

Assignment

1. a) Write a polynomial expression for the group of algebra tiles shown.



- b) Arrange the algebra tiles into a rectangle and state the length and width of the rectangle.

- c) Use the algebra tile diagram to express the polynomial in factored form.

2. Factor the following expressions using algebra tiles.

a) $2x^2 + 5x + 3$ $\begin{array}{r} +x \\ 5 \overline{) 6} \end{array}$

$$2x^2 + 2x + 3x + 3$$

$$2x(x+1) + 3(x+1)$$

$$(2x+3)(x+1)$$

c) $6x^2 + 7x + 2$ $\begin{array}{r} +x \\ 7 \overline{) 12} \end{array}$

$$6x^2 + 3x + 4x + 2$$

$$3x(2x+1) + 2(2x+1)$$

$$(3x+2)(2x+1)$$

b) $2x^2 + 7x + 3$ $\begin{array}{r} +x \\ 7 \overline{) 6} \end{array}$ 6,1

$$2x^2 + 6x + 1x + 3$$

$$2x(x+3) + 1(x+3)$$

$$(2x+1)(x+3)$$

d) $4x^2 + 13x + 3$ $\begin{array}{r} +x \\ 13 \overline{) 12} \end{array}$ 12,1

$$4x^2 + 12x + 1x + 3$$

$$4x(x+3) + 1(x+3)$$

$$(4x+1)(x+3)$$

3. Factor the following expressions.

a) $10x^2 + 17x + 3$ $\begin{array}{r} \cancel{+}x \\ 17 \quad 30 \end{array}$ 15, 2

$10x^2 + 15x + 2x + 3$

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

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

c) $3x^2 + 14x + 15$ $\begin{array}{r} \cancel{+}x \\ 14 \quad 45 \end{array}$ 9, 5

$3x^2 + 9x + 5x + 15$

$3x(x+3) + 5(x+3)$

$(3x+5)(x+3)$

e) $3a^2 + a - 2$ $\begin{array}{r} \cancel{+}x \\ 17 \quad -6 \end{array}$

$3a^2 + 3a - 2a - 2$ 3, -2

$3a(a+1) - 2(a+1)$

$(3a-2)(a+1)$

4. Factor.

a) $3x^2 - 2x - 1$ $\begin{array}{r} \cancel{+}x \\ -21 \quad -3 \end{array}$

$3x^2 - 3x + 1x - 1$ -3, 1

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

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

c) $9t^2 - 24t + 16$ $\begin{array}{r} \cancel{+}x \\ -24 \quad 144 \end{array}$ -12, -12

$9t^2 - 12t - 12t + 16$

$3t(3t-4) - 4(3t-4)$

$(3t-4)^2$

e) $12p^2 + 13p - 4$ $\begin{array}{r} \cancel{+}x \\ 13 \quad -48 \end{array}$ 16, -3

$12p^2 - 3p + 16p - 4$

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

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

b) $9x^2 + 6x + 1$ $\begin{array}{r} \cancel{+}x \\ 6 \quad 9 \end{array}$ 3, 3

$9x^2 + 3x + 3x + 1$

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

$(3x+1)(3x+1) \rightarrow (3x+1)^2$

d) $3a^2 - 23a - 8$ $\begin{array}{r} \cancel{+}x \\ -23 \quad -24 \end{array}$ -24, 1

$3a^2 - 24a + 1a - 8$

$3a(a-8) + 1(a-8)$

$(3a+1)(a-8)$

f) $2p^2 - 19p + 9$ $\begin{array}{r} \cancel{+}x \\ -17 \quad 18 \end{array}$ -18, -1

$2p^2 - 18p - 1p + 9$

$2p(p-9) - 1(p-9)$

$(2p-1)(p-9)$

b) $8y^2 + 2y - 3$ $\begin{array}{r} \cancel{+}x \\ 2 \quad -24 \end{array}$ 6, -4

$8y^2 - 4y + 6y - 3$

$4y(2y-1) + 3(2y-1)$

$(4y+3)(2y-1)$

d) $12m^2 - 11m - 5$ $\begin{array}{r} \cancel{+}x \\ -11 \quad -60 \end{array}$ -15, 4

$12m^2 - 15m + 4m - 5$

$3m(4m-5) + 1(4m-5)$

$(3m+1)(4m-5)$

f) $9x^2 - x - 10$ $\begin{array}{r} \cancel{+}x \\ -1 \quad -90 \end{array}$ -10, 9

