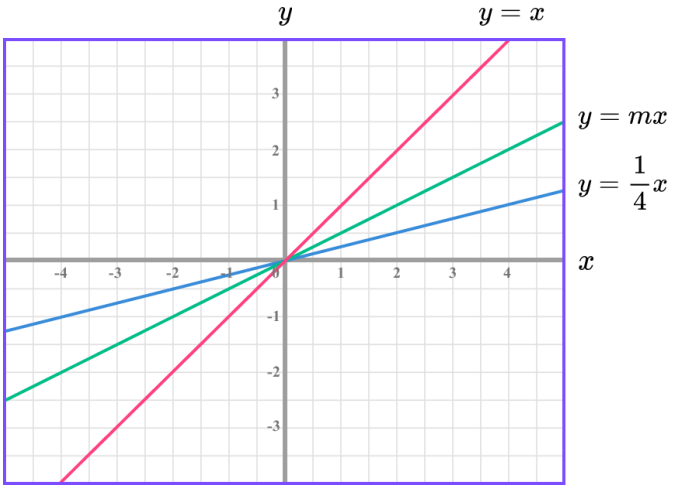
	Question	Answer
Group C	Skill Questions	
	Show that the two straight line equations are parallel, perpendicular or neither. **1)** $y = 2x + 4,\ y = 2x + 9$ **2)** $y = 4x + 3, y = -x + 3$ **3)** $y = -2x,\ y = \frac{1}{2}x$ **4)** $y = 3x + 5,\ y = 3 + 5x$ **5)** $y = 4x + 6,\ 2y = 8x + 18$ **6)** $y = 4 - x,\ y = x - 4$ **7)** $y = \frac{2}{3}x + 2,\ y = 6 - \frac{3}{2}x$ **8)** $3y = 4x + 1,\ y = -\frac{1}{12}x + 8$ **9)** $x + y = 1,\ x - y = 1$ **10)** $3y = 6 - \frac{x}{2},\ 5y = 10 - \frac{x}{2}$ **11)** $y - 0.6x = 17, y = \frac{3}{5}x + 14$ **12)** $5y = -2x + 6, y = 2.5x + 7$	**1) Parallel** **2) Neither** **3) Perpendicular** **4) Neither** **5) Parallel** **6) Perpendicular** **7) Perpendicular** **8) Neither** **9) Perpendicular** **10) Neither** **11) Parallel** **12) Perpendicular**

Parallel and Perpendicular Lines - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Given that the two lines A and B are parallel and the equation of line A is $y = 3 + x$, calculate the equation of line B.  	**a)** Gradient of line B is 1 Y-intercept of line B is -2 $y = x - 2$
	b) Show that line C is perpendicular to lines A and B.  	**b)** Gradient of line C is -1 $1 \times -1 = -1$ The lines are perpendicular as the product of their gradients is equal to -1..

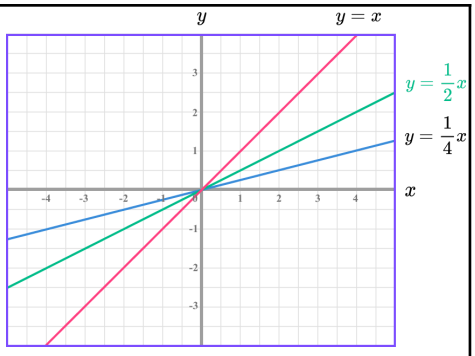
2)

a) Use the lines $y = x$ and $y = \frac{1}{4}x$ to state the value of m for the line $y = mx$.



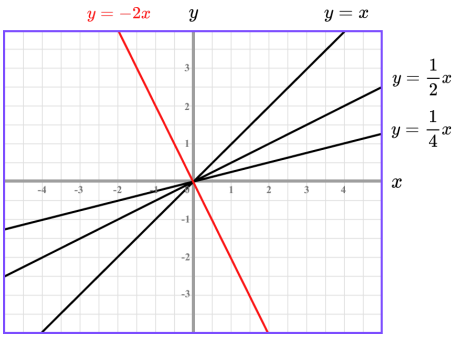
b) Draw the line that is perpendicular to the line $y = mx$ at the origin, using your answer to part a) to help you.

a)



