


L6 Booster Algebra

Name: _____

Date: _____

19. Match each expression on the left with the equivalent expression on the right.
The first one is done for you.



$3d + d$	3
$3d - d$	$2d$
$3d \times d$	$3d$
$3d \div d$	$4d$
	$2d^2$
	$3d^2$
	$2d^3$

A line connects the box containing $3d + d$ to the box containing $4d$.

2 marks

11. Write each expression in its simplest form.

$$7 + 2t + 3t$$



.....

.....
1 mark

$$b + 7 + 2b + 10$$



.....

.....
1 mark

$$(3d + 5) + (d - 2)$$



.....

.....
1 mark

$$3m - (-m)$$



.....

.....
1 mark

13. One way to make a magic square is to substitute numbers into this algebra grid.


$a + b$	$a - b + c$	$a - c$
$a - b - c$	a	$a + b + c$
$a + c$	$a + b - c$	$a - b$

- (a) Complete the magic square below using the values

$$a = 10$$

$$b = 3$$

$$c = 5$$



		5
	10	
15		

.....

.....
2 marks

(b) Here is the algebra grid again.

$a + b$	$a - b + c$	$a - c$
$a - b - c$	a	$a + b + c$
$a + c$	$a + b - c$	$a - b$

I use **different values** for a , b and c to complete the magic square.

20	21	7
3	16	29
25	11	12

What values for a , b and c did I use?

14. Write numbers in the boxes to make the statements true.



When $x =$ then $x + 3 =$

When $x =$ then $3x =$

When $x =$ then $\frac{x}{3} =$

2 marks

17. Find the values of x

$$5x - 3 = 12$$



$x =$ _____

1 mark

$$13 + 2x = 3$$



$x =$ _____

1 mark



27. Find the value of x

$$6 + 2x = x - 6$$



$x = \underline{\hspace{2cm}}$

2 marks

21. (a) Solve this equation.

$$7 + 5k = 8k + 1$$



$k = \dots\dots\dots$

.....
1 mark

(b) Solve this equation. Show your working.

$$10y + 23 = 4y + 26$$



$y = \dots\dots\dots$

.....
.....
2 marks

15. (a) When $x = 5$, work out the values of the expressions below.



$$2x + 13 = \dots\dots\dots$$

$$5x - 5 = \dots\dots\dots$$

$$3 + 6x = \dots\dots\dots$$

.....

2 marks

(b) When $2y + 11 = 17$, work out the value of y
Show your working.



$$y = \dots\dots\dots$$

.....

2 marks

(c) Solve the equation $9y + 3 = 5y + 13$
Show your working.



$$y = \dots\dots\dots$$

.....

2 marks

20. Rearrange the equations.



$$b + 4 = a$$

$$b = \dots\dots\dots$$

.....
1 mark

$$4d = c$$

$$d = \dots\dots\dots$$

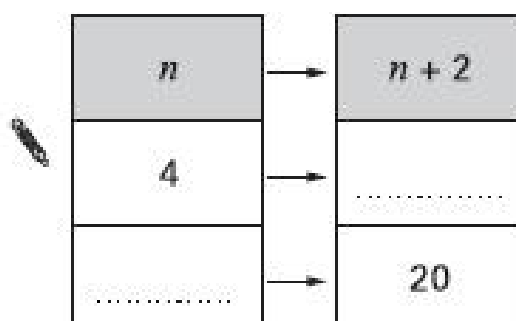
.....
1 mark

$$m - 3 = 4k$$

$$m = \dots\dots\dots$$

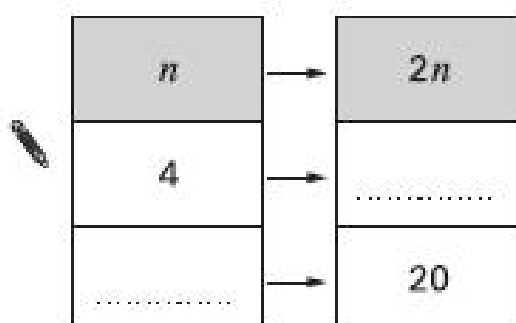
.....
1 mark

15. (a) A function maps the number n to the number $n + 2$
 Complete the missing values.



