Assessing pupils' progress in mathematics at Key Stage 3

Year 9 assessment package
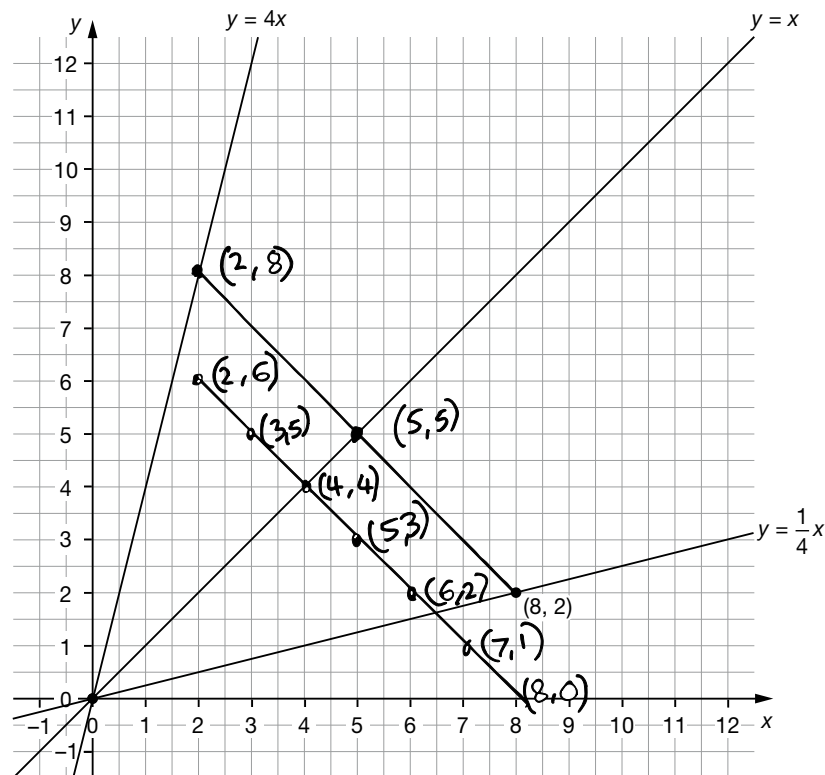## Algebra

Examples of pupils' work

Year 9

Algebra

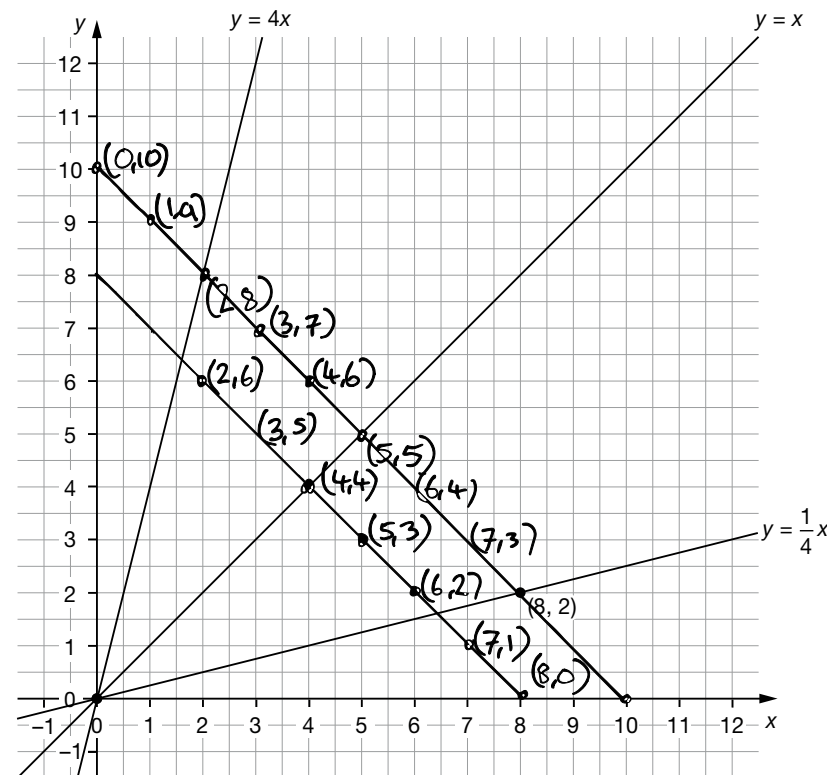# LESSON 1: *Twelve sum*

Ten sum sheet 1
Level 4

On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{4}x$ has been done for you.

Now draw a straight line through these three points.

What is an equation of this straight line?

On the graph, draw the straight line with equation $x + y = 8$

On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{4}x$ has been done for you. $x + y = 10$

Now draw a straight line through these three points.

What is an equation of this straight line?

On the graph, draw the straight line with equation $x + y = 8$

Ten sum sheet 2
Level 4

On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{3}x$ has been done for you.
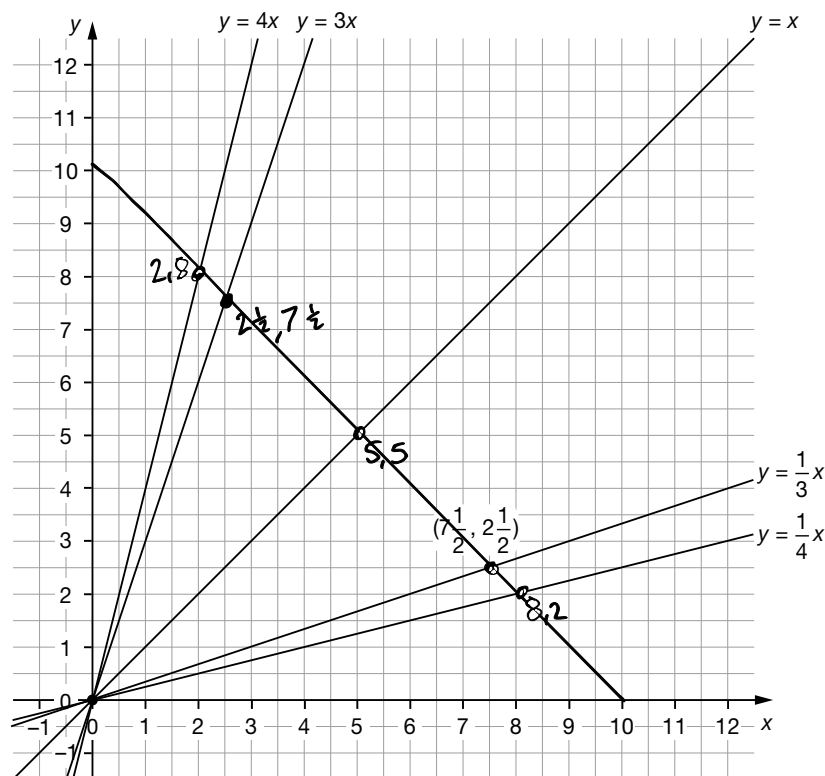
Now draw a straight line through these five points.

What is an equation of this straight line?

