

Name: \_\_\_\_\_

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## Chapter 4 Review

For each type of question, the achievement level is indicated. Showing work is an important strategy in communicating your knowledge and ideas so please be thorough.

**Learning Goal 5.1**








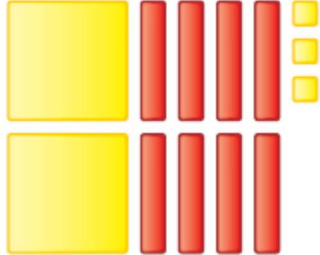


I can identify characteristics of polynomials and simplify polynomials by collecting like terms.

Developing		
1. Identify how many terms there are in each polynomial.		
a. $2x + 9$	b. $9x^2 - 4x + 1$	c. $x^3 - 5$
2	3	2
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^4$	f. $p^3 + p^4$
4	3	2
2. Identify the degree of each polynomial.		
a. $2x + 9$	b. $9x^2 - 4x + 1$	c. $x^3 - 5$
1	2	3
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^4$	f. $p^3 + p^4$
5	4	4
3. Identify the constant term in each polynomial.		
a. $2x + 9$	b. $9x^2 - 4x + 1$	c. $x^3 - 5$
9	1	-5
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^4$	f. $p^3 + p^4$
-	12	-
4. Identify the coefficient of the highest degree term in each polynomial.		
a. $2x + 9$	b. $9x^2 - 4x + 1$	c. $x^3 - 5$
2	9	1
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^4$	f. $p^3 + p^4$
1	1	1
5. Label each polynomial as a monomial, binomial, trinomial or a polynomial with what number of terms.		
a. $2x + 9$	b. $9x^2 - 4x + 1$	c. $x^3 - 5$
Binomial	Trinomial	Binomial
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^4$	f. $p^3 + p^4$
Polynomial with 4 terms	Trinomial	binomial

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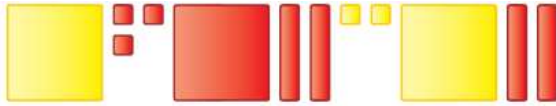
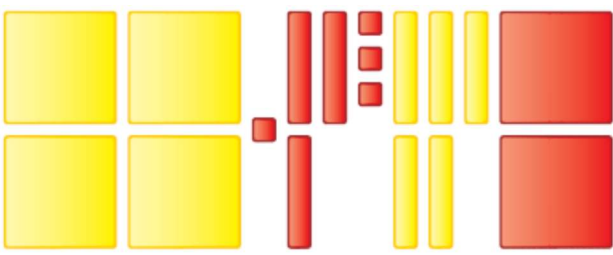
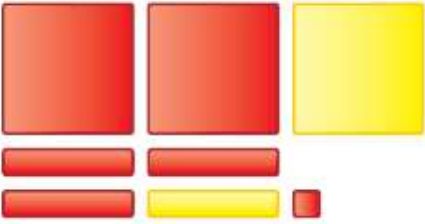

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Proficient		
6. Which of the following expressions are polynomials? Explain how you know.		
a. $5x + x^7$	b. $\frac{3}{x}$	c. $\sqrt{9x^3}$
Yes	No	No
d. $\frac{1}{x^2} + \frac{1}{x} + 1$	e. $\frac{x^2}{2} + \frac{x}{4} + \frac{1}{8}$	f. $p^3 + p^4$
No	Yes	yes
7. Identify which of the following can be represented by algebra tiles. For those that can, draw the model.		
a. $2x + 9$	b. $x^2 - 4x + 1$	c. $x^3 - 5$
		----
d. $a^5 - 4a^3 + 3a^4 + a^2$	e. $12 - j + j^2$	f. $p + p^2$
----		
8. Identify the polynomial being modelled by the algebra tiles.		
a. 	b. 	c. 
$2x + 2$	$x^2 - x + 3$	$4x$
d. 	e. 	f. 
$2x^2 - 8x + 3$	$-2x^2 + 2x + 4$	$x^2 - 4x + 3$

