# Review 5.4-5.8

Need to Know!

Standard Form of Quadratic Eq. $y = ax^2+bx+c$ $(a\neq 0)$
Solving Quadratic Eq by:
,graphing, factoring, taking sq roots, completing the square, quadratic formula
Complex Numbers: $\sqrt{-1} = i$ *and* $i^2 = -1$
Simplest radical form and adding, subtracting and multiplying with imaginary numbers.
Using the discriminant $(b^2 - 4ac)$ to determine the number of solutions of a quadratic eq.
Writing the equation of a quadratic given the roots or a graph
Writing the equation of a quadratic in vertex form

Aug 10-2:00 PM

## WARM UP-Review for Test 5.4-5.8

Solve by completing the square.

$2y^2 = 4y - 1$

$2y^2 - 4y = -1$

$2\left(y^2 - 2y + \left(\frac{-2}{2}\right)^2\right) = -1 + 2\left(\frac{-2}{2}\right)^2$

$2(y-1)^2 = 1$

$\sqrt{(y-1)^2} = \pm\sqrt{\frac{1}{2}}$

$y = 1 \pm \sqrt{1/2}$

Nov 15-11:05 AM

## WARM UP-Review for Test 5.4-5.8

**FACTOR**

1) $x^2 + 3x - 10$ 2) $8m^2 + 4m$ 3) $18x^2 - 8$ 4) $2x^2 - 7x + 6$

$(x+5)(x-2)$ $4m(2m+1)$ $2(3x-2)(3x+2)$ $(2x-2)(x-3)$

**SOLVE BY FACTORING OR TAKING SQUARE ROOTS**

5) $3x^2 + 15 = 0$ 6) $2x^2 - 5x - 3 = 0$ 7) $5(x - 7)^2 = 50$

$3x^2 = -15$
$x^2 = -5$
$x = \pm i\sqrt{5}$

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

$\sqrt{(x-7)^2} = \pm\sqrt{10}$
$x - 7 = \pm\sqrt{10}$
$x = 7 \pm \sqrt{10}$

Oct 24-11:13 AM

in standard form

**WRITE A QUADRATIC WITH THE GIVEN ZEROS.**

8) -2, -3

$y = (x+2)(x+3)$

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

9) 4, 0

$y = (x-4)(x-0)$

$y = (x-4)x$

$y = x^2 - 4x$

**SIMPLIFY.**

10) (3 + 4*i*) - (-8 + 3*i*)

$11 + i$

11) $(2 - \sqrt{-9})(1 + \sqrt{-25})$

$(2 - 3i)(1 + 5i)$

$17 + 7i$

Nov 14-11:14 AM

**FIND THE VALUES OF x AND y.**

12) -12 + 3y*i* = 4x + 27*i*

$-12 = 4x$

$-3 = x$

$3y = 27$

$y = 9$

**FIND THE ADDITIVE INVERSE OF:**

13) $4 - i$

Nov 14-11:15 AM

**SOLVE BY COMPLETING THE SQUARE:**

14) $x^2 - x = 2$

$x^2 - x + (-\frac{1}{2})^2 = 2 + (-\frac{1}{2})^2$

$\sqrt{(x - \frac{1}{2})^2} = \pm\sqrt{\frac{9}{4}}$

$x - \frac{1}{2} = \pm\frac{3}{2}$

$x = 2$ or $-1$

15) $2x^2 - 4x + 7 = 0$

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

$2(x-1)^2 = -5$

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

$x - 1 = \pm i\sqrt{\frac{5}{2}}$

$x = 1 \pm i\sqrt{5/2}$

**USE THE QUADRATIC FORMULA TO SOLVE:**

16) $3x^2 + 2x = -4$

$x = \frac{-1 \pm i\sqrt{11}}{3}$

17) $x^2 + 4x = 41$

*(also find answers on calculator)*

$x = -2 \pm 3\sqrt{5}$

Nov 14-11:17 AM

$\sqrt{180}$

9  20

4  5

$\sqrt{36 \cdot 5} = 6\sqrt{5}$

Oct 27-11:05 AM

**USE THE DISCRIMINANT TO DETERMINE THE NUMBER OF SOLUTIONS AND WHETHER THEY ARE REAL OR IMAGINARY:**

18) $6x^2 - 2x - 5 = 0$  2  real or imaginary

$(-2)^2 - 4(6)(-5)$

$4 + 120 = 124$

19) $x^2 - 12x + 36 = 0$  1  real or imaginary

$(-12)^2 - 4(1)(36)$

$0$

20) $2x^2 + x + 28 = 0$  2  real or imaginary

$(1)^2 - 4(2)(28)$

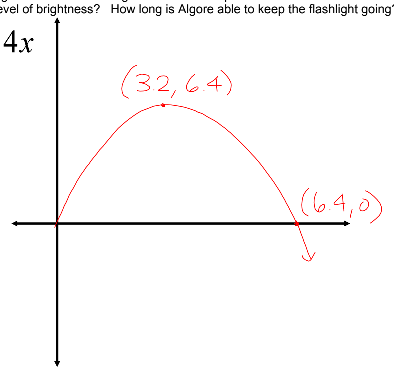
$-288$

Nov 14-11:22 AM

Calculator:

Algore has a flashlight powered by an exercise bike. The equation that models the brightness of his light in lumens (y) over time in minutes (x) is given below. According to the model, what is the maximum number of lumens that his flashlight emits and how long does he need to pedal the bike in order to achieve that level of brightness? How long is Algore able to keep the flashlight going?

