
A-level Maths

$$\begin{aligned} f(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \\ f(x) &= \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h} \\ &= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - x^2}{h} \\ &= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h} \end{aligned}$$

Transition Task

Logarithms

(a) Simplify $x^8 \times x^3$

(b) Simplify $(5y)^3$

(c) Simplify $\frac{w^7}{w^4}$

The laws of logarithms

a $\log_a xy = \log_a x + \log_a y$

b $\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y$

c $\log_a x^k = k \log_a x$

d $\log_a 1 = 0$

When working through the A-level Maths transition tasks, please **complete and mark** your work in a notebook or on A4 paper which you can hand in when you arrive at your first lesson in September.

Please **don't** complete your transition task for all your subjects in the same book as we will want to take in your work for checking.

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- The next slides give solutions to a selection of questions from each section.
 - Email dcrocker@coombedean.co.uk if you need more help.
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Indices

The screenshot shows the OneNote application interface. The title bar at the top indicates the user is 'D.Crocker' and the window title is 'OneNote for Windows 10'. The ribbon menu includes 'Home', 'Insert', 'Draw', 'View', 'Help', and 'Class Notebook'. The 'Draw' tab is active, showing various drawing tools. The main content area contains the following text:

5 By writing 16 as a power of 2, or otherwise, solve the equation $16^x = 32$.

6 Solve these equations.

a $8^x = 16$ b $16^x = 64$

c $9^x \times 3^x = 9$ d $\frac{8^x}{4^{x+1}} = 32$

7 Express these terms in the form ax^n where a is a real number.

a $\frac{4x}{2x^2}$ b $\frac{1}{2x^3}$

c $3x\sqrt{x}$ d $\frac{\sqrt[3]{x^2}}{4}$

The Windows taskbar is visible at the bottom, showing the Start button and several open applications. The system tray in the bottom right corner shows the time as 20:28 and the date as 04/06/2023.

Basic Algebra

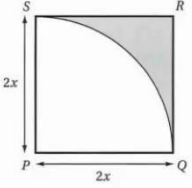
OneNote for Windows 10

Home Insert Draw View Help Class Notebook

Shapes Link to Shape Link to Text Maths

D.Crocker

6 The diagram shows a square $PQRS$ of side length $2x$ cm. A quarter circle, centre P and radius $2x$ cm, is inscribed inside the square.



a Show that the area A of the shaded shape is given by the formula $A = 4x^2 - \pi x^2$.

b Make x the subject of this formula.

c Show that the perimeter of the shaded shape is given by the expression $(4 + \pi)\sqrt{\frac{A}{4 - \pi}}$.

10 Make the letter indicated in square brackets the subject of these formulae.

a $A = \frac{B - 2}{B}$ [B]

b $C = \frac{D^2 + 4}{D^2}$ [D]

c $E = \frac{5 - 4F^3}{F^3}$ [F]

11 Make the letter indicated in square brackets the subject of these formulae.

a $A = \frac{B}{B - 2}$ [B]

b $C = \frac{D + 2}{2D + 3}$ [D]

c $E = \frac{F^2 + 3}{F^2 + 1}$ [F]

12 Simplify these fractions.

a $\frac{x^2 + 3x}{x}$ b $\frac{2x^4 + 4x^2}{x^2}$

c $\frac{3x^2 - 3x}{x - 1}$ d $\frac{x^2 - 2x^3}{2x - 1}$

21:26
04/06/2023

Forming Expressions

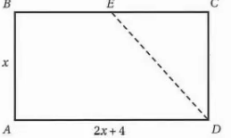
OneNote for Windows 10 | D.Crocker

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Shapes Ink to Shape Ink to Text Maths