$9x^2 - 10x + 9x - 10$

$x(9x-10) + 1(9x-10)$

$(x+1)(9x-10)$

5. A rectangular garden has an area of $12a^2 - 5a - 2$ m². $\begin{array}{r} +x \\ -5 \end{array} | -24 \quad -8, 3$

a) Write the area as the product of two binomials with integer coefficients.

$$12a^2 - 5a - 2$$

$$12a^2 - 8a + 3a - 2$$

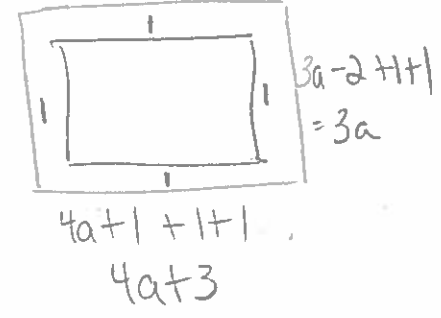
$$4a(3a - 2) + 1(3a - 2)$$

$$(4a + 1)(3a - 2)$$



b) The garden is to be completely enclosed by a path 1m wide. Find and simplify an expression for the area of the path.

Area big rec - Area original = area path



$$3a(4a+3)$$

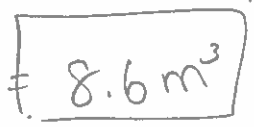
$$12a^2 + 9a - (12a^2 - 5a - 2)$$

$$= 14a + 2$$

c) The path is concrete, poured to a depth of 10 cm. Calculate the volume (in m³) of concrete used if $a = 6$.

$$V = (14(6) + 2) \cdot 0.1$$

$$= 86m^3 (0.1)$$



$V = lwh$

$$\begin{array}{r} 14 \\ 6 \\ \hline 84 \end{array}$$

6. Factor the following expressions.

a) $12 + 8x + x^2$ $\begin{array}{r} +x \\ -3 \\ -5, 6 \end{array}$

$$(x+6)(x+2)$$

or

$$(6+x)(2+x)$$

b) $6 - 7x - 20x^2$ $\begin{array}{r} +x \\ -7 \\ -120 \end{array} \quad -15, 8$

$$6 - 15x + 8x - 20x^2$$

$$3(2 - 5x) + 4x(2 - 5x)$$

$$(3 + 4x)(2 - 5x)$$

or $(-5x + 2)(4x + 3)$

c) $3 + a - 10a^2$ $\begin{array}{r} +x \\ -3 \\ -5, 6 \end{array}$

$$-10a^2 + a + 3$$

$$-10a^2 - 5a + 6a + 3$$

$$-5a(2a + 1) + 3(2a + 1)$$

$$(-5a + 3)(2a + 1) \text{ or } (3 - 5a)(1 + 2a)$$

d) $10a^2 + 25a - 15$

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

$$5(2a^2 + 6a - 1a - 3)$$

$$5(2a(a+3) - 1(a+3))$$

$$5(2a-1)(a+3)$$

e) $12z^2 + 66z + 30$ $\begin{array}{r} +x \\ 11 \\ -10 \end{array}$

$$6(2z^2 + 11z + 5)$$

$$(2z^2 + 10z + 12z + 5)$$

$$2z(2z + 5) + 1(2z + 5)$$

$$6(2z + 1)(z + 5)$$

f) $4x^3 - 7x^2 - 2x$ $\begin{array}{r} +x \\ -7 \\ -8 \end{array} \quad -8, 1$

$$x(4x^2 - 7x - 2)$$

$$x(4x^2 - 8x + 1x - 2)$$

$$4x(x-2) + 1(x-2)$$

$$x(4x+1)(x-2)$$

7. Factor.

a) $8x^2 + 22xy + 5y^2$ $\begin{array}{r} + \quad | \quad x \\ 22 \quad | \quad 40 \\ \hline 20, 2 \end{array}$

$8x^2 + 20xy + 2xy + 5y^2$

$4x(2x+5y) + y(2x+5y)$

$(4x+y)(2x+5y)$

c) $4a^2 - 9ab - 9b^2$ $\begin{array}{r} + \quad | \quad x \\ -9 \quad | \quad -36 \\ \hline -12, 3 \end{array}$

$4a^2 - 12ab + 3ab - 9b^2$

$4a(a-3b) + 3b(a-3b)$

$(4a+3b)(a-3b)$

b) $6x^2 + 11xy - 7y^2$ $\begin{array}{r} + \quad | \quad x \\ 11 \quad | \quad -42 \\ \hline 14, -3 \end{array}$

