

MAT 101 - BEGINNING ALGEBRA
Comprehensive Review for the Final Examination

Item	Answer
Match.	
A. Additive inverse property B. Identity element of addition C. Associative property of addition D. Commutative property of addition	E. Commutative property of multiplication F. Distributive property G. Identity element of multiplication H. Multiplication property of zero
1. $-9(1) = -9$	1. G
2. $(-3) + 4 = 4 + (-3)$	2. D
3. $6(0) = 0$	3. H
4. $(-5)(-6) = (-6)(-5)$	4. E
5. $-4 + 0 = -4$	5. B
6. $[7 + (-3)] + (-2) = 7 + [(-3) + (-2)]$	6. C
7. $-5(7 + 8) = -5(7) - 5(8)$	7. F
8. $3 + (-3) = 0$	8. A
Simplify each expression.	
9. $-17 - (-6)$	9. $-17 - (-6)$ $-17 + 6$ -11
10. $6[2 + 7(5 - 9) - 1]$	10. $6[2 + 7(5 - 9) - 1]$ $6[2 + 7(-4) - 1]$ $6[2 - 28 - 1]$ $6[-27]$ -162
11. $-2(-3)^2 - 24$	11. $-2(-3)^2 - 24$ $-2(9) - 24$ $-18 - 24$ -42
12. $-9 \div 0$	12. $-9 \div 0$ undefined

Item	Answer
Simplify each expression.	
13. $-11 + (-3)$	13. $-11 + (-3)$ $-11 - 3$ -14
14. $(-2 + 1)^3 - (5 - 2)^2$	14. $(-2 + 1)^3 - (5 - 2)^2$ $(-1)^3 - (3)^2$ $-1 - 9$ -10
15. $-10(-4)$	15. $-10(-4)$ 40
16. $15 - (-1)$	16. $15 - (-1)$ $15 + 1$ 16
17. $-9 + 15 \div 3(2)$	17. $-9 + 15 \div 3(2)$ $-9 + 5(2)$ $-9 + 10$ 1
18. $-4^2 + 12 \div (-3)$	18. $-4^2 + 12 \div (-3)$ $-16 - 4$ -20
19. $(-4)^2 + 6^2 \div (-2)$	19. $(-4)^2 + 6^2 \div (-2)$ $16 + 36 \div (-2)$ $16 - 18$ -2
20. $0 \div (-5)$	20. $0 \div (-5)$ 0
21. $[-9 + (3 \div 3)] 2$	21. $[-9 + (3 \div 3)] 2$ $[-9 + 1] 2$ $[-8] 2$ -16

Item	Answer
Simplify each expression.	
22. $2(8) + 4 \div (-1)(3)$	22. $2(8) + 4 \div (-1)(3)$ $16 - 4(3)$ $16 - 12$ 4
Evaluate.	
23. $x^2 - 2yz$ if $x = -2$, $y = 5$, and $z = 3$	23. $x^2 - 2yz$ if $x = -2$, $y = 5$, and $z = 3$ $(-2)^2 - 2(5)(3)$ $4 - 30$ -26
24. $3x^2 - 2x + 1$ at $x = -2$	24. $3x^2 - 2x + 1$ at $x = -2$ $3(-2)^2 - 2(-2) + 1$ $3(4) + 4 + 1$ $12 + 4 + 1$ 17
Solve each of these linear equations.	
25. $17y + 12 = -5$	25. $17y + 12 = -5$ $17y = -5 - 12$ $17y = -17$ $y = -1$
26. $10(x-3) - x + 2 - 2(x+1) = 3(3+x) - 9$	26. $10(x-3) - x + 2 - 2(x+1) =$ $3(3+x) - 9$ $10x - 30 - x + 2 - 2x - 2 =$ $9 + 3x - 9$ $10x - x - 2x - 3x =$ $9 - 9 + 30 - 2 + 2$ $\frac{4x}{4} = \frac{30}{4}$ $x = \frac{15}{2}$ or $7\frac{1}{2}$ or 7.5

Item	Answer
Solve each of these linear equations.	
27. $-\frac{4}{7}x = 24$	27. $-\frac{4}{7}x = 24$ $\left(-\frac{7}{4}\right)\left(-\frac{4}{7}x\right) = \left(-\frac{7}{4}\right)(24)$ $x = -42$
28. $.5(w + 1) = 2.5w - 7.5$	28. $.5(w + 1) = 2.5w - 7.5$ (multiply by 10) $5(w + 1) = 25w - 75$ $5w + 5 = 25w - 75$ $5w - 25w = -75 - 5$ $-20w = -80$ $w = 4$
29. $3(4n + 5) - 2n = 5(n - 6)$	29. $3(4n + 5) - 2n = 5(n - 6)$ $12n + 15 - 2n = 5n - 30$ $12n - 2n - 5n = -30 - 15$ $5n = -45$ $n = -9$
30. $4.1m + 7.85 = 8.26$	30. $4.1m + 7.85 = 8.26$ (multiply by 100) $410m + 785 = 826$ $410m = 826 - 785$ $410m = 41$ $m = \frac{41}{410}$ $m = \frac{1}{10}$ or 0.1
31. $\frac{6(a + 1)}{7} = a - 3$	31. $\frac{6(a + 1)}{7} = a - 3$ $7 \cdot \frac{6(a + 1)}{7} = 7(a - 3)$ $6(a + 1) = 7a - 21$ $6a + 6 = 7a - 21$ $6a - 7a = -21 - 6$ $-a = -27$ $a = 27$