$y + x = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

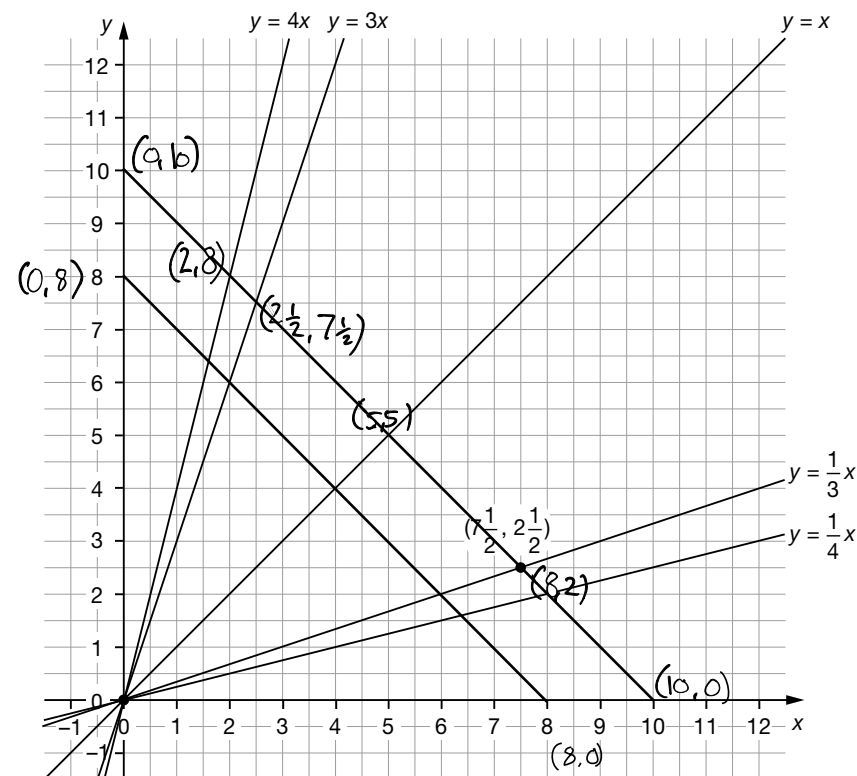On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{3}x$ has been done for you.

Now draw a straight line through these five points.

What is an equation of this straight line?

$x + y = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

Yes

Ten sum sheet 2
Level 5

Left graph labels: $y = 4x$, $y = 3x$, $y = x$, $y = \frac{1}{3}x$, $y = \frac{1}{4}x$, $x + y = 8$

Points: (2,8), $(2\frac{1}{2}, 7\frac{1}{2})$, (5,5), $(7\frac{1}{2}, 2\frac{1}{2})$, (8,2)

Right graph labels: $y = 4x$, $y = 3x$, $y = x$, $y = \frac{1}{3}x$, $y = \frac{1}{4}x$

Points: (2,8), $(2\frac{1}{2}, 7\frac{1}{2})$, (2,6), (5,5), $(7\frac{1}{2}, 2\frac{1}{2})$, (8,2)

On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{3}x$ has been done for you.

Now draw a straight line through these five points.
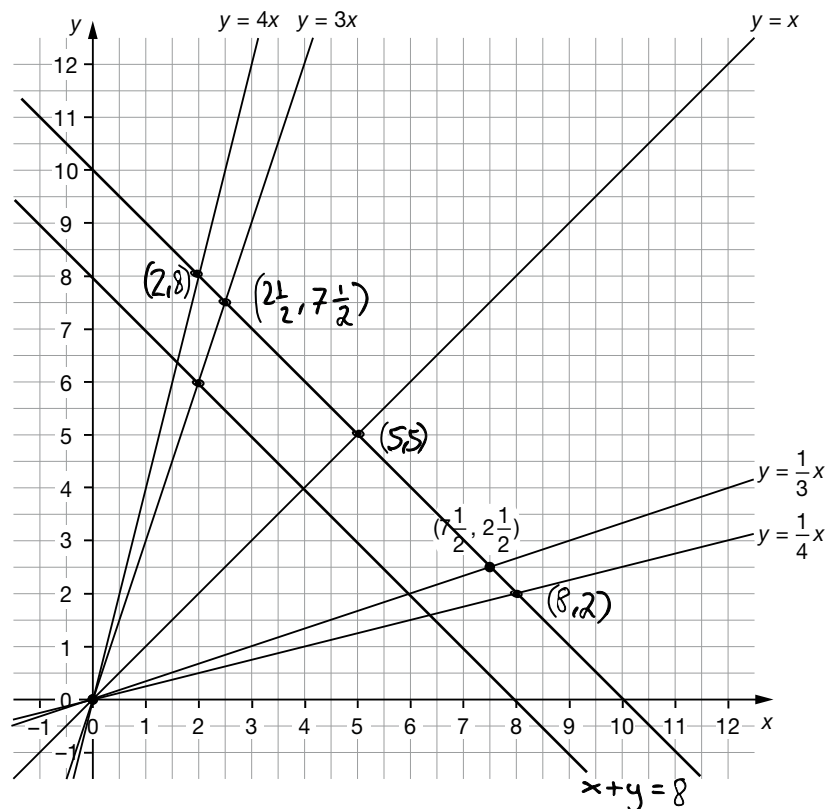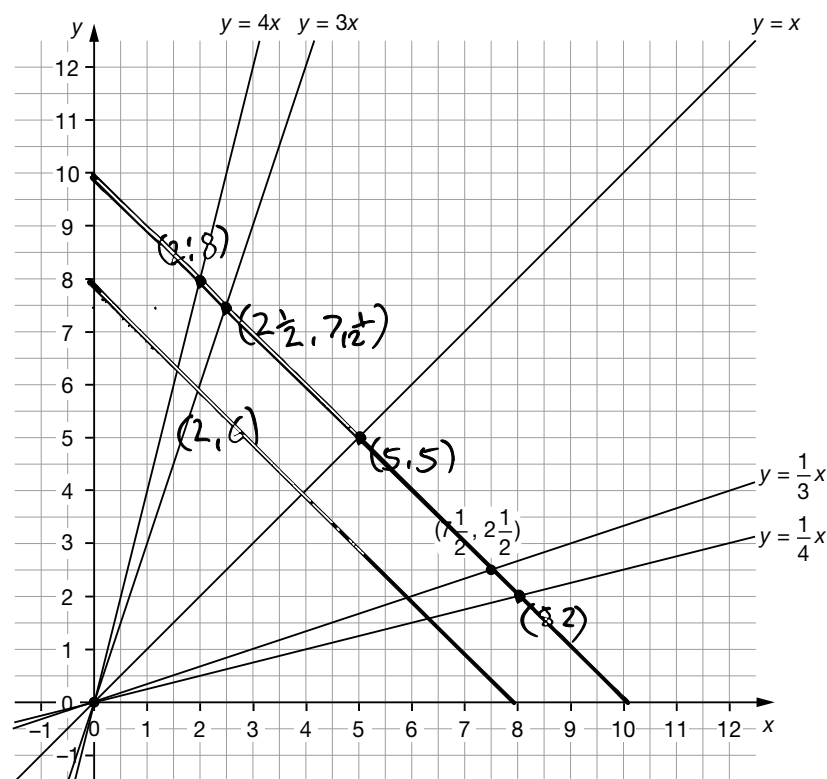
What is an equation of this straight line? $x + y = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

(2,6)   You can see from the graph where they cross.

