Multiple Choice
Identify the choice that best completes the statement or answers the question.

HALF & SQUARE

C 1. Complete the square for $x^2 - 14x +$ [49]. Then write the resulting expression as a binomial squared.

A $49; (x+7)^2$ C $49; (x-7)^2$

B $-49; (x+7)^2$ D $-49; (x-7)^2$

$(x-7)^2$

B 2. Solve $(13x-7)^2 = 110$.

A $\frac{-7-\sqrt{110}}{26}, \frac{-7+\sqrt{110}}{26}$ C $\frac{-7-\sqrt{110}}{13}, \frac{-7+\sqrt{110}}{13}$

B $\frac{7-\sqrt{110}}{13}, \frac{7+\sqrt{110}}{13}$ D $\frac{7-\sqrt{110}}{26}, \frac{7+\sqrt{110}}{26}$

$13x-7 = \pm\sqrt{110}$

$13x = 7 \pm \sqrt{110}$

$x = \frac{7 \pm \sqrt{110}}{13}$

A

3. Solve $8x^2 = 135$.

A $x = \pm\frac{3\sqrt{30}}{4}$

B $x = \pm\frac{3}{2}\sqrt{\frac{15}{2}}$

C $x = \pm 8.4275$

D $x = \pm 16.875$

$x^2 = \frac{135}{8}$

$x = \pm\frac{\sqrt{135}}{\sqrt{8}}$ ← $\sqrt{9}\sqrt{15}$, $\sqrt{4}\sqrt{2}$

$x = \pm\frac{3\sqrt{15}}{2\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

$x = \pm\frac{3\sqrt{30}}{4}$

C 4. Find the zeros of $g(x) = 4x^2 - x + 2$.

A $x = \frac{1}{2} \pm \frac{\sqrt{31}}{2} i$

B $x = \frac{1}{8} \pm \frac{31}{8} i$

C $x = \frac{1}{8} \pm \frac{\sqrt{31}}{8} i$

D $x = \frac{1}{8} \pm \frac{\sqrt{33}}{8} i$

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

$$\frac{1 \pm \sqrt{-31}}{8} = \frac{1 \pm i\sqrt{31}}{8} = \frac{1}{8} \pm \frac{\sqrt{31}}{8} i$$

C 5. Find the number and type of solutions for $x^2 - 5x = -10$.

$b^2 - 4ac$

A The equation has two real solutions.
B Cannot determine without graphing.
C The equation has two nonreal complex solutions.
D The equation has one real solution.

$$x^2 - 5x + 10 = 0$$

$$b^2 - 4ac$$

$$(-5)^2 - 4(1)(10)$$

$$-15$$

B

6. When $2x^2 - 20x + 49 = 19$ is written in the form $(x-p)^2 = q$, what is the value of q?

A 19
B 10
C 5
D −30

$2x^2 - 20x = -30$

HALF & SQUARE

$x^2 - 10x \underline{+25} = -15 \underline{+25}$

$(x-5)^2 = 10$

$x - 5 = \pm\sqrt{10}$

$x = 5 \pm \sqrt{10}$

____ 7. Which of the following quadratic equations has no real solutions?

b^2-4ac

A $x^2+3x-5=0$ $3^2-4(1)(-5)=29$
B $4x^2+4x+1=0$ $4^2-4(4)(1)=0$
C $2x^2-4x+3=0$ $(-4)^2-4(2)(3)=-8$
D $x^2-6x-2=0$ $(-6)^2-4(1)(-2)=44$

B

8. What is the simplified form of $-i^{18}\sqrt{-1600}$?

B

A $-40i$
B $40i$
C 40
D -40

$i=\sqrt{-1}$
$i^2=-1$
$i^3=-\sqrt{-1}=-i$
$i^4=1$

$-i^{18}\sqrt{-1600}$
$-i^2(40i)$
$40i$

A

9. Simplify $i^9\sqrt{-289}$.

A -17
B $-17i$
C 17
D $17i$

$i^9\sqrt{-289}$

$i\ 17i$

$17i^2$

-17

10. What does the imaginary number i represent?

A -1
B $\sqrt{1}$
C $\sqrt{-1}$
D $-\sqrt{-1}$

B 11. Simplify $\left(i\sqrt{3}-2\right)\left(i\sqrt{3}+2\right)$.

