1. Factoring is one of the most critical skills you will learn in Algebra 1. In your own words, describe what it means to *factor a polynomial*. What actually happens when you factor an expression? Try use vocabulary words like binomial, terms, multiply, etc. in your explanation.

To factor a polynomial means to breakdown a mathematical expression into simpler terms, called factors, usually resulting in two binomials. When you multiply the factors together, you should get the original polynomial.

Factor out the GCF, if possible. Write the answer in standard form on the blank provided.

2. $\dfrac{2x}{2} + \dfrac{36}{2} = x + 18$

   $\underline{\quad 2(x+18) \quad}$

3. $\dfrac{6r^3}{r^2} - \dfrac{7r^2}{r^2} = 6r - 7$

   $\underline{\quad r^2(6r-7) \quad}$

4. $5k - 11$

   $\underline{\quad \text{No GCF.} \quad}$

5. $\dfrac{-9t}{3t} + \dfrac{3t^2}{3t} = -3 + t$

   $\underline{\quad 3t(t-3) \quad}$

6. $4x^3 + 8x^2 - 2x^3 + 20x$

   $\dfrac{2x^3}{2x^1} + \dfrac{8x^2}{2x^1} + \dfrac{20x}{2x} = x^2 + 4x + 10$

   $\underline{\quad 2x(x^2 + 4x + 10) \quad}$

7. $\dfrac{5}{5} + \dfrac{15x^2}{5} - \dfrac{25x}{5} = 1 + 3x^2 - 5x$

   $\underline{\quad 5(3x^2 - 5x + 1) \quad}$

Factor each polynomial. Write the answer in factored form on the blank provided.
Hint: Factor each trinomial into 2 binomial factors.

8. $x^2 + 12x + 35$

   Factors

   $1 \cdot 35$
   $5 \cdot 7 \qquad 5 + 7 = 12 \checkmark$

   $\underline{\quad (x+5)(x+7) \quad}$

9. $w^2 - 11w + 24$

   Factors

   $1 \quad 24$
   $2 \quad 12$
   $3 \quad 8 \qquad -3 + (-8) = -11 \checkmark$

   $\underline{\quad (w-3)(w-8) \quad}$

10. $d^2 + 4d = 12$ ↰ Move

    $d^2 + 4d - 12 = 0$

    Factors

    $1 \cdot 12$
    $2 \cdot 6 \qquad -2 + 6 = 4 \checkmark$

    $\underline{\quad (d-2)(d+6) \quad}$

11. $\dfrac{z^2}{z} + \dfrac{7z}{z} = z + 7$

    $\underline{\quad z(z+7) \quad}$

12. $g^2 = 2g + 8$ Move.

    $g^2 - 2g - 8 = 0$

    Factors

    $1 \cdot 8$
    $2 \cdot 4 \qquad 2 + (-4) = -2 \checkmark$

    $\underline{\quad (g+2)(g-4) \quad}$

13. $y^2 - 13y + 40$

    Factors

    $1 \cdot 40$
    $2 \cdot 20$
    $4 \cdot 10$
    $5 \cdot 8 \qquad -5 + (-8) = -13 \checkmark$

    $\underline{\quad (y-5)(y-8) \quad}$

Factor each polynomial. Write the answer in factored form on the blank provided.
Hint: Factor each trinomial into 2 binomial factors where a ≠ 1.

14. $5m^2 - m - 6$ $m^2 - m - 30$
"slip"

Factors

1 · 30
2 · 15
3 · 10
5 · 6 $5 + (-6) = -1 ✓$

$(m+5)(m-6)$
   $\overline{5}$ $\overline{5}$

$(m+1)(5m-6)$

"slide"

$\underline{(m+1)(5m-6)}$

15. $3p^2 + 14p + 16$ $p^2 + 14p + 48$

Factors

1 · 48
2 · 24
3 · 16
4 · 12
6 · 8 $6 + 8 = 14 ✓$

$(p+6)(p+8)$
   $\overline{3}$ $\overline{3}$

$(p+2)(3p+8)$

$\underline{(p+2)(3p+8)}$

16. $6h^2 - 11h - 2$ $h^2 - 11h - 12$

Factors

1 · 12 $1 + (-12) = -11 ✓$

$(h+1)(h-12)$
   $\overline{6}$ $\overline{6}$

$(6h+1)(h-2)$

$\underline{(6h+1)(h-2)}$

17. $3v^2 - 13v + 10$ $v^2 - 13v + 30$
"slip"

Factors

1 · 30
2 · 15
3 · 10 $-3 + (-10) = -13 ✓$

$(v-3)(v-10)$
   $\overline{3}$ $\overline{3}$

$(v-1)(3v-10)$ "slide"

$\underline{(v-1)(3v-10)}$

18. $5r^2 = 15r$
$8r^2 = 42r$ $8r^2 - 42r = 0$
          Move

$\dfrac{8r^2}{2r} - \dfrac{42r}{2r} = 4r - 21$

$2r(4r - 21)$

$\underline{2r(4r-21)}$

19. $3g^2 + 14g = -16$
$5g^2 = 4g + 12$
            Move

$5g^2 - 4g - 12$ $g^2 - 4g - 60$

Factors

1 · 60   5 · 12
2 · 30   6 · 10 $6 + (-10) = -4 ✓$
4 · 15

$(g+6)(g-10)$
   $\overline{5}$ $\overline{5}$

$(5g+6)(g-2)$

$\underline{(5g+6)(g-2)}$

SOLVE each polynomial by factoring. Check for the GCF first. Write the solutions on the blanks provided.

20. $x^2 + 10x + 24 = 0$

Factors

1 · 24
2 · 12
3 · 8
4 · 6 $4 + 6 = 10 ✓$

$(x+4)(x+6) = 0$

$\underline{(-4,\ 0)}$ & $\underline{(-6,\ 0)}$

21. $k^2 = 2k + 15$ $k^2 - 2k - 15 = 0$
         Move

Factors

1 · 15
3 · 5 $3 + (-5) = -2 ✓$

$(k+3)(k-5) = 0$

$\underline{(-3,\ 0)}$ & $\underline{(5,\ 0)}$

22. $21n^2 = 9n$ $21n^2 - 9n = 0$
            Move

$\dfrac{21n^2}{3n} - \dfrac{9n}{3n} = 7n - 3$

$3n(7n - 3) = 0$

$3n = 0$ $7n - 3 = 0$
$n = 0$ $n = 3/7$

$\underline{(0,\ 0)}$ & $\underline{(3/7,\ 0)}$

26. On a graph, what do the solutions of a quadratic equation represent? Write the answer in a complete sentence.
The solutions are the x-intercepts on a graph.