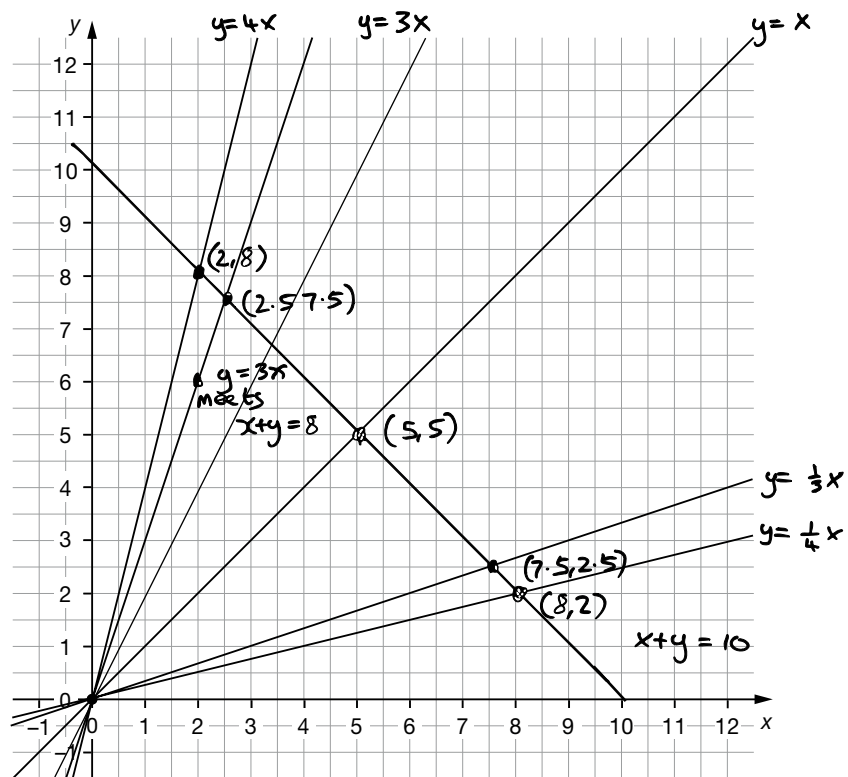On each line, label the point that has **coordinates that sum to 10**

The point on the line $y = \frac{1}{3}x$ has been done for you.

Now draw a straight line through these five points.

What is an equation of this straight line? $y = -x + 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

$y = -x + 8$
(2,6) $2 + 6 = 8$
Its also on the line $y = 3x$

Ten sum sheet 3
Level 5

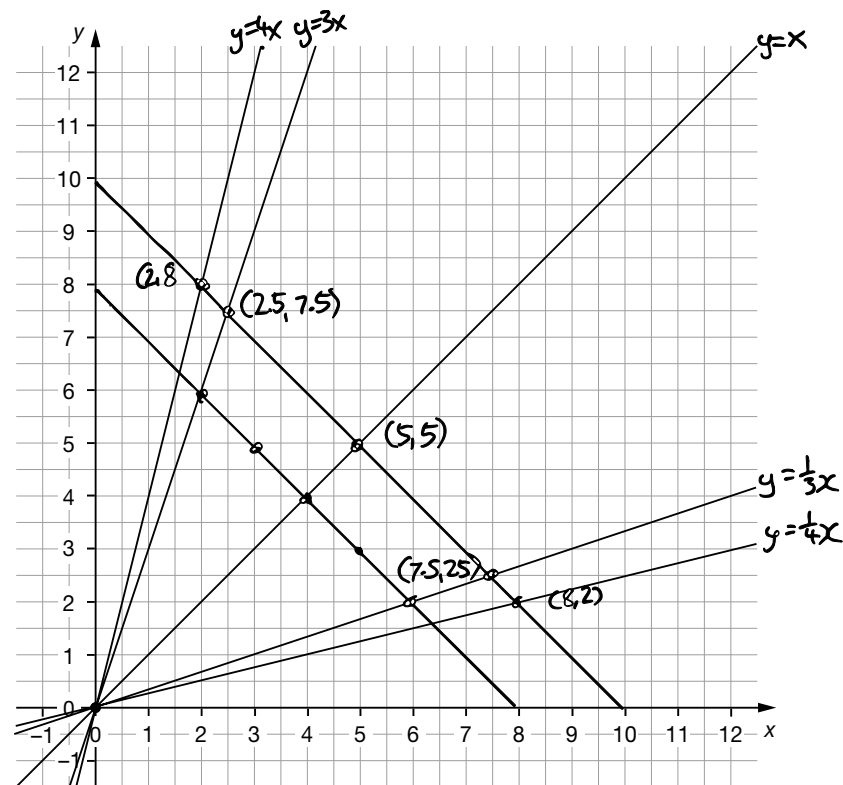The graph shows five straight lines. Label the lines to show their equations. 10 + 5

For each line, label the point that has **coordinates that sum to 10**   12 + 6

14 + 7

What is an equation of the straight line through these points?

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

Where will the straight lines $y = 2x$ and $x + y = 21$ meet? How do you know?

(14, 7)

The graph shows five straight lines. Label the lines to show their equations.

For each line, label the point that has **coordinates that sum to 10**

What is an equation of the straight line through these points?

$x + y = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

They will meet at (2,6) .. You know this because the line x+y=8 all the points add up to 8 and the only point that adds up to 8 on y=3x is (2,6)

Where will the straight lines $y = 2x$ and $x + y = 21$ meet? How do you know?

Ten sum sheet 3
Level 6

The graph shows five straight lines. Label the lines to show their equations.

For each line, label the point that has **coordinates that sum to 10**

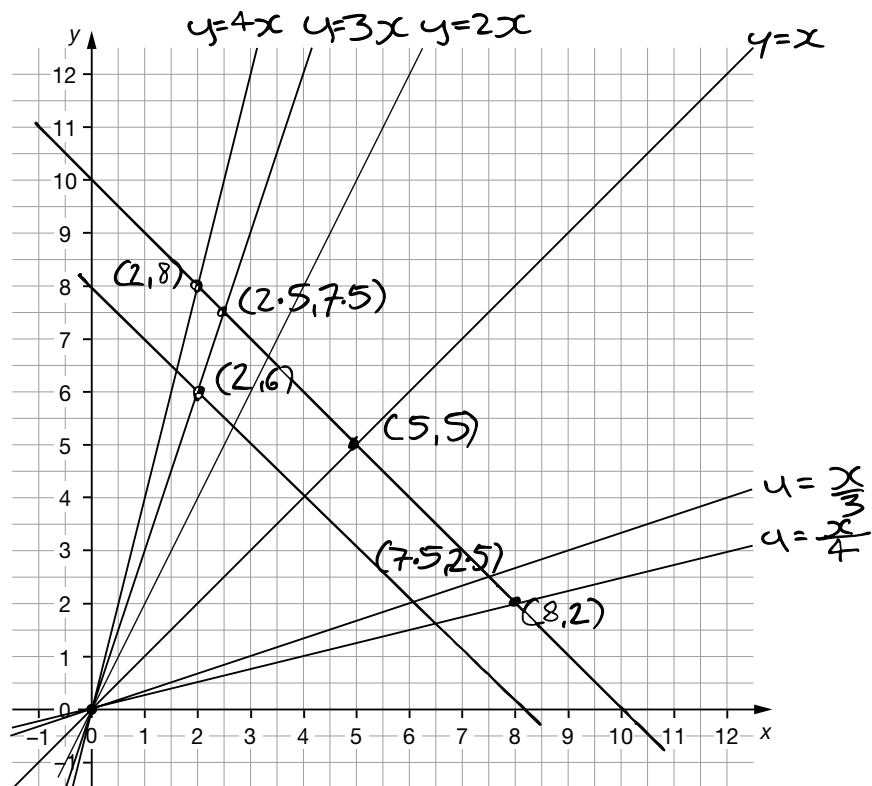What is an equation of the straight line through these points? $x + y = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know? $(2,6)$

Because $(2,6)$ adds up to 8 and is on the line $y = 3x$

Where will the straight lines $y = 2x$ and $x + y = 21$ meet? How do you know? $(7,14)$

Because $(7,14)$ adds to 21 and will be on the $y = 2x$ line because $7 \times 2 = 14$

Ten sum sheet 3
Above level 6

The graph shows five straight lines. Label the lines to show their equations.

