

BE-Alg. 2 MONDAY 11-1-10

ACT
2009
2010
PRACTICE
TEST

① WHAT RATIONAL NUMBER IS
HALFWAY BETWEEN $\frac{1}{5}$ AND $\frac{1}{3}$?

② IF $a < b$, THEN $|a - b|$ IS EQUIVALENT
TO WHICH OF THE FOLLOWING?

- (A) $a + b$ (B) $-(a + b)$ (C) $\sqrt{a - b}$ (D) $a - b$ (E) $-(a - b)$

ANS

① $\frac{1}{5} + \frac{1}{3}$

$$\frac{3}{15} + \frac{5}{15} = \frac{8}{15} \cdot \frac{1}{2} \therefore \left[\frac{4}{15} \right] \text{ is } \frac{1}{2} \text{ way}$$

② IF $a < b \Rightarrow$ TAKING b FROM a WILL
BE NEGATIVE, BUT THE
ABSOLUTE VALUE WILL TURN THIS
DIFFERENCE POSITIVE.

$-(a - b)$ WILL HAVE THE SAME
RESULT, CHANGING THE
SIGN OF THE DIFFERENCE.

$$= |a - b| \text{ if } a < b \therefore \text{ANSWER}$$

(E)

Reviews of how to solve QUADRATIC EQUATIONS (2nd degree)

if they can be factored $\Rightarrow$ Roots ALWAYS RATIONAL

- (Clean-up) • Combine like terms, put in standard form, and factor a GCF if possible.
(ax²+bx+c = 0)
- (Factor) • Factor using the magic number method.
- (Solve) • Write solutions using ZPP.
(Zero product property)
- (Check) • Check solutions

(Ex) Solve $3x^2 + 5x + 10 = -16x - 20$ } COMBINE LIKE TERMS

$$3x^2 + 21x + 30 = 0$$

} STANDARD FORM

$$3(x^2 + 7x + 10) = 0$$

} GCF

$$ax^2 + bx + c$$

} FACTOR, MAGIC NUMBER METHOD

$$\text{sum} = b = 7$$

$$\text{prod} = ac = 10$$

$$+2 \quad +5$$

$$3(x+2)(x+5) = 0$$

Since a = +1
Check w/ FOIL

NOTE: WHILE NECESSARY, this 3
= does NOT AFFECT SOLUTION

$$x = \{-2, -5\}$$

ZPP } SOLVE
} CHECK

CK $x = -2$ $3(-2)^2 + 5(-2) + 10 \stackrel{?}{=} -16(-2) - 20$
 $12 - 10 + 10 \stackrel{?}{=} 32 - 20 \checkmark$

$x = -5$ $3(-5)^2 + 5(-5) + 10 \stackrel{?}{=} -16(-5) - 20$
 $75 - 25 + 10 \stackrel{?}{=} 80 - 20 \checkmark$

CHAPTER 6-3
Solving Quadratic
Equations By
Factoring

BE ALERT TO the special form of a
Perfect Square Trinomial $\Rightarrow$ you can factor
these using mental MATH.

Ex 2
Pg 302

Solve $X^2 - 16X + 64 = 0$

$\downarrow \quad \downarrow \quad \downarrow$
 $2 \cdot X \cdot 8 \checkmark$

$$(X - 8)^2 = 0$$

or $(X - 8)(X - 8) = 0$

$$X = \{8\}$$

DID
YOU
CHECK
this?

This type of quadratic, a
Perfect Square, is said to have
A Double Root.

NOTE: $\sqrt{X^2 - 16X + 64} = (X - 8)$

Because $(X - 8)(X - 8) = X^2 - 16X + 64$

Suppose the "C" term in $ax^2 + bx + c = 0$ is 0.
Then the "GCF" will be all you need to factor
to solve the quadratic.

Ex 1
Pg 301

$$X^2 = 6X$$

$$X^2 - 6X = 0$$

$$X(X - 6) = 0$$

or $(X - 0)(X - 6) = 0$ $X = \{0, 6\}$ Checks?

STANDARD FORM

$$X^2 - 6X + 0 = 0$$

2pp

What if "b" = 0 in $ax^2 + bx + c = 0$?

Easiest way to solve is "Isolate" the x^2 term and take the square root of both sides.

