Algebra 2 Honors Final Exam Review

1. $a_n = a_1 + (n-1)d$

$a_7 = 14 + (7-1)\cdot(-9)$

$= 14 + (6)(-9)$

$= 14 - 54$

$= -40$ **B.**

2. $a_n = a_1 \cdot r^{n-1}$

$a_8 = -1 \cdot \left(\frac{-1}{2}\right)^{8-1}$

$= -1 \cdot \left(\frac{-1}{2}\right)^{7}$

$= -1\left(\frac{-1}{128}\right)$

$= \frac{1}{128}$

3. $9, 7, 5, \ldots$

$a_n = a_1 + (n-1)d$

$a_n = 9 + (n-1)\cdot(-2)$

$= 9 - 2n + 2$

$= 11 - 2n$ **D.**

4. $3, 6, 9, 12, \ldots$

$a_n = a_1 + (n-1)d$

$a_n = 3 + (n-1)\cdot(3)$

$= 3 + 3n - 3$

$= 3n$ **A.**

5. $5n - 10 = 15$ $\quad$ $5n - 10 = -15$

$5n = 25$ $\quad$ $5n = -5$

$n = 5$ $\quad$ $n = -1$ **D.**

6. $-12 < 2x + 6 < 12$

$-18 < 2x < 6$

$-9 < x < 3$

7. $2(-2)^2 - (-2) - 10$

$2(4) + 2 - 10$

$8 + 2 - 10$

0 **B.**

8. $(-4)^2 + (-4) - 3$

$16 - 4 - 3$

9 **A.**

9. **B.**

10. **B.**

11. $m = \frac{3-6}{-1+4} = \frac{-3}{3} = -1$

12. $m = \frac{-5-1}{2-8} = \frac{-6}{-6} = 1$ **A.**

13. $m = -2/5$ $\quad (\overset{x}{5}, \overset{y}{2})$

$y - y_1 = m(x - x_1)$

$y - 2 = -2/5(x - 5)$

$y = -2/5x + 10/5 + 2$

$y = -2/5x + 4$ **B.**

14. $y - 2 = 2/5(x - 5)$

$y = 2/5x - 10/5 + 2$

$y = 2/5x$

15. $m = \frac{2-(-2)}{-1-3} = \frac{4}{-4} = -1$

$y + 2 = -1(x - 3)$

$y = -1x + 3 - 2$

$y = -1x + 1$

16. $m = \frac{4-2}{1-(-1)} = \frac{2}{2} = 1$

$y - 4 = 1(x-1)$

$y = 1x - 1 + 4$

$y = 1x + 3$ **C.**

17. **D.**

18. **D.**

19. $2x - 3y \leq 6$

$-3y \leq -2x + 6$

$y \geq \frac{2}{3}x - 2$ **D.**

20. $3x - 2y > 4$

$-2y > -3x + 4$

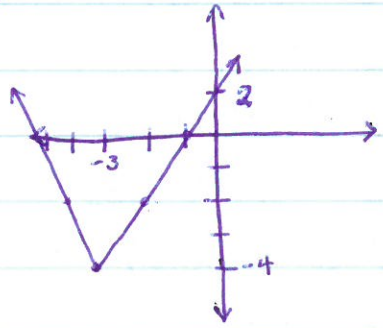
$y > \frac{3}{2}x - 2$ **A.**

21. **B.**

22. **C.**

23. **D.**

24.