Item	Answer
Solve each of these linear equations.	
32. $5x - (2x + 3) = 4(x + 1) - 2x$	32. $5x - (2x + 3) = 4(x + 1) - 2x$ $5x - 2x - 3 = 4x + 4 - 2x$ $5x - 2x - 4x + 2x = 4 + 3$ $x = 7$
33. $\frac{x}{3} - 7 = 9$	33. $\frac{x}{3} - 7 = 9$ $(3)\frac{x}{3} - (3)7 = (3)9$ $x - 21 = 27$ $x = 27 + 21$ $x = 48$
34. $\frac{4}{5}x - 1 = \frac{2}{7}x + 3$	34. $\frac{4}{5}x - 1 = \frac{2}{7}x + 3$ $(35)\frac{4}{5}x - (35)1 = (35)\frac{2}{7}x + (35)3$ $28x - 35 = 10x + 105$ $28x - 10x = 105 + 35$ $\frac{18x}{18} = \frac{140}{18}$ $x = \frac{70}{9}$ or $7\frac{7}{9}$ or $7.\bar{7}$
35. $\frac{1}{2} - b + \frac{5}{2} = b + 3$	35. $\frac{1}{2} - b + \frac{5}{2} = b + 3$ $(2)\frac{1}{2} - (2)b + (2)\frac{5}{2} = (2)b + (2)3$ $1 - 2b + 5 = 2b + 6$ $-2b - 2b = 6 - 5 - 1$ $-4b = 0$ $\frac{-4b}{-4} = \frac{0}{-4}$ $b = 0$

Item	Answer
Solve for the indicated letter.	
36. $h = 3(p + 2k)$ for k	36. $h = 3(p + 2k)$ $h = 3p + 6k$ $-6k = 3p - h$ $\frac{-6k}{-6} = \frac{3p - h}{-6}$ $k = \frac{-3p + h}{6}$ or $-\frac{3p - h}{6}$
37. $3x - y + 7 = 0$ for y	37. $3x - y + 7 = 0$ $-y = -3x - 7$ $y = 3x + 7$
38. $I = p + prt$ for t	38. $I = p + prt$ $I - p = prt$ $\frac{I - p}{pr} = t$ or $t = \frac{I - p}{pr}$
39. $5ax - 3y = g$ for x	39. $5ax - 3y = g$ $5ax = g + 3y$ $x = \frac{g + 3y}{5a}$
40. $3 - 4h = 3h - a$ for a	40. $3 - 4h = 3h - a$ $a = 3h + 4h - 3$ $a = 7h - 3$
41. $y = mx + b$ for b	41. $y = mx + b$ $y - mx = b$ or $b = y - mx$
Solve each of the following applications.	
42. A number increased by two-thirds of the number is 25. Find the number.	42. Let $N = \text{Number}$ $N + \frac{2}{3}N = 25$ $(3)N + (3)\frac{2}{3}N = (3)25$ $3N + 2N = 75$ $5N = 75$ <div style="border: 1px solid black; display: inline-block; padding: 2px;"> $N = 15$ </div>

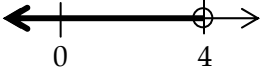
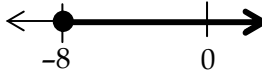


Item	Answer									
Solve each of the following applications.										
<p>43. Two trains leave Boston simultaneously traveling on the same track in opposite directions at average speeds of 80 and 92 miles per hour. How long will it take before they are 516 miles apart?</p>	<p>43. $d = rt$</p> <table border="1"> <thead> <tr> <th>Rate</th> <th>• Time</th> <th>= Distance</th> </tr> </thead> <tbody> <tr> <td>80</td> <td>t</td> <td>80t</td> </tr> <tr> <td>92</td> <td>t</td> <td>92t</td> </tr> </tbody> </table> <p>$80t + 92t = 516$</p> <p>$172t = 516$</p> <p>$t = 3 \text{ hours}$</p>	Rate	• Time	= Distance	80	t	80t	92	t	92t
Rate	• Time	= Distance								
80	t	80t								
92	t	92t								
<p>44. The sum of a number and twice the number is 57. What is the number?</p>	<p>44. Let $N = \text{Number}$</p> <p>$N + 2N = 57$</p> <p>$3N = 57$</p> <p>$N = 19$</p>									
<p>45. For three consecutive integers, the sum of the smallest and largest integers, added to four more than the middle integer, equals 97. What are the three integers?</p>	<p>45. Let $N = 1\text{st consecutive integer}$ (smallest)</p> <p>$N + 1 = 2\text{nd consecutive integer}$ (middle)</p> <p>$N + 2 = 3\text{rd consecutive integer}$ (largest)</p> <p>$[N + (N + 2)] + [(N + 1) + 4] = 97$</p> <p>$N + N + 2 + N + 5 = 97$</p> <p>$3N + 7 = 97$</p> <p>$3N + 7 - 7 = 97 - 7$</p> <p>$3N = 90$</p> <p>$N = 30$</p> <p>$N + 1 = 31$</p> <p>$N + 2 = 32$</p>									