$$y = \frac{-5}{8}x^2 + 4x$$




Nov 15-11:04 AM

REVIEW FOR TEST 5.4-5.8
HW - Review Part 2
p. 300 #24-46 even, 47-52 all, 70-72 all

Pull

Complete the square (solve)

① $x^2 - 16x + 43 = 0$

② $3x^2 + 12x + 20 = 0$

③ $2x^2 - x + 7 = 0$

Nov 1-11:18 AM

Solve:

| | | |
|---|---|---|
| $36x^2 - 49 = 0$ | $x^2 - 15x + 36 = 0$ | $6x^2 + x - 15 = 0$ |

Nov 1-11:18 AM

**5-4 and 5-5 Objectives**

- To find common and binomial factors of quadratic expressions (p. 259)
- To factor special quadratic expressions (p. 262)
- To solve quadratic equations by factoring and by finding square roots (p. 267)
- To solve quadratic equations by graphing (p. 268)

You can solve some quadratic equations by finding square roots of both sides or by finding the zeros of the related function. You can solve some quadratic equations in the **standard form of a quadratic equation** $ax^2 + bx + c = 0$ by **factoring** and using the **Zero Product Property**. For a **perfect square trinomial**, $ax^2 \pm 2abx + b^2 = (a \pm b)^2$. For the **difference of two squares,** $a^2 - b^2 = (a + b)(a - b)$. In all cases, first factor out the **greatest common factor (GCF) of the expression.**

**Solve by factoring, taking square roots, or, if necessary, by graphing. Give exact radical answers. For answers found by graphing, round to the nearest hundredth.**

**24.** $x^2 - 7x = 0$
**25.** $x^2 + 2x - 8 = 0$
**26.** $(x + 3)^2 = 9$
**27.** $4(x - 2)^2 = 32$
**28.** $2x^2 - 6x - 8 = 0$
**29.** $x^2 - 5x - 5 = 0$
**30.** $3x^2 - 14x + 8 = 0$
**31.** $x^2 - 3x - 4 = 0$
**32.** $x^2 + 8x + 16 = 0$
**33.** $x^2 - 6x + 9 = 0$
**34.** $4x^2 - 12x + 9 = 0$
**35.** $x^2 - 9 = 0$
**36.** $6x^2 - 13x - 5 = 0$
**37.** $4x^2 + 3 = -8x$
**38.** $3x^2 + 4x - 10 = 0$

Nov 5-3:44 PM

**5-6 Objectives**

- To identify and graph complex numbers (p. 274)
- To add, subtract, and multiply complex numbers (p. 276)

An **imaginary number** has the form $a + bi$, where $b \neq 0$. The imaginary number $i$ is defined as $i^2 = -1$. A **complex number** has the form $a + bi$, where $a$ and $b$ are any real numbers. The **absolute value of a complex number** is its distance from the origin in the **complex number plane**. You graph $a + bi$ in the complex plane just as you graphed $(a, b)$ in the coordinate plane. Complex numbers follow rules of operation like those of real numbers. Some quadratic equations have imaginary numbers as roots. Functions of complex numbers may be used to generate fractals.

**Simplify each expression.**

**39.** $\sqrt{-25}$ **40.** $\sqrt{-2} - 1$ **41.** $-4 - \sqrt{-1}$ **42.** $\sqrt{-27}$

**43.** $2\sqrt{-32} + 4$ **44.** $|3 - i|$ **45.** $|-2 + 3i|$ **46.** $|4i|$

**47.** $(3 + 4i) - (7 - 2i)$ **48.** $(5 - i)(9 + 6i)$

**49.** $(3 + 8i) + (5 - 2i)$ **50.** $(4 + 6i)(2 + i)$

Oct 24-12:50 PM

**5-7 and 5-8 Objectives**

- To solve equations by completing the square (p. 282)
- To rewrite functions in vertex form by completing the square (p. 284)
- To solve quadratic equations by using the Quadratic Formula (p. 289)
- To determine types of solutions by using the discriminant (p. 291)

**Completing the square** is based on the relationship $x^2 + bx + \left(\frac{b}{2}\right)^2 = \left(x + \frac{b}{2}\right)^2$. You can use it to write a quadratic function in vertex form. If the coefficient of the quadratic term is not 1, you must factor out the coefficient from the variable terms.

You can solve any quadratic equation by using the Quadratic Formula.

If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

The discriminant $b^2 - 4ac$ determines the number and type of solutions of the equation. If $b^2 - 4ac > 0$, the equation has two real solutions. If $b^2 - 4ac = 0$, the equation has one real solution. If $b^2 - 4ac < 0$, the equation has no real solutions and two imaginary solutions.

**Solve each equation by completing the square.**

**61.** $9x^2 + 6x + 1 = 4$ **62.** $x^2 + 3x = -25$ **63.** $x^2 - 2x + 4 = 0$

**64.** $-x^2 + x - 7 = 0$ **65.** $2x^2 + 3x = 8$ **66.** $4x^2 - x - 3 = 0$

**Rewrite the equation in vertex form by completing the square. Find the vertex.**

**67.** $y = x^2 + 3x - 1$ **68.** $y = 2x^2 - x - 1$ **69.** $y = x^2 + x + 2$

**Determine the number and type of solutions. Solve using the Quadratic Formula.**

**70.** $x^2 - 6x + 2 = 0$ **71.** $-2x^2 + 7x = 10$ **72.** $x^2 + 4 = 6x$

Oct 24-12:50 PM