1 The diagram shows a rectangle $ABCD$. Point E is the mid-point of BC .

$AB = x$, $AD = 2x + 4$

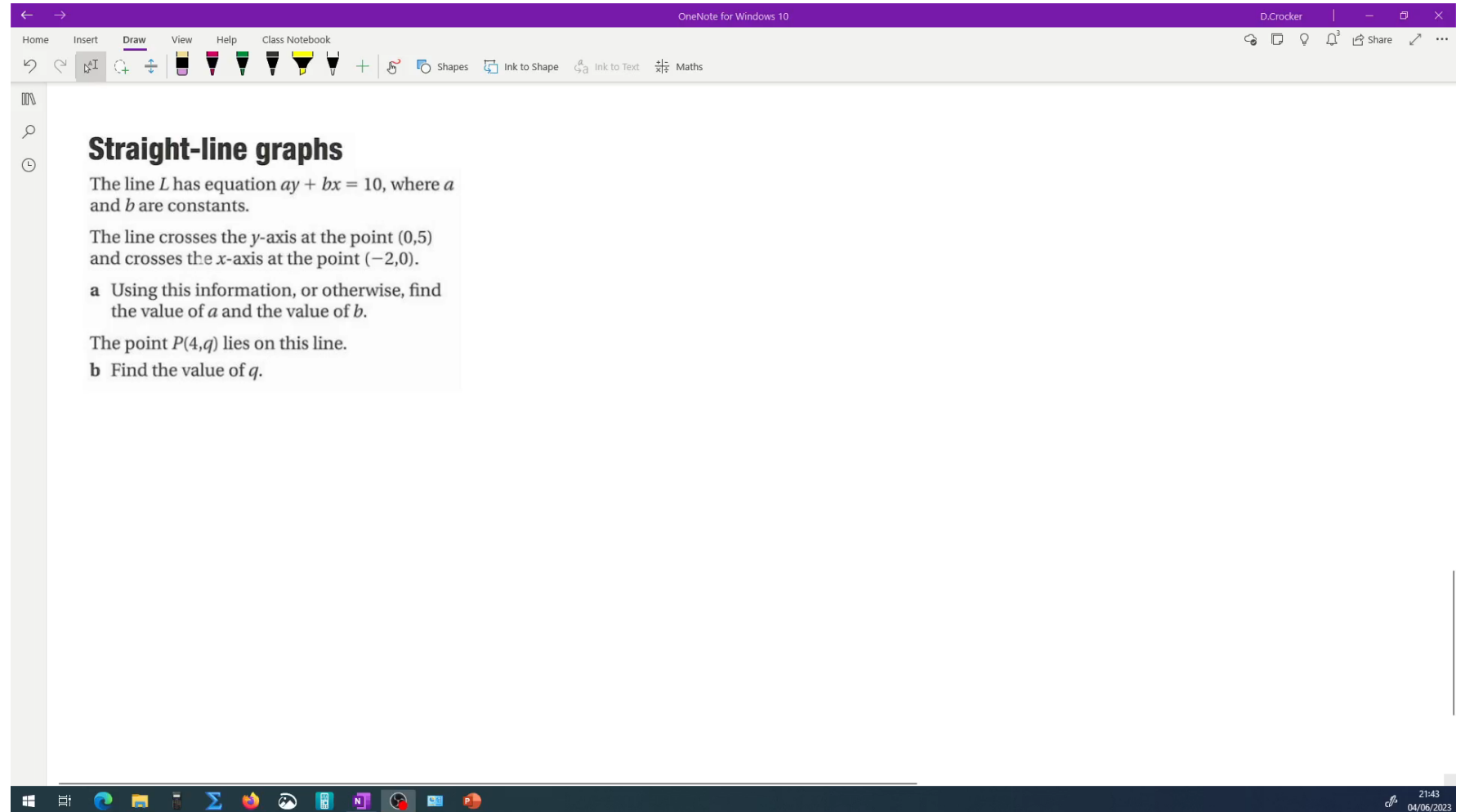


a Find an expression in terms of x for the perimeter of this rectangle.

b Show that the area of the trapezium $ABED$ is given by the formula
Area = $\frac{3}{2}x(x + 2)$.

21:38 04/06/2023

Straight-line Graphs



The screenshot shows a OneNote window titled "OneNote for Windows 10" with the user name "D.Crocker". The ribbon includes "Home", "Insert", "Draw", "View", "Help", and "Class Notebook". The "Draw" tab is active, showing various drawing tools. The main content area contains the following text:

Straight-line graphs

The line L has equation $ay + bx = 10$, where a and b are constants.

The line crosses the y -axis at the point $(0,5)$ and crosses the x -axis at the point $(-2,0)$.