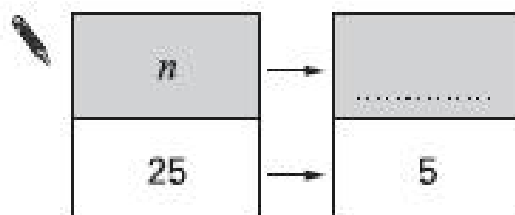
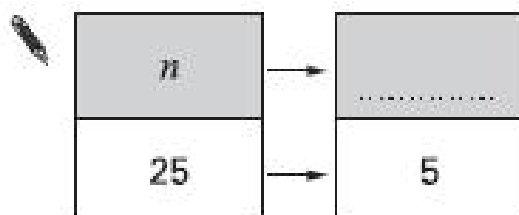
.....
1 mark

- (b) A different function maps the number n to the number $2n$
 Complete the missing values.



.....
1 mark

- (c) Many different functions can map the number 25 to the number 5
 Complete the tables by writing two **different** functions.



.....
2 marks

11. Complete the statements below.



When x is $\dots 8 \dots$, $4x$ is \dots

\dots
1 mark

When x is \dots , $4x$ is $\dots 48 \dots$

\dots
1 mark

When x is $\dots 8 \dots$, \dots is $\dots 48 \dots$

\dots
1 mark

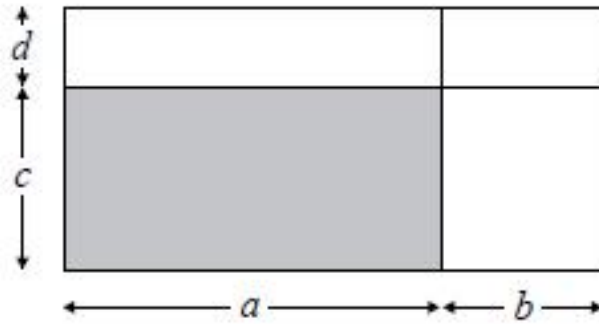
6

The diagrams show a rectangle divided into different parts.

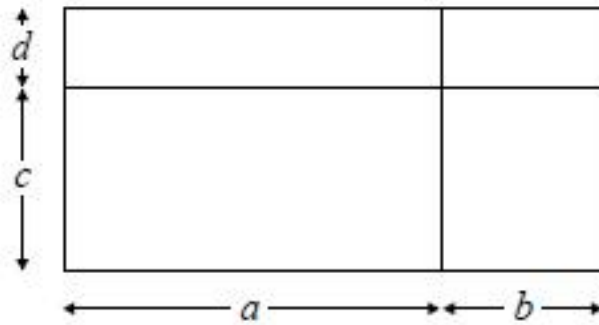
On each, **shade the area** represented by the expression.

The first one is done for you.

ac



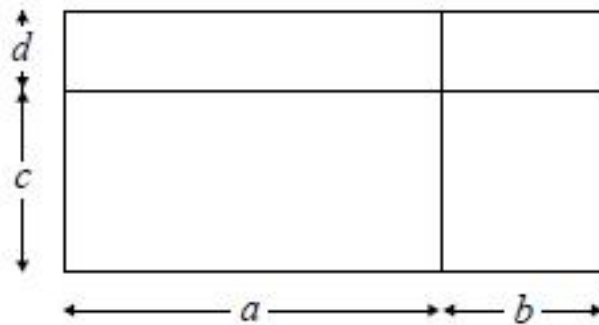
$ad + bd$



(1 mark)



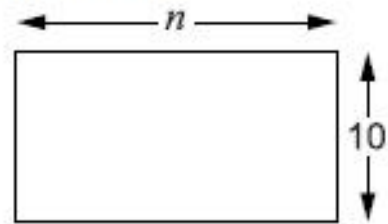
$b(c + d)$



(1 mark)

14. Jenny and Alan each have a rectangle made out of paper.

One side is 10cm.
The other side is n cm.



- (a) They write expressions for the **perimeter** of the rectangle.

Jenny writes $2n + 20$

Alan writes $2(n + 10)$

Tick (✓) the true statement below.



Jenny is correct and Alan is wrong.

