Multiplying Polynomials (ALG.POL.04)

Multiply. Write each answer in standard form.

1. $-2x^3(5x^2-2x+9)$ $\mathbf{-10x^5+4x^4-18x^3}$
2. $-7k^5(-3k^4+2k^2-8)$ $\mathbf{21k^9-14k^7+56k^5}$
3. $-11g^4(-2g^9+4g^6+g^3-8)$ $\mathbf{22g^{13}-44g^{10}-11g^7+88g^4}$
4. $(y-5)(y+8)$ $\mathbf{y^2+3y-40}$
5. $(x+8)(6x+4)$ $\mathbf{6x^2+52x+32}$
6. $(7n-4)(6n+3)$ $\mathbf{42n^2-3n-12}$
7. $(5p-8)(3p+2)$ $\mathbf{15p^2-14p-16}$
8. $(8c-3d)(4c^2+3d)$ $\mathbf{32c^3-12c^2d+24cd-9d^2}$
9. $(r^3-5t^2)(5r^2+3t)$ $\mathbf{5r^5+3r^3t-25r^2t^2-15t^3}$
10. $(5a-3)(5a+3)$ $\mathbf{25a^2-9}$
11. $(9c^3-2d)(9c^3+2d)$ $\mathbf{81c^6-4d^2}$
12. $(7a^2b+5c^4)(7a^2b-5c^4)$ $\mathbf{49a^4b^2-25c^8}$
13. $3x(2x-5)(2x+5)$ $\mathbf{12x^3-75x}$
14. $(u-4)^2$ $\mathbf{u^2-8u+16}$
15. $(2w+3)^2$ $\mathbf{4w^2+12w+9}$
16. $(4n-3)(n^2+5n-6)$ $\mathbf{4n^3+17n^2-39n+18}$
17. $(m^2-5)(2m^3-m^2+9)$ $\mathbf{2m^5-m^4-10m^3+14m^2-45}$
18. $(5p^2+8p-2)(7p^2-p+4)$ $\mathbf{35p^4+51p^3-2p^2+34p-8}$
19. $(2x^5-5x^3+x)(3x^4+5x^2-2)$ $\mathbf{6x^9-5x^7-26x^5+15x^3-2x}$
20. $(7x-3)(4x^2-9x+2)$ $\mathbf{28x^3-75x^2+41x-6}$
21. $(x^2+5)(7x^5-x^4+3x^2+9)$ $\mathbf{7x^7-x^6+35x^5-2x^4+24x^2+45}$
22. $(b^2-b+3)^2$ $\mathbf{b^4-2b^3+7b^2-6b+9}$
23. $(5y^3-8y+3)^2$ $\mathbf{25y^6-80y^4+30y^3+64y^2-48y+9}$
24. $(3u^3-5u^2+u-2)^2$ $\mathbf{9u^6-30u^5+31u^4-22u^3+21u^2-4u+4}$
25. $(2a-5)(2a+5)(5a-2)$ $\mathbf{20a^3-8a^2-125a+50}$
26. $(7c+3)(c-5)^2$ $\mathbf{7c^3-67c^2+145c+75}$
27. $(m+1)^2(m-2)^2$ $\mathbf{m^4-2m^3-3m^2+4m+4}$
28. $(7n+3)(3n+7)(7n-3)$ $\mathbf{147n^3+343n^2-27n-63}$
29. $(p-1)^3$ $\mathbf{p^3-3p^2+3p-1}$
30. $(2x-1)^4$ $\mathbf{16x^4-32x^3+24x^2-8x+1}$

31. A certain rectangle has a length of $(8x - 3)$ meters and a width of $(x^2 - 6x + 4)$ meters.

a. Write an algebraic expression (in terms of x) that represents the area of the rectangle, including units. **$(8x^3 - 51x^2 + 50x - 12)$ square meters**

b. If $x = 8$, determine the dimensions of the rectangle, including units. **61 m by 20 m**

c. If $x = 8$, determine the area of the rectangle, including units. **1,220 m^2**

32. A certain rectangular prism has a length of $(5a - 8)$ inches, a width of $(a^2 + 9)$ inches, and a height of $(3a + 8)$ inches.

a. Write an algebraic expression (in terms of a) that represents the volume of the rectangular prism, including units.