For each line, label the point that has **coordinates that sum to 10**

What is an equation of the straight line through these points?
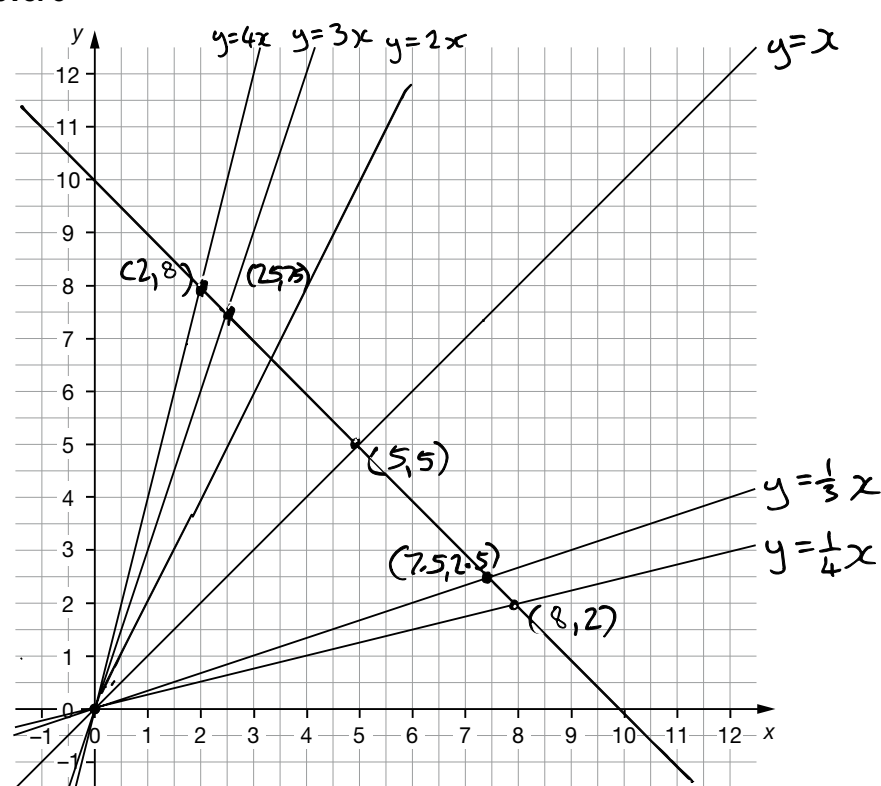
$x + y = 10$

Where will the straight lines $y = 3x$ and $x + y = 8$ meet? How do you know?

$(2,6)$ because $x + 3x = 8$ so $4x = 8$ $x = 2$ $y = 6$ $2 + 6 = 8$

Where will the straight lines $y = 2x$ and $x + y = 21$ meet? How do you know?

$(7,14)$ because $x + 2x = 21$ $3x = 21$ $x = 7$ $7 + 14 = 21$ $y = 14$
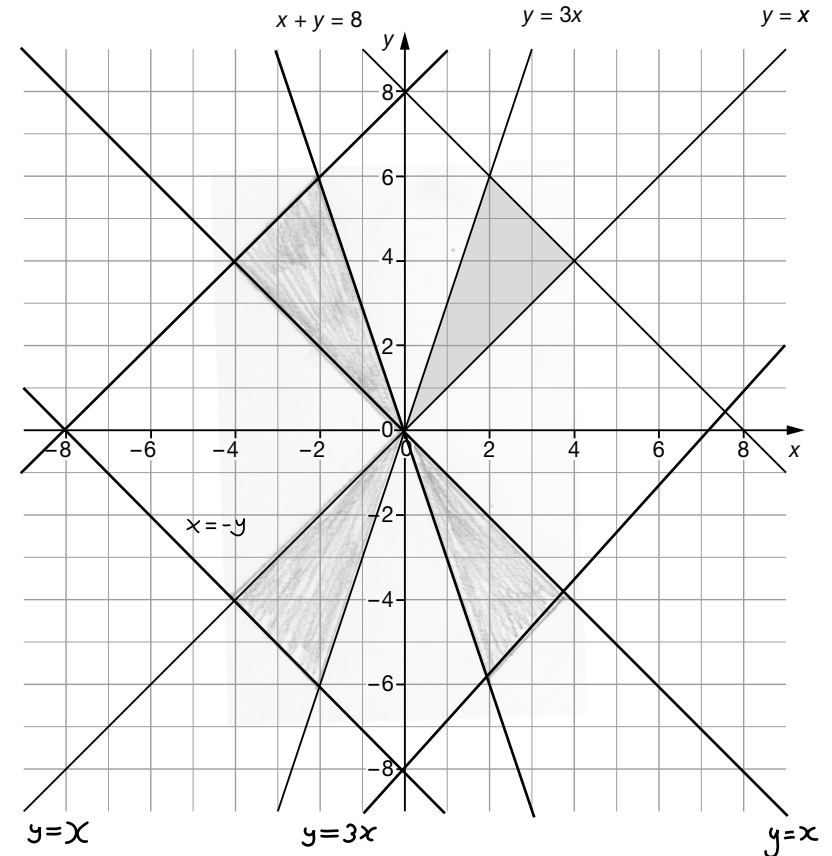
Year 9