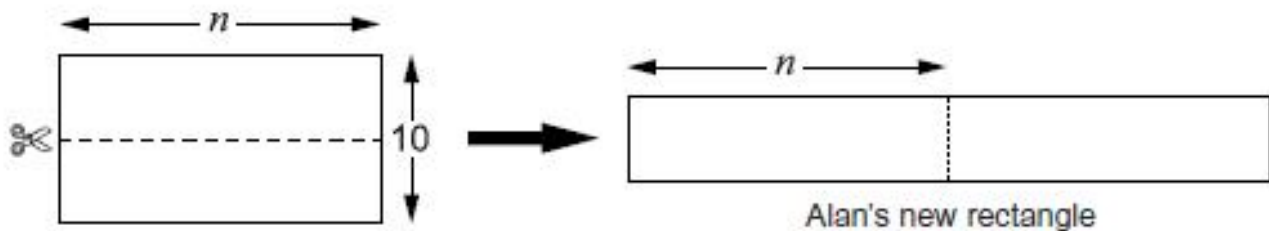
Jenny is wrong and Alan is correct.

Both Jenny and Alan are correct.

Both Jenny and Alan are wrong.

1 mark

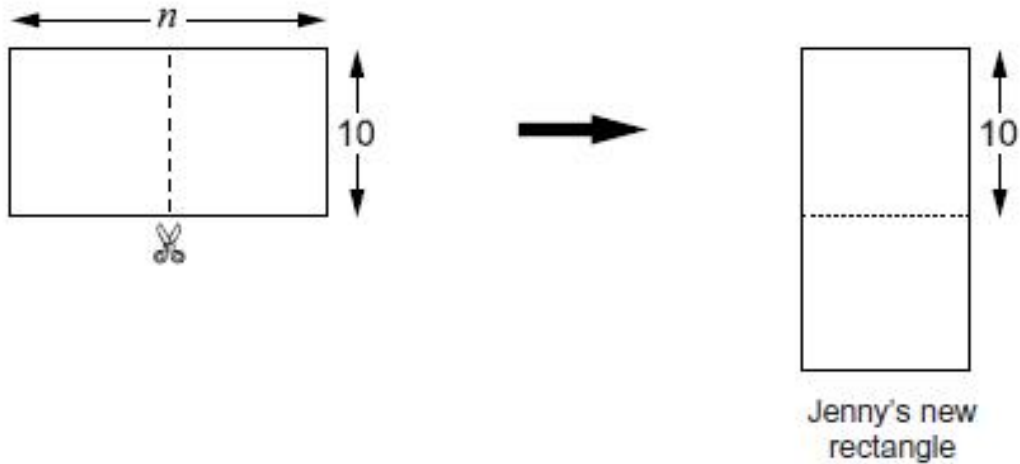
- (b) Alan cuts his rectangle, then puts the two halves side by side.



What is the perimeter of Alan's new rectangle?

Write your expression as simply as possible.

- (c) Jenny cuts her rectangle a different way, and puts one half below the other.



What is the perimeter of Jenny's new rectangle?
Write your expression as simply as possible.



.....

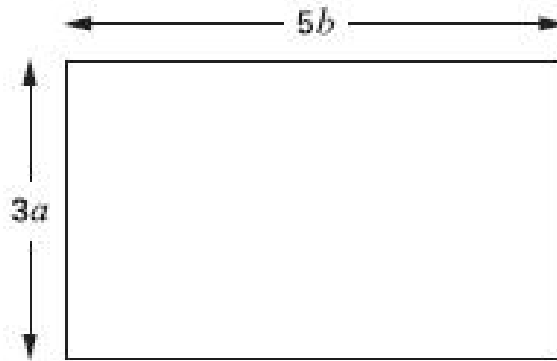
.....
2 marks

- (d) What value of n would make the perimeter of Jenny's new rectangle the same value as the perimeter of Alan's new rectangle?



19. (a) The diagram shows a rectangle.

Its dimensions are $3a$ by $5b$



Write **simplified expressions** for the area and the perimeter of this rectangle.



Area:

.....
1 mark

Perimeter:

.....
1 mark

(b) A different rectangle has **area $12a^2$** and **perimeter $14a$**

What are the dimensions of this rectangle?



Dimensions: by

.....
1 mark

10

Lisa is using trial and improvement to find a solution to this equation.

$$x^2 - 3x = 1$$

Here are her first few trials.

Complete the missing information.



When $x = 3$, $x^2 - 3x = \underline{0}$, so this value of x is too small

When $x = 4$, $x^2 - 3x = \underline{\hspace{2cm}}$, so this value of x is too (1 mark)

When $x = 3.5$, $x^2 - 3x = \underline{\hspace{2cm}}$, so this value of x is too (1 mark)

What value of x should Lisa try next?



$x = \underline{\hspace{2cm}}$

Explain why you chose that value.