25. $2x + y = 1$

$y = -2x + 1$

$3x - y = 4$

$-y = -3x + 4$

$y = 3x - 4$ **A.**

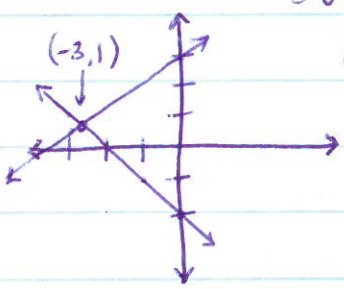
26. $2x - 3y = -9$

$-3y = -2x - 9$

$y = \frac{2}{3}x + 3$

$x + y = -2$

$y = -x - 2$



27. $y + 3x = 10$

$y = -3x + 10$

$2x - 5(-3x + 10) = 1$

$2x + 15x - 50 = 1$

$17x = 51$

$x = 3$ **D.**

$y + 3(3) = 10$

$y = 1$

28. $7w - 4(3w - 1) = -16$

$7w - 12w + 4 = -16$

$-5w = -20$

$w = 4$

$z = 3(4) - 1$

$z = 11$

$(4, 11)$

29. $5a + 4b = -3$

$-5(a + 3b = 6)$

$5a + 4b = -3$

$-5a - 15b = -30$

$-11b = -33$

$b = 3$

$5a + 4(3) = -3$

$5a + 12 = -3$

$5a = -15$

$a = -3$

(-3, 3)

30. $2m+3n=1$

$(4m-n=9)\cdot 3$

$2m+3n=1$

$12m-3n=27$

$14m=28$

$m=2$ D.

31. C.

32. $4x^2-8x-5$

a·c	B
-20	-8

$4x^2-10x+2x-5$

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

$(2x+1)(2x-5)$ D.

33. C.

34. $(x-8)(x+3)$

35. $x^2-x=20$

$x^2-x-20=0$

$(x-5)(x+4)=0$

$x=5 \quad x=-4$ A.

36. $3x^2-3x-18=0$

$x^2-x-6=0$

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

$x=3 \quad x=-2$

37. x-int: -5 and -1

$y=(x+5)(x+1)$

$y=x^2+5x+1x+5$

$y=x^2+6x+5$ B.

38. $y=2x^2-4x-5$

$h=\frac{-B}{2A}=\frac{-(-4)}{2(2)}=\frac{4}{4}=1$

$k=2(1)^2-4(1)-5$

$k=2-4-5$

$k=-7$

$y=2(x-1)^2+7$

39. $y=5x^2-10x+3$

$h=\frac{-B}{2A}=\frac{-(-10)}{2(5)}=\frac{10}{10}=1$

$k=5(1)^2-10(1)+3$

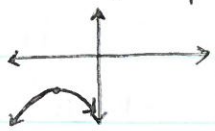
$k=5-10+3$

$k=-2$ A.

40. $C=0.6p^2-7.2p+48$

$p \Rightarrow h=\frac{-(-7.2)}{2(0.6)}=\frac{7.2}{1.2}=6$ A.

41. opens down, compression, vertex $(-2,-3)$



C.