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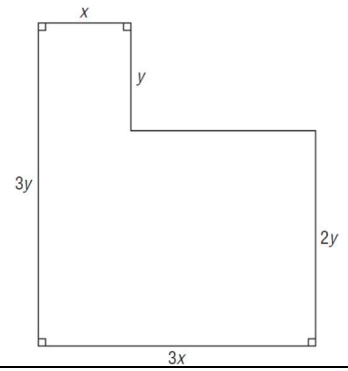
9. Identify the polynomial being modelled by the algebra tiles. Simplify if possible.	
a. 	b. 
$x^2 - 3 - x^2 - 2x + 2 + x^2 - 2x$ $= x^2 - 4x - 1$	$4x^2 - 1 - 3x - 3 + 5x - 2x^2$ $= 2x^2 + 2x - 4$
c. 	d. 
$-2x^2 + x^2 - 3x + x - 1$ $= -x^2 - 2x - 1$	$x^2 - x^2 + 4x + 3 - x^2 - 2x - 3$ $= -x^2 + 2x$
10. Simplify the polynomial.	
e. $6 - 3x + x^2 + 9 - x$ $= x^2 - 4x + 15$	f. $-6x^2 + 17x - 4 - 3x^2 + 8 - 12$ $= 9x^2 + 17x - 8$
g. $15x^2 - 12xy + 5y + 10xy - 8y - 9x^2$ $= 6x^2 - 2xy - 3y$	h. $4xy - y^2 - 3x^2 + 2xy - x - 3y^2$ $= -3x^2 - x + 6xy - 4y^2$
<b>Extending</b>	
11. The stopping distance of a car is the distance the car travels between the time the driver applies the brakes and the time the car stops. The polynomial $0.4s + 0.02s^2$ can be used to calculate the stopping distance in metres of a car travelling at $s$ kilometres an hour on dry pavement.	
a. Determine the stopping distance for $50 \text{ km/hr}$ .	
b. Does doubling the speed double the stopping distance? Explain.	
70 metres	$0.4(2s) + 0.02(2s)^2$ $= 2(0.4s) + 4(0.02s^2)$ $= 2(0.4s + 0.04s^2)$ <p style="text-align: center;">no</p>

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12. Write a polynomial for the perimeter of this shape.  
Simplify the polynomial.



$$\begin{aligned} P &= x + y + 2x + 2y + 3x + 3y \\ &= 6x + 6y \end{aligned}$$

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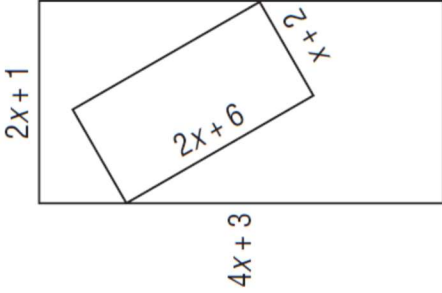
<b>Learning Goal 5.2</b>	I can add and subtract polynomials.
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<b>Developing</b>	
1. Add or subtract the following polynomials. Use algebra tiles if you like.	
a. $(-x^2 + 2x - 4) + (-2x^2 + 2x - 2)$ $-3x^2 + 4x - 6$	b. $(-x^2 + 2x - 4) - (-2x^2 + 2x - 2)$ $x^2 - 2$
c. $(1 + 2x^2 + 5x) + (x^2 + 5x)$ $3x^2 + 10x + 1$	d. $(1 + 2x^2 + 5x) - (x^2 + 5x)$ $x^2 + 1$
e. $(2x^2 + 8x - 1) + (4x - 2x^2 + 4)$ $12x + 3$	f. $(2x^2 + 8x - 1) - (4x - 2x^2 + 4)$ $4x^2 - 4x - 5$
g. $(4x^2 + 7x - 1) + (3x - x^2 + 5)$ $3x^2 + 10x + 4$	h. $(4x^2 + 7x - 1) - (3x - x^2 + 5)$ $5x^2 + 4x - 6$
i. $(7s + 14) + (-6s^2 + s - 6)$ $-6s^2 + 8s + 8$	j. $(7s + 14) - (-6s^2 + s - 6)$ $6s^2 + 6s + 20$
k. $(3x^2 + 2x + 4) + (-5x^2 + 3x - 5)$ $-2x^2 + 5x - 1$	l. $(3x^2 + 2x + 4) - (-5x^2 + 3x - 5)$ $8x^2 - x + 9$
m. $(-2a^2 + a - 1) + (a^2 - 3a + 2)$ $-a^2 - 2a + 1$	n. $(-2a^2 + a - 1) - (a^2 - 3a + 2)$ $-3a^2 + 4a - 3$
<b>Proficient</b>	
2. Add or subtract the following polynomials.	
a. $(9p + 4pq - 2pqr) + (6pq - 2p + 8pqr)$ $7p + 10pq + 6pqr$	b. $(9p + 4pq - 2pqr) - (6pq - 2p + 8pqr)$ $11p - 2pq - 10pqr$
c. $(6p - 4pq + 13pqr) + (5pq - 2p + 7pqr)$ $4p + pq + 20pqr$	d. $(6p - 4pq + 13pqr) - (5pq - 2p + 7pqr)$ $8p - 9pq + 5pqr$
e. $(13a + 8b^2 - c^3) + (14c^3 - 2b^2 + a)$ $14a + 6b^2 + 13c^3$	f. $(13a + 8b^2 - c^3) - (14c^3 - 2b^2 + a)$ $12a + 10b^2 - 15c^3$
g. $(11a + 2b^2 - 6c^3) + (9c^3 - 5b^2 + 3a)$ $14a - 3b^2 + 3c^3$	h. $(11a + 2b^2 - 6c^3) - (9c^3 - 5b^2 + 3a)$ $8a + 7b^2 - 15c^3$