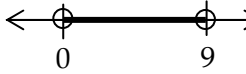
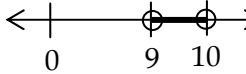
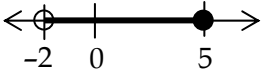
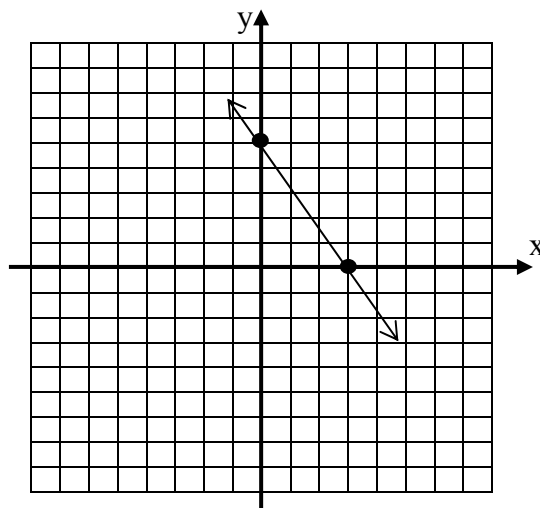
Item	Answer
Solve each of the following applications.	
<p>46. One angle of a triangle is 20° greater than the first angle. The third angle is twice as large as the first angle. What are the measures of the three angles?</p>	<p>46. Let A = measure of 1st angle $A + 20$ = measure of 2nd angle $2A$ = measure of 3rd angle $A + (A + 20) + 2A = 180$ $A + A + 20 + 2A = 180$ $4A = 180 - 20$ $4A = 160$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = 40^\circ$ $A + 20 = 60^\circ$ $2A = 80^\circ$ </div>
<p>47. The width of a rectangle is 8 feet less than the length. If the perimeter of the rectangle is 64 feet, what are the dimensions of the rectangle?</p>	<p>47. Let ℓ = length $\ell - 8$ = width $2(\ell) + 2(\ell - 8) = 64$ $2\ell + 2\ell - 16 = 64$ $4\ell = 64 + 16$ $4\ell = 80$ $\ell = 20$ ft. $\ell - 8 = 12$ ft.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> Dimensions: 20 ft. by 12 ft. </div>
<p>48. Two trains that are 550 miles apart are traveling towards each other. One is traveling 10 mph per hour faster than the other car. What is the speed of each car if they meet in five hours?</p>	<p>48. Let x = speed of 1st car $x + 10$ = speed of 2nd car $5(x) + 5(x + 10) = 550$ $5x + 5x + 50 = 550$ $10x = 500$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $x = 50$ mph $x + 10 = 60$ mph </div>

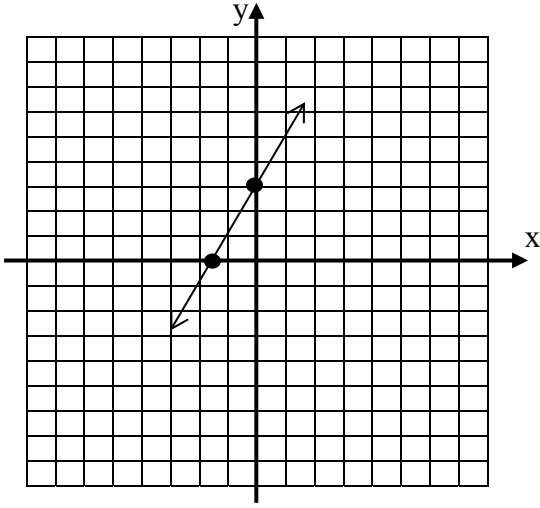
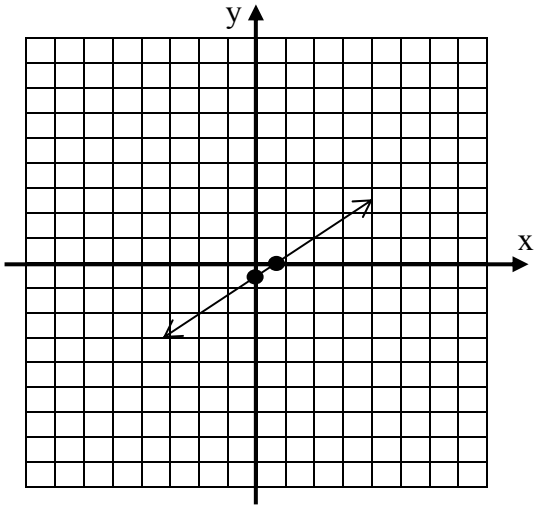
Item	Answer
Solve each of the following applications.	
<p>49. The second angle of a triangle is 7° more than three times the first angle. The third angle is 12° greater than the second angle. What are the measures of the three angles?</p>	<p>49. Let A = measure of 1st Angle $3A + 7 =$ measure of 2nd Angle $(3A + 7) + 12 =$ measure 3rd Angle $A + (3A + 7) + (3A + 19) = 180$ $A + 3A + 7 + 3A + 19 = 180$ $7A = 180 - 7 - 19$ $7A = 154$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = 22^\circ$ $3A + 7 = 73^\circ$ $3A + 19 = 85^\circ$ </div>
<p>50. A total of \$10,000 was invested in two bond funds, a junk bond fund and a government bond fund. The junk bond fund is risky and yields 11% interest. The safe government bond fund yields 5%. The year's total income from the two investments was \$740. How much was invested in each fund?</p>	<p>50. Let A = Amount at 11% $\\$10,000 - A =$ Amount at 5% $\underbrace{.11A} + \underbrace{.05(10,000 - A)} = \underbrace{740.00}$ <small>(multiply by 100)</small> $11A + 5(10,000 - A) = 74,000$ $11A + 50,000 - 5A = 74,000$ $11A - 5A = 74,000 - 50,000$ $6A = 24,000$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = \\$4,000 @ 11\%$ $\\$10,000 - A = \\$6,000 @ 5\%$ </div>
<p>51. An embossing shop etches metal with acid solutions. The owner is discussing a certain job with the shop supervisor, and they decide to use 30 ounces of a 40% acid solution. Upon checking the acid solution supplies, the supervisor has found some 25% acid solution and some 50% acid solution, but there is no 40% solution. How much of each solution must the supervisor mix to obtain the 40% acid solution for the job?</p>	<p>51. Let A = Amount of 25% acid solution $30 - A =$ Amount of 50% acid solution $.25A + .50(30 - A) = .40(30)$ $25A + 50(30 - A) = 40(30)$ $25A + 1500 - 50A = 1200$ $25A - 50A = 1200 - 1500$ $-25A = -300$ $25A = 300$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = 12 \text{ ounces}$ $30 - A = 18 \text{ ounces}$ </div>

