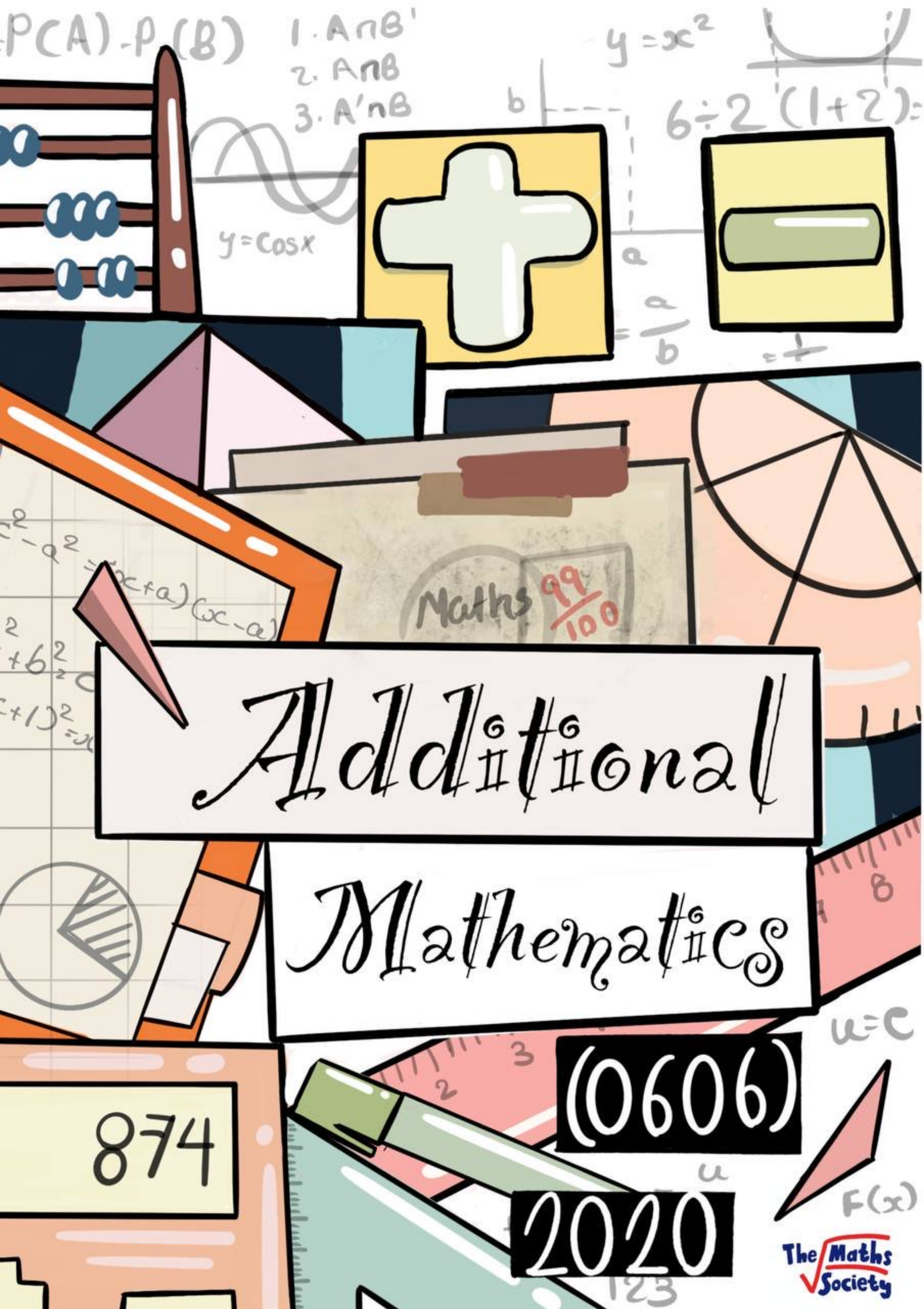
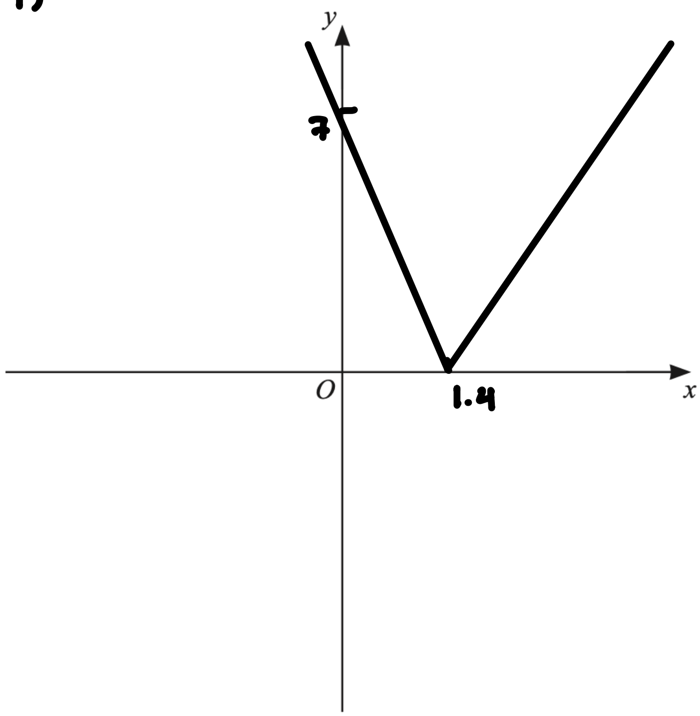