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i. $(3x^2 - 2y^2 + xy) + (-2xy - 2y^2 - 3x^2)$	j. $(3x^2 - 2y^2 + xy) - (-2xy - 2y^2 - 3x^2)$
$-4y^2 - xy$	$6x^2 + 3xy$
k. $(3 - 8f + 5g - f^2) + (2g^2 - 3f + 4g - 5)$	l. $(3 - 8f + 5g - f^2) - (2g^2 - 3f + 4g - 5)$
$-f^2 + 2g^2 - 11f + 9g - 2$	$-f^2 - 2g^2 - 5f + g + 8$
m. $(5x^2 - 3xy + 2y^2) + (8x^2 - 7xy - 4y^2)$	n. $(5x^2 - 3xy + 2y^2) - (8x^2 - 7xy - 4y^2)$
$13x^2 - 10xy - 2y^2$	$-3x^2 + 4xy + 6y^2$
<b>Extending</b>	
3. What polynomial must be added to $4x^2 - 5y + 3x + 2y^2$ to obtain a sum of zero?	
$-4x^2 + 5y - 3x - 2y^2$	
4. Create a polynomial that is added to $3x^2 + 7x + 2$ to get a sum of $-x^2 + x - 1$	
$-4x^2 - 6x - 3$	
5. The polynomials $4x + 3y$ and $2x + y$ represent the lengths of two sides of a triangle. The perimeter of the triangle is $9x + 2$ . Determine the length of the third side.	
$3x - 4y + 2$	
6. The difference of two polynomials is $3x^2 + 4x - 7$ . One polynomial is $-8x^2 + 5x - 4$ . What are the two choices for the other polynomial?	
$-5x^2 + 9x - 11$	$-11x^2 + x - 3$
7. The perimeter of the polygon is $10p + 8$ . Determine the missing side length.	
	
$4p + 1$	
8. The diagram shows one rectangle inside another rectangle. What is the difference in the perimeters of the rectangles?	
	
$6x - 8$	$-6x + 8$

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**Learning Goal 5.3**

I can multiply and divide polynomials by a constant, monomial and binomial.

