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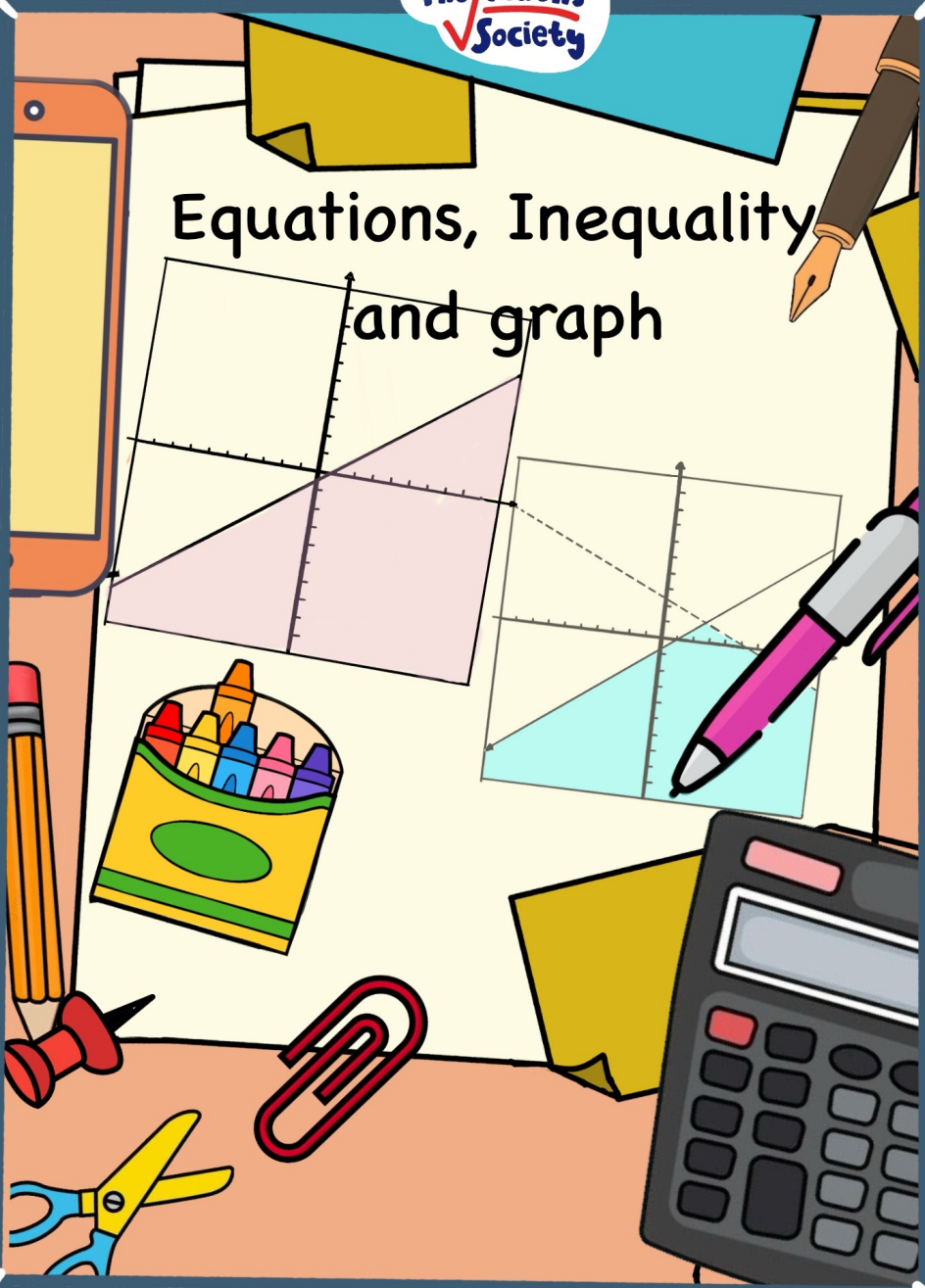
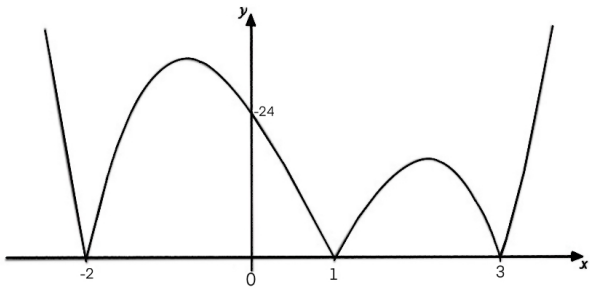
Equations, Inequality and graph



1. (a)



The diagram shows the graph of $y = |f(x)|$, where $f(x)$ is a cubic.Find the possible expressions for $f(x)$.