(Ex) $4x^2 = 30$

$$4x^2 - 30 = 0$$

$$+30 \quad +30$$

Standard Form $4x^2 + 0x - 30 = 0$

$$a = 4 \quad b = 0$$

$$c = -30$$

$$\frac{4x^2}{4} = \frac{30}{4}$$

$$x^2 = \frac{15}{2}$$

$$\sqrt{x^2} = \pm \sqrt{\frac{15}{2}}$$

$$x = \pm \sqrt{\frac{15}{2}} = \pm \frac{\sqrt{30}}{2}$$

Simplify - RAT. THE BOT.

$$\frac{\sqrt{15}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{30}}{2}$$

Since $\sqrt{x^2} = |x|$

$$|x| = \sqrt{\frac{15}{2}}$$

$$\begin{cases} + (x) = \frac{\sqrt{15}}{\sqrt{2}} \\ - (x) = \frac{\sqrt{15}}{\sqrt{2}} \end{cases}$$

$$x = -\frac{\sqrt{15}}{\sqrt{2}}$$

CK $4\left(\sqrt{\frac{15}{2}}\right)^2 \stackrel{?}{=} 30$

$$4 \cdot \left(\frac{15}{2}\right) \stackrel{?}{=} 30 \checkmark$$

$$4\left(-\sqrt{\frac{15}{2}}\right)^2 \stackrel{?}{=} 30$$

$$4\left(-1 \cdot \sqrt{\frac{15}{2}}\right)^2 \stackrel{?}{=} 30$$

$$4\left(\frac{15}{2}\right) \stackrel{?}{=} 30 \checkmark$$

If you solve a quadratic by taking the square root of both sides, it may have complex roots.

Factorable quadratics will never have complex roots, only real roots. Many, many quadratics are not factorable - we will get to those soon.

$$\textcircled{\text{ex}} \quad 5x^2 + 20 = 0 \quad \Rightarrow b = 0$$

$$\frac{5x^2}{5} = \frac{-20}{5}$$

$$x^2 = -4$$

$$x = \pm\sqrt{-4} = \pm\sqrt{-1}\sqrt{4}$$

$$\boxed{x = \pm 2i}$$

$$\begin{array}{l} \text{CK} \quad 5(2i)^2 + 20 \stackrel{?}{=} 0 \\ \quad 5(4)(i^2) + 20 \stackrel{?}{=} 0 \\ \quad 20(-1) + 20 \stackrel{?}{=} 0 \checkmark \end{array} \left\{ \begin{array}{l} 5(-2i)^2 + 20 \stackrel{?}{=} 0 \\ 5(4)(i^2) + 20 \stackrel{?}{=} 0 \\ 20(-1) + 20 \stackrel{?}{=} 0 \checkmark \end{array} \right.$$

Summary: Solving $ax^2 + bx + c = 0$
by factoring and solving the two
special cases $b = 0$ and $c = 0$.

NOTE: $a = 0 \Rightarrow$ Linear Equation

- ①
- Cleanup $\Rightarrow$ Combine Like Terms, Standard Form, GCF
 - FACTOR $\Rightarrow$ Magic Numbers Unless Perfect Square
TRINOMIAL
 $\Rightarrow$ Double Root
OR $\bullet c = 0$
 $\Rightarrow$ GCF ONLY
 - Solve $\Rightarrow$ ZPP
 - Checks
- FACTORABLE
||
ROOTS
ALWAYS
RATIONAL

- ②
- If $b = 0$, isolate x^2 & take $\sqrt{\quad}$ of both sides,
don't forget $x = \pm \sqrt{\quad}$
- MAY HAVE
Complex
roots

PRACTICE USING ZPP AND MENTAL MATH TO
name the roots (solutions):

EX $(x+5)(x-3) = 0$ $x = \{-5, 3\}$

EX $(2x-3)(5x+6) = 0$ $x = \{\frac{3}{2}, -\frac{6}{5}\}$

why?

$$\left. \begin{array}{l} 2x-3=0 \\ \quad +3 \quad +3 \\ \hline 2x = 3 \\ \hline \frac{2x}{2} = \frac{3}{2} \\ \hline \end{array} \right\} \begin{array}{l} 5x+6=0 \\ \quad -6 \quad -6 \\ \hline 5x = -6 \\ \hline \frac{5x}{5} = \frac{-6}{5} \\ \hline \end{array}$$

NAME THE SOLUTIONS:

$$(x-1)(6x+7) = 0$$

$$x = \left\{1, -\frac{7}{6}\right\}$$

$$(3x+4)(2x-1) = 0$$

$$x = \left\{-\frac{4}{3}, \frac{1}{2}\right\}$$

order?

Can you go backwards? If you know the solutions can you write the original quadratic?

EX $x = \{2, 3\} \Rightarrow (x-2)(x-3) = 0$

$$x^2 - 5x + 6 = 0$$

EX $x = \{-5, 1\} \Rightarrow (x - (-5))(x - 1) = 0$
 $(x+5)(x-1) = 0$

$$x^2 + 4x - 5 = 0$$

EX $x = \left\{-\frac{4}{3}, \frac{1}{2}\right\}$

$$(x - (-\frac{4}{3}))(x - \frac{1}{2}) = 0$$

$$(x + \frac{4}{3})(x - \frac{1}{2}) = 0$$

$$(3x+4)(2x-1) = 0 \quad ?$$

$$6x^2 + 5x - 4 = 0 \quad \text{cks?}$$

Look

$$3(x + \frac{4}{3}) = 0 \cdot 3$$

$$3x + 4 = 0$$

Homework: Pg. 303 # 4-12.
 (Ch. 6-3)