Algebra

LESSON 2: *Three lines*

Reflecting triangle
Level 4

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflecting triangle
Level 4

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.
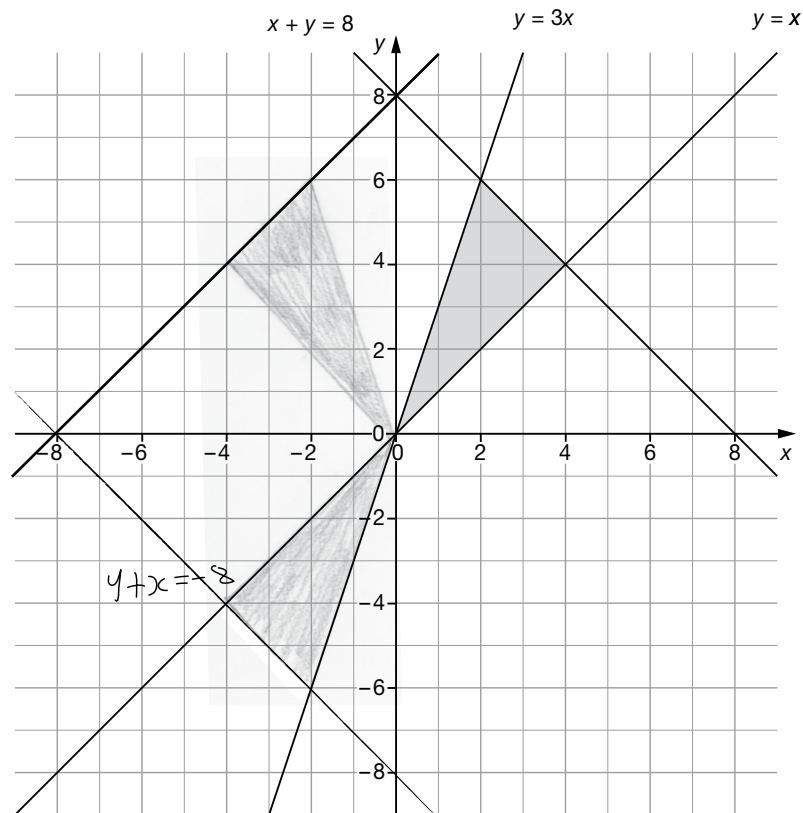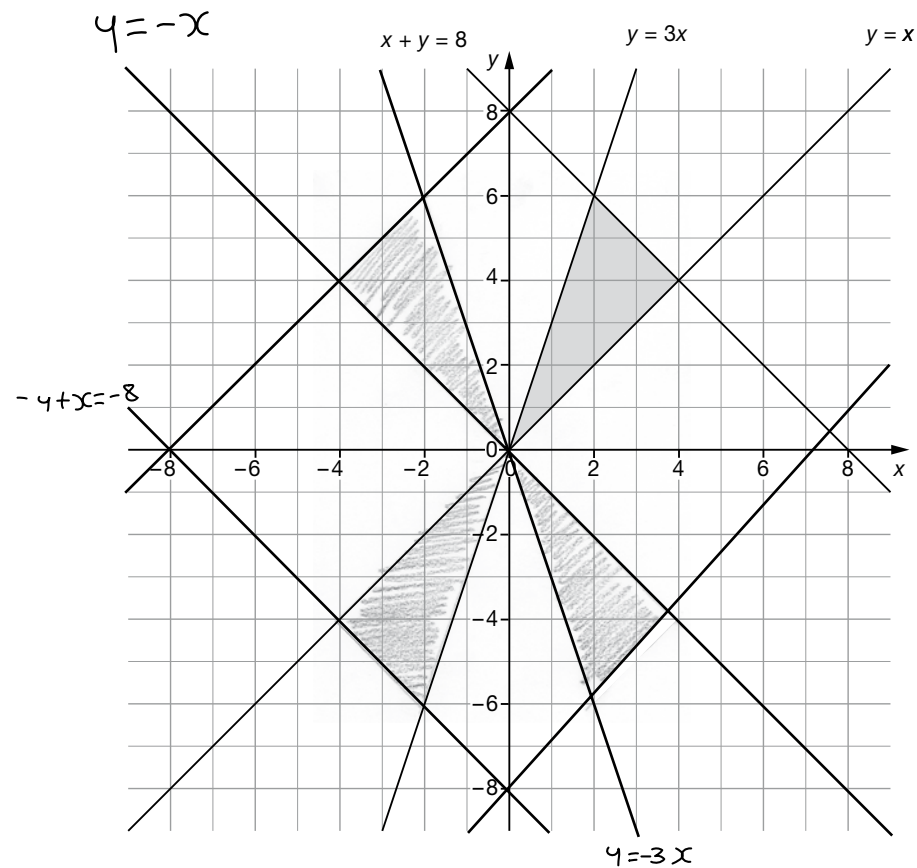
$x + y = 8$ $y = 3x$ $y = x$

$y + x = -8$

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflecting triangle
Level 5

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.

$y = -x$

$x + y = 8$ $y = 3x$ $y = x$
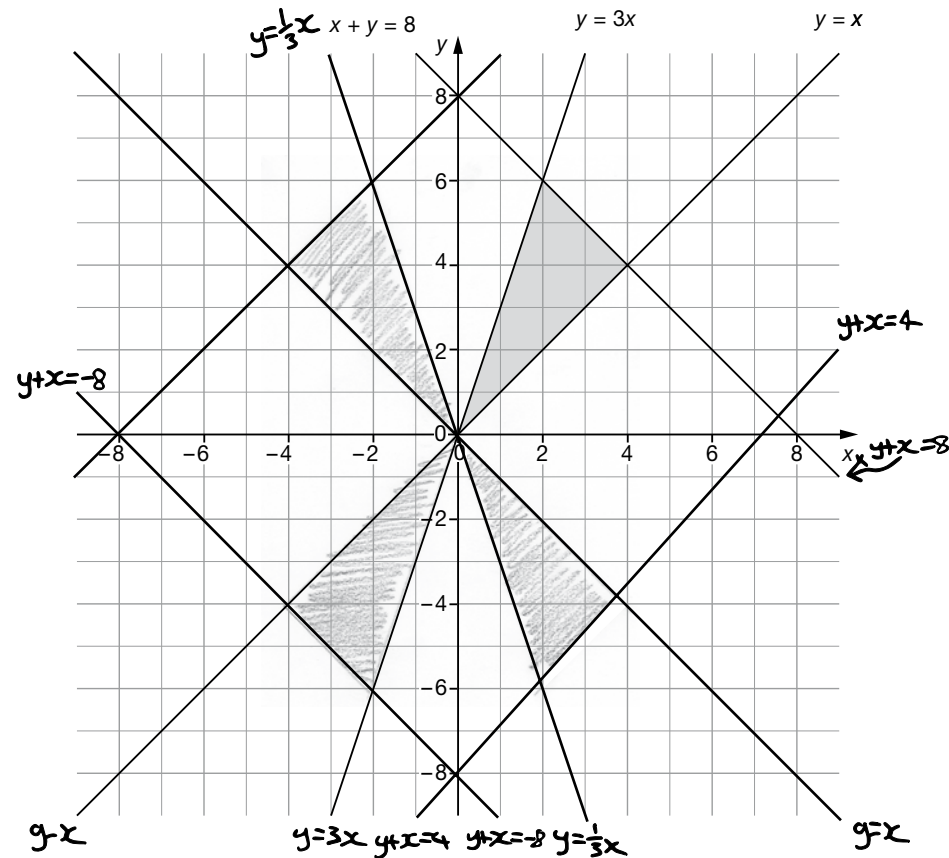
$-y + x = -8$

$y = -3x$

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflecting triangle
Level 5

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.

