Cambridge International AS & A Level

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Mathematics 9709/32

Paper 3 Pure Mathematics 3 **October/November 2021**

Question No (2)

2 Solve the inequality $|3x - a| > 2|x + 2a|$, where a is a positive constant.

Solution:

$$|3x - a| > 2|x + 2a| \quad , \quad a > 0$$

$$Squaring$$

$$(3x - a)^2 > 2^2(x + 2a)^2$$

$$(3x)^2 - 2(3x)(a) + a^2 > 4(x^2 + 4ax + 4a^2)$$

$$9x^2 - 6ax + a^2 > 4x^2 + 16ax + 16a^2$$

$$9x^2 - 4x^2 - 6ax - 16ax + a^2 - 16a^2 > 0$$

$$5x^2 - 22ax - 15a^2 > 0$$

$$By\ factorizatin$$

$$5x^2 - 25ax + 3ax - 15a^2 > 0$$

$$5x(x - 5a) + 3a(x - 5a) > 0$$

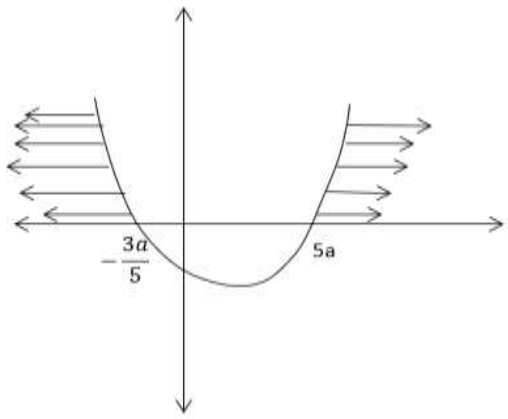
$$(x - 5a)(5x + 3a) > 0$$

$$Critical\ values$$

$$x - 5a = 0, \qquad 5x + 3a = 0$$

$$x = 5a, \qquad x = -\frac{3a}{5}$$

$As\ coefficient\ of\ x^2\ is\ 5 > 0, So\ it\ will\ have$ min $value.$



$$\Rightarrow x > 5a, \qquad x < -\frac{3a}{5}$$