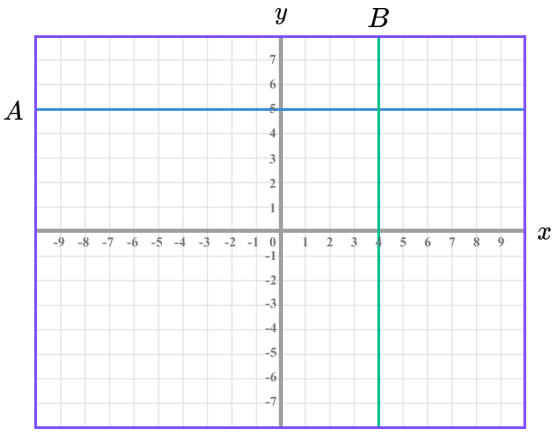
b) The gradient of the perpendicular line n is equal to $n = -1 \div \frac{1}{2} = -2$

The y intercept is 0.



3)

a) Line A is parallel to the x axis. State the equation of line A.



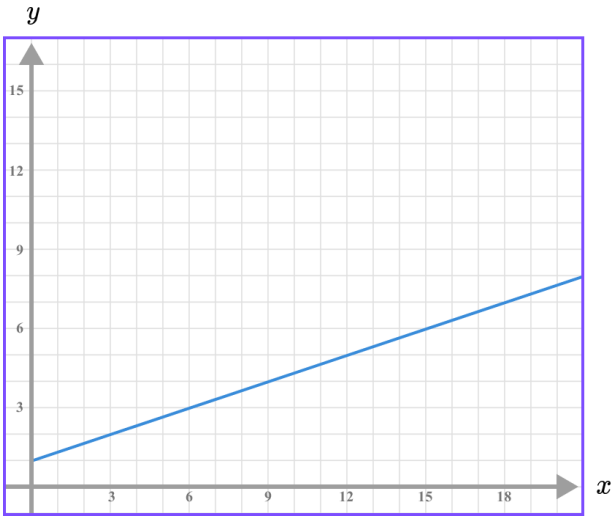
b) Line B is perpendicular to line A at the point (4,5). State the equation of line B.

a) $y = 5$

b) $x = 4$

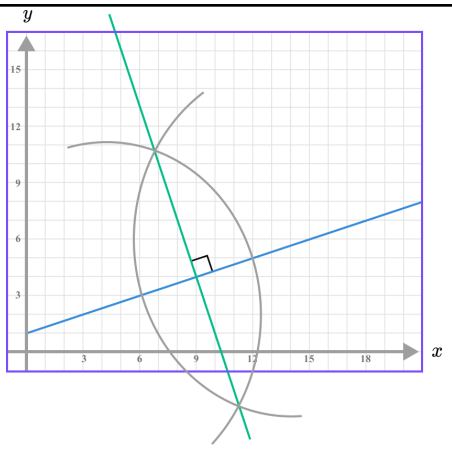
4)

a) Construct the perpendicular bisector to the line $y = \frac{1}{3}x + 1$ on the set of axes below going through the coordinate (9,4).



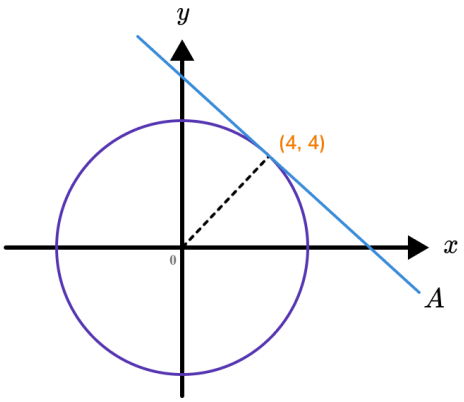
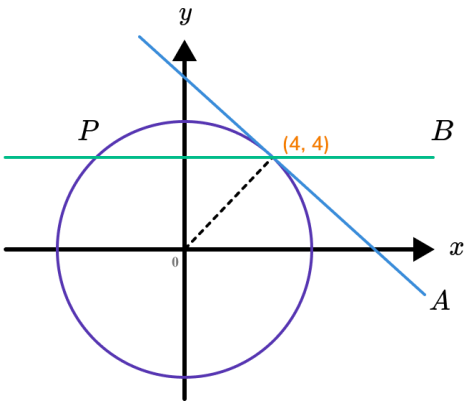
b) Hence calculate the gradient of the perpendicular bisector.