$y=\frac{1}{3}x$ $x + y = 8$ $y = 3x$ $y = x$

$y+x=4$

$y+x=-8$

$y+x=8$

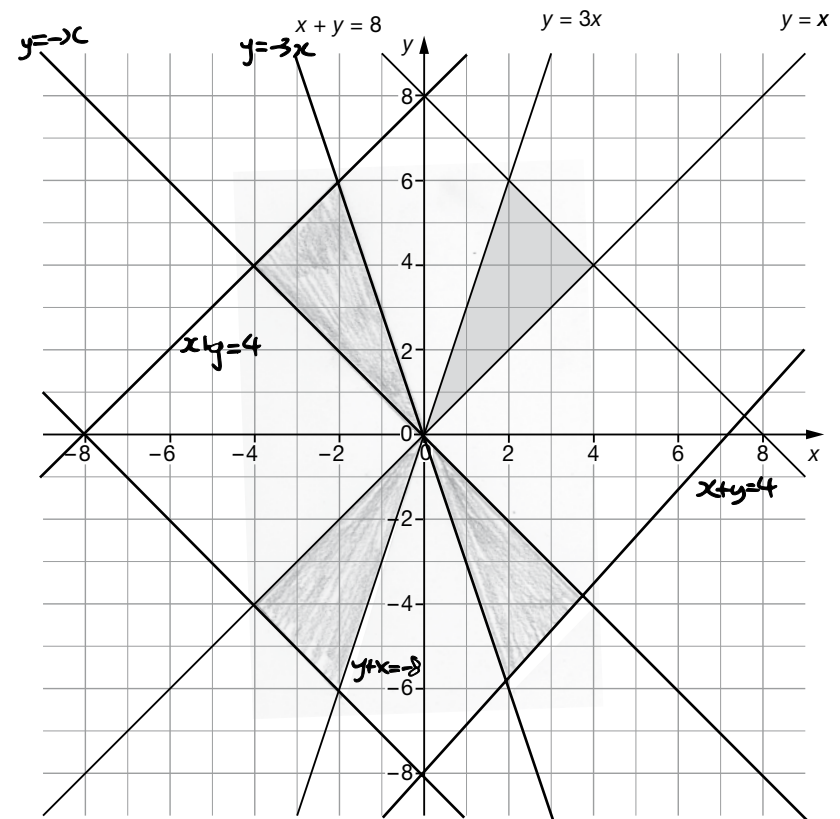$y=x$ $y=3x$ $y+x=4$ $y+x=-8$ $y=\frac{1}{3}x$ $y=x$

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.

$y=-x$ $x + y = 8$ $y = 3x$ $y = x$

$y=-3x$

$x+y=4$

$x+y=4$

$y+x=-8$

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflecting triangle
Level 6

Reflect this picture in the *y*-axis.

Then reflect the complete picture in the *x*-axis.

$y = -x$ $y = -3x$ $x + y = 8$ $y = 3x$ $y = x$

$y = -x - 8$

$x + y = -8$

$y = x - 8$

What are the equations of the lines in your picture?

Label as many of them as you can.

Reflect this picture in the *y*-axis.
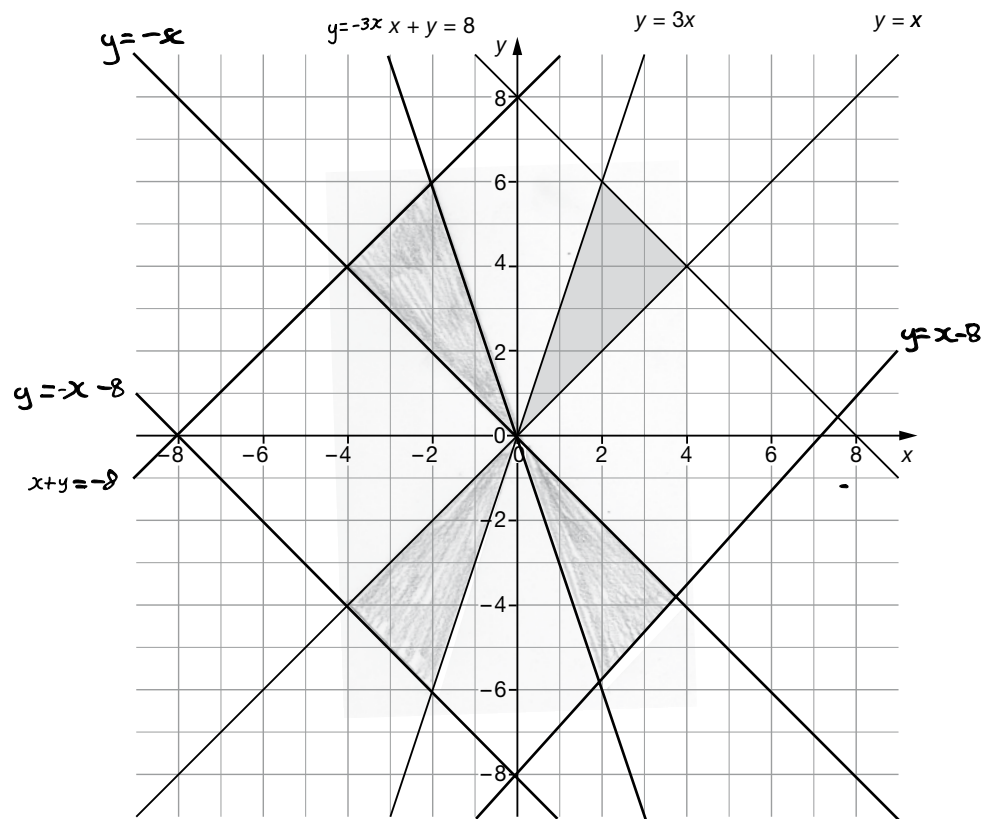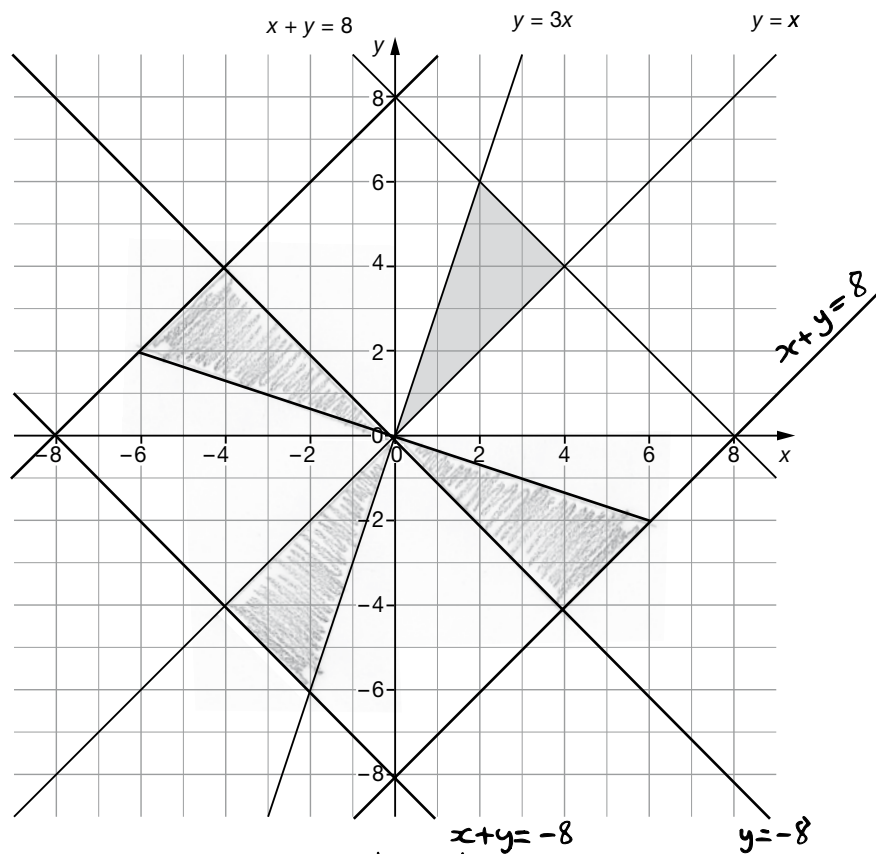
Then reflect the complete picture in the *x*-axis.

$x + y = 8$ $y = 3x$ $y = x$

$y = x + 8$

$y = x - 8$ $x + y = -8$ $y = -3x$ $y = -x$

What are the equations of the lines in your picture?

Label as many of them as you can.