<b>Developing</b>	
1. Multiply or divide the following polynomials. Use algebra tiles if you like.	
a.	$\begin{array}{r} 5(-x^2 + 2x - 4) \\ -5x^2 + 10x - 20 \end{array}$
b.	$\begin{array}{r} 3(-2x^2 + 2x - 2) \\ -6x^2 + 6x - 6 \end{array}$
c.	$\begin{array}{r} 4(1 + 2x^2 + 5x) \\ 8x^2 + 20x + 4 \end{array}$
d.	$\begin{array}{r} 7(x^2 + 5x) \\ 7x^2 + 35x \end{array}$
e.	$\begin{array}{r} 2(2x^2 + 8x - 1) \\ 4x^2 + 16x - 2 \end{array}$
f.	$\begin{array}{r} 6(4x - 2x^2 + 4) \\ -12x^2 + 24x + 24 \end{array}$
g.	$\begin{array}{r} 8(4x^2 + 7x - 1) \\ 32x^2 + 56x - 8 \end{array}$
h.	$\begin{array}{r} 10(3x - x^2 + 5) \\ -10x^2 + 30x + 50 \end{array}$
i.	$\begin{array}{r} \frac{7x + 14}{7} \\ x + 2 \end{array}$
j.	$\begin{array}{r} \frac{-6x^2 + 9x - 6}{3} \\ -2x^2 + 3x - 2 \end{array}$
k.	$\begin{array}{r} \frac{6x^2 + 2x + 4}{2} \\ 3x^2 + x + 2 \end{array}$
l.	$\begin{array}{r} \frac{-5x^2 + 10x - 5}{5} \\ -x^2 + 2x - 1 \end{array}$
m.	$\begin{array}{r} \frac{12x - 8x^2 + 4}{4} \\ -2x^2 + 3x + 1 \end{array}$
n.	$\begin{array}{r} \frac{8x^2 + 24x - 16}{8} \\ x^2 + 3x - 2 \end{array}$
o.	$\begin{array}{r} \frac{-6x^2 + 18x - 6}{3} \\ -2x^2 + 6x - 2 \end{array}$
p.	$\begin{array}{r} \frac{-6x^2 + 18x - 12}{6} \\ -x^2 + 3x - 2 \end{array}$
<b>Proficient</b>	
2. Multiply or divide the following polynomials.	
a.	$\begin{array}{r} -5(-a^2 + 2a - 4) \\ 5a^2 - 10a + 20 \end{array}$
b.	$\begin{array}{r} -3(-2b^2 + 2b - 2) \\ 6b^2 - 6b + 6 \end{array}$
c.	$\begin{array}{r} -4(1 + 2d^2 + 5d) \\ -8d^2 - 20d - 4 \end{array}$
d.	$\begin{array}{r} -7(c^2 + 5c) \\ -7c^2 - 35c \end{array}$

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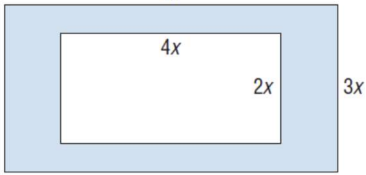
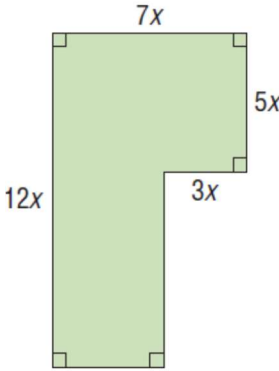
e.	$\frac{6g^2 + 2gh + 4h^2}{-2}$	f.	$\frac{8j + 24jk - 16k}{-8}$
	$-3g^2 - gh - 2h^2$		$-j - 3jk + 2k$
g.	$\frac{7x^5 + 14x^3}{-7}$	h.	$\frac{-6m^2n + 18mn^2 - 12n^3}{-6}$
	$-x^5 - 2x^3$		$m^2n - 3mn^2 + 2n^3$
i.	$2y(2x^2 + 8x - 1)$	j.	$9x^3(4x - 2x^2 + 4)$
	$4x^2y + 16xy - 2y$		$36x^4 - 18x^5 + 36x^3$
k.	$6mn(4p + 7m - n)$	l.	$-3q^2(3q - q^2 + 5q^3)$
	$24mnp + 42m^2n - 6mn^2$		$-9q^3 + 3q^4 - 15q^5$
m.	$\frac{-6x^5 + 18x^3}{3x^2}$	n.	$\frac{-6x^5 + 18x^3 + 12x^4}{-6x^2}$
	$-2x^3 + 6x$		$x^3 - 3x - 2x^2$
o.	$\frac{12m^4n - 8m^3n^2 + 4m^2n^3}{4mn}$	p.	$\frac{-6z^2 + 21z^3}{-3z^2}$
	$3m^3 - 2m^2n + mn^2$		$2 - 7z$
q.	$(2y + 1)(3x - 1)$	r.	$(x + 6)(6 - x)$
	$6xy - 2y + 3x - 1$		$-x^2 + 36$
s.	$(x + 5)^2$	t.	$(3a + b)(3b + a)$
	$x^2 + 10x + 25$		$3a^2 + 10ab + 3b^2$
u.	$(x + 2)(x - 4)$	v.	$(2x - 1)(x - 6)$
	$x^2 - 2x - 8$		$2x^2 - 13x + 6$
w.	$(x - 4)^2$	x.	$(x + 4)^2$
	$x^2 - 8x + 16$		$x^2 + 8x + 16$
y.	$\frac{x^2 + 5x + 6}{x + 2}$	z.	$\frac{x^2 + 8x + 7}{x + 7}$
	$x + 3$		$x + 1$
aa.	$\frac{x^2 + 6x + 8}{x + 4}$	bb.	$\frac{x^2 + 7x + 10}{x + 2}$
	$x + 2$		$x + 5$
cc.	$\frac{x^2 + 7x + 12}{x + 3}$	dd.	$\frac{x^2 + 8x + 16}{x + 4}$
	$x + 4$		$x + 4$