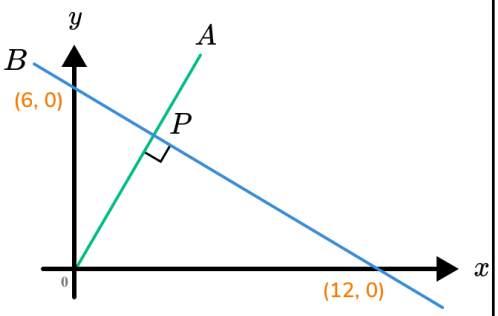
a)

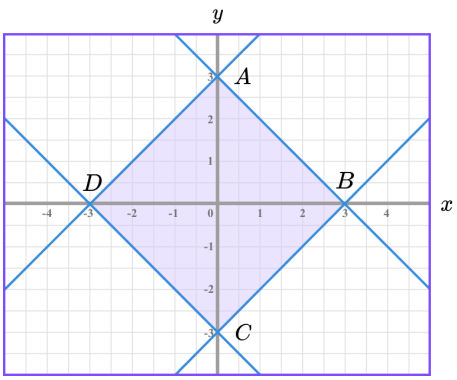


b) $n = -1 \div \frac{1}{3} = -1 \times 3 = -3$

Parallel and Perpendicular Lines - Answers

	Question	Answer	
	Exam Questions		
1) (a)	The line A is the tangent to the circle of centre O. The tangent meets the circle at the coordinate (4,4). Calculate the gradient of the tangent. 	(a) $m = \frac{4-0}{4-0} = 1$ $n = -1 \div 1 = -1$	**(1)** **(1)**
(b)	Line B is parallel to the x axis going through the point (4,4). State the coordinate P. 	(b) $(-4, 4)$	**(1)**
2) (a)	The equation of a line A is 2y+4x=11. Another line B is parallel to line A. What is the gradient of line B? Circle the correct answer. 4 | 2 | $-\frac{1}{2}$ | -2 | $\frac{1}{2}$	(a) -2	**(1)**

(b)	Line C is perpendicular to line A. What is the gradient of line C? Circle the correct answer. 4 | 2 | $-\frac{1}{2}$ | -2 | $\frac{1}{2}$	(b) $\frac{1}{2}$	**(1)**
3)	Two lines A and B are perpendicular. They intersect at the point P. Calculate the coordinate P. 	Line B: Gradient $m = \frac{6-0}{0-12} = -\frac{1}{2}$ Y-intercept $c = 6$ Line B equation: $y = -\frac{1}{2}x + 6$ Line A: Gradient $n = -1 \div -\frac{1}{2} = 2$ Y-intercept $c = 0$ Line A equation: $y = 2x$ Coordinate P: $2x = -\frac{1}{2}x + 6$ $+\frac{1}{2}x \quad +\frac{1}{2}x$ $\frac{5}{2}x = 6$ $\times 2 \quad \times 2$ $5x = 12$ $\div 5 \quad \div 5$ $x = 2.4$ When $x = 2.4$, $y = 2 \times 2.4 = 4.8$ P=(2.4,4.8)	**(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)** **(1)**

4)	Show that the shape ABCD is a square using parallel and perpendicular lines.  	Line AB: $y = -x + 3$ or $y = 3 - x$ Line BC: $y = x - 3$ Line CD: $y = -x - 3$ Line AD: $y = x + 3$ **A square has 2 sets of parallel sides:** Line AB and CD have the same gradient and so they are parallel. Line BC and AD have the same gradient and so they are parallel. **A square contains four 90° angles:** Line AB and BC are perpendicular as $1 \times -1 = -1$ (the product of their gradients is -1) Line BX and CD are perpendicular $1 \times -1 = -1$ (the product of their gradients is -1) Line CD and AD are perpendicular as $1 \times -1 = -1$ (the product of their gradients is -1) Line AD and AB are perpendicular as $1 \times -1 = -1$ (the product of their gradients is -1) **The diagonals are the same length:** AC=BD=6 units Therefore ABCD is a square.	**(1)** **(1)** **(1)** **(1)** **(1)** **(2)** **(1)**