Rotating triangle
Level 5

Using (0, 0) as the centre of rotation, rotate the shaded triangle.

Draw the new position of the triangle accurately.

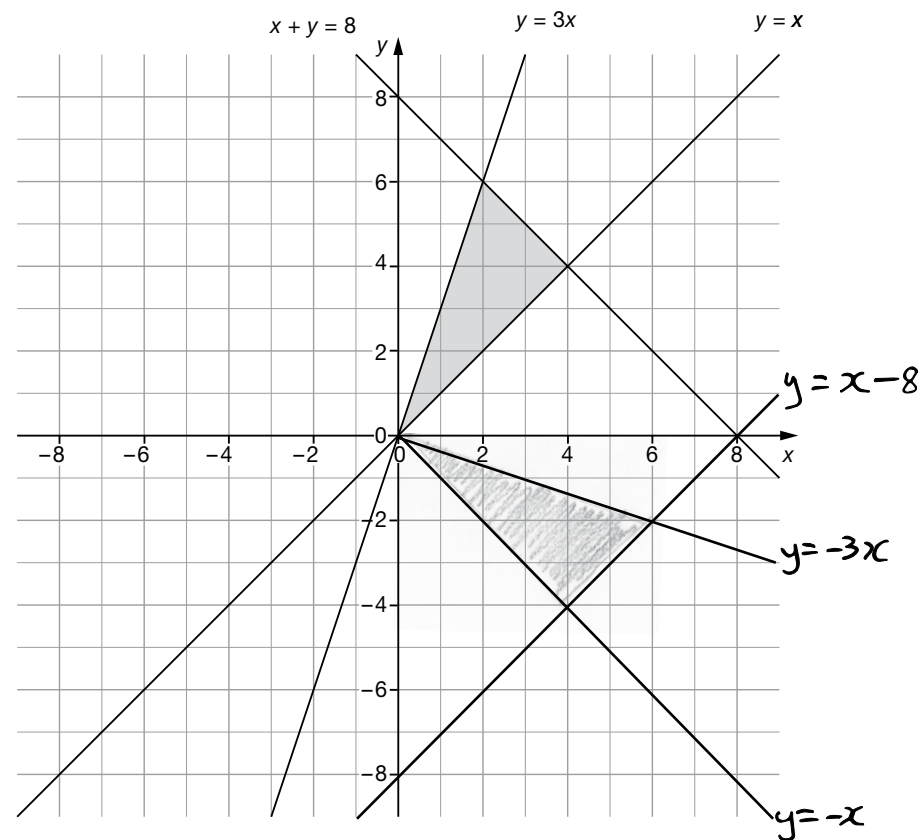$x + y = 8$ $y = 3x$ $y = x$

$x+y=8$

$x+y=-8$ $y=-8$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

Using (0, 0) as the centre of rotation, rotate the shaded triangle.

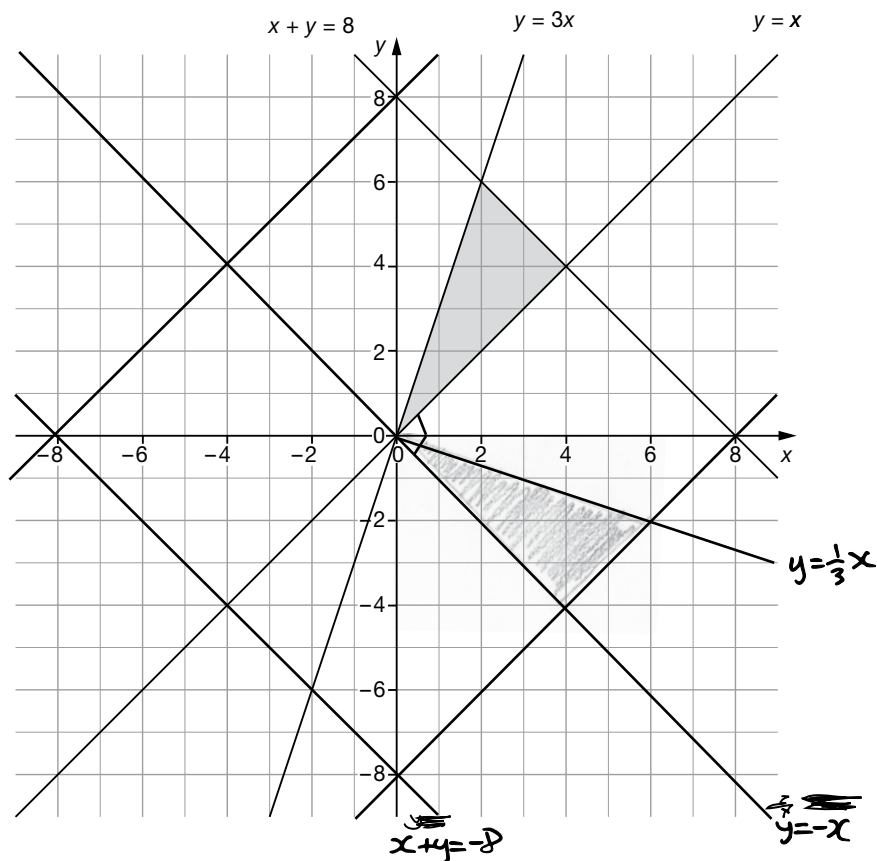Draw the new position of the triangle accurately.

$x + y = 8$ $y = 3x$ $y = x$

$y = x - 8$

$y = -3x$

$y = -x$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

Rotating triangle
Level 5

Using (0, 0) as the centre of rotation, rotate the shaded triangle.

Draw the new position of the triangle accurately.

$x + y = 8$ $y = 3x$ $y = x$

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

$x + y = -8$ $y = -x$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

Rotating triangle
Level 6

Using (0, 0) as the centre of rotation, rotate the shaded triangle.
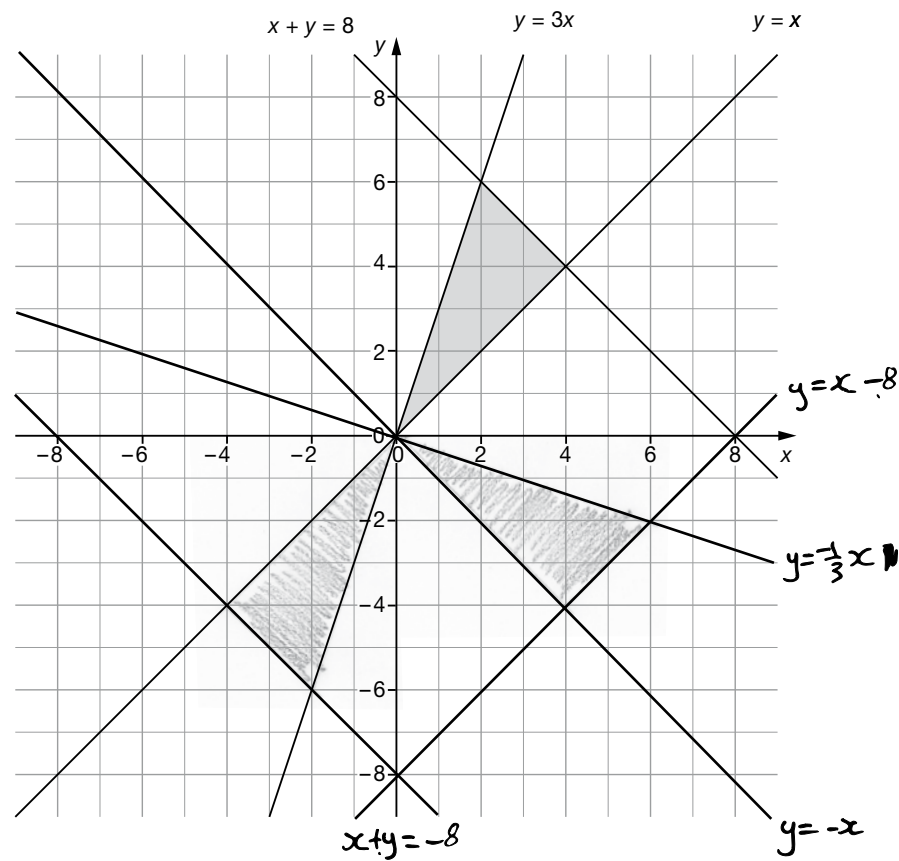
Draw the new position of the triangle accurately.