$6x^2 - 3xy + 14xy - 7y^2$

$3x(2x-y) + 7y(2x-y)$

$(3x+7y)(2x-y)$

d) $2m^2 - 19mn + 9n^2$ $\begin{array}{r} + \quad | \quad x \\ -19 \quad | \quad 18 \\ \hline -18, -1 \end{array}$

$2m^2 - 18mn - 1mn + 9n^2$

$2m(m-9n) - n(m-9n)$

$(2m-n)(m-9n)$

e) $9x^2 + xy - 10y^2$ $\begin{array}{r} + \quad | \quad x \\ 1 \quad | \quad -90 \\ \hline 10, -9 \end{array}$

$9x^2 - 9xy + 10xy - 10y^2$

$9x(x-y) + 10y(x-y)$

$(9x+10y)(x-y)$

f) $8x^2 + 7xy - 15y^2$ $\begin{array}{r} + \quad | \quad x \\ 7 \quad | \quad -120 \\ \hline 15, -8 \end{array}$

$8x^2 - 8xy + 15xy - 15y^2$

$8x(x-y) + 15y(x-y)$

$(8x+15y)(x-y)$

8. Consider the following, in which each letter represents a whole number.

$4x^2 + 23x + 15 = (Dx + W)(x + R)$

$4x^2 + 20x + 3x + 15$

$4x(x+5) + 3(x+5)$

$(4x+3)(x+5)$

$16x^2 + 40xy - 56y^2 = I(x - Gy)(Ex + Sy)$

$8(2x^2 + 5xy - 7y^2)$

$2x^2 - 2xy + 7xy - 7y^2$

$2x(x-y) + 7y(x-y)$

$12x^2 - 52xy - 9y^2 = (Ex - Ty)(Ox + y)$

$12x^2 + 2xy - 54xy - 9y^2$

$2x(6x+y) - 9y(6x+y)$

$(2x-9y)(6x+y)$

Determine the value of each letter, and hence name the sports celebrity represented by the following code.

(9) T (8) J (1) G (2) E (5) R (3) W (6) O (6) O (4) D (7) S

9. Which of the following are perfect square trinomials?

- a) $\sqrt{a^2 + 12a + 36}$ $(6) \times 2 = 12$ yes
 b) $x^2 - 25x + 50$ no
 c) $\sqrt{4x^2 - 4x + 1}$ $2(1)(2)$ yes
 d) $\sqrt{16y^2 + 32y + 16}$ 4 $16(a) = 32$ yes
 e) $\sqrt{a^2 + 9a + 9}$ $(3)(2) = 6$ no
 f) $\sqrt{25x^2 - 90x + 81}$ 5 $5(9)(2) = 45$ yes
 g) $1 - 16x + 64x^2$ 1 8 $1, 8, 2 = 16$ yes
 h) $y^2 + 20y - 100$ 1 $1(10)(2)$ no must be +

10. Fill in the blank so that each of the following is a perfect square trinomial.

- a) $x^2 + \underline{14}x + 49$ $1(7)(2)$
 b) $x^2 - \underline{24}x + 144$ $1(12)(2)$
 c) $9x^2 + \underline{36}x + 36$ $3(6)(2)$
 d) $\sqrt{4m^2 + 24m + \underline{36}}$ $2(\underline{6})(2) = 24$ 6^2
 e) $\sqrt{a^2 + \underline{1}a + 1}$ $\frac{1}{2}(1)(2)$
 f) $\sqrt{225x^2 - \underline{20}x + 16}$ $15(4)$
 g) $\sqrt{100x^2 + \underline{20}x + y^2}$ 10 $1(10)(2)$
 h) $\underline{25} - 30y + 9y^2$ $\sqrt{(3)(2) = 30 = 5 \ 5^2}$

11. Factor.

- a) $16x^2 - 8x + 1$ $(4x-1)^2$
 b) $\sqrt{36 + 60x + 25x^2}$ $(6+5x)^2$
 c) $\sqrt{4a^2 - 12ab + 9b^2}$ $(2a+9b)^2$
 d) $\sqrt{4x^2 - 44x + 121}$ $(2x-11)^2$
 e) $5x^2 + 10x + 5$ $5(x^2+2x+1)$
 f) $\frac{4}{9}x^2 + \frac{2}{9}x + \frac{1}{36}$ $(\frac{2}{3}x + \frac{1}{6})^2$
 g) $5(x+1)^2$

Multiple Choice 12. One factor of $20x^2 + 6x - 8$ is

- A. $2x - 1$
 B. $4x + 2$
 C. $5x - 4$
 D. $10x - 1$

$2(10x^2 + 3x - 4)$ $3 \frac{+1x}{-40}$ $10x^2 - 5x + 8x - 4$
 $8, -5$ $5x(2x-1) + 4(2x-1)$
 $(5x+4)(2x-1)$

