

Honors Algebra 1
Ch. 9 Study Guide
No Calculator

Name: *Key*
Period:

Name the following polynomials according to the degree and the number of terms.

1. $4x^3 - 2x^2 + x + x^4$

*4th degree
polynomial*

2. 1

*constant
monomial*

3. $2xy^2 - y$

*1+2=3
cubic
binomial*

4. $4x - 4$

*linear
binomial*

Add or subtract the following polynomials.

5. $(5x^3 - x^2 + 2x + 5) + (4x^3 - 3x - 7)$

$9x^3 - 4x^2 - x - 2$

6. $(2x^5 + 2x^3 + 3x) - (3x^5 - 5x^4 + x^3 - 4x + 4)$

$\underline{2x^5} + \underline{2x^3} + \underline{3x} - \underline{3x^5} + \underline{5x^4} - \underline{x^3} + \underline{4x} - \underline{4}$
 $-x^5 + 5x^4 + x^3 + 7x - 4$

Multiply the following expressions.

7. $(3x + 2)(3x - 1)$

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

$9x^2 + 3x - 2$

9. $(4x + 3)(3x^2 - 3x + 7)$

$12x^3 - 12x^2 + 28x + 9x^2 - 9x + 21$

8. $(6x - 5)^2 \rightarrow (6x - 5)(6x - 5)$

$36x^2 - 30x - 30x + 25$

$36x^2 - 60x + 25$

10. $(3x - 2)(3x + 2)$

$9x^2 + 6x - 6x - 4$

$9x^2 - 4$

Factor out a GCF of an Expression (Do Not Factor Further than taking out the GCF).

11. $9a^3 + 15a^2$

$3a^2(3a + 5)$

12. $10x^5y^4 + 14x^3y^8 - 2xy$

$2xy(5x^4y^3 + 7x^2y^7 - 1)$

Factor Completely.

13. $x^2 - x - 42$

$(x - 7)(x + 6)$

14. $x^3 + 12x^2 + 11x$

$x(x^2 + 12x + 11)$

$x(x + 11)(x + 1)$

15. $2x^5 - 18x^3$

$2x^3(x^2 - 9)$

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

16. ~~$(x^3 + x^2)(16x - 16)$~~

$x^2(x + 1) + 16(x - 1)$

cannot

17. $25x^2 - 1$

$(5x + 1)(5x - 1)$

18. $x^2 - 22x + 121$

$(x - 11)^2$

or

$$x^2(x+1)+16(x-1)$$

Cannot factor further

$$(5x+1)(5x-1)$$

$$(x-11)^2$$

or

$$(x-11)(x-11)$$

Solve.

19. $x^2 + 2x - 3 = 0$

$$(x+3)(x-1) = 0$$

$$\begin{array}{r} x+3=0 \\ -3 \quad -3 \\ \hline x = -3 \end{array} \quad \begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x = 1 \end{array}$$

22. $(x^3 - 5x^2) + 4(x - 20) = 0$

$$x^2(x-5) + 4(x-5) = 0$$

$$(x^2+4)(x-5) = 0$$

$$\begin{array}{r} x^2+4=0 \\ -4 \quad -4 \\ \hline \sqrt{x^2} = \sqrt{-4} \\ \text{can't do!} \end{array} \quad \begin{array}{r} x-5=0 \\ \hline x = 5 \end{array}$$

25. $(9x^3 + 27x^2) - 4x - 12 = 0$

$$9x^2(x+3) - 4(x+3) = 0$$

$$(9x^2 - 4)(x+3) = 0$$

$$(3x+2)(3x-2)(x+3) = 0$$

$$\begin{array}{r} 3x+2=0 \\ \hline x = -2/3 \end{array} \quad \begin{array}{r} 3x-2=0 \\ \hline x = 2/3 \end{array} \quad \begin{array}{r} x+3=0 \\ \hline x = -3 \end{array}$$

Vertical Motion

20. $2x^2 - 11x - 21 = 0$

$$(2x+3)(x-7) = 0$$

$$\begin{array}{r} 2x+3=0 \\ +3 \quad +3 \\ \hline \frac{2x}{2} = \frac{-3}{2} \\ x = -3/2 \end{array} \quad \begin{array}{r} x-7=0 \\ +7 \quad +7 \\ \hline x = 7 \end{array}$$

23. $x^2 - 2x - 5 = 2x$

$$\begin{array}{r} x^2 - 2x - 5 = 2x \\ -2x \quad -2x \\ \hline x^2 - 4x - 5 = 0 \\ (x-5)(x+1) = 0 \\ \begin{array}{r} x-5=0 \\ \hline x = 5 \end{array} \quad \begin{array}{r} x+1=0 \\ \hline x = -1 \end{array} \end{array}$$

26. ~~$18x^3 + 24x^2 + 8x = 0$~~

$$2x(9x^2 + 12x - 4) = 0$$

can't factor further!

