

Algebra 1: 12.3 - 12.5 Test Review  
Factoring Polynomials

Name \_\_\_\_\_ Period \_\_\_\_\_

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

$2(x+18)$

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

$r^2(6r-7)$

4.  $5k-11$

No GCF.

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

$3t(t-3)$

6.  $\frac{4x^3+8x^2-2x^3+20x}{2x^2} = x^2+4x+10$

$2x(x^2+4x+10)$

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

$5(3x^2-5x+1)$

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

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

$(x+5)(x+7)$

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

Factors

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

$(w-3)(w-8)$

10.  $d^2+4d-12$  Move

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

Factors

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

$(d-2)(d+6)$

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

$z(z+7)$

12.  $g^2-2g-8$  Move.

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

Factors

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

$(g+2)(g-4)$

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

Factors

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

$(y-5)(y-8)$

Factor each polynomial. Write the answer in factored form on the blank provided.

Hint: Factor each trinomial into 2 binomial factors where  $a \neq 1$ .

14.  $5m^2 - m - 6$   $m^2 - m - 30$  "slip"  
 Factors  
 1. 30  
 2. 15  
 3. 10  
 5. 6  $5 + (-6) = -1$   
 $(m+1)(5m-6)$

15.  $3p^2 + 14p + 16$   $p^2 + 14p + 48$   
 Factors  
 1. 48  
 2. 24  
 3. 16  
 4. 12  
 6. 8  $6 + 8 = 14$   
 $(p+2)(3p+8)$

16.  $6h^2 - 11h - 2$   $h^2 - 11h - 12$   
 Factors  
 1. 12  $1 + (-12) = -11$   
 $(h+1)(h-12)$   
 $(6h+1)(h-2)$

17.  $3v^2 - 13v + 10$   $v^2 - 13v + 30$  "slip"  
 Factors  
 1. 30  
 2. 15  
 3. 10  $-3 + (-10) = -13$   
 $(v-3)(v-10)$   
 $(v-1)(3v-10)$  "slide"  
 $(v-1)(3v-10)$

18.  $5r^2 - 15r$   $8r^2 - 42r = 0$   
 Factors  
 8r^2 - 42r = 0  
 Move  
 $8r^2 - 42r = 4r - 21$   
 $2r(4r - 21)$

19.  $3g^2 + 14g - 16$   
 $5g^2 = 4g + 12$   
 Move  
 $5g^2 - 4g - 12$   $g^2 - 4g - 60$   
 Factors  
 1. 60  
 2. 30  
 4. 15  
 5. 12  
 6. 10  
 $(g+6)(g-10)$   
 $(5g+6)(g-2)$

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  $4 + 6 = 10$   
 $(x+4)(x+6) = 0$   
 $(-4, 0)$  &  $(-6, 0)$

21.  $k^2 = 2k + 15$   $k^2 - 2k - 15 = 0$   
 Factors  
 1. 15  
 3. 5  $3 + (-5) = -2$   
 $(k+3)(k-5) = 0$   
 $(-3, 0)$  &  $(5, 0)$

22.  $21n^2 = 9n$   $21n^2 - 9n = 0$   
 Move  
 $21n^2 - 9n = 7n - 3$   
 $3n(7n - 3) = 0$   
 $3n = 0$   $7n - 3 = 0$   
 $n = 0$   $n = 3/7$   
 $(0, 0)$  &  $(3/7, 0)$

23.  $2m^2 - 13m - 24 = 0$   
 $m^2 - 13m - 48$   
 Factors  
 1. 48  
 2. 24  
 3. 16  
 4. 6  $3 + (-16) = -13$   
 $(m+3)(m-16)$   
 $(2m+3)(m-8)$   
 $2m+3=0, m-8=0$   
 $(-\frac{3}{2}, 0)$  &  $(8, 0)$

24.  $3x^2 + 2x - 5 = 0$   
 $x^2 + 2x - 15$   
 Factors  
 1. 15  
 3. 5  $-3 + 5 = 2$   
 $(x-\frac{3}{3})(x+\frac{5}{3})$   
 $(x-1)(3x+5)$   
 $x-1=0, 3x+5=0$   
 $(1, 0)$  &  $(-\frac{5}{3}, 0)$

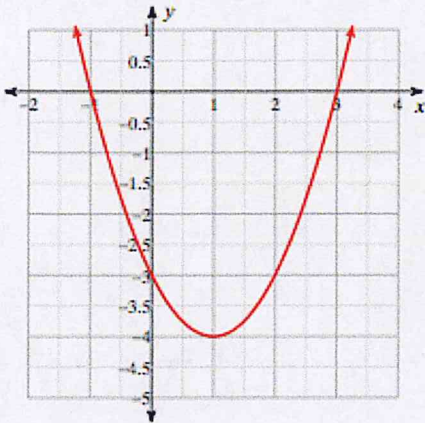
25.  $2x^2 + 22x + 48 = 0$   $x^2 + 11x + 24$   
 Factors  
 1. 24  
 2. 12  
 3. 8  $3 + 8 = 11$   
 $(x+3)(x+8)$   
 $(-3, 0)$  &  $(-8, 0)$

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.

Factor each polynomial and find the solutions. Write the factored form of the polynomial and the solutions on the blanks provided.