A $3i^2-4$
B -7
C $-\sqrt{3}-4$
D $\sqrt{3}+4$

$3i^2+2i\sqrt{3}-2i\sqrt{3}-4$

$-3-4$

-7

B 12. Add. Write the result in the form $a+bi$.

$(7-9i)+(-6+5i)$

A $12-15i$
B $1-4i$
C $-2-i$
D $13-14i$

$1-4i$

A

13. What is the product: $6i(5-2i)$ in the form $a+bi$?

A $12+30i$
B $-12-30i$
C $12-30i$
D $-12+30i$

$30i - 12i^2 + 12$

$12 + 30i$

Multiple Response

Identify one or more choices that best complete the statement or answer the question.

____ 1. Identify the quadratic equations below that have non-real solutions. b^2-4AC IS NEG

A $x^2+3x-25=-7$
B $-x^2+7x+1=13$
C $x^2+2x=-5$
D $2x^2+x+13=0$
E $-2x^2+4x+9=11$

A) $x^2+3x-18=0$

$3^2-4(1)(-18)$

81

B) $-x^2+7x-12=0$

$7^2-4(-1)(-12)=1$

C) $x^2+2x+5=0$

$2^2-4(1)(5)=-16$

D) $1^2-4(2)(13)=-103$

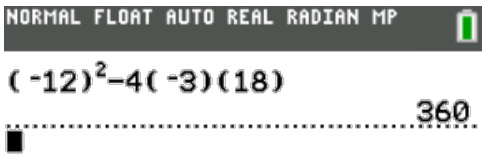
E) $-2x^2+4x-2=0$

$4^2-4(-2)(-2)=0$

Short Answer

1. Solve.

$-3x^2 - 12x + 18 = 0$



$\frac{12 \pm \sqrt{(-12)^2-4(-3)(18)}}{2(-3)}$

$x^2 + 4x - 6 = 0$

$\frac{12 \pm \sqrt{360}}{-6} = \frac{12 \pm 6\sqrt{10}}{-6}$

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

$\frac{-4 \pm \sqrt{40}}{2}$

$\frac{-4 \pm 2\sqrt{10}}{2} = -2 \pm \sqrt{10}$

2. Solve.

$x^2 - 2x + 10 = 0$

$$\frac{2 \pm \sqrt{(-2)^2 - 4(1)(10)}}{2(1)}$$

$$\frac{2 \pm \sqrt{-36}}{2} = \frac{2 \pm 6i}{2} = 1 \pm 3i$$

3. Solve the equation.

$\frac{1}{6}x^2 = 54$

$x^2 = 324$

$x = \pm\sqrt{324}$

$x = \pm 18$

4. Solve the equation.

$x^2 - 19x + 28 = 0$

$$\frac{19 \pm \sqrt{(-19)^2 - 4(1)(28)}}{2(1)}$$

$$\frac{19 \pm \sqrt{249}}{2}$$

5. Solve the quadratic equation $x^2 - 22x = -57$ by any method. Show your work.

$x^2 - 22x + 121 = -57 + 121$

$(x-11)^2 = 64$

$x - 11 = \pm\sqrt{64}$

$x = 11 \pm 8$

$x = 19, 3$

ay

-OR-

$x^2 - 22x + 57 = 0$

$\frac{22 \pm \sqrt{(-22)^2 - 4(1)(57)}}{2(1)}$

$\frac{22 \pm \sqrt{256}}{2} = \frac{22 \pm 16}{2}$

19, 3

1. ***Part A***: Use completing the square to write $f(x) = x^2 + 3x - 18$ in vertex form. Show your work.
Part B: What is the vertex of the graph of the function?
Part C: Describe another algebraic method you can use to confirm your answer to *Part B*, and show your confirmation.

