Name: *Key*   Hour: _____

Algebra 1 B Final Exam Review
Modules 14, 17, 18, 19, 21, 22, 9, 10, 8.1

1. Simplify: $(3x^2y^4)^3$

$$3^3x^6y^{12} = \boxed{27x^6y^{12}}$$

2. Simplify: $x^3y^5x^3y^4$

$$\boxed{x^6y^9}$$

3. Simplify: $2^3 3^5 2^{-3} 3^7$

$$2^0 \cdot 3^{12} = \boxed{3^{12}}$$

4. Rewrite without a negative exponent: 4^{-3}

$$\frac{1}{4^3} = \boxed{\frac{1}{64}}$$

5. Simplify $x^3 x^{-7}$

$$= x^{-4} = \boxed{\frac{1}{x^4}}$$

6. Simplify $(3x^4)^{-2}$

$$3^{-2}x^{-8} = \boxed{\frac{1}{9x^8}}$$

7. Simplify $(ab^2)^3(a^3b^2)^{-2} = a^3b^6a^{-6}b^{-4} = a^{-3}b^2 = \boxed{\frac{b^2}{a^3}}$

8. Simplify: $\frac{3^5}{3^2} = 3^3 = \boxed{27}$

9. Simplify: $\frac{a^5b^3}{a^2b^5} = \boxed{\frac{a^3}{b^2}}$

10. Simplify: $\frac{a^0b^{-3}}{a^2b^5} = \frac{1}{a^2}b^{-3-5} = b^{-8} = \boxed{\frac{1}{a^2b^8}}$

$11. 8^0 = \boxed{1}$

$12. (\frac{a^3 b}{c^7 p^{12}})^0 = \boxed{1}$

→ in order from Highest Degree (exponent) to lowest

13. Write $3x + 12 - 5x^2$ in standard form. Identify the leading coefficient (LC).

$\not\!\!4 \; -5x^2 + 3x + 12$

$LC = -5$

out front!

14. Write $4x^2 - 12x - 2x^3 + 7$ in standard form. Identify the leading coefficient.

$-2x^3 + 4x^2 - 12x + 7$ $LC = -2$

15. What is the degree of $3x^3$? $\boxed{3}$

16. What is the degree of $7x^4 y^2$? $\boxed{6}$

17. Find the degree of the polynomial $7x^3 - 8x^4 + 10x^2 + 9x - 5$. Put it in standard form.
$\quad\quad\quad\quad\quad\;\; 3 \quad\; 4 \quad\quad 2 \quad\; 1 \quad\; 0$

$\boxed{-8x^4 + 7x^3 + 10x^2 + 9x - 5}$ $\boxed{4}$

18. Find the degree of the polynomial $7x^3 + 2x^5 - 9x^6 + 14x - 2$. Put it in standard form.

$\boxed{-9x^6 + 2x^5 + 7x^3 + 14x - 2}$

$\boxed{6}$

19. Describe $7x^4 - 2x^2 + 3$ by the degree and number of terms

4th degree trinomial

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20. Describe $7x^6 - 2x^9 + 3x + 4$ by the degree and number of terms

9th degree polynomial (4t)

21. Describe $3x + 4$ by the degree and number of terms

1st degree binomial (Linear)

22. Add $4p^3 + 3p - p^3 - 7$

$3p^3 + 3p - 7$

23. Add $7x - 2 + 4x^2 - 3x + 7x^2$ $= 11x^2 + 4x - 2$

24. Add. $\left(3x^3 - 4\right) + \left(x^3 - 7\right)$

$4x^3 - 11$

25. Subtract. $\left(x^3 - 3x + 5\right) - \left(3x^2 + 4x - 3\right)$

$-3x^2 - 4x + 3$ $= x^3 - 3x^2 - 7x + 8$

26. Subtract. $\left(x^3 - 2x^2 + 9\right) - \left(3x^3 + 5x - 6\right)$

$-3x^3 - 5x + 6$ $-2x^3 - 2x^2 - 5x + 15$

27. Multiply x^4y and $4x^2$

$4x^6y$

28. Multiply $3x^9y^4$ and $7x^3y$

$3x^9y^4 \cdot 7x^3y = 21x^{12}y^5$

29. Multiply $(x + 3)(x - 4)$ $= x^2 - 4x + 3x - 12$

$$\boxed{x^2 - x - 12}$$

30. Multiply $(x - 6)(x - 9)$

$$\boxed{x^2 - 15x + 54}$$

31. Multiply $(x + 10)(x + 3)$

$x^2 + 10x + 3x + 30$ $\boxed{x^2 + 13x + 30}$

32. Multiply $(3x - 2)(4x + 8)$ $= 12x^2 + 24x - 8x - 16$

$$\boxed{12x^2 + 16x - 16}$$
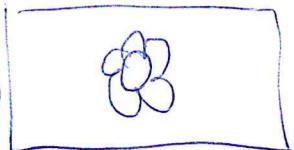
33. Multiply $(6x - y)(2x + y)$