(1 mark)

16. Ali, Barry and Cindy each have a bag of counters.
They do not know how many counters are in each bag.
They know that

Barry has **two more** counters than Ali.

Cindy has **four times as many** counters as Ali.

- (a) Ali calls the number of counters in her bag a

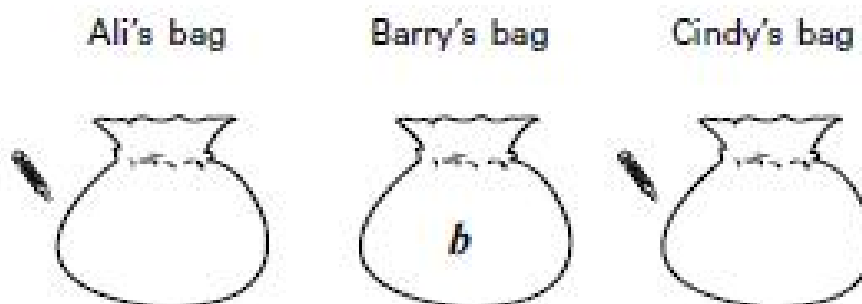
Write expressions using a to show the number of counters in Barry's bag and in Cindy's bag.



1 mark

- (b) Barry calls the number of counters in his bag b

Write expressions using b to show the number of counters in Ali's bag and in Cindy's bag.



2 marks

(c) Cindy calls the number of counters in her bag c



Which of the expressions below shows the number of counters in **Barry's** bag?

Circle the correct one.