A) $f(x) + 18 + \frac{9}{4} = x^2 + 3x + \frac{9}{4}$

$f(x) + \frac{81}{4} = (x + \frac{3}{2})^2$

$f(x) = (x + \frac{3}{2})^2 - \frac{81}{4}$

$f(x) = a(x-h)^2 + k$ (vertex)

B) $(-\frac{3}{2}, -\frac{81}{4})$

C) AXIS OF SYMMETRY then SUBSTITUTE

$x = -\frac{b}{2a} = \frac{-3}{2}$

$f(-\frac{3}{2}) = (-\frac{3}{2})^2 + 3(-\frac{3}{2}) - 18 = -\frac{81}{4}$

2. A farmer's crop yield, in bushels per acre, can be modeled by the function $y = -0.008f^2 + 2f - 50$ where y is the yield and f is the amount of fertilizer used, in pounds per acre.

Other

Part A: The farmer wants to use enough fertilizer for the yield to be 80 bushels per acre. Solve $-0.008f^2 + 2f - 50 = 80$ and identify the solutions. Show your work.

Part B: Based on the solutions you found in ***Part A***, is it possible for the yield to be 80 bushels per acre? If so, how much fertilizer should the farmer use? If not, explain why not.

A) $-.008f^2 + 2f - 130 = 0$

$$\frac{-2 \pm \sqrt{2^2 - 4(-.008)(-130)}}{2(-.008)}$$

$$\frac{-2 \pm \sqrt{-.16}}{-.016} = \frac{-2 \pm .4i}{-.016} = 125 \pm 25i$$

B) NO, ANSWER WAS IMAGINARY

3. Tracy throws a football straight up toward the ceiling of the school gymnasium at a velocity of 48 feet per second. The function $h(t) = -16t^2 + 48t$ represents the height in feet above its release point that the ball goes after t seconds.

Part A: The ceiling of the gymnasium is 52 feet above the ball's release point. Solve $-16t^2 + 48t = 52$. Show your work.

Part B: Based on your solutions in ***Part A***, will the football reach the ceiling of the gym? Explain.

Part C: Later, Tracy throws the football straight up with an initial velocity of 57 feet per second. Will it reach the ceiling? Explain and show your work.

A) $-16t^2 + 48t - 52 = 0$

$4t^2 - 12t + 13 = 0$

$$\frac{12 \pm \sqrt{(-12)^2 - 4(4)(13)}}{2(4)}$$

$$\frac{12 \pm \sqrt{-64}}{8} = \frac{12 \pm 8i}{8} = \frac{3 \pm 2i}{2}$$

B) NO, SOLUTION WAS IMAGINARY

C) $-16t^2 + 57t - 52 = 0$

$$\frac{-57 \pm \sqrt{57^2 - 4(-16)(-52)}}{2(-16)} = \frac{-57 \pm \sqrt{-79}}{32}$$

NO, Also IMAGINARY

1. Determine the number of distinct, real solutions for each given equation.

a.	$x^2 + 25 = 10x$	Zero	One	Two
b.	$x^2 + 3x + 9 = 5$	Zero	One	Two
c.	$x^2 + x = 72$	Zero	One	Two
d.	$3x^2 + 36x + 121 = 13$	Zero	One	Two
e.	$2x^2 - 16 = -7x - 1$	Zero	One	Two

$b^2 - 4ac$

A) $x^2 - 10x + 25 = 0$ $(-10)^2 - 4(1)(25) = 0$

B) $x^2 + 3x + 4 = 0$ $3^2 - 4(1)(4) = -7$

C) $x^2 + x - 72 = 0$ $1^2 - 4(1)(-72) = 289$

D) $3x^2 + 36x + 108 = 0$ $12^2 - 4(1)(36) = 0$

$x^2 + 12x + 36 = 0$

E) $2x^2 + 7x - 15 = 0$ $7^2 - 4(2)(-15) = 169$