Cambridge International AS & A Level

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Mathematics 9709/32

Paper 3 Pure Mathematics 3 **October/November 2023**

Question No (1)

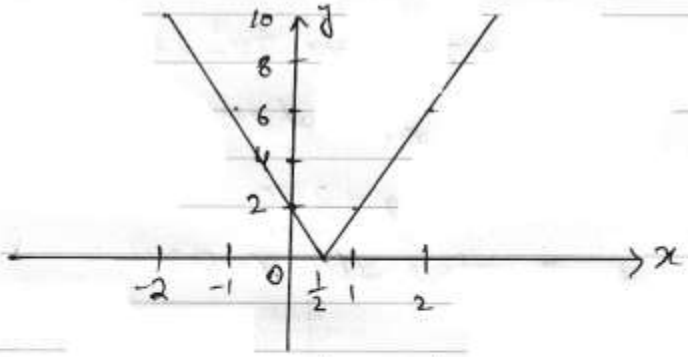
1 **(a)** Sketch the graph of $y = |4x - 2|$.

(b) Solve the inequality $1 + 3x < |4x - 2|$.

Solution:

(a) $y = |4x-2|$

x	-2	-1	0	1	2
y	10	6	2	2	6



(b) $1+3x < |4x-2|$

squaring both sides

$(1+3x)^2 < (4x-2)^2$

$1+6x+9x^2 < 16x^2 - 16x + 4$

$0 < 16x^2 - 16x + 4 - 1 - 6x - 9x^2$

$0 < 7x^2 - 22x + 3$

$\Rightarrow 7x^2 - 22x + 3 > 0$ $\quad a > 0$, $-a < 0$

By factorization

$7x^2 - 21x - x + 3 > 0$

$$7x(x-3)-1(x-3)>0$$

$$(x-3)(7x-1)>0$$

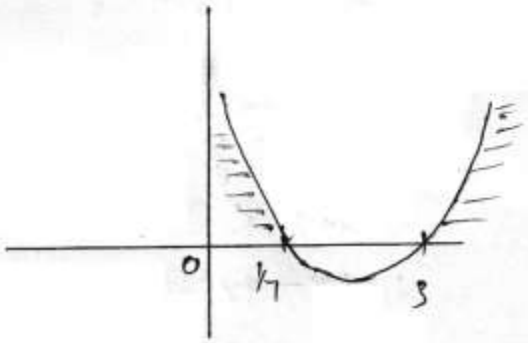
critical values are

$x-3=0, \quad 7x-1=0$

$x=3, \quad x=1/7$

As $a=7>0$ in $7x^2-22x+3$, so parabola face up and have minimum value.

As $7x^2-22x+3>0$, so we shall consider grap above the x-axis.



$\therefore \quad x<1/7, \; x>3$ Ans