KEY

Math 20-1

L45 – LQ – 7.3 Absolute Value Equations

Q1: Solve $|x-5| = -2x^2 + 6x + 2$ algebraically. Verify your answers. Confirm by graphing. *(4 marks)*

$+(x-5) = -2x^2+6x+2$

$x-5 = -2x^2+6x+2$

$+2x^2-6x-2 \quad +2x^2-6x-2$

$2x^2-5x-7 = 0$

$(2x-7)(x+1) = 0$

(A) $2x-7=0$, $x = 7/2$ — ½ mark

(B) $x+1=0$, $x=-1$ — ½ mark

$-(x-5) = -2x^2+6x+2$

$-x+5 = -2x^2+6x+2$

$+2x^2-6x-2 \quad +2x^2-6x-2$

$2x^2-7x+3 = 0$

$(x-3)(2x-1) = 0$

(C) $x-3=0$, $x=3$ — ½ mark

(D) $2x-1=0$, $x=1/2$ — ½ mark

Solns are $x = \frac{1}{2}, 3$ — ½ mark

(A) Verify

$|3.5-5| = -2(3.5)^2+6(3.5)+2$

$|-1.5| = -24.5+21+2$

$|-1.5| = -1.5$

Nope. Not a solution.

(B) Verify

$|-1-5| = -2(-1)^2+6(-1)+2$

$|-6| = -2-6+2$

$|-6| = -6$

Nope. Not a solution.

(C) Verify

$|3-5| = -2(3)^2+6(3)+2$

$|-2| = -18+18+2$

$|-2| = 2$

Yes!

(D) Verify

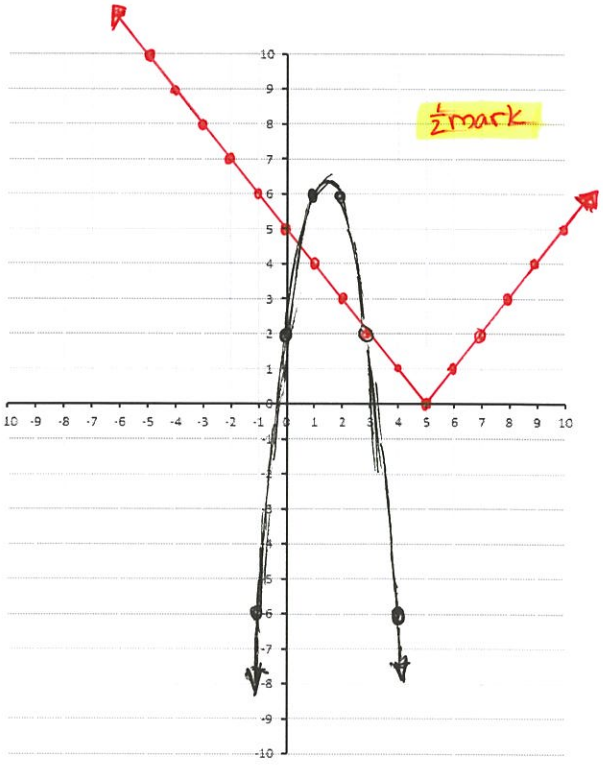
$|0.5-5| = -2(0.5)^2+6(0.5)+2$

$|-4.5| = -0.5+3+2$

$|-4.5| = 4.5$

Yes!

1 mark



KEY

Math 20-1

Q2: Solve $|x^2 + 2x + 2| = 4$ algebraically. Verify your answers. *(4 marks)*

$+(x^2+2x+2) = 4$

$x^2+2x+2 = 4$

$-4 \quad -4$

$x^2+2x-2 = 0$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-2 \pm \sqrt{(2)^2-4(1)(-2)}}{2(1)}$

$x = \dfrac{-2 \pm \sqrt{4+8}}{2}$

$x = \dfrac{-2 \pm \sqrt{12}}{2}$

12 → 2, 6 → 2, 3

$x = \dfrac{-2 \pm \sqrt{2^2 \cdot 3}}{2}$

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

$x = -1 \pm \sqrt{3}$

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

$-x^2-2x-2 = 4$

$-4 \quad -4$

$-x^2-2x-6 = 0$

$\div(-1) \quad \div(-1) \quad \div(-1) \quad \div(-1)$

$x^2+2x+6 = 0$

$x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \dfrac{-2 \pm \sqrt{2^2-4(1)(6)}}{2(1)}$

$x = \dfrac{-2 \pm \sqrt{4-24}}{2}$

$x = \dfrac{-2 \pm \sqrt{-20}}{2}$

Doesn't work. ½ mark

1 mark

(A) $x_1 = -1 + \sqrt{3}$

$x_1 \simeq 0.732$

1 mark

(B) $x_2 = -1 - \sqrt{3}$

$x_2 \simeq -2.732$

(A) $|(0.732)^2 + 2(0.732) + 2| = 4$

$|4| = 4$

Yes!

(B) $|(-2.732)^2 + 2(-2.732) + 2| = 4$

$|4| = 4$

Yes!

½ mark

1 mark

Solns are $x = -1 - \sqrt{3}, \; -1 + \sqrt{3}$

MARKING:

Beginning	0.0 – 3.5
Progressing	4.0 – 5.5
Competent	6.0 – 7.5
Exemplary	8.0