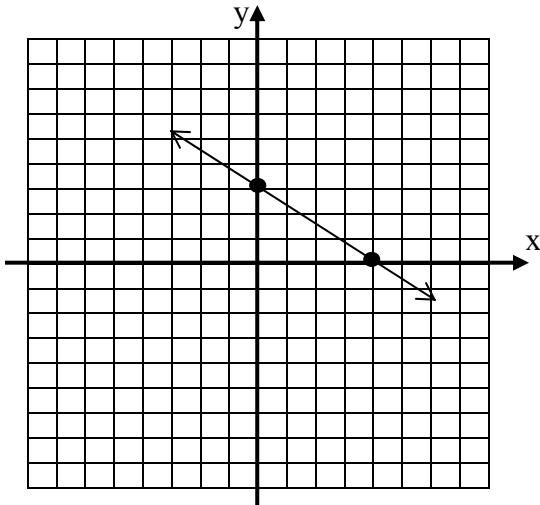
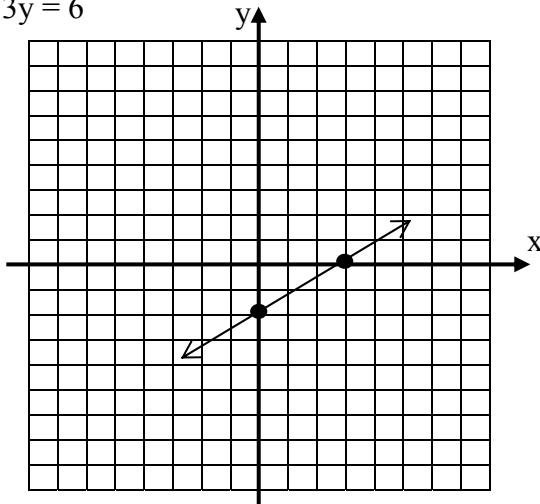
Item	Answer
Solve each of the following applications.	
<p>52. You are scheduling parties for a restaurant. One dining room holds four more than twice as many guests as a smaller room. Together they hold 127 guests. How many guests can you schedule into the smaller room?</p>	<p>52. Let $N = \#$ guests in smaller room $2N + 4 = \#$ guests in larger room $N + (2N + 4) = 127$ $N + 2N + 4 = 127$ $3N = 127 - 4$ $3N = 123$ $N = 41$ guests</p>
<p>53. The owner of a small business, hoping to maintain good relations with two banks, invested a total of \$5,000. Part of the money went to NationSecurities which pays 8% simple interest. The remainder went to Lowcountry investments, which pays 12% simple interest. Altogether the two investments earned a total of \$420 for the year. How much was invested in each of the two accounts?</p>	<p>53. Let $A = \text{Amount at } 8\%$ $\\$5,000 - A = \text{Amount at } 12\%$ $\underbrace{.08A} + \underbrace{.12(5,000 - A)} = \underbrace{420.00}$ (multiply by 100) $8A + 12(5,000 - A) = 42,000$ $8A + 60,000 - 12A = 42,000$ $8A - 12A = 42,000 - 60,000$ $-4A = -18,000$ $4A = 18,000$ $A = \\$4,500$ at 8% $\\$5,000 - A = \\500 at 12%</p>
<p>54. At Cloth World a fabric worker has a 106-yard bolt of cloth that has to be cut into three lengths. The second piece is to be 4 yards longer than the first. The third piece is to be three times as long as the second piece. What is the length of each piece?</p>	<p>54. Let $\ell = \text{Length of 1st piece}$ $\ell + 4 = \text{Length of 2nd piece}$ $3(\ell + 4) = \text{Length of 3rd piece}$ $\ell + (\ell + 4) + 3(\ell + 4) = 106$ $\ell + \ell + 4 + 3\ell + 12 = 106$ $\ell + \ell + 3\ell = 106 - 4 - 12$ $5\ell = 90$</p> <p>$\ell = 18$ yd. $\ell + 4 = 22$ yd. $3(\ell + 4) = 66$ yd.</p>