Additional
Mathematics
(0606)
2020
The Maths Society

Chapter 1 Functions

1. (a) On the axes below, sketch the graph of $y = |5x - 7|$, showing the coordinates of the points where the graph meets the coordinate axes.

[3]

$y = 5x - 7$
$x = 0, y = -7 \ (0, -7)$
$y = 0, 0 = 5x - 7$
$7 = 5x$
$x = \frac{7}{5} = 1.4$



(b) Solve $5|5x - 7| - 1 = 14$.

[3]

$5|5x - 7| = 15$

$|5x - 7| = 3$

$5x - 7 = 3$ or $5x - 7 = -3$

$5x = 10$ $5x = 4$

$x = 2$ $x = \frac{4}{5}$

2. (i) $g(x) = 3 + \frac{1}{x}$ for $x \geq 1$.

a. Find an expression for $g^{-1}(x)$.

$y = 3 + 1/x$ [2]

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

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

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

$g^{-1}(x) = \frac{1}{x-3}$

b. Write down the range of $g^{-1}(x)$.

$y \geq 1$ [1]

c. Find the domain of $g^{-1}(x)$.

$3 < x \leq 4$ [2]

3. $f(x) = (2x + 3)^2$ for $x > 0$

a. Find the range of f.

$y > 9$

[1]

b. Explain why f has an inverse.

f is a one to one function

[1]

c. Find f^{-1}.

$y = (2x+3)^2$

$x = (2y+3)^2$

$\sqrt{x} = 2y+3$

$\sqrt{x} - 3 = 2y$

$y = \frac{\sqrt{x} - 3}{2}$

$f^{-1}(x) = \frac{\sqrt{x} - 3}{2}$

[3]

d. State the domain of f^{-1}.

$x > 9$

[1]

e. Given that $g(x) = ln\,(x + 4)$ for $x > 0$, find the exact solution of $fg(x) = 49$.

$fg(x) = 49$

$f(\ln(x+4)) = 49$

$\ln(x+4) = f^{-1}(49)$

$\ln(x+4) = \frac{7-3}{2}$

$\ln(x+4) = 2$

$x+4 = e^2$

$x = e^2 - 4$

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4. $g(x) = x + 5$ for $x \epsilon \mathbb{R}$

$h(x) = \sqrt{2x - 3}$ for $x > \frac{3}{2}$

Solve $gh(x) = 7$.

[3]

$g(\sqrt{2x-3}) = 7$

$\sqrt{2x-3} + 5 = 7$

$\sqrt{2x-3} = 2$

$2x - 3 = 4$

$2x = 7$

$x = \frac{7}{2}$

5. Solve $|3x - 2| = 4 + x$.

[3]

$3x-2 = 4+x$ or $3x-2 = -4-x$

$2x = 6$

$x = 3$

$4x = -2$

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