$12x^2 + 6xy - 2xy - y^2$

$$\boxed{12x^2 + 4xy - y^2}$$

34. Celeste has a garden that has a length of $x + 7$ feet and a width of $3x - 5$ feet. What is the area of the garden? $A = lw$

$w = 3x - 5$

$l = x + 7$
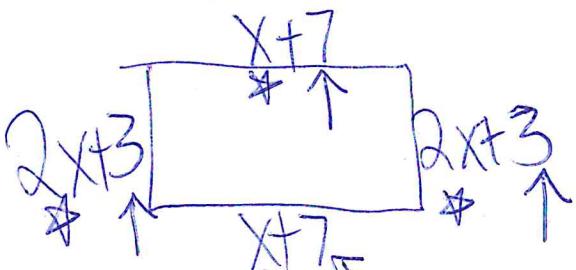
$A = (3x - 5)(x + 7)$

$3x^2 + 21x$
$- 5x - 35$

$$\boxed{A = 3x^2 + 16x - 35}$$

35. Rachel has a fence that has a length of $2x + 3$ feet and a width of $x + 7$ feet. What is the Perimeter of the garden?

ADD!

$x + 7$

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

$x + 7$

$$\boxed{Perimeter = 6x + 20}$$

Name: _____   Hour: _____

36. Multiply $(x + 3)(2x^2 - 3x + 5)$

$$2x^2 - 3x + 5$$

	$2x^2$	$-3x$	5
x	$2x^3$	$-3x^2$	$5x$
$+3$	$6x^2$	$-9x$	$+15$

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

37. Multiply $(x - 2)(x^2 + 6x + 12)$
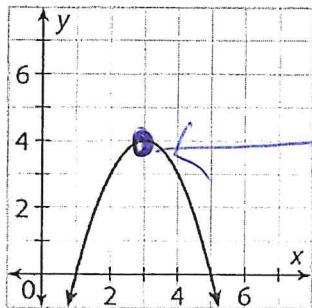
$$x^3 + 6x^2 + 12x$$
$$-2x^2 - 12x - 24$$

$$\boxed{x^3 + 4x^2 - 24}$$

38. Multiply $(x + 5)(4x^2 + 3x + 1)$

$$x^3 + 3x^2 + x$$
$$+20x^2 + 15x + 5$$

$$\boxed{x^3 + 23x^2 + 16x + 5}$$
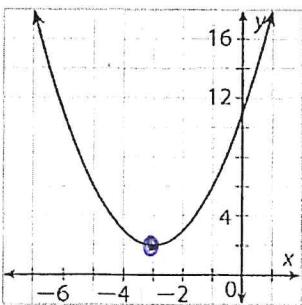
39. What is the vertex of the quadratic function f(x)? Is it a maximum or a minimum?

$$(3, 4), \text{ max (highest)}$$

40. What is the vertex of the quadratic function f(x)? Is it a maximum or a minimum?
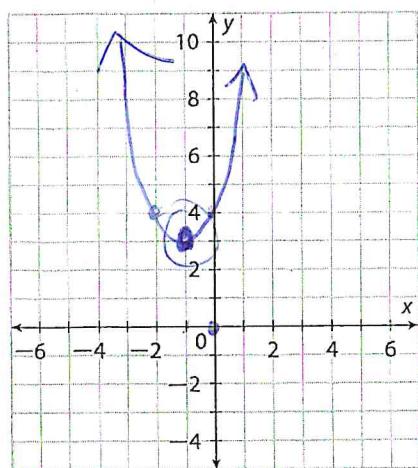
$$(-3, 1), \text{ minimum}$$
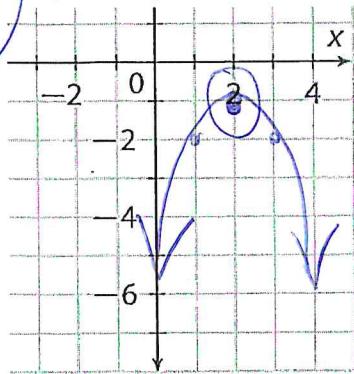
Name: _____   Hour: _____