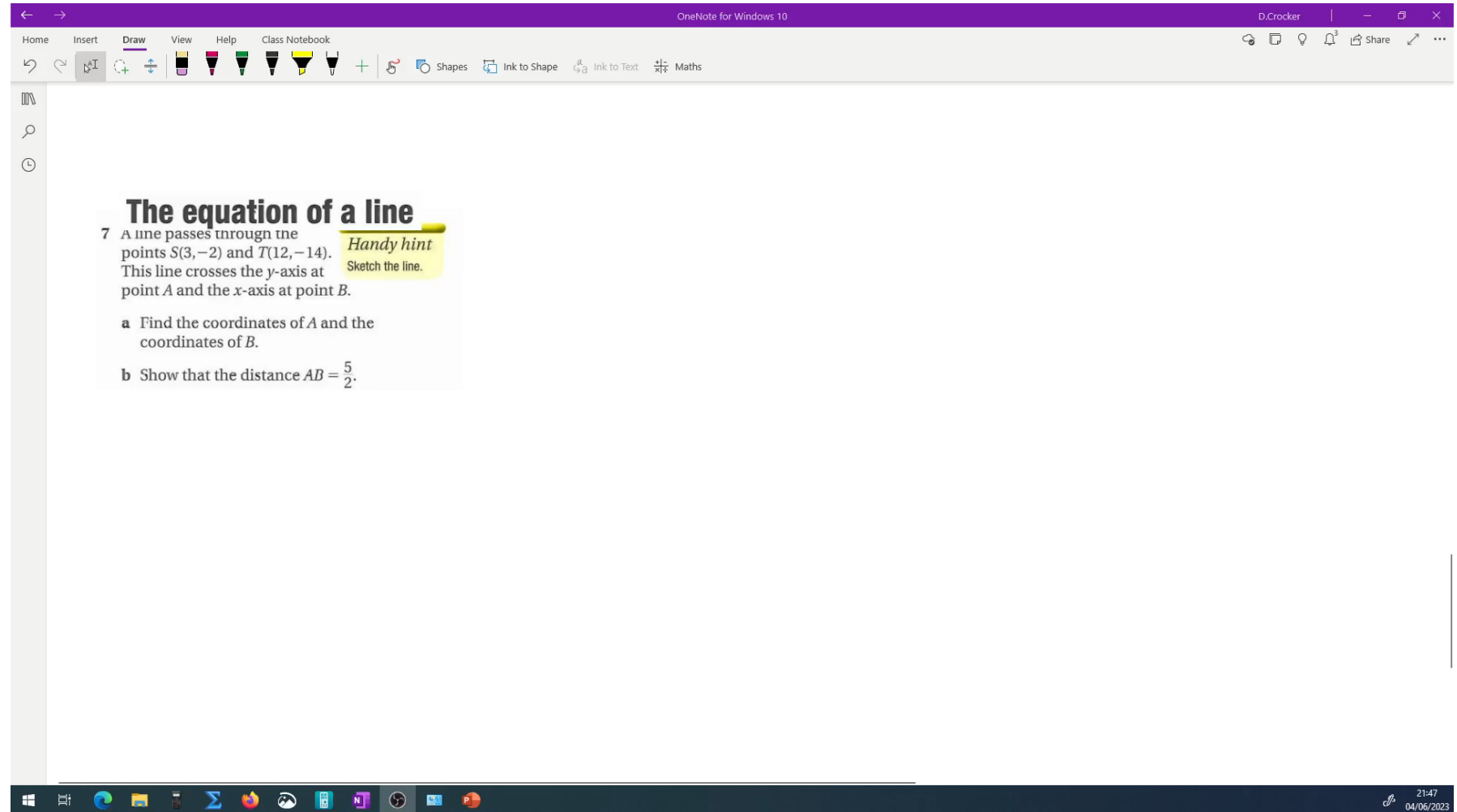
a Using this information, or otherwise, find the value of a and the value of b .

The point $P(4,q)$ lies on this line.

b Find the value of q .

The Windows taskbar at the bottom shows the Start button, task view, and several application icons. The system tray in the bottom right corner displays the time "21:43" and the date "04/06/2023".

The equation of a line $y - y_1 = m(x - x_1)$



The screenshot shows a OneNote window titled "OneNote for Windows 10" with the user name "D.Crocker". The ribbon includes "Home", "Insert", "Draw", "View", "Help", and "Class Notebook". The "Draw" tab is active, showing various drawing tools. The main content area contains the following text:

The equation of a line

7 A line passes through the points $S(3, -2)$ and $T(12, -14)$. This line crosses the y -axis at point A and the x -axis at point B .

Handy hint
Sketch the line.

a Find the coordinates of A and the coordinates of B .

b Show that the distance $AB = \frac{5}{2}$.

The Windows taskbar at the bottom shows the Start button, task view, and several application icons. The system tray on the right shows the time as 21:47 and the date as 04/06/2023.