

ALGEBRA (Q 1 & 2, PAPER 1)

SOLUTIONS NO. 8: INEQUALITIES

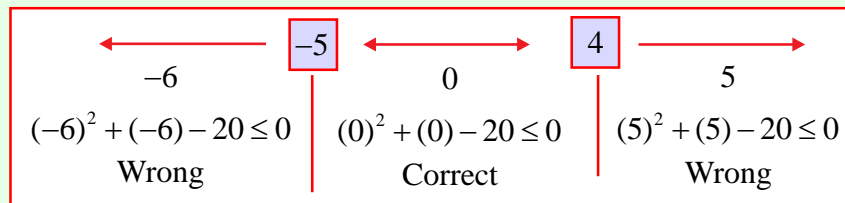
2002

2 (b) (i) Find the range of values of $x \in \mathbf{R}$ for which $x^2 + x - 20 \leq 0$.

SOLUTION

Solve the equality: $x^2 + x - 20 = 0 \Rightarrow (x+5)(x-4) = 0 \Rightarrow x = -5, 4$

Do the region test:



Region Test on $x^2 + x - 20 \leq 0$ **Test Box**

$\therefore -5 \leq x \leq 4$.

2004

2 (b) (i) Solve the inequality $\frac{x+1}{x-1} < 4$, where $x \in \mathbf{R}$ and $x \neq 1$.

SOLUTION

Multiply both sides by the denominator squared.

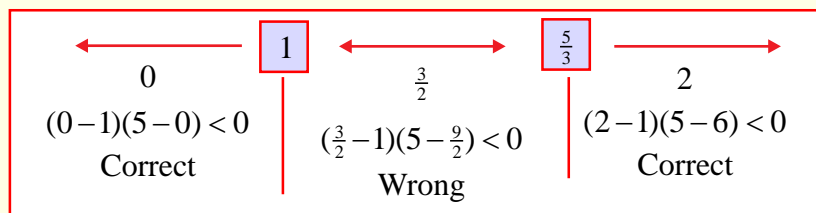
$$\frac{x+1}{x-1} < 4 \Rightarrow (x+1)(x-1) < 4(x-1)^2 \Rightarrow (x+1)(x-1) - 4(x-1)^2 < 0$$

$$(x-1)[(x+1) - 4(x-1)] < 0 \text{ [Factorise the left-hand side]}$$

$$(x-1)[5 - 3x] < 0$$

Solve the equality: $(x-1)(5-3x) = 0 \Rightarrow x = 1, \frac{5}{3}$

Do the region test:



Region Test on $(x-1)(5-3x) < 0$ **Test Box**

$\therefore x < 1, x > \frac{5}{3}$.

2003

2 (b) (i) Solve for x : $|4x + 7| < 1$.

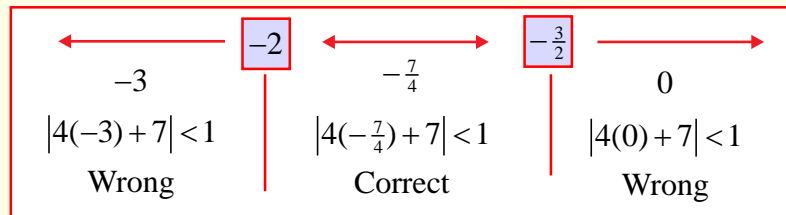
SOLUTION

Solve the equality: $|4x + 7| = 1 \Rightarrow 4x + 7 = \pm 1$

$$x = 1 \Rightarrow 4x + 7 = 1 \Rightarrow 4x = -6 \Rightarrow x = -\frac{3}{2}$$

$$x = -1 \Rightarrow 4x + 7 = -1 \Rightarrow 4x = -8 \Rightarrow x = -2$$

Do the region test:



Region Test on $|4x + 7| < 1$ **Test Box**

$$\therefore -2 < x < -\frac{3}{2}$$

2001

2 (b) (i) Solve for x : $|3x + 5| < 4$.

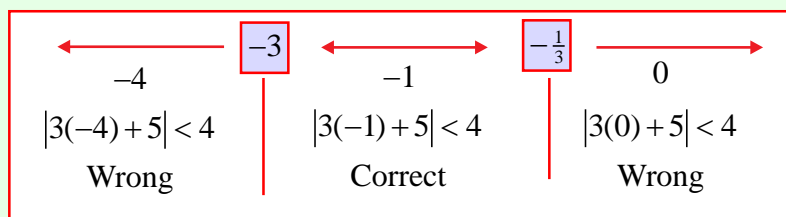
SOLUTION

Solve the equality: $|3x + 5| = 4 \Rightarrow 3x + 5 = \pm 4$

$$3x + 5 = 4 \Rightarrow 3x = -1 \Rightarrow x = -\frac{1}{3}$$

$$3x + 5 = -4 \Rightarrow 3x = -9 \Rightarrow x = -3$$

Do the region test:



Region Test on $|3x + 5| < 4$ **Test Box**

$$\therefore -3 < x < -\frac{1}{3}$$