[3]

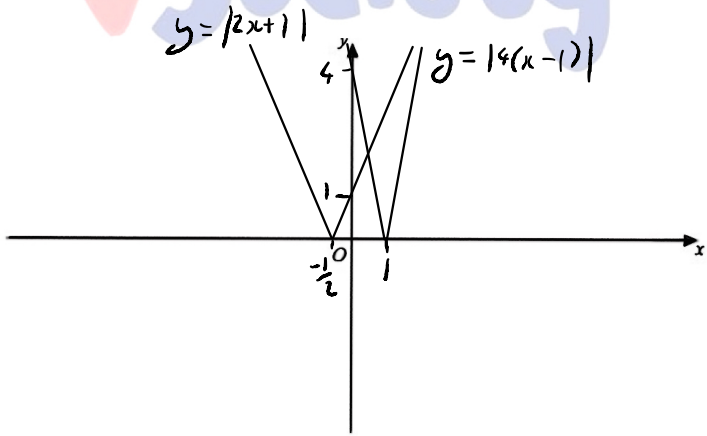
$f(x) = 4(x+2)(x-1)(x-3)$

or

$f(x) = -4(x+2)(x-1)(x-3)$

(b) (i) On the axes below, sketch the graph of $y = |2x + 1|$ and the graph of $y = |4(x - 1)|$, stating the coordinates of the points where the graphs meet the coordinate axes.

[3]



(ii) Find the exact solutions of the equation $|2x + 1| = |4(x - 1)|$.

[4]

$(2x+1)^2 = 16(x-1)^2$

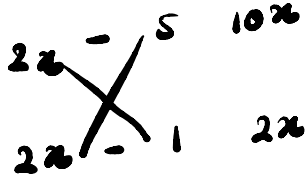
$4x^2 + 4x + 1 = 16(x^2 - 2x + 1)$

$4x^2 + 4x + 1 = 16x^2 - 32x + 16$

$0 = 12x^2 - 36x + 15$

$(\div 3)$

$0 = 4x^2 - 12x + 5$



$0 = (2x - 5)(2x - 1)$

$x = \frac{5}{2}$ or $x = \frac{1}{2}$

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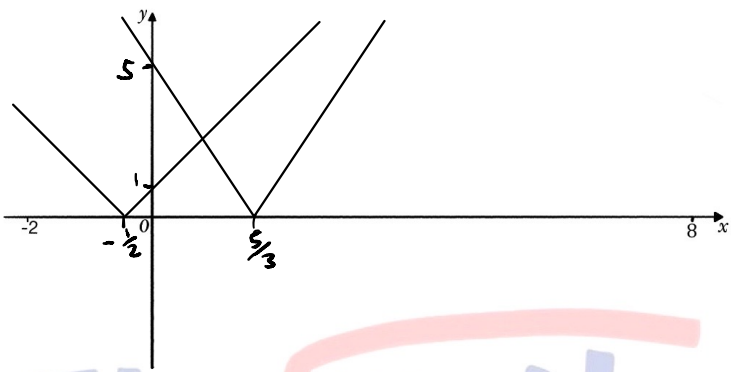
2. (a) On the axes, sketch the graph of $y = |2x + 1|$ and $y = |5 - 3x|$ for -2 $\leq x \leq 8$. State the coordinates of the points where these graphs meet the coordinate axes.

[3]



(b) Solve the equation $|2x + 1| = |5 - 3x|$.

[3]

$(2x+1)^2 = (5-3x)^2$

$4x^2 + 4x + 1 = 25 - 30x + 9x^2$

$0 = 5x^2 - 34x + 24$

$0 = (x-6)(5x-4)$

$x = 6$ or $x = \frac{4}{5}$

$1x \times -6 = -30x$

$5x \times -4 = -4x$

$24 = 1 \times 24$
$= 2 \times 12$
$= 3 \times 8$
$= 4 \times 6$

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