13. From the expressions below, the one which does not represent a perfect square trinomial is

- A. $x^2 - 14x + 49$ $(x-7)^2$ ✓
 B. $\sqrt{144 + 24x + x^2}$ $12(1)(2)$ ✓
 C. $4x^2 - 12x + 36$ $2(6)(2) = 24$
 D. $9x^4 + 30x^2 + 25$ $3(5)(2)$ ✓

Numerical Response 14. The polynomial expression $\frac{1}{16}x^2 + \frac{1}{3}x + \frac{4}{9}$ can be written in the form $(Ax + B)^2$. The value of the product AB , to the nearest one hundredth, is _____.

(Record your answer in the numerical response box from left to right.)

0.17

$(\frac{1}{4}x + \frac{2}{3})$ $\frac{1}{4}(\frac{2}{3}) = \frac{2}{12}$ 0.1666

15. The factored form of $3x^2 - 14x + 8$ is $(x+a)(bx+c)$ where a , b , and c are integers. The value of b^c , to the nearest hundredth, is _____

(Record your answer in the numerical response box from left to right.)

0	.	1	1
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$$\begin{array}{r} +7x \\ -14 \end{array} \quad \begin{array}{r} +24 \\ -2 \end{array}$$

$$3x^2 - 12x - 2x + 8$$

$$3x(x-4) - 2(x-4)$$

$$\begin{matrix} (x-4) & (3x-2) \\ a & b & c \end{matrix}$$

$$3^{-2} = 0.11$$

16. The expression $24x^2 + 41x - 35$ can be written in the form $(ax-b)(cx+d)$ where a , b , c , and d are all positive integers.

Write the value of a in the first box.
Write the value of c in the third box.

Write the value of b in the second box.
Write the value of d in the fourth box.

(Record your answer in the numerical response box from left to right.)

8	5	3	7
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$$\begin{array}{r} +7x \\ 41 \end{array} \quad \begin{array}{r} -840 \\ -15 \end{array}$$

$$56, -15$$

$$24x^2 - 15x + 56x - 35$$

$$3x(8x-5) + 7(8x-5) = \begin{matrix} (8x-5) & (3x+7) \\ A & B & C & D \end{matrix}$$

Answer Key

1. a) $3x^2 + 7x + 2$ b) $3x + 1, x + 2$ c) $3x^2 + 7x + 2 = (3x + 1)(x + 2)$
2. a) $(2x + 3)(x + 1)$ b) $(2x + 1)(x + 3)$ c) $(3x + 2)(2x + 1)$ d) $(4x + 1)(x + 3)$
3. a) $(5x + 1)(2x + 3)$ b) $(3x + 1)^2$ c) $(3x + 5)(x + 3)$
d) $(3a + 1)(a - 8)$ e) $(3a - 2)(a + 1)$ f) $(2p - 1)(p - 9)$
4. a) $(3x + 1)(x - 1)$ b) $(2y - 1)(4y + 3)$ c) $(3t - 4)^2$
d) $(3m + 1)(4m - 5)$ e) $(4p - 1)(3p + 4)$ f) $(9x - 10)(x + 1)$
5. a) $(3a - 2)(4a + 1)$ b) $14a + 2 \text{ m}^2$ c) 8.6 m^3
6. a) $(6 + x)(2 + x)$ b) $(3 + 4x)(2 - 5x)$ c) $(3 - 5a)(1 + 2a)$
d) $5(2a - 1)(a + 3)$ e) $6(2z + 1)(z + 5)$ f) $x(4x + 1)(x - 2)$
7. a) $(2x + 5y)(4x + y)$ b) $(2x - y)(3x + 7y)$ c) $(4a + 3b)(a - 3b)$
d) $(2m - n)(m - 9n)$ e) $(9x + 10y)(x - y)$ f) $(8x + 15y)(x - y)$
8. TIGER WOODS 9. a), c), d), f), g) are all perfect square trinomials.

840

10. a) $14x$ b) $24x$ c) $36x$ d) 36 e) a f) $120x$ g) $20xy$ h) 25

11. a) $(4x - 1)^2$ b) $(6 + 5x)^2$ c) $(2a - 3b)^2$ d) $(2x - 11)^2$ e) $5(x + 1)^2$ f) $\left(\frac{2}{3}x + \frac{1}{6}\right)^2$

12. A 13. C

14.

0	.	1	7
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15.

0	.	1	1
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16.

8	5	3	7
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