$4c + 2$

$4c - 2$

$\frac{c}{4} + 2$

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

$\frac{c+2}{4}$

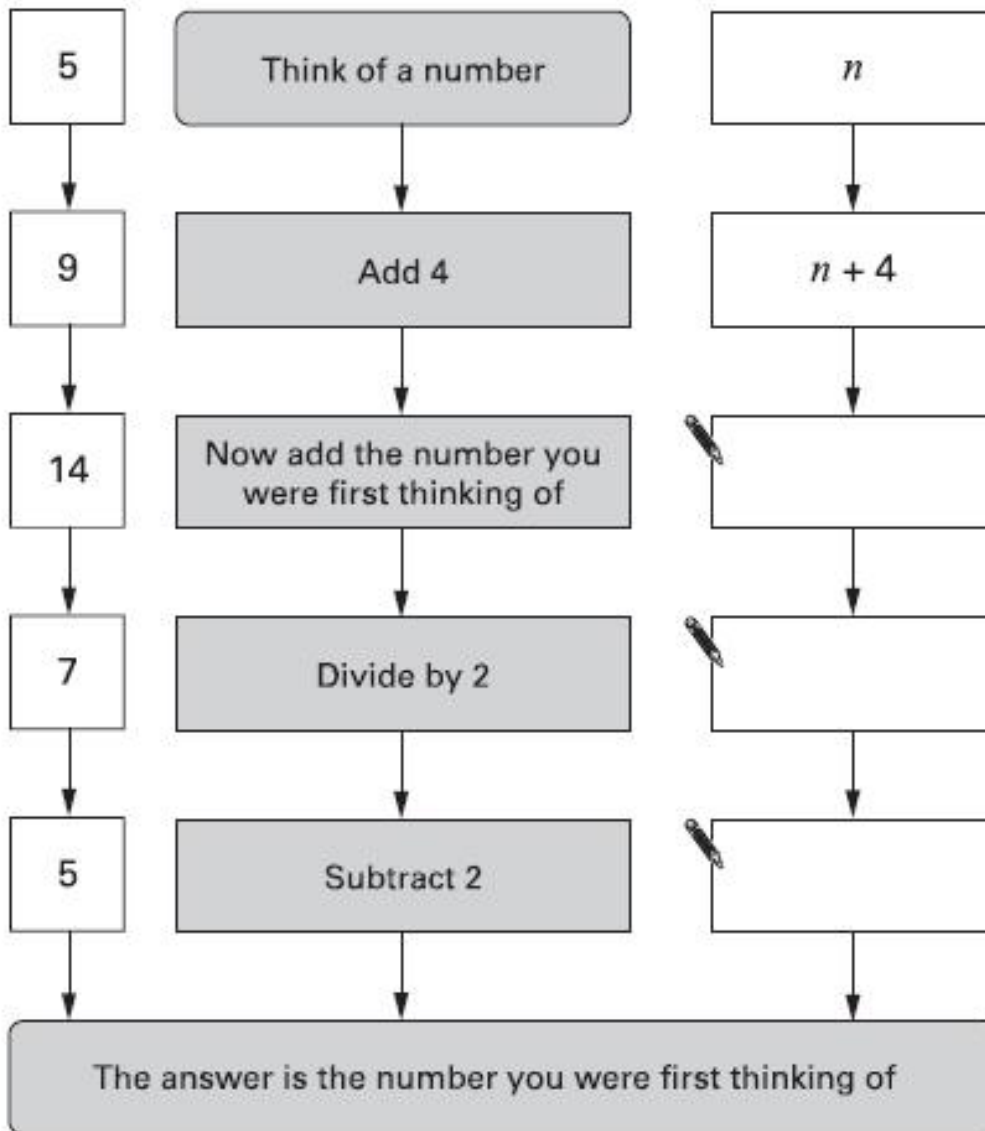
$\frac{c-2}{4}$

1 mark

16. You can often use algebra to show why a number puzzle works.

Fill in the missing expressions.

Example:



Algebra:

.....

2 marks

21. (a) Bags A and B contain some counters.



Bag A



Bag B

The number of counters in each bag is the same.

Work out the value of y



3 marks

- (b) Bag C contains more counters than bag D.



Bag C



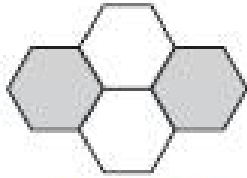
Bag D

What is the **smallest** possible value of k ?

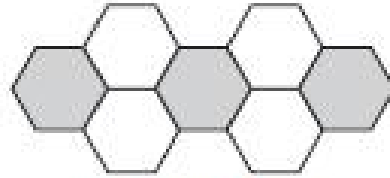


3 marks

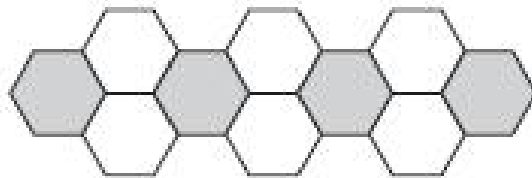
13. Look at this sequence of patterns made with hexagons.



pattern number 1



pattern number 2



pattern number 3

To find the number of hexagons in pattern number n you can use these rules:

$$\text{Number of grey hexagons} = n + 1$$

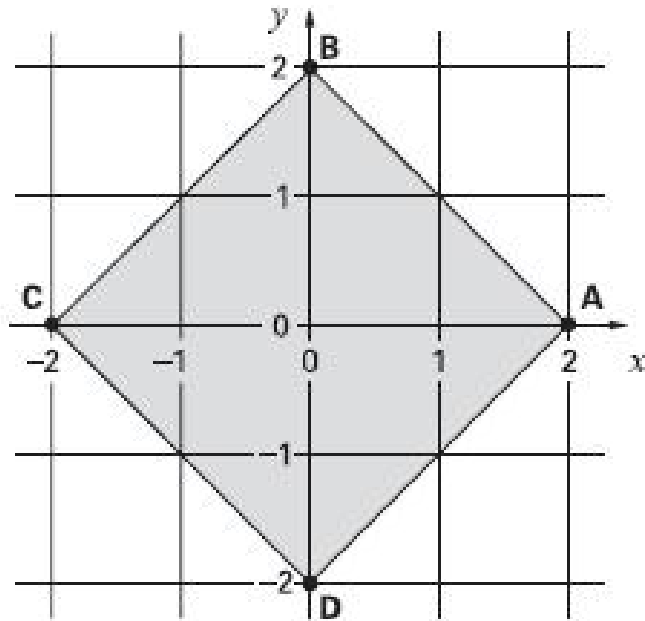
$$\text{Number of white hexagons} = 2n$$

Altogether, what is the total number of hexagons in pattern number 20?



2 marks

21. The diagram shows a square drawn on a square grid.



The points A, B, C and D are at the vertices of the square.

Match the correct line to each equation.