41. Graph the quadratic function $f(x) = (x + 1)^2 + 3$
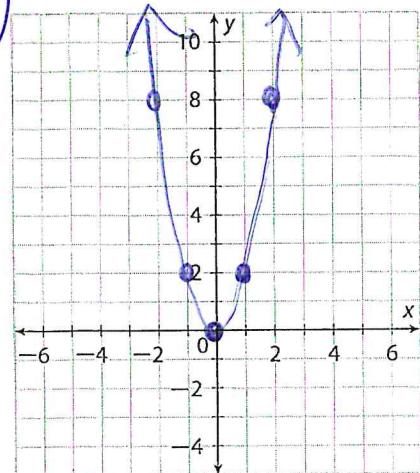
left 1   up 3

42. Graph the quadratic function $f(x) = -(x - 2)^2 - 1$

REFLECT   right   down 1
OVER   2
X-AXIS
(upside down)

43. Graph the quadratic function $f(x) = 2x^2$


vertical
stretch x2
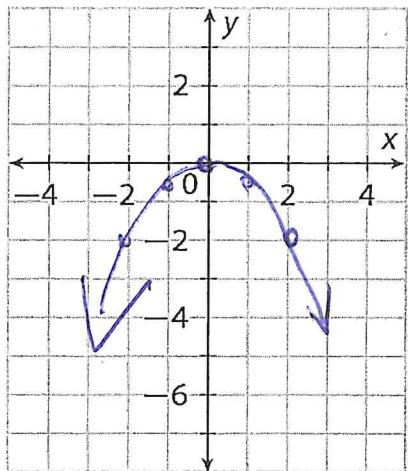
X	$Y = 2x^2$
2	
1	
0	0
1	$2(1)^2 = 2$
2	$2(2)^2 = 2 \cdot 4 = 8$

44. Graph the quadratic function $f(x) = -\frac{1}{2}x^2$

$$
\begin{array}{c|c}
x & y \\
\hline
0 & 0 \\
1 & -\frac{1}{2}(1)^2 = -\frac{1}{2} \\
2 & -\frac{1}{2}(2)^2 = -\frac{1}{2} \cdot 4 = -2 \\
\end{array}
$$

45. Use the zero product property to solve the equation $(x - 3)(x + 2) = 0$

$x - 3 = 0 \qquad x + 2 = 0$

$\boxed{x = 3 \mid x = -2}$
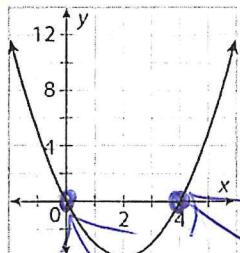
46. Use the zero product property to solve the equation $(x + 16)(x + 6) = 0$

$x + 16 = 0 \qquad x + 6 = 0$
$\quad -16 \; -16 \qquad -6 \; -6$

$\boxed{x = -16 \\ x = -6}$

47. Use the zero product property to solve the equation $(2x - 5)(x - 9) = 0$

$2x - 5 = 0 \qquad x - 9 = 0$
$\quad +5 \; +5 \qquad +9 \; +9$

$\dfrac{2x}{2} = \dfrac{5}{2}$ $\qquad \boxed{x = 9}$

$\boxed{x = 5/2}$
or 2.5

48. Find the solutions (zeros/x-intercepts) of the graph

$x = 4$
$x = 0$
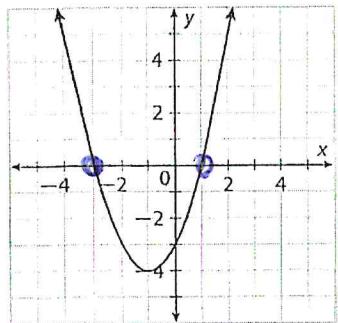
Name: _____   Hour: _____

49. Find the solutions (zeros/x-intercepts) of the graph

$X=1 \quad X=-3$

50. Find the GCF of the terms of this polynomial $12x^2 - 4x$

$4x$

51. Find the GCF of the terms of this polynomial $5x^2 + 100x^5 \rightarrow 5x^2$

52. Find the GCF of the terms of this polynomial $14x^2 + 28x - 6$

2

53. Factor out the GCF. $9x^4 - 27x^3 + 81x^2 = 9x^2(x^2-3x+9)$

54. Factor out the GCF. $2x - 54$

$2(x-27)$

55. Factor out the GCF. $10x^2 + 55x + 100$

$5(2x^2+11x+20)$

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56. Solve the quadratic $x^2 + 5x + 6 = 0$ by factoring.

