Name:_____
Date:_____Per:_____

[1-6] What is the value of c that makes each trinomial a perfect square?

1. $x^2 + 16x + c$

2. $x^2 - 8x + c$

3. $x^2 + 6x + c$

4. $x^2 - 14x + c$

5. $x^2 + 5x + c$

6. $x^2 - 24x + c$

[7-10] Solve by completing the square. Express answers in simplified radical form and complex solutions in terms of i.

7. $a^2 + 12a + 32 = 0$

8. $x^2 - 14x + 44 = 0$

9. $2n^2 - 12n + 24 = 0$

10. $4p^2 - 8p - 60 = 0$

[11-12] Solve by the quadratic formula.

11. a) Solve $x^2 - 9x + 21 = 0$ using the quadratic formula by completing the boxes from the number choices.

| -21 | -9 | -4 | -2 | -1 | $+1$ | $+2$ | $+4$ | $+9$ | $+21$ |

$$x = \frac{-\left(\boxed{}\right) \pm \sqrt{\left(\boxed{}\right)^2 - \left(\boxed{}\right)\left(\boxed{}\right)\left(\boxed{}\right)}}{\left(\boxed{}\right)\left(\boxed{}\right)}$$

11. b) Solve for x in 11a, write answer in simplified radical form.

11b) _____

12. a) Solve $n^2 - 20n + 91 = 0$ using the quadratic formula by completing the boxes from the number choices.

| -91 | -20 | -4 | -2 | -1 | $+1$ | $+2$ | $+4$ | $+20$ | $+91$ |

$$x = \frac{-\left(\boxed{}\right) \pm \sqrt{\left(\boxed{}\right)^2 - \left(\boxed{}\right)\left(\boxed{}\right)\left(\boxed{}\right)}}{\left(\boxed{}\right)\left(\boxed{}\right)}$$

12. b) Solve for x in 12a, write answer in simplified radical form.

12b) _____

[13-14] Solve by the quadratic formula.
    13. $2x^2 + 10x - 3 = 0$ 14. $x^2 = 6x - 14$

[15-18] Solve each equation for x using any method. Express answers in simplified radical form and complex solutions in terms of i.
    15. $x^2 - 1 = 3x$ 16. $x^2 - 121 = 0$

    17. $b^2 + 8b - 39 = -6$ 18. $3a^2 - 15a = 0$

[19-26] Simplify.
    19. $(7 + 3i) + 3(5 - 9i)$ 20. $4(2 + 8i) - 2(12 - 3i)$

    21. $(3i)(9i)$ 22. $(-5i)(4i)(7i)(2i)(3i^2)$

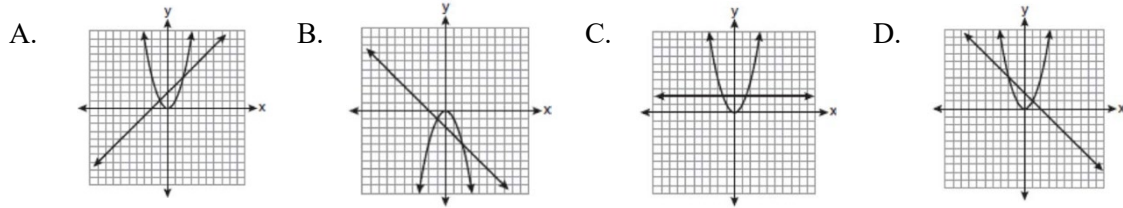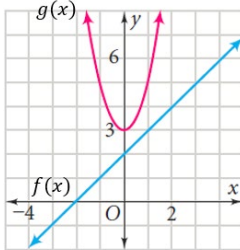   23. $(6 + 4i)(2 - 3i)$ 24. $(2 - 3i)(5 - i)$

    25. $(7 + 2i)^2$ 26. $(7 + 2i)(7 - 2i)$

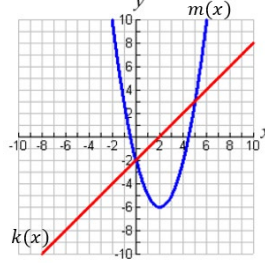27. Select the graph with the correct solutions for $f(x) = g(x)$ when $f(x) = x^2$ and $g(x) = -x + 2$.

A.   B.   C.   D.

28. Select the correct solution(s) for $f(x) = g(x)$.

A. $x = -2$ only

B. $x = 2$ only

C. $x = -2$ and 2

D. There are no solutions to $f(x) = g(x)$

29. Select the correct solution(s) for $m(x) = k(x)$.

A. $x = 0$ only

B. $x = 5$ only

C. $x = 0$ and 5

D. There are no solutions to $m(x) = k(x)$

30. Graph the following parabola written in standard form and determine the key features.

$y = 2x^2 - 12x + 10$

Vertex: _____

Axis of Symmetry: _____

x-intercept(s): _____

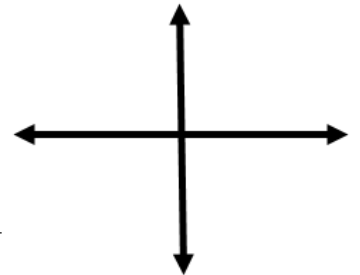31. Graph the following parabola written in standard form and determine the key features.

$y = 3x^2 + 6x - 9$

Vertex: _____

Axis of Symmetry: _____

x-intercept(s): _____

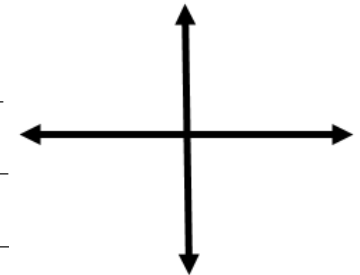[32-33] Given a quadratic function in standard form $f(x) = ax^2 + bx + c$, determine the equivalent equation in vertex form $f(x) = a(x - h)^2 + k$, where a, h, and k are constants.

32. $f(x) = x^2 - 12x + 10$

33. $f(x) = 8x^2 + 16x - 22$

34. Consider the equation $(x - 1)^2 + k = 0$. Create a value for k that gives:

    a. no real solutions   b. two real solutions

35. Consider the equation $-2(x + 4)^2 + k = 0$. Create a value for k that gives:

    a. no real solutions   b. two real solutions

36. A firework is launched from a platform that is 10 feet high. It is set to explode as it reaches maximum height. The height of the firework, h, can be modeled by the function $h = -16t^2 + 160t + 10$, where t is the number of seconds after launch.

    a. How long does it take to reach the maximum height?

    b. What is the maximum height?

37. Aaron Judge hit his longest homerun on June 12th, 2017 with a length of 496 feet. Bryce Harper's longest homerun was hit the following month on July 22nd, 2017 with a length of 467 feet. The functions below model these hits, where the height, h, of the ball after t seconds is given by:

$$\text{Judge: } h = -16t^2 + 160t + 4$$

$$\text{Harper: } h = -16t^2 + 128t + 4$$

    a. Whose ball reached a greater vertical height? Show work to support your answer.

    b. If the ball was able to travel until it hit the ground, how long would Judge's ball be in the air?

    c. If the ball was able to travel until it hit the ground, how long would Harper's ball be in the air?