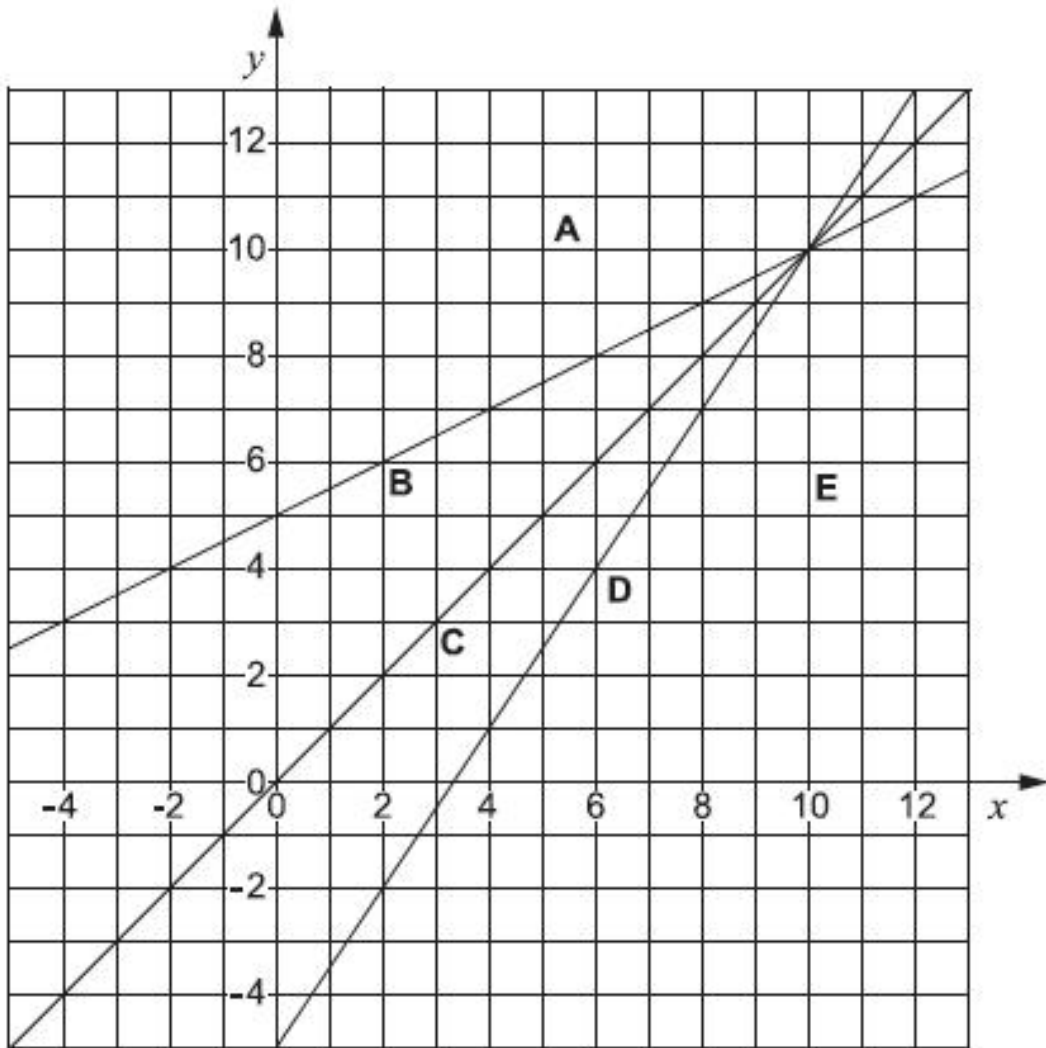
One is done for you.



$y = 0$	Line through C and D
$x = 0$	Line through A and C
$x + y = 2$	Line through A and D
$x + y = -2$	Line through B and D
	Line through B and C
	Line through A and B

2 marks

15. These straight line graphs all pass through the point (10, 10)



Fill in the gaps to show which line has which equation.