27)  $y = x^2 - 2x - 3$



Factors

1 · 3

$1 + (-3) = -2$  ✓

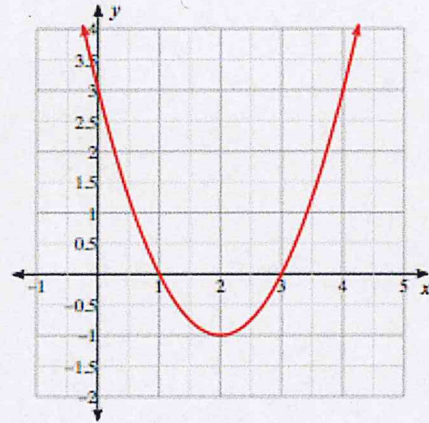
$(x + 1)(x - 3)$

$x + 1 = 0$     $x - 3 = 0$

$(x + 1)(x - 3)$

$(-1, 0)$  &  $(3, 0)$

28)  $y = x^2 - 4x + 3$



Factors

1 · 3

$-1 + (-3) = -4$

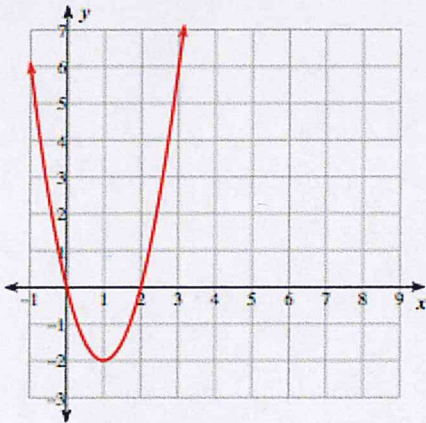
$(x - 1)(x - 3)$

$x - 1 = 0$     $x - 3 = 0$

$(x - 1)(x - 3)$

$(1, 0)$  &  $(3, 0)$

29)  $y = 2x^2 - 4x$



GCF →  $\frac{2x^2 - 4x}{2x} = x - 2$

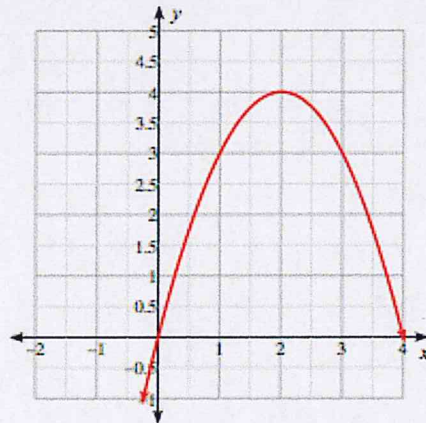
$2x(x - 2)$

$2x = 0$     $x - 2 = 0$

$2x(x - 2)$

$(0, 0)$  &  $(2, 0)$

30)  $y = -x^2 + 4x$



GCF →  $\frac{-x^2 + 4x}{-x} = x - 4$

$-x(x - 4)$

$-x = 0$     $x - 4 = 0$

$-x(x - 4)$

$(0, 0)$  &  $(4, 0)$

Factor each polynomial, if possible. Check for the GCF first. Write the answer in factored form on the blank provided. Hint: Factor each trinomial using the difference of two squares.

31.  $f^2 - 16$

$$\sqrt{f^2} = f$$

$$\sqrt{16} = 4$$

$$\underline{(f+4)(f-4)}$$

32.  $9x^2 - 1$

$$\sqrt{9x^2} = 3x$$

$$\sqrt{1} = 1$$

$$\underline{(3x+1)(3x-1)}$$

33.  $m^2 - 25$

$$\sqrt{m^2} = m$$

Cannot factor.  
No real solution.

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

34.  $81 - 4z^2$

$$\sqrt{81} = 9$$

$$\sqrt{4z^2} = 2z$$

$$\underline{(9+2z)(9-2z)}$$

35.  $\frac{2g^2 - 72}{2} = g^2 - 36$

$$\sqrt{g^2} = g$$

$$\sqrt{36} = 6$$

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

Don't forget!

36.  $\frac{4h^2 + 100}{4} = h^2 + 25$

Cannot factor.

No real solution.

Factor each polynomial, if possible. Check for the GCF first. Write the answer in factored form on the blank provided. Hint: Factor each trinomial using perfect square trinomials.

37.  $s^2 + 24s + 144$

$$\sqrt{s^2} = s$$

$$\sqrt{144} = 12$$

$$2(s \cdot 12) = 24s$$

$$\underline{(s+12)^2}$$

38.  $36z^2 - 60z + 25$

$$\sqrt{36z^2} = 6z$$

$$\sqrt{25} = 5$$

$$2(6z \cdot 5) = 60z$$

$$\underline{(6z-5)^2}$$

39.  $9k^2 + 24k + 16$

$$\sqrt{9k^2} = 3k$$

$$\sqrt{16} = 4$$

$$2(3k \cdot 4) = 24k$$

$$\underline{(3k+4)^2}$$

40.  $49 + 14z + z^2$

$$\sqrt{49} = 7$$

$$\sqrt{z^2} = z$$

$$2(7 \cdot z) = 14z$$

$$\underline{(7+z)^2}$$

41.  $9v^2 + 4v + 1$

$$\sqrt{9v^2} = 3v$$

$$\sqrt{1} = 1$$

$$2(3v \cdot 1) = 6v$$

Cannot factor

No real solution.

42.  $\frac{x^3 + 6x^2y + 9xy^2}{x}$

$$x^2 + 6xy + 9y^2$$

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

$$\sqrt{9y^2} = 3y$$

$$2(x \cdot 3y) = 6xy$$

$$\underline{x(x+3y)^2}$$

Don't forget  
the GCF.