Item	Answer
Solve each of the following applications. (Cont)	
<p>55. The length of a rectangle is 7 meters greater than the width. If the perimeter of the rectangle is 134 meters, what are the dimensions of the rectangle?</p>	<p>55. Let w = width $w + 7$ = length $2(w) + 2(w + 7) = 134$ $2w + 2w + 14 = 134$ $4w = 134 - 14$ $4w = 120$ $w = 30$ m $l = w + 7 = 37$ m</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;">30 m by 37 m</div>
<p>56. A Hanahan seed company has fescue grass seed worth 55 cents per pound and bluegrass seed worth 95 cents per pound. How many pounds of each should be mixed to produce 100 pounds of seed mix that will sell for 70 cents per pound?</p>	<p>56. Let A = Amount at 55¢ $100 - A$ = Amount at 95¢ $.55A + .95(100 - A) = .70(100)$ $55A + 95(100 - A) = 70(100)$ $55A + 9500 - 95A = 7000$ $55A - 95A = 7000 - 9500$ $-40A = -2500$ $40A = 2500$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = 62.5$ lbs. at 55 cents $100 - A = 37.5$ lbs. at 95 cents </div>
<p>57. Two sons borrowed a total of \$26,000 from their mother for one year. One son was charged 6% simple interest, but the less reliable son was charged 10% simple interest. If both pay off their loans on time and the mother receives a total of \$2,000 in interest, how much did each son borrow?</p>	<p>57. Let A = Amount at 6% $\\$26,000 - A$ = Amount at 10% $.06A + .10(26,000 - A) = 2,000.00$ $6A + 10(26,000 - A) = 200,000$ $6A + 260,000 - 10A = 200,000$ $6A - 10A = 200,000 - 260,000$ $-4A = -60,000$ $4A = 60,000$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> $A = \\$15,000$ @ 6% $\\$26,000 - A = \\$11,000$ @ 10% </div>

Item	Answer
Solve each of the following applications.	
58. The sum of two consecutive even integers is sixty-two. What are the integers?	58. Let $N = 1\text{st}$ consecutive integers $N + 2 = 2\text{nd}$ consecutive integers $N + (N + 2) = 62$ $N + N + 2 = 62$ $2N = 62 - 2$ $2N = 30$ $N = 30$ $N + 2 = 32$
59. Dillard’s advertised a 25% off sale. If the sale price was \$117 on a London Fog coat, what was the original price?	59. Let $P = \text{Original price}$ $P - .25P = 117$ $.75P = 117.00$ $75P = 11700$ $P = \$156$
Solve and graph each of the inequalities.	
60. $x + 5 < 9$	60. $x + 5 < 9$ $x < 9 - 5$ $x < 4$ 
61. $3x - 8 \leq 6x + 16$	61. $3x - 8 \leq 6x + 16$ $3x - 6x \leq 16 + 8$ $-3x \leq 24$ $\frac{-3x}{-3} \geq \frac{24}{-3}$ $x \geq -8$ 
62. $4x - 7 \leq x + 14$	62. $4x - 7 \leq x + 14$ $4x - x \leq 14 + 7$ $3x \leq 21$ $x \leq 7$ 
63. $-3x \geq -9$	63. $-3x \geq -9$ $3x \leq 9$ $x \leq 3$ 

Item	Answer
Solve and graph each of the inequalities.	
64. $9 < 2x + 9 < 27$	64. $9 < 2x + 9 < 27$ $9 - 9 < 2x < 27 - 9$ $0 < 2x < 18$  $0 < x < 9$
65. $18 < 2x < 20$	65. $18 < 2x < 20$  $9 < x < 10$
66. $-9 \leq -3x + 6 < 12$	66. $-9 \leq -3x + 6 < 12$ $-9 - 6 \leq -3x < 12 - 6$ $-15 \leq -3x < 6$ $\frac{-15}{-3} \geq \frac{-3x}{-3} > \frac{6}{-3}$ $5 \geq x > -2$  or $-2 < x \leq 5$
Graphs.	
67. Graph the linear equation $5x + 3y = 15$. 	67. $5x + 3y = 15$ x-intercept: (3, 0) y-intercept: (0, 5)

Item	Answer
Graphs.	
<p>68. Graph the equation $-2x + y = 3$.</p> 	<p>68. $-2x + y = 3$</p> <p>x-intercept: $(-\frac{3}{2}, 0)$</p> <p>y-intercept: $(0, 3)$</p>
<p>69. Graph the equation $4x - 3 = 7y$.</p> 	<p>69. $4x - 3 = 7y$</p> <p>x intercept: $(\frac{3}{4}, 0)$</p> <p>y-intercept: $(0, -\frac{3}{7})$</p>