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

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

Factors of 6

1	6
2	3

57. Solve the quadratic $x^2 + 5x - 14 = 0$ by factoring.

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

$$\boxed{x = 2 \quad x = -7}$$

58. Factor the expression $x^2 + 15x + 54$.

$$\boxed{(x+9)(x+6)}$$

59. Factor the expression $x^2 - x - 12$

$$\boxed{(x+3)(x-4)}$$

Factors of -12

1	12
2	6
+3	-4

60. Factor the expression $x^2 + 6x + 8$

$$\boxed{(x+4)(x+2)}$$

61. Factor the expression $x^2 - 3x - 15$

$$\boxed{(x-5)(x+3)}$$

62. Factor the expression $2x^2 + 3x + 1$

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

$$\boxed{(x+1)(2x+1)}$$

63. Factor the expression $\underline{3x^2 + 20x + 12}$

$= \Longrightarrow (3x^2 + 2x)(+18x + 12)$

$x(3x + 2) + 6(3x + 2)$

$\boxed{(3x+2)(x+6)}$

Factors of 36

36
36
18
$\frac{2}{3}$
9

36

2 × 18
20

64. Factor the expression $2x^2 + 3x - 20$

$2x^2 - 5x + 8x - 20$

$x(2x - 5) + 4(2x - 5) \Rightarrow \boxed{(2x - 5)(x + 4)}$

-5 × 8
+3

65. Simplify the radical $\sqrt{20}$

$\sqrt{4} \cdot \sqrt{5} = \boxed{2\sqrt{5}}$

66. Simplify the radical $\sqrt{32}$

$\sqrt{2} \cdot \sqrt{16} \rightarrow \boxed{4\sqrt{2}}$

67. Simplify the radical $\sqrt{27}$

$\sqrt{9} \cdot \sqrt{3}$ $\boxed{3\sqrt{3}}$

68. Simplify the radical completely $\sqrt{2}\sqrt{50} = \sqrt{100} = \boxed{10}$

69. Simplify the radical completely $\sqrt{3}\sqrt{48} = \sqrt{144} = \boxed{12}$

70. Simplify the radical completely $\sqrt{25x^2}$

$\boxed{5x}$

71. Simplify the radical completely $\sqrt{54x^4}$

$\sqrt{9}\sqrt{6}$

$\boxed{3x^2\sqrt{6}}$

72. Solve $(x - 2)^2 = 36$

$x - 2 = \pm 6$

$x + 2 = 6$
$ -2 \quad -2$
$\boxed{x = 4}$

$x + 2 = -6$
$ -2 \quad -2$
$\boxed{x = -8}$

73. Solve $(x + 2)^2 = 49$

$x + 2 = 7$
$ -2 \quad -2$
$\boxed{x = 5}$

$x + 2 = -7$
$ -2 \quad -2$
$\boxed{x = -9}$

SKIP

74. Solve $(x - 4)^2 = 121$

$x - 4 = 11$
$ +4 \quad +4$
$\boxed{x = 15}$

$x - 4 = -11$ ← oops
$ +4 \quad +4$
$\boxed{x = -7}$

75. Solve $(2x - 5)^2 = 100$

$2x - 5 = 10$
$2x = 15$
$\boxed{x = \tfrac{15}{2} \text{ or } 7.5}$

$2x - 5 = -10$
$ +5 \quad +5$
$2x = -5 \quad \boxed{x = -\tfrac{5}{2} \text{ or } -2.5}$

76. Solve $(3x + 4)^2 = 64$

$3x + 4 = 8$
$3x = 4$
$\boxed{x = \tfrac{4}{3}}$

$3x + 4 = -8$
$3x = -12$
$\boxed{x = -4}$

skip

77. Solve $(4x - 6)^2 = 196$

$4x - 6 = 14$ $4x - 6 = -14$
$4x = 20$ $4x = -8$
$\boxed{x = 5}$ $\boxed{x = -2}$

78. What is the Quadratic Formula?

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2(a)}$$

79. Use the Quadratic Formula to solve $x^2 + 7x + 12 = 0$

$$x = \frac{-7 \pm \sqrt{(7)^2 - 4(1)(12)}}{2(1)}$$ $$x = \frac{-7 \pm \sqrt{1}}{2}$$

$$x = \frac{-7 \pm \sqrt{49 - 48}}{2}$$ $$x = \frac{-7 \pm 1}{2}$$

$$\boxed{\begin{array}{c} x = -4 \\ x = 3 \end{array}}$$

80. Use the Quadratic Formula to solve $x^2 - 4x - 12 = 0$

$$x = \frac{4 \pm \sqrt{(4)^2 - 4(1)(-12)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 + 48}}{2}$$

$$x = \frac{4 \pm \sqrt{64}}{2}$$ $$\boxed{\begin{array}{c} x = 6 \\ x = -2 \end{array}}$$

$$x = 4 \pm 8$$

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SKIP 81. Use the Quadratic Formula to solve $x^2 - 13x + 12 = 0$

$$\boxed{X = 12 \quad X = 1}$$

82. What is the discriminant formula?

$$B^2 - 4AC$$

83. Use the discriminant to find the number of solutions to the equation $y = 9x^2 - 3x + 2$

$$\frac{(-3)^2 - 4(9)(2)}{9 - 72} = \boxed{-63} \Leftarrow \text{no real sol.}$$

84. Use the discriminant to find the number of solutions to the equation $y = 9x^2 + 6x + 1$

$$6^2 - 4(9)(1)$$
$$36 - 36 = \boxed{0}$$
$$\boxed{1 \text{ real sol.}}$$

85. Use the discriminant to find the number of solutions to the equation $y = -6x^2 + 7x + 3$

$$7^2 - 4(-6)(3)$$
$$49 + 72 = \boxed{121}$$
$$\boxed{2 \text{ real solutions}}$$

