BE – PRECALC | MONDAY 10-5-09

ACT ① A formula for finding the value, A dollars, of P dollars invested at $i\%$ interest compounded annually for N years is $A = P(1+0.01i)^N$. Find an expression for P in terms of i, N, and A.

② In the equation $X^2 + mX + N = 0$, m and N are integers. The only possible value for X is -3. What is the value of m?

ANS

① Divide both sides by $(1+.01i)^N$

$$\boxed{P = \frac{A}{(1+0.01i)^N}}$$

② OPTION 1 ⇒ if $X = -3$
(use factors)

$$(X+3)(X+3) = 0$$
$$X^2 + 6X + 9 = 0$$
$$\boxed{m = 6}$$

OPTION 2 ⇒
(use QF)

$$X = \frac{-b \pm \sqrt{d}}{2a}$$

SINCE 1 rational solution ⇒ $\sqrt{d} = 0$

$$-3 = \frac{-b}{2} \quad \therefore -6 = -b$$
$$\boxed{b = 6}$$

Some facts about graphing quadratics of the form: $ax^2+bx+c=y$

① The graph of $y=f(x)=ax^2+bx+c$ is a u-shaped curve called a parabola. If the leading coefficient a is positive, the parabola

POSITIVE = SMILEY

if a is <0 (NEGATIVE), the parabola

NEGATIVE = frown

② The (x,y) coordinates of the vertex (x,y) or (x,y) are $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

x, y

Ex) $y=x^2-6x-16$

Vertex is at $x=\frac{-b}{2a}=\frac{-(-6)}{2(1)}=3$

LOOK

X=3 IS THE AXIS OF SYMMETRY

$y=f(x)=x^2-6x-16$

$y=f(3)=(3)^2-6(3)-16$

$y=f(3)=9-18-16=-25$

$\boxed{V=(3,-25)}$

Where does $y = x^2 - 6x - 16$ cross the x axis?

Solve $0 = x^2 - 6x - 16$

$a = 1 \qquad b^2 - 4ac$

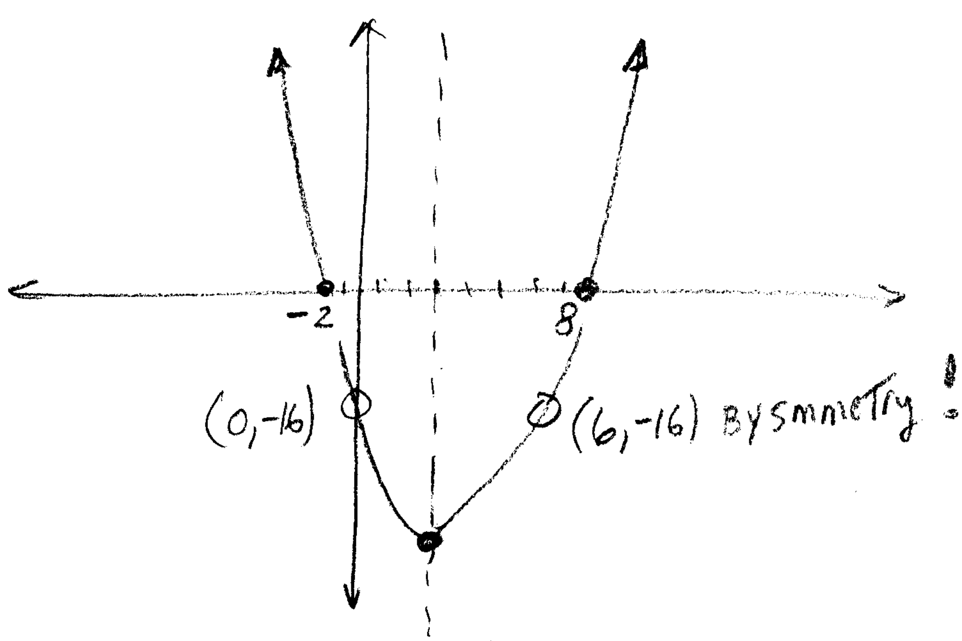
$b = -6 \qquad (-6)^2 - 4(1)(-16)$

$c = -16 \qquad 36 + 64 = 100 = d$ Two rational solutions

$$x = \frac{-b \pm \sqrt{d}}{2a} = \frac{-(-6) \pm 10}{2(1)}$$

$$x = \frac{6+10}{2}, \frac{6-10}{2}$$

$$\boxed{x = 8, -2}$$



AOS $\Rightarrow x = 3$

Use T-Table too!