Item	Answer		
Graph the equation by using intercepts.			
<p>70. $3x + 4y = 12$</p> 	<p>70. $3x + 4y = 12$ x-intercept: (4, 0) y-intercept: (0, 3)</p>		
<p>71. $2x - 3y = 6$</p> 	<p>71. $2x - 3y = 6$ x-intercept: (3, 0) y-intercept: (0, -2)</p>		
Complete the table for the polynomial.			
72. $x^2y^2 + 5x^2 - 7y^2 + 11xy - 1$	Term	Numerical Coefficient	Degree of Term
	x^2y^2	1	4
	$5x^2$	5	2
	$-7y^2$	-7	2
	$11xy$	11	2
	-1	-1	0
What is the degree of the polynomial?		4	

Item	Answer
Perform the indicated operation and simplify each problem. Write your answer in standard form.	
73. $-8m - 3m$	73. $-8m - 3m$ $-11m$
74. $(8a - 9)(4a + 3)$	74. $(8a - 9)(4a + 3)$ $32a^2 - 12a - 27$
75. $(2x)^2(5x)^2$	75. $(2x)^2(5x)^2$ $(4x^2)(25x^2)$ $100x^4$
76. $(m - n) - (m - n) - (m - n)$	76. $(m - n) - (m - n) - (m - n)$ $m - n - m + n - m + n$ $-m + n$
77. $(m - 5)^2$	77. $(m - 5)^2$ $m^2 - 10m + 25$
78. $(-4a^2b^2)^3$	78. $(-4a^2b^2)^3$ $-64a^6b^6$
79. $(2x + 1)(2x - 1)$	79. $(2x + 1)(2x - 1)$ $4x^2 - 1$
80. $(x^2y^3)^4(xy)^2$	80. $(x^2y^3)^4(xy)^2$ $(x^8y^{12})(x^2y^2)$ $x^{10}y^{14}$
81. Subtract $(-x^2y - 2x + 3y)$ from $(x^2y + 2x - 3y)$	81. $(x^2y + 2x - 3y) - (-x^2y - 2x + 3y)$ $x^2y + 2x - 3y + x^2y + 2x - 3y$ $2x^2y + 4x - 6y$
82. $(3a - 2b)(2a - 3b)$	82. $(3a - 2b)(2a - 3b)$ $6a^2 - 13ab + 6b^2$
83. $-4x(x - 3y)$	83. $-4x(x - 3y)$ $-4x^2 + 12xy$
84. $(3m - 2n)(7m + 4n)$	84. $(3m - 2n)(7m + 4n)$ $21m^2 - 2mn - 8n^2$

Item	Answer
Perform the indicated operation and simplify each problem. Write your answer in standard form.	
85. $3x - [x - (5x - 1)]$	85. $3x - [x - (5x - 1)]$ $3x - [x - 5x + 1]$ $3x - [-4x + 1]$ $3x + 4x - 1$ $7x - 1$
86. $-5h - (-6h)$	86. $-5h - (-6h)$ $-5h + 6h$ h
87. $2[3(a - 4) - 5]$	87. $2[3(a - 4) - 5]$ $2[3a - 12 - 5]$ $2[3a - 17]$ $6a - 34$
88. $(3y + 5)^2$	88. $(3y + 5)^2$ $9y^2 + 30y + 25$
89. $2x^2y^3(x^2y - 3x^2y^3)$	89. $2x^2y^3(x^2y - 3x^2y^3)$ $2x^4y^4 - 6x^4y^6$
90. $\frac{2x^5 + 6x^3 - 4x^2}{-2x^2}$	90. $\frac{2x^5 + 6x^3 - 4x^2}{-2x^2}$ $-x^3 - 3x + 2$
91. $\frac{4x^3 + 12x^4 - 4x^5}{4x^3}$	91. $\frac{4x^3 + 12x^4 - 4x^5}{4x^3}$ $1 + 3x - x^2$ $-x^2 + 3x + 1$ (Standard Form)
92. $\frac{2x^2 + x - 15}{x + 3}$	92. $\begin{array}{r} 2x - 5 \\ x + 3 \overline{) 2x^2 + x - 15} \\ \underline{2x^2 + 6x} \\ -5x - 15 \\ \underline{-5x - 15} \\ 0 \end{array}$ $2x^2 + 6x$ (subtract & change signs) $-5x - 15$ $-5x - 15$ (subtract & change signs)