$x + y = 8$ $y = 3x$ $y = x$

$y = x - 8$

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

$x + y = -8$ $y = -x$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

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Rotating triangle
Level 6

Using (0, 0) as the centre of rotation, rotate the shaded triangle.

Draw the new position of the triangle accurately.

$x + y = 8$ $y = 3x$ $y = x$

$y=x+8$

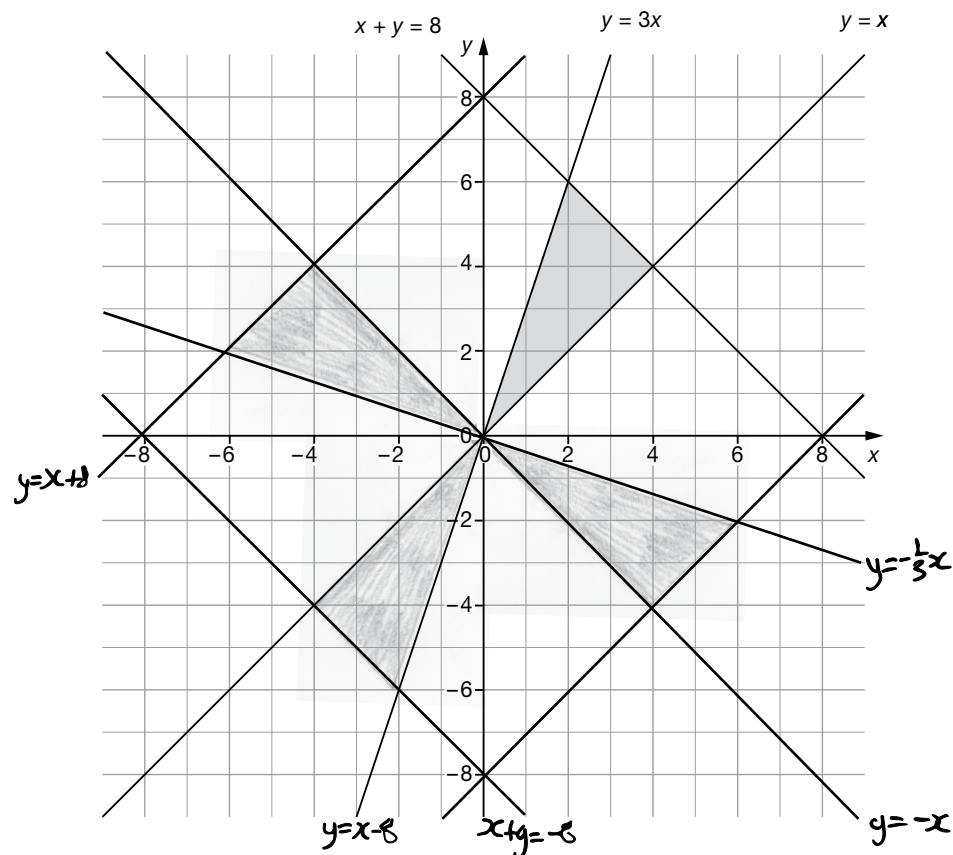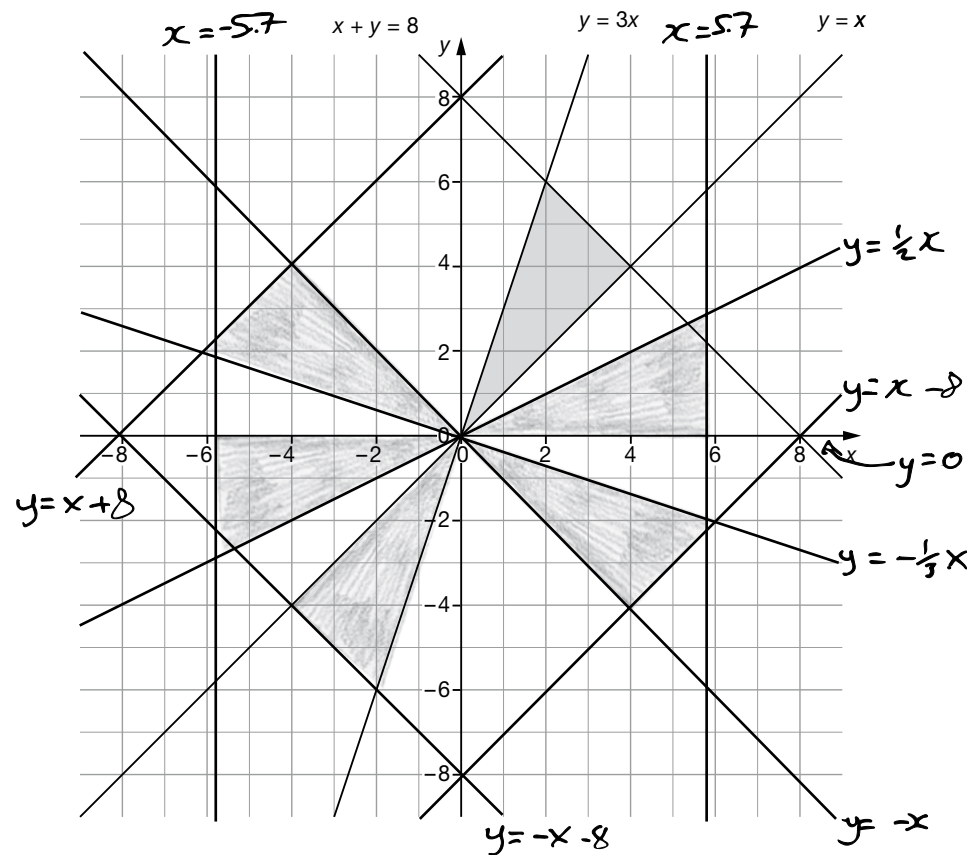$y=-\frac{1}{3}x$

$y=x-8$ $x+y=-8$ $y=-x$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

Rotating triangle
Above level 6

Using (0, 0) as the centre of rotation, rotate the shaded triangle.

Draw the new position of the triangle accurately.

$x = -5.7$ $x + y = 8$ $y = 3x$ $x = 5.7$ $y = x$

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

$y = x - 8$

$y = x + 8$ $y = 0$

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

$y = -x - 8$ $y = -x$

What are the equations of the lines that form the new triangle?

Label as many of them as you can.

Repeat as many times as you like.

$4 \times 4 + 4 \times 4 = 32$

$\sqrt{32} = 5.656\,85\ldots$