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Extending																																	
<p>3. This diagram shows one rectangle inside another. Determine the area of the shaded region.</p>																																	
$10x^2$																																	
<p>4. The area of a rectangular deck is <math>8d^2 + 20d</math> square metres. The deck is <math>4d</math> metres long. Determine a polynomial that represents the width of the deck.</p>																																	
$2d + 5$																																	
<p>5. The polynomial <math>54s^2</math> represents the surface area of a cube. Determine a polynomial that represents the area of one face. Determine the polynomial that represents the length of one side.</p>																																	
$9s^2$	$3s$																																
<p>6. Find the polynomial that represent the area of the polygon.</p> 	<p>7. Factor the following polynomials.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;">a. <math>x^2 + 4x + 4</math></td> <td style="width: 50%;">b. <math>x^2 + 5x + 6</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 2)^2</math></td> <td style="text-align: center;"><math>(x + 2)(x + 3)</math></td> </tr> <tr> <td>c. <math>x^2 + 8x + 12</math></td> <td>d. <math>x^2 + 6x + 8</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 6)(x + 2)</math></td> <td style="text-align: center;"><math>(x + 4)(x + 2)</math></td> </tr> <tr> <td>e. <math>x^2 + 10x + 25</math></td> <td>f. <math>x^2 + 8x + 15</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 5)^2</math></td> <td style="text-align: center;"><math>(x + 3)(x + 5)</math></td> </tr> <tr> <td>g. <math>x^2 + 10x + 9</math></td> <td>h. <math>x^2 + 7x + 10</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 9)(x + 1)</math></td> <td style="text-align: center;"><math>(x + 2)(x + 5)</math></td> </tr> <tr> <td>i. <math>x^2 + 10x + 16</math></td> <td>j. <math>x^2 + 14x + 40</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 8)(x + 2)</math></td> <td style="text-align: center;"><math>(x + 10)(x + 4)</math></td> </tr> <tr> <td>k. <math>x^2 + 10x + 21</math></td> <td>l. <math>x^2 + 9x + 20</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 3)(x + 7)</math></td> <td style="text-align: center;"><math>(x + 4)(x + 5)</math></td> </tr> <tr> <td>m. <math>x^2 - x - 6</math></td> <td>n. <math>x^2 - 4x + 4</math></td> </tr> <tr> <td style="text-align: center;"><math>(x - 3)(x + 2)</math></td> <td style="text-align: center;"><math>(x - 2)^2</math></td> </tr> <tr> <td>o. <math>x^2 + 3x - 10</math></td> <td>p. <math>x^2 + 5x - 14</math></td> </tr> <tr> <td style="text-align: center;"><math>(x + 5)(x - 2)</math></td> <td style="text-align: center;"><math>(x + 7)(x - 2)</math></td> </tr> </tbody> </table>	a. $x^2 + 4x + 4$	b. $x^2 + 5x + 6$	$(x + 2)^2$	$(x + 2)(x + 3)$	c. $x^2 + 8x + 12$	d. $x^2 + 6x + 8$	$(x + 6)(x + 2)$	$(x + 4)(x + 2)$	e. $x^2 + 10x + 25$	f. $x^2 + 8x + 15$	$(x + 5)^2$	$(x + 3)(x + 5)$	g. $x^2 + 10x + 9$	h. $x^2 + 7x + 10$	$(x + 9)(x + 1)$	$(x + 2)(x + 5)$	i. $x^2 + 10x + 16$	j. $x^2 + 14x + 40$	$(x + 8)(x + 2)$	$(x + 10)(x + 4)$	k. $x^2 + 10x + 21$	l. $x^2 + 9x + 20$	$(x + 3)(x + 7)$	$(x + 4)(x + 5)$	m. $x^2 - x - 6$	n. $x^2 - 4x + 4$	$(x - 3)(x + 2)$	$(x - 2)^2$	o. $x^2 + 3x - 10$	p. $x^2 + 5x - 14$	$(x + 5)(x - 2)$	$(x + 7)(x - 2)$
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