Item	Answer
Perform the indicated operation and simplify each problem. Write your answer in standard form.	
93. $\frac{4x^3 + 12x^2 + x - 12}{2x + 3}$	93. $\begin{array}{r} 2x^2 + 3x - 4 \\ 2x + 3 \overline{) 4x^3 + 12x^2 + x - 12} \\ \underline{4x^3 + 6x^2} \text{ (subtract \& change signs)} \\ 6x^2 + x \\ \underline{6x^2 + 9x} \text{ (subtract \& change signs)} \\ -8x - 12 \\ \underline{-8x - 12} \text{ (subtract \& change signs)} \\ 0 \end{array}$
94. $\frac{3x^2 + 17x + 7}{3x + 2}$	94. $\begin{array}{r} x + 5 + \frac{-3}{3x + 2} \\ 3x + 2 \overline{) 3x^2 + 17x + 7} \\ \underline{3x^2 + 2x} \text{ (subtract \& change signs)} \\ 15x + 7 \\ \underline{15x + 10} \text{ (subtract \& change signs)} \\ -3 \end{array}$
95. $(3x^2 + x) - (4x - 3) + (2x^2 + 3x - 5)$	95. $\begin{aligned} &(3x^2 + x) - (4x - 3) + (2x^2 + 3x - 5) \\ &3x^2 + x - 4x + 3 + 2x^2 + 3x - 5 \\ &5x^2 - 2 \end{aligned}$
96. $(7y - 5)(4y + 1)$	96. $\begin{aligned} &(7y - 5)(4y + 1) \\ &28y^2 - 13y - 5 \end{aligned}$
97. $5x^4(2x^3 - 7x + 9)$	97. $\begin{aligned} &5x^4(2x^3 - 7x + 9) \\ &10x^7 - 35x^5 + 45x^4 \end{aligned}$

Item	Answer
Perform the indicated operation and simplify each problem. Write your answer in standard form.	
98. $\frac{12x^5b^3}{18x^3b^7}$	98. $\frac{12x^5b^3}{18x^3b^7}$ $\frac{2x^2}{3b^4}$
99. $-7(y - 2) - 3(4 - 6y)$	99. $-7(y - 2) - 3(4 - 6y)$ $-7y + 14 - 12 + 18y$ $11y + 2$
100. $(x - 5)(x - 7)$	100. $(x - 5)(x - 7)$ $x^2 - 12x + 35$
101. $(2x - 3)(7x + 5)$	101. $(2x - 3)(7x + 5)$ $14x^2 - 11x - 15$
102. $(3x - 1)(2x^2 + 3x - 1)$	102. $(3x - 1)(2x^2 + 3x - 1)$ $6x^3 + 9x^2 - 3x - 2x^2 - 3x + 1$ $6x^3 + 7x^2 - 6x + 1$
103. $(x - 10)(x + 10)$	103. $(x - 10)(x + 10)$ $x^2 - 100$
Reduce to simplest exponential form. Leave all results with positive exponents.	
104. $(2a)^{-1}$	104. $(2a)^{-1}$ $2^{-1}a^{-1}$ $\frac{1}{2a}$
105. $2a^{-1}$	105. $2a^{-1}$ $\frac{2}{a}$
106. $y^{-3}y^{-5}$	106. $y^{-3}y^{-5}$ y^{-8} $\frac{1}{y^8}$

Item	Answer
Reduce to simplest exponential form. Leave all results with positive exponents.	
107. $\left(\frac{a^3}{b^3}\right)^{-2}$	107. $\left(\frac{a^3}{b^3}\right)^{-2}$ $\frac{a^{-6}}{b^{-6}}$ $\frac{b^6}{a^6}$
108. $(2a^4)^{-3}$	108. $(2a^4)^{-3}$ $2^{-3}a^{-12}$ $\frac{1}{2^3 a^{12}}$ $\frac{1}{8a^{12}}$
109. $(3a^{-3})^2$	109. $(3a^{-3})^2$ $9a^{-6}$ $\frac{9}{a^6}$
110. $\frac{x^{-2}y^4}{x^5y^{-2}}$	110. $\frac{x^{-2}y^4}{x^5y^{-2}}$ $\frac{y^4y^2}{x^5x^2}$ $\frac{y^6}{x^7}$
Factor completely each of these polynomials.	
111. $x^2 + 12x + 35$	111. $x^2 + 12x + 35$ $(x + 7)(x + 5)$
112. $2a^2b + 6ab^2$	112. $2a^2b + 6ab^2$ $2ab(a + 3b)$
113. $6x^2 + 11x + 3$	113. $6x^2 + 11x + 3$ $(3x + 1)(2x + 3)$
114. $1 - 7x - 18x^2$	114. $1 - 7x - 18x^2$ $(1 - 9x)(1 + 2x)$ or $-(9x - 1)(2x + 1)$

Item	Answer
Factor completely each of these polynomials.	
115. $3x - 3y + 2x^2 - 2xy$	115. $3x - 3y + 2x^2 - 2xy$ $3(x - y) + 2x(x - y)$ $(x - y)(3 + 2x)$
116. $9a^3b^2 - 12a^2b^5 - 3ab$	116. $9a^3b^2 - 12a^2b^5 - 3ab$ $3ab(3a^2b - 4ab^4 - 1)$
117. $25y^2 - 36$	117. $25y^2 - 36$ $(5y + 6)(5y - 6)$
118. $9a^2b - 24ab + 16b$	118. $9a^2b - 24ab + 16b$ $b(9a^2 - 24a + 16)$ $b(3a - 4)(3a - 4)$ $b(3a - 4)^2$
119. $a^3 - 64$	119. $a^3 - 64$ $(a - 4)(a^2 + 4a + 16)$
120. $64x^3 - 216$	120. $64x^3 - 216$ $8(8x^3 - 27)$ $8(2x - 3)(4x^2 + 6x + 9)$
121. $x^2 - 18x + 81$	121. $x^2 - 18x + 81$ $(x - 9)(x - 9)$ $(x - 9)^2$
122. $x^4 - 10x^2 + 9$	122. $x^4 - 10x^2 + 9$ $(x^2 - 9)(x^2 - 1)$ $(x + 3)(x - 3)(x + 1)(x - 1)$
123. $x^3 - y^2$	123. $x^3 - y^2$ prime
124. $40x^4 + 5xy^3$	124. $40x^4 + 5xy^3$ $5x(8x^3 + y^3)$ $5x(2x + y)(4x^2 - 2xy + y^2)$
125. $125m^3 - 64n^3$	125. $125m^3 - 64n^3$ $(5m - 4n)(25m^2 + 20mn + 16n^2)$
126. $25x^2 + 81$	126. $25x^2 + 81$ prime

