Common Errors

observed on the NSE Mathematics 12/Advanced Mathematics 12

Quadratic Unit

Errors	*Corrections*
☒ $-13^2 = 169$	☑ $(-13)^2 = 169$ $-13^2 = -169$
☒ The vertex is 5, 2.	☑ The vertex is (5, 2).
☒ $(3-x)(10-x) = 18$ $30 - 3x - 10x - x^2 = 18$	☑ $(3-x)(10-x) = 18$ $30 - 3x - 10x + x^2 = 18$
☒ $\sqrt{b^2 - 4ac} = b - \sqrt{4ac}$	☑ $\sqrt{b^2 - 4ac} = \sqrt{b^2 - 4ac}$ Note: $\sqrt{25+16} \neq 5+4$ $\sqrt{25+16} = \sqrt{41}$
☒ $\sqrt{x^2 = 25}$	☑ $\sqrt{x^2} = \sqrt{25}$
☒ $\frac{2x = 18}{2}$	☑ $\frac{2x}{2} = \frac{18}{2}$
☒ $3 + 2 = 5 + 1 = 6$	☑ $3 + 2 = 5$ $5 + 1 = 6$
☒ The equation $2x^2 + x - 5$	☑ The expression $2x^2 + x - 5$
☒ $y + 9 = 3(x^2 - 2x)$ $y + 9^{+3} = 3(x^2 - 2x^{+1})$ Note: The +3 could be misread as an exponent.	☑ $y + 9 = 3(x^2 - 2x)$ $y + 9 + 3 = 3(x^2 - 2x + 1)$

☒ $y = x^2 + 5x + 6$

☑ $0 = x^2 + 5x + 6$

Note: The quadratic formula is used to solve a quadratic equation which is equal to zero.

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(6)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(6)}}{2(1)}$$

☒ $\dfrac{-2 \pm \sqrt{2^2 - 4(1)(-5)}}{2(1)}$

☑ $x = \dfrac{-2 \pm \sqrt{2^2 - 4(1)(-5)}}{2(1)}$

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

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

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

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

☒ $2x^2 - 3x - 5 = 0$

$$0 = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-5)}}{2(2)}$$

☑ $2x^2 - 3x - 5 = 0$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-5)}}{2(2)}$$

☒ $1/3$

☑ $\frac{1}{3}$

☒ $y = x^2 - 8x$

$y = x^2 - 8x + 16$

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

☑ $y = x^2 - 8x$

$y + 16 = x^2 - 8x + 16$

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

☒ $h = t^2 - 2t$

$h + 1 = t^2 - 2 + 1$

$h + 1 = (t - 1)^2$

☑ $h = t^2 - 2t$

$h + 1 = t^2 - 2t + 1$

$h + 1 = (t - 1)^2$

Common Errors

observed on the NSE Mathematics 12/Advanced Mathematics 12

✏ Domain and Range ✎

UNACCEPTABLE NOTATIONS		ACCEPTABLE NOTATIONS	
		On the Math 12 exams, set or interval notation is acceptable: $\{x \mid x \geq 2, x \in \mathbb{R}\}$ or $\{x \in \mathbb{R} \mid x \geq 2\}$ or $[2, \infty)$	
✗	Domain = $x \in \mathbb{R}$	✓	Domain is $x \in \mathbb{R}$
✗	xER	✓	$x \in R$
✗	xer = $-\infty, \infty$	✓	Domain is $(-\infty, \infty)$
✗	$\{x = \in \mathbb{R}\}$	✓	$x \in \mathbb{R}$
✗	$\{x \in (-\infty, \infty)\}$	✓	Domain is $(-\infty, \infty)$
✗	$\{y \in \mathbb{R} \geq -25\}$	✓	$\{y \in \mathbb{R} \mid y \geq -25\}$
✗	$y \in R =< -1$	✓	$\{y \in R \mid y < -1\}$
✗	$y \in R \geq 3$	✓	$\{y \in R \mid y \geq 3\}$
✗	$\mathbb{R} = \{y \in (-1, \infty)\}$	✓	Range is $(-1, \infty)$
✗	$y \in \mathbb{R} = [9, \infty)$	✓	Range is $[9, \infty)$
✗	$y > 5 \in \mathbb{R}$	✓	$\{y \mid y > 5, y \in \mathbb{R}\}$