x	y
0	-16

4-7 RADICAL EQUATIONS

RADICAL EQUATIONS — EQUATIONS WITH THE VARIABLE UNDER A RADICAL

$$\sqrt{X} = \sqrt[2]{X} \Rightarrow \sqrt[2]{X}\sqrt[2]{X} = X$$

$$\sqrt[3]{X} \Rightarrow \sqrt[3]{X}\sqrt[3]{X}\sqrt[3]{X} = X$$

$$\sqrt[4]{X} \Rightarrow \sqrt[4]{X}\sqrt[4]{X}\sqrt[4]{X}\sqrt[4]{X} = X$$

EX $\sqrt{16} = 4$ SINCE $4 \cdot 4 = 16$

READ "the cube root of 8" $\sqrt[3]{8} = 2$ SINCE $2 \cdot 2 \cdot 2 = 8$

Read "the fourth root of 16" $\sqrt[4]{16} = 2$ SINCE $2 \cdot 2 \cdot 2 \cdot 2 = 16$

Steps to solve: ① Get the RADICAL term "by itself"

② "Undo" the radical

$$(\sqrt{X})^2 = X$$

$$(\sqrt[3]{X})^3 = X$$

Because UNDO by RAISING the power raises the degree → creates false SOLUTIONS

③ Check SOLUTION – the UNDO may create false or "EXTRANEOUS" SOLUTIONS.

$\overline{\text{Ex 2}}$ pg 252 Solve $x = \sqrt{x+7} + 5$

$\sqrt{x+7} = x - 5$ Radical term "by itself"

$(\sqrt{x+7})^2 = (x-5)^2$ Undo radical by squaring both sides

$$x + 7 = x^2 - 10x + 25$$
$$-x \quad -7 \qquad\quad -x \quad -7$$

$$0 = x^2 - 11x + 18$$

sum ⇒ -11
prod ⇒ 18
$-2 \; -9$

$0 = (x-2)(x-9)$ $\therefore$ $x = 2, 9$

$\underline{\text{ck}}$ $x=2$

$x \overset{?}{=} \sqrt{x+7} + 5$

$(2) \overset{?}{=} \sqrt{(2)+7} + 5$

$2 \overset{?}{=} 3 + 5$ NO

FALSE SOLUTION
$x \neq 2$

$\underline{\text{ck}}$ $x=9$

$x \overset{?}{=} \sqrt{x+7} + 5$

$(9) \overset{?}{=} \sqrt{(9)+7} + 5$

$9 = \sqrt{16} + 5$ ✓

yes.

$$\boxed{x = \{9\}}$$

FINAL ANSWER

EX 3 Solve $4 = \sqrt[3]{x+2} + 8$

Pg 252

$$\sqrt[3]{x+2} = -4$$

$$\left(\sqrt[3]{x+2}\right)^3 = (-4)^3$$

$$x+2 = -64$$

$$x = -66$$

CK

$$4 \stackrel{?}{=} \sqrt[3]{x+2} + 8$$

$$4 \stackrel{?}{=} \sqrt[3]{(-66)+2} + 8$$

$$4 \stackrel{?}{=} \sqrt[3]{-64} + 8$$

Since $(-4)(-4)(-4) = -64$

$$4 = -4 + 8 \checkmark$$

$$\boxed{x = \{-66\}}$$

• WATCH OUT FOR OCCASIONAL "NO SOLUTION" PROBLEMS

• Homework: Pg. 254/255 # 4, 5, 6, 12, 13, 14