Item	Answer
Factor completely each of these polynomials.	
127. $x^4 - 16$	127. $x^4 - 16$ $(x^2 + 4)(x^2 - 4)$ $(x^2 + 4)(x + 2)(x - 2)$
128. $10x^2 - 23xy - 5y^2$	128. $10x^2 - 23xy - 5y^2$ $(5x + y)(2x - 5y)$
129. $4b^3 + 32c^3$	129. $4b^3 + 32c^3$ $4(b^3 + 8c^3)$ $4(b + 2c)(b^2 - 2bc + 4c^2)$
130. $x^4 - 3x^2 - 4$	130. $x^4 - 3x^2 - 4$ $(x^2 - 4)(x^2 + 1)$ $(x + 2)(x - 2)(x^2 + 1)$
131. $x^4 + x^2 - 20$	131. $x^4 + x^2 - 20$ $(x^2 + 5)(x^2 - 4)$ $(x^2 + 5)(x + 2)(x - 2)$
132. $2x^2 + 7x - 12$	132. $2x^2 + 7x - 12$ Prime
133. $6x^2 - 17xy + 7y^2$	133. $6x^2 - 17xy + 7y^2$ $(3x - 7y)(2x - y)$
134. $x^3 - 27$	134. $x^3 - 27$ $(x - 3)(x^2 + 3x + 9)$
135. $5 - 25a - 30a^2$	135. $5 - 25a - 30a^2$ $5(1 - 5a - 6a^2)$ $5(1 - 6a)(1 + a)$ or $-5(6a - 1)(a + 1)$
136. $x^2 + 4$	136. Prime
137. $64a^6 - 16a^3b^3 + b^6$	137. $64a^6 - 16a^3b^3 + b^6$ $(8a^3 - b^3)(8a^3 - b^3)$ $(2a - b)(4a^2 + 2ab + b^2)$ $(2a - b)(4a^2 + 2ab + b^2)$ or $(2a - b)^2(4a^2 + 2ab + b^2)^2$

Item	Answer
Solve the following quadratic equations by factoring.	
138. $x^2 - x - 6 = 0$	138. $x^2 - x - 6 = 0$ $(x - 3)(x + 2) = 0$ $x - 3 = 0$ $x + 2 = 0$ $x = 3$ $x = -2$
139. $x^2 + x = 2$	139. $x^2 + x = 2$ $x^2 + x - 2 = 0$ $(x + 2)(x - 1) = 0$ $x + 2 = 0$ $x - 1 = 0$ $x = -2$ $x = 1$
140. $x^2 - 9 = 0$	140. $x^2 - 9 = 0$ $(x + 3)(x - 3) = 0$ $x + 3 = 0$ $x - 3 = 0$ $x = -3$ $x = 3$
141. $2y^2 - y = 0$	141. $2y^2 - y = 0$ $y(2y - 1) = 0$ $y = 0$ $2y - 1 = 0$ $\frac{2y}{2} = \frac{1}{2}$ $y = \frac{1}{2}$
142. $x^2 = 4$	142. $x^2 = 4$ $x^2 - 4 = 0$ $(x + 2)(x - 2) = 0$ $x + 2 = 0$ $x - 2 = 0$ $x = -2$ $x = 2$
143. $x^2 + 8x = -15$	143. $x^2 + 8x = -15$ $x^2 + 8x + 15 = 0$ $(x + 5)(x + 3) = 0$ $x + 5 = 0$ $x + 3 = 0$ $x = -5$ $x = -3$

Item	Answer
Solve the following quadratic equations by factoring.	
<p>144. The length of a rectangle is 2 centimeters less than twice the width. Its area is 84 square centimeters. Find the dimensions of the rectangle.</p>	<p>144. $w(2w - 2) = 84$ $2w^2 - 2w - 84 = 0$ $2(w^2 - w - 42) = 0$ $2(w - 7)(w + 6) = 0$ $w - 7 = 0$ $w + 6 = 0$ $w = 7$ $w = -6$</p> <p>The dimensions are 7cm by 12 cm.</p>
<p>145. A hang-glider pilot accidentally drops his compass from the top of a 576-foot cliff. The height h of the compass after t seconds is given by the quadratic equation $h = -16t^2 + 576$. When will the compass hit the ground?</p>	<p>145. $h = -16t^2 + 576$ $0 = -16t^2 + 576$ $16t^2 - 576 = 0$ $16(t^2 - 36) = 0$ $16(t + 6)(t - 6) = 0$ $t + 6 = 0$ $t - 6 = 0$ $t = -6$ $t = 6$</p> <p>The compass will hit the ground in 6 seconds.</p>