86. The height in feet of a rock above the ground is given by the equation
$h = -16t^2 + 8t + 48$ where t is the time in seconds after a rock is thrown. It is 48 feet above the ground. How long does it take the rock to reach the ground?

$$X = \frac{-8 \pm \sqrt{8^2 - 4(-16)(48)}}{2(-16)}$$

$h = 0$

$$X = \frac{-8 \pm \sqrt{3136}}{-32}$$

$$X = \frac{-8 \pm 56}{-32}$$

$$X = +2 \text{ sec}$$

$$X = -1.5$$

Skip

87. The height in feet of a rock above the ground is given by the equation
$h = -16t^2 + 4t + 56$ where t is the time in seconds after a rock is thrown. It is 56 feet above the ground. How long does it take the rock to reach the ground?

88. Solve $3x^2 - 27 = 0$

$$+27 \quad +27$$
$$\frac{3x^2}{3} = \frac{27}{3}$$
$$\sqrt{x^2} = \sqrt{9}$$

$$X = \pm 3$$

89. Solve $4x^2 - 64 = 0$

$$4x^2 = 64$$
$$x^2 = 16$$

$$X = \pm 4$$

SKIP
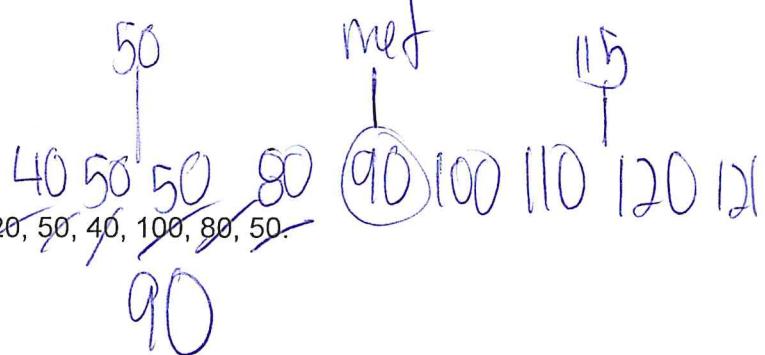
90. Solve $2x^2 - 32 = 0$

$2x^2 = 32$

$x^2 = 16$

$x = \pm 4$

91. Find the median of the data: 90, 110, 120, 120, 50, 40, 100, 80, 50.

50   med   115

40 50 50 80 (90) 100 110 120 121

90

92. Find the mode of the data: 90, 110, 120, 120, 50, 40, 100, 80, 50.

120
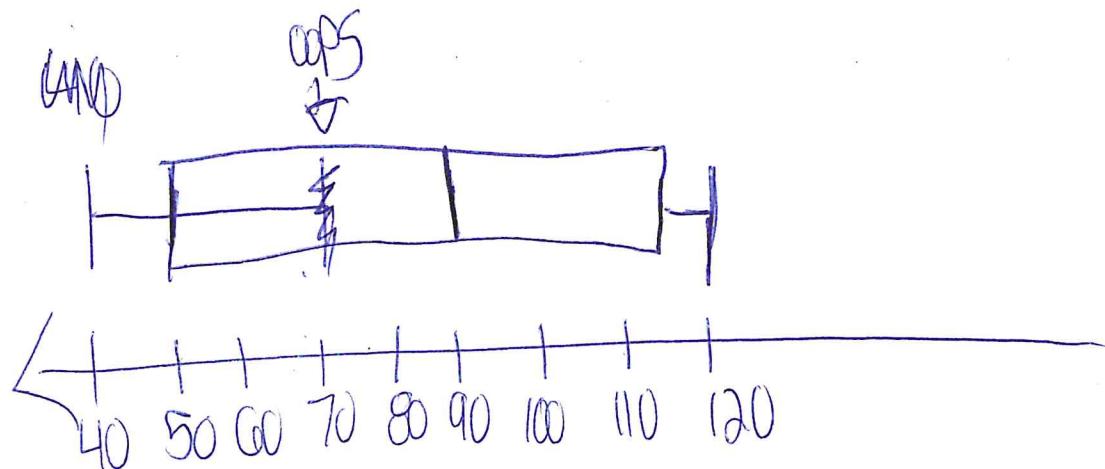
93. Find the mean of the data: 90, 110, 120, 120, 50, 40, 100, 80, 50.

