Precalculus 11 – Flashback #3

1. Determine the equation of the quadratic function that has a vertex of (4, -2) and goes through the point (-3,8).

$V = (4, -2)$ with $p = 4$, $q = -2$

$(-3, 8)$ with $x = -3$, $y = 8$

$y = a(x-p)^2 + q$

$8 = a(-3-4)^2 + -2$

$8 = a(49) - 2$

$10 = 49a$

$\frac{10}{49} = a$

$\therefore \quad y = \frac{10}{49}(x-4)^2 - 2$

2. Determine the discriminant and state the nature of the roots for:

$3x^2 - 11x = 5$

$3x^2 - 11x - 5 = 0$ with $a = 3$, $b = -11$, $c = -5$

$b^2 - 4ac$

$(-11)^2 - 4(3)(-5)$

$121 + 60$

$181 \rightarrow$ 2 real roots irrational

3. Evaluate (without a calculator) $-\left(\frac{1}{125}\right)^{-2/3}$

$-\left(\frac{1}{125}\right)^{-2/3}$

neg. exp. law → reciprocate base

$-\left(\frac{125}{1}\right)^{2/3}$

fractional exp. law (write as radical

$-\sqrt[3]{(125)^2}$

$-(5)^2$ → evaluate root

-25 → square base

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4. Explain the difference between a quadratic and a linear function.

linear – equation has a degree of 1
– usually has 1 root – possible to have zero

quadratic – equation has a degree of 2
– can have 2, 1 or zero roots

5. Rationalize and reduce (or reduce then rationalize): $\frac{2\sqrt{320}}{\sqrt{3}}$. Is there a difference if you rationalize or reduce first?

320
32 10
16 2 2 5

$$\frac{2\sqrt{320}}{\sqrt{3}} \rightarrow \frac{2\sqrt{16\cdot4\cdot5}}{\sqrt{3}} \rightarrow \frac{2\cdot4\cdot2\sqrt{5}}{\sqrt{3}}$$

$$\frac{16\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} \rightarrow \frac{16\sqrt{15}}{3}$$

6. Simplify: $\frac{-12+\sqrt{80}}{4}$ $\rightarrow \frac{-\cancel{12} \pm \cancel{4}\sqrt{5}}{\cancel{4}}$

80
4 · 20
4 · 5

$$\rightarrow -3 \pm \sqrt{5}$$

7. State the transformations for the function $y = -7(x-11)^2 - 19$

parabola opens down

stretch of 7

horizontal translation right 11

vert. translation down 19

$\cancel{1}$ - $\cancel{3}$ - $\cancel{5}$
7 21 35

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↗ opens up

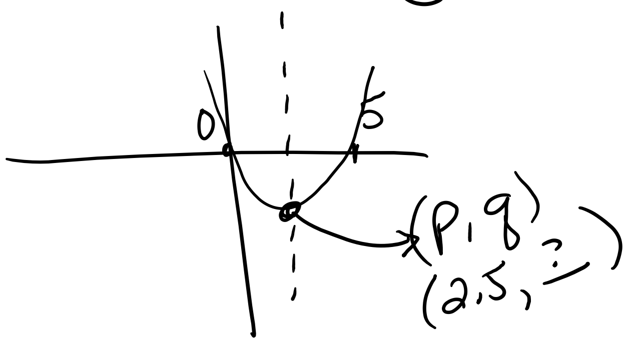
8. Two numbers have a difference of 5. Their product is a minimum. Determine the two numbers and their product.

if x = first #
then $x-5$ = Second #

$x\underbrace{(x-5)}$ = product

$x=0$ $\quad$ $x=5$

The 2 numbers are ~~0~~ and 5. The minimum is the y value of the vertex.



$x(x-5)$ = product
$2.5(2.5-5)$ = product
$2.5(-2.5)$
-6.25 = product

9. Solve algebraically: $2x^2 - 3x \le 9$

$2x^2 - 3x - 9 \le 0$
$(2x+3)(x-3) \le 0$
$2x = -3 \qquad x = 3$
$x = -3/2$

So
$-3/2 \le x \le 3$

10. Simplify: $\frac{x^2+5x+6}{9-x^2} \div \frac{x+3}{x+5}$

$\frac{(x+3)(x+2)}{(3-x)(3+x)} \div \frac{x+3}{x+5}$ $\qquad$ $x \ne 3, -3, -5$

Note
$x+3 = 3+x$

$\frac{(\cancel{x+3})(x+2)}{(3-x)(\cancel{3+x})} \cdot \frac{(x+5)}{(x+3)}$

and

$\frac{(x+2)(x+5)}{(3-x)(x+3)}$