21. $8c^4 - 18c^2 = 0$

$$2c^2(4c^2 - 9) = 0$$

$$2c^2(2c+3)(2c-3) = 0$$

$$\begin{array}{r} \frac{2c^2}{2} = 0 \\ \hline c^2 = 0 \\ \hline c = 0 \end{array} \quad \begin{array}{r} 2c+3=0 \\ -3 \quad -3 \\ \hline 2c = -3 \\ \hline c = -3/2 \end{array} \quad \begin{array}{r} 2c-3=0 \\ +3 \quad +3 \\ \hline 2c = 3 \\ \hline c = 3/2 \end{array}$$

24. $6x^2 + 5x - 6 = 0$

$$\begin{array}{r} 6x^2 + 5x - 6 = 0 \\ -6 \quad -6 \\ \hline 6x^2 + 5x - 6 = 0 \\ (3x-2)(2x+3) = 0 \\ \begin{array}{r} 3x-2=0 \\ \hline x = 2/3 \end{array} \quad \begin{array}{r} 2x+3=0 \\ \hline x = -3/2 \end{array} \end{array}$$

27. $25c^2 - 4 = 0$

$$(5c+2)(5c-2) = 0$$

$$\begin{array}{r} 5c+2=0 \\ -2 \quad -2 \\ \hline 5c = -2 \\ \hline c = -2/5 \end{array} \quad \begin{array}{r} 5c-2=0 \\ +2 \quad +2 \\ \hline 5c = 2 \\ \hline c = 2/5 \end{array}$$

The height h (in feet) of a projectile can be modeled by $h(t) = -16t^2 + vt + h_0$

where: t is time (sec) the object has been in the air
 v is the initial vertical velocity (in ft/sec)
 h_0 is the initial height (ft)

28. In a shot put event, an athlete throws the shot put with an initial vertical velocity of 38 feet per second and releases it from a height of 5 feet. After how many seconds does the shot put hit the ground?

$$V_0 = 38 \text{ ft/s}$$

$$h_0 = 5 \text{ ft}$$

$$t = ?$$

$$H = 0 \text{ ft (ground)}$$

$$0 = -16t^2 + 38t + 5$$

$$0 = -(16t^2 - 38t - 5)$$

$$0 = -(8t+1)(2t-5)$$

$$\begin{array}{r} 8t+1=0 \\ \hline t = -1/8 \text{ sec} \\ \text{neg. time!} \end{array} \quad \begin{array}{r} 2t-5=0 \\ \hline t = 5/2 \text{ sec} \end{array}$$

29. A hickory nut falls from a branch that is 100 feet above the ground. After how many seconds does the hickory nut land on the ground?

$$V_0 = 0 \text{ ft/sec (falls - no velocity)}$$

$$h_0 = 100 \text{ ft}$$

$$H = 0 \text{ (ground)}$$

$$t = ?$$

$$0 = -16t^2 + 0t + 100$$

$$0 = -(16t^2 - 100)$$

$$0 = -(4t+10)(4t-10)$$

$$\begin{array}{r} 4t+10=0 \\ \hline t = -5/2 \end{array} \quad \begin{array}{r} 4t-10=0 \\ \hline t = 5/2 \text{ sec} \end{array}$$

30. While standing on a ladder, you drop a paintbrush from a height of 25 feet. After how many seconds does the

$$h = 0 \text{ (ground)}$$

$$t = ?$$

30. While standing on a ladder, you drop a paintbrush from a height of 25 feet. After how many seconds does the paint brush land on the ground?

$$V_0 = 0 \text{ ft/sec (dropped)}$$

$$h_0 = 25 \text{ ft}$$

$$h = 0 \text{ (ground)}$$

$$t = ?$$

$$0 = 4t + 10 \quad 0 = 4t - 10$$

$$0 = -16t^2 + 0t + 25$$

$$0 = -(16t^2 - 25)$$

$$0 = -(4t + 5)(4t - 5)$$

$$\begin{array}{r} 0 = 4t + 5 \\ -5 \quad -5 \\ \hline \end{array} \quad \begin{array}{r} 0 = 4t - 5 \\ +5 \quad +5 \\ \hline \end{array}$$

$$\begin{array}{r} -5 = 4t \\ 4 \quad 4 \\ \hline \end{array} \quad \begin{array}{r} 5 = 4t \\ 4 \quad 4 \\ \hline \end{array}$$

$$\begin{array}{r} t = \frac{5}{4} \\ \hline \end{array}$$

$$t = \frac{5}{4} \text{ sec}$$