line has equation $x = 10$

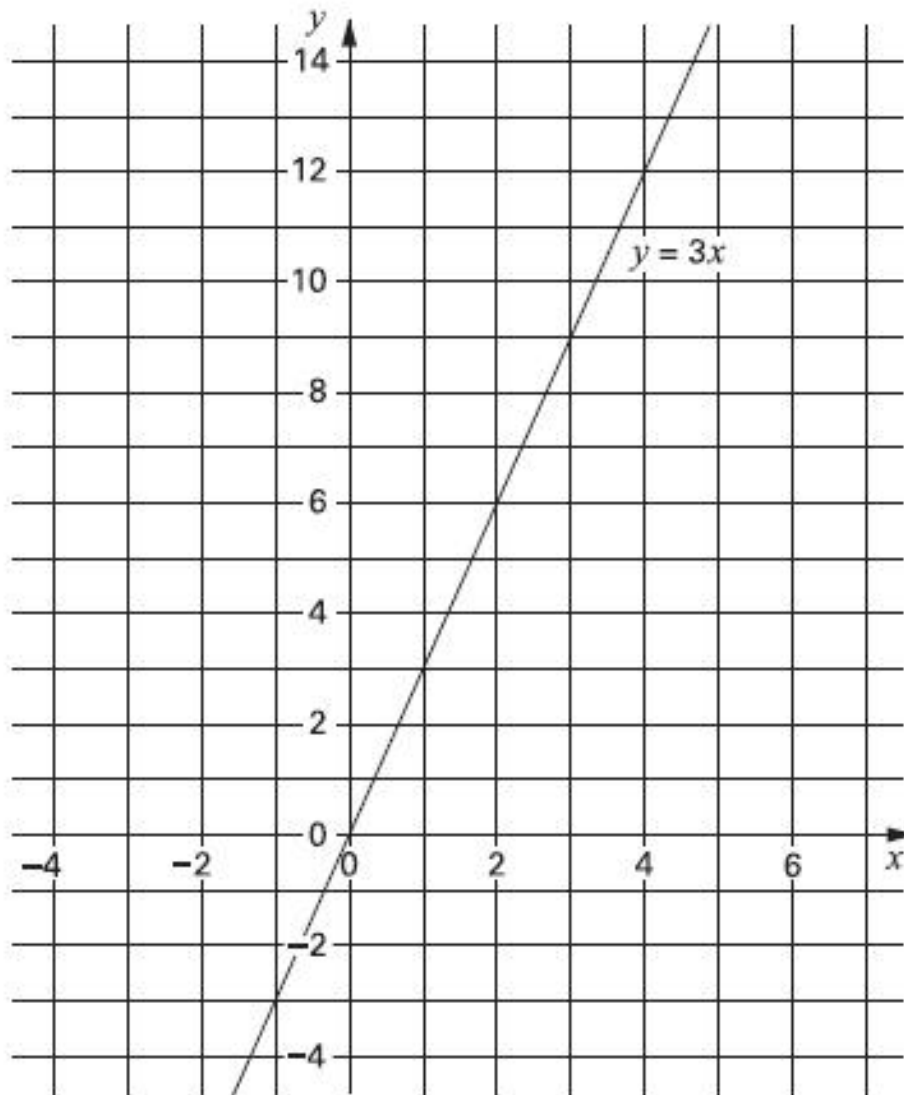
line has equation $y = 10$

line has equation $y = x$

line has equation $y = \frac{3}{2}x - 5$

line has equation $y = \frac{1}{2}x + 5$

18. The graph shows a straight line. The equation of the line is $y = 3x$



Does the point $(25, 75)$ lie on the straight line $y = 3x$?

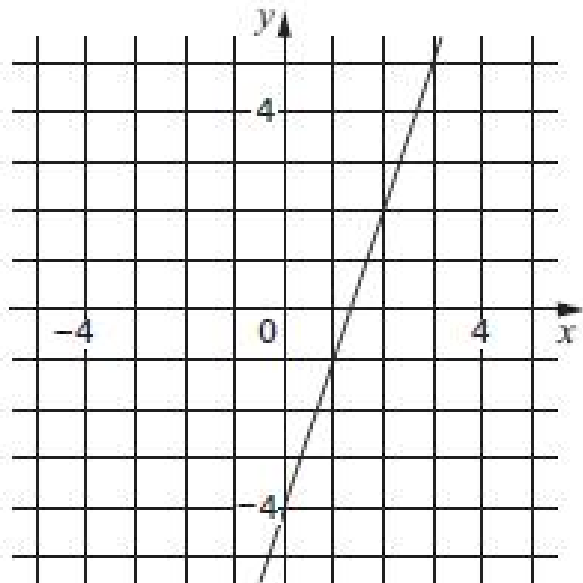
Tick (✓) Yes or No.



Yes No

Explain how you know.

24. The graph shows the straight line with equation $y = 3x - 4$



- (a) A point on the line $y = 3x - 4$ has an x -coordinate of 50
What is the y -coordinate of this point?



.....

1 mark

- (b) A point on the line $y = 3x - 4$ has a y -coordinate of 50
What is the x -coordinate of this point?



.....

1 mark