$(5a - 8)(a^2 + 9)(3a + 8) = 15a^4 + 16a^3 + 71a^2 + 144a - 576$ cubic inches

b. If $a = 6$, determine the dimensions of the rectangular prism, including units.

22 inches by 45 inches by 26 inches

c. If $a = 6$, determine the volume of the rectangular prism, including units. **25,740 in^3**

33. Use the composite figure in the diagram to answer each part.

a. Write an algebraic expression in terms of x for the area of the composite figure.

Answers will vary.

$$A = \left(\frac{5x + 2}{2} + 2 - x\right)(x^3 + 9x - 2) - (3 - 2x)(2 - x) - (6x^2 - 1)(x^2 - x + 1) - \left(6x^2 - 1 - (5 - 2x)\right)(x^3 - 2x^2 + 3)$$

b. If $x = 1$ yard, then use the expression you wrote in **part *a*** to calculate the area of the figure, including units. **26 square yards**

c. If $x = 1$ yard, then determine the dimensions in the composite figure.

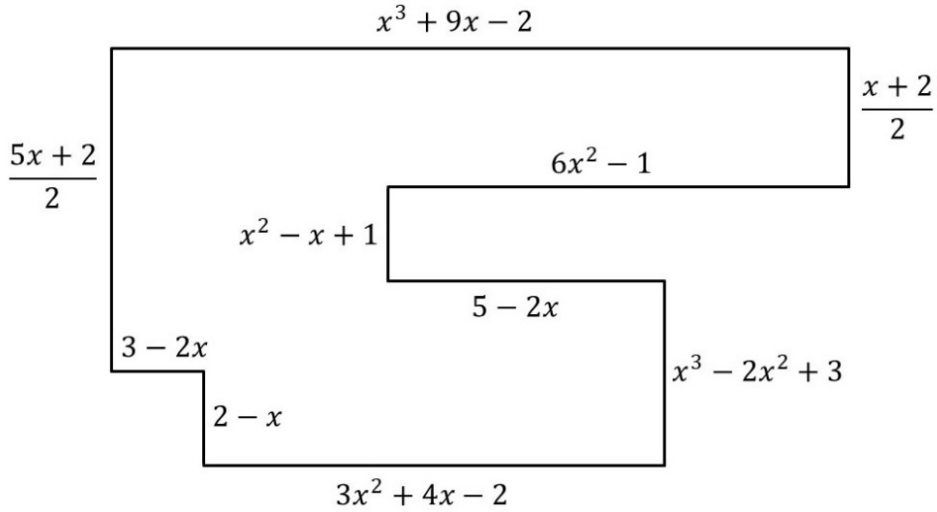
Moving clockwise from the top edge, the dimensions are 8 yards, 1.5 yards, 5 yards, 1 yard, 3 yards, 2 yards, 5 yards, 1 yard, 1 yard, and 3.5 yards.

d. Use the dimensions from **part *c*** to calculate the area of the composite figure.

26 square yards

e. How do your answers in **parts *b* and *d*** compare to one another?

They are equal.



34. Use the figure in the diagram to answer each part.

a. Write an algebraic expression in terms of x for the volume of the right triangular prism.

$$\boldsymbol{V = \frac{1}{2}(4x+5)(x^2-4x+5)(x-2)^2}$$

b. If $x = 6$ inches, then what are the dimensions of the right triangular prism, including units?

The height is 29 inches, the base is 17 inches, and the depth is 16 inches.

c. If $x = 6$ inches, then calculate the volume of the prism, including units.

$\boldsymbol{V = 3,944}$ **cubic inches**

d. For what values of x does the right triangular prism in the diagram fail? Explain your answer.

The diagram fails if $x \leq -\frac{5}{4}$ or if $x = 2$. If $x = -\frac{5}{4}$ or $x = 2$, then one dimension would be 0 inches. If $x < -\frac{5}{4}$, then one dimension would be negative.