84.$\overline{4}$

94. Find the range of the data: 90, 110, 120, 120, 50, 40, 100, 80, 50.
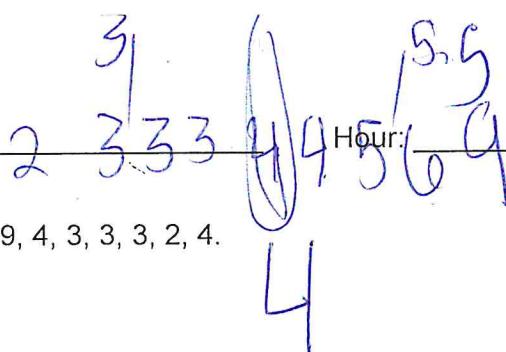
80

95. Create a box plot of the data: 90, 110, 120, 120, 50, 40, 100, 80, 50.

LAND   oops

40 50 60 70 80 90 100 110 120

SkP

Handwritten work above name line: 3 | 2 3.3 3 4 | 4 5.5 6 9

96. Find the median of the data: 5, 6, 9, 4, 3, 3, 3, 2, 4.

4

97. Find the mode of the data: 5, 6, 9, 4, 3, 3, 3, 2, 4.

3
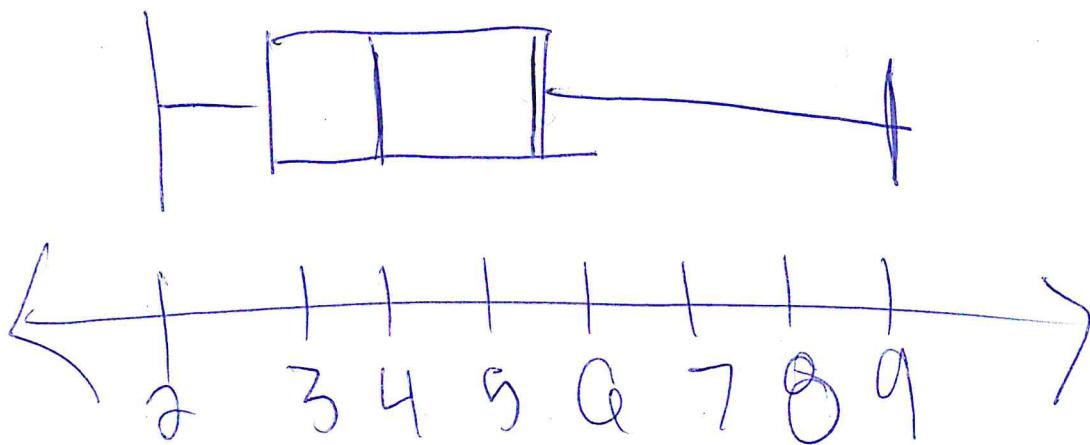
98. Find the mean of the data: 5, 6, 9, 4, 3, 3, 3, 2, 4.

$\overline{4.3}$

99. Find the range of the data: 5, 6, 9, 4, 3, 3, 3, 2, 4.

7
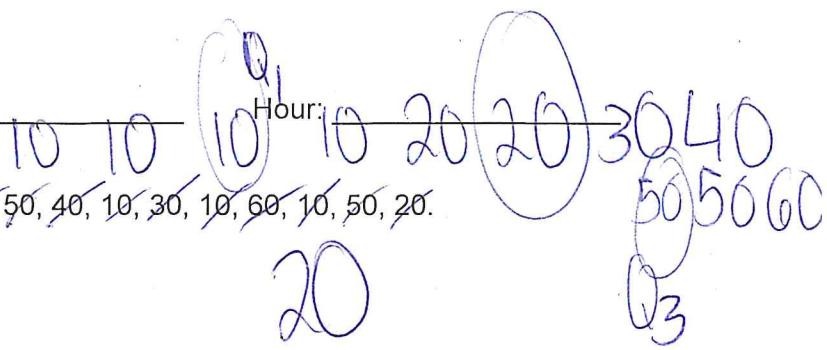
100.   Create a box plot of the data: 5, 6, 9, 4, 3, 3, 3, 2, 4.