Marking student work

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Using the following marking scheme, mark the student responses on the next two pages. (see suggested point allotment attached)

Given the equation $3x^2 - 5x - 1 = 0$, solve for 'x'. (Value: 2 points)

~ Using quadratic formula ~

$3x^2 - 5x - 1 = 0$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-1)}}{2(3)}$$

1 pt

$$x = \frac{5 \pm \sqrt{37}}{6}$$

0.5 pt

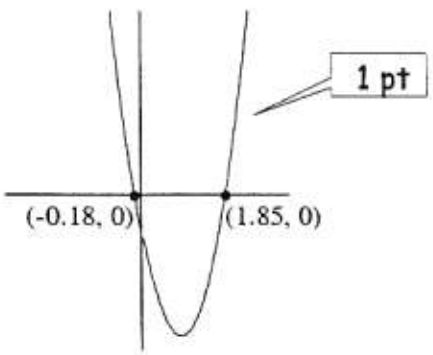
$x = -0.18 \; ; \; x = 1.85$

0.5 pt

OR

~ Using a graphing calculator ~

$y = 3x^2 - 5x - 1$ 0.5 pt



$x = -0.18 \; ; \; x = 1.85$

0.5 pt

WAYS TO SOLVE A QUADRATIC EQUATION

Algebraic and graphical methods

Given $x^2 - x - 6 = 0$, solve for 'x'.

Algebraic Method 1

~ Using the quadratic formula ~

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

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

$$x = \frac{1 \pm \sqrt{1+24}}{2} = \frac{1 \pm \sqrt{25}}{2} = \frac{1 \pm 5}{2}$$

$$x = -2 \; ; \; x = 3$$

Algebraic Method 2

~ Factoring ~

$$x^2 - x - 6 = 0$$
$$(x+2)(x-3) = 0$$
$$x + 2 = 0 \; ; \; x - 3 = 0$$
$$x = -2 \; ; \; x = 3$$

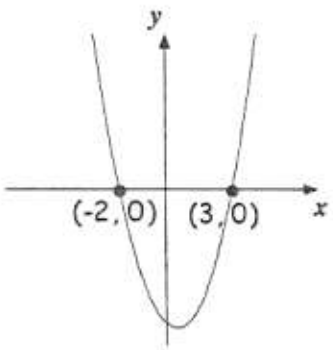
Algebraic Method 3

~ Completing the square ~

$$x^2 - x - 6 = 0$$
$$x^2 - x = 6$$
$$x^2 - x + \tfrac{1}{4} = 6 + \tfrac{1}{4}$$
$$(x - \tfrac{1}{2})^2 = \tfrac{25}{4}$$
$$x - \tfrac{1}{2} = \pm\sqrt{\tfrac{25}{4}}$$
$$x = \pm\tfrac{5}{2} + \tfrac{1}{2}$$
$$x = -2 \; ; \; x = 3$$

~ Using a graphing calculator ~

$$y = x^2 - x - 6$$



$$\therefore \; x = -2 \; ; \; x = 3$$

ZEROS / ROOTS / X-INTERCEPTS

The ZEROS of $y = ax^2 + bx + c$ are the ROOTS of $ax^2 + bx + c = 0$ and are the x-coordinates of the X-INTERCEPTS of the parabola.

Example: Determine the zeros of $y = x^2 - x - 20$.

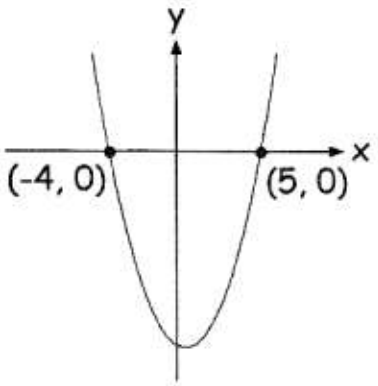
$\Rightarrow$ Determine the roots of $x^2 - x - 20 = 0$

$$(x-5)(x+4) = 0$$
$$x - 5 = 0 \;;\; x + 4 = 0$$
$$x = 5 \;;\; x = -4$$

$\therefore$ The zeros of $y = x^2 - x - 20$ are 5 and -4.

~ or ~

$\Rightarrow$ Determine the x-intercepts of $y = x^2 - x - 20$



$\therefore$ The zeros of $y = x^2 - x - 20$ are 5 and -4.