Name: _____ Hour: _____

101. Find the median of the data: 10, 20, 50, 40, 10, 30, 10, 60, 10, 50, 20.

(handwritten work) 10 10 10 10 20 20 30 40 50 50 60

20

Q3

31

102. Find the mode of the data: 10, 20, 50, 40, 10, 30, 10, 60, 10, 50, 20.

10
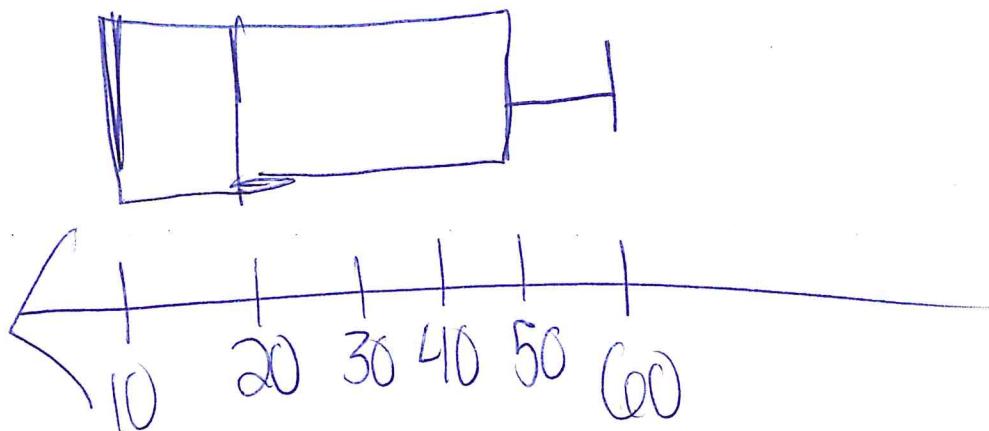
103. Find the mean of the data: 10, 20, 50, 40, 10, 30, 10, 60, 10, 50, 20.

28.18

104. Find the range of the data: 10, 20, 50, 40, 10, 30, 10, 60, 10, 50, 20.

50

105. Create a box plot of the data: 10, 20, 50, 40, 10, 30, 10, 60, 10, 50, 20.

(handwritten box plot)

10   20   30   40   50   60

Name: _____   Hour: _____

106.   Complete the two-way frequency table:

	Like Basketball		
Like Track	Yes	No	Total
Yes	40	60	100
No	10	90	100
Total	50	150	200

107.   Using the two-way frequency table above, how many students don't like basketball and don't like track?

90

108.   Complete the two-way frequency table:

	Like Carrots		
Like Apples	Yes	No	Total
Yes	20	30	50
No	25	25	50
Total	45	55	100
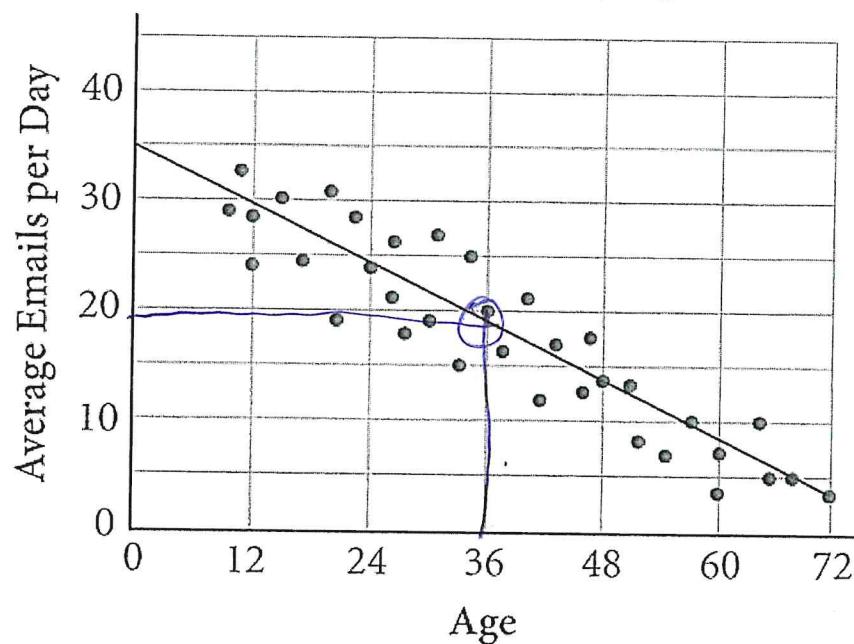
109.   Using the two-way frequency table above, how many students like apples and don't like carrots?

30

Name: _____   Hour: _____

110.   Based on the graph, what is the best prediction for the average number of emails per day for a 36 year old.
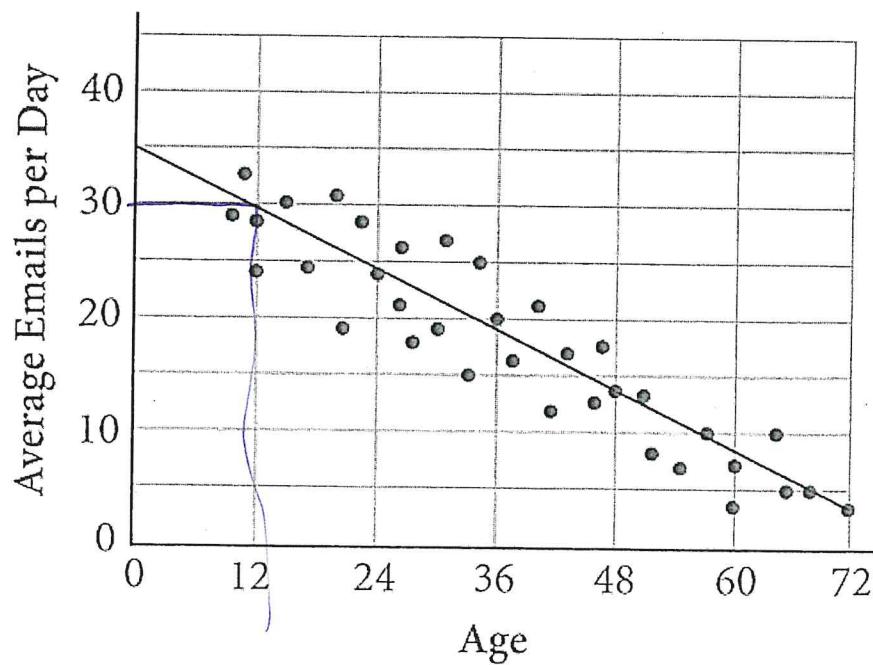
Emails per Day by Age

19
Emails

111.   Based on the graph, what is the best prediction for the age of a person who has on average 30 emails per day?

Emails per Day by Age
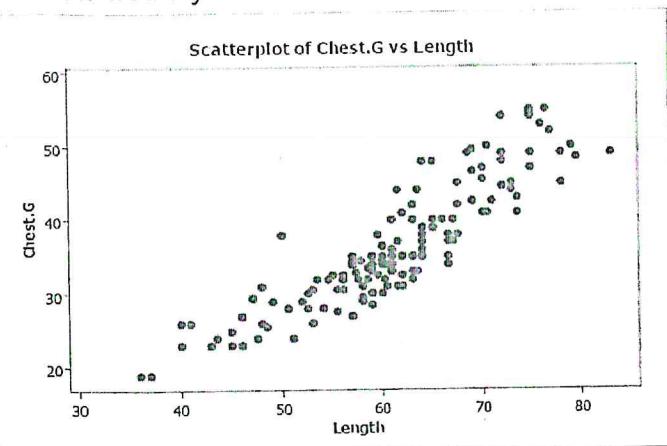
12
y/o
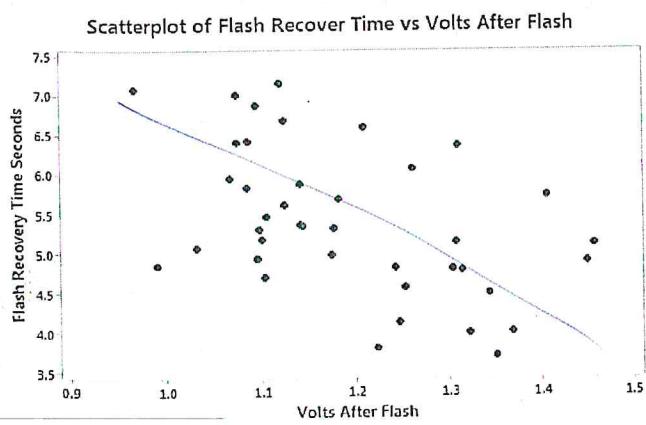
Name: _____   Hour: _____

112. How would you describe the correlation of the scatter plot?

Scatterplot of Chest.G vs Length
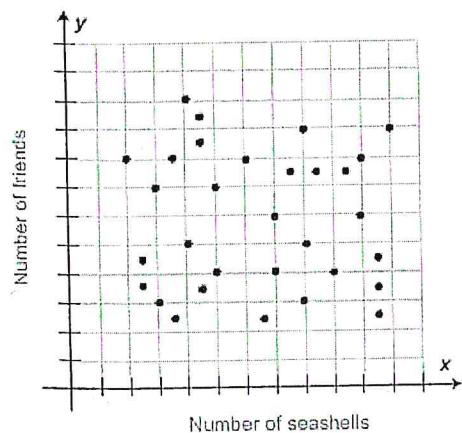
positive Strong

113. How would you describe the correlation of the scatter plot?

Scatterplot of Flash Recover Time vs Volts After Flash

NONE/WEAK NEG

114. How would you describe the correlation of the scatter plot?

NONE