42. $y=2(x-3)(x-3)-8$

$=2(x^2-6x+9)-8$

$=2x^2-12x+18-8$

$y=2x^2-12x+10$

43. $y=a(x+1)^2-3 \qquad (\overset{x}{1}, \overset{y}{-1})$

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

$-1=a(2)^2-3$

$-1=4a-3$

$2=4a \rightsquigarrow a=1/2 \qquad y=\frac{1}{2}(x+1)^2-3$

44. $a=-1 \quad h=2 \quad k=-1$

$\boxed{D.}$

45. $3x^2-12x=-42$

$x^2-4x=-14$

$(-4/2)^2$

$x^2-4x+4=-14+4$

$(x-2)^2=-10$ $\boxed{B.}$

46. $L=6+H$

$A=L\cdot H$

$16=(6+H)(H)$

$16=H^2+6H$

$(6/2)^2$

$16+9=H^2+6H+9$

$\sqrt{25}=\sqrt{(H+3)^2}$

$\pm 5=H+3$

$5=H+3 \quad -5=H+3$

$2=H \quad -8=H$

height = 2 inches

length = 8 inches

47. $8x^2-12x+3$

$a=8 \quad b=-12 \quad c=3$

$$\frac{12\pm\sqrt{(-12)^2-4(8)(3)}}{2(8)}$$

$$\frac{12\pm\sqrt{48}}{16}=\frac{12\pm\sqrt{16}\sqrt{3}}{16}$$

$$=\frac{12\pm4\sqrt{3}}{16}=\boxed{\frac{3\pm\sqrt{3}}{4}}$$

48. $9x^2+3x-1$

$a=9 \quad b=3 \quad c=-1$

$$\frac{-3\pm\sqrt{(3)^2-4(9)(-1)}}{2(9)}$$

$$\frac{-3\pm\sqrt{45}}{18}=\frac{-3\pm\sqrt{9}\sqrt{5}}{18}$$

$$\frac{-3\pm3\sqrt{5}}{18}=\frac{-1\pm\sqrt{5}}{6}$$ $\boxed{A.}$

49. I. a is positive, parabola opens up

II. c is positive, positive y-int.

III. discriminant is negative, no x-ints

$\boxed{D.}$

50. $a=9 \quad b=k \quad c=1$

$b^2-4ac=0$, one solution

$k^2-4(9)(1)=0$

$k^2-36=0$

$(k-6)(k+6)=0$

$\boxed{k=6,-6}$

51. $3\sqrt{-4}\sqrt{14}$

$3\cdot 2i\sqrt{14}$

$6i\sqrt{14}$ $\boxed{D.}$

52. $4x^2+4x-1$

$a=4 \quad b=4 \quad c=-1$

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

$$\frac{-4\pm\sqrt{32}}{8}=\frac{-4+\sqrt{16}\sqrt{2}}{8}$$

$$\frac{-4\pm4\sqrt{2}}{8}=\boxed{\frac{-1\pm\sqrt{2}}{2}}$$ $\boxed{D.}$

53. $-9-i-7+6i$

$-16+5i$ **C.**

54. $(3-4i)(5+2i)$

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

$15-14i-8(-1)$

$15-14i+8$

$23-14i$ **C.**

55. **D.**

56. leading coefficient is neg.

degree is positive

C.

57. $-3, 6, 0$

$(x+3)(x-6)(x)$

$(x^2-3x-18)(x)$

x^3-3x^2-18x **C.**

58. 3 curves - degree is 4

multiplicity of 2 at $(-2,0)$ & $(2,0)$

$(x+2)(x+2)(x-2)(x-2)$

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

x^4-8x^2+16 **D.**

59. $8x^3-27$ diff of cubes

$(2x-3)(4x^2+6x+9)$ **D.**

60. $x^4-16=0$

$(x^2-4)(x^2+4)=0$

$(x-2)(x+2)(x^2+4)=0$

$x=2 \quad x=-2 \quad \sqrt{x^2}=\sqrt{-4}$

$x=\pm 2i$

$x=\pm 2, \pm 2i$

61.

		+	+
-2	1	-8	12
	↓	-2	20
	1	-10	32_R

A.

62.

2	1	0	-6	0	8
	↓	2	+	-4	-8
	1	2	-2	-4	0_R

x^3+2x^2-2x-4 **D.** typo

63. factors of 10

factors of 2

$\pm 1 \quad \pm 2 \quad \pm 5 \quad \pm 10$

$\pm 1 \quad \pm 2$

$= \pm 1 \pm 2 \pm 5 \pm 10 \pm \frac{1}{2} \pm \frac{5}{2}$ **C.**

64. **B.**

65. $(3x^5z)^3$

$3^3 x^{5\cdot 3} z^{1\cdot 3}$

$27x^{15}z^3$ **D.**

66. $(2a^3b^2)^4$

$2^4 a^{3\cdot 4} b^{2\cdot 4}$

$16a^{12}b^8$ **D.**

67. $8 \div 4 \; x^{15-5}$

$2x^{10}$ **B.**

68. $9 \div 3 \; m^{8-2}$

$3m^6$ **B.**

69. **B.**

70. **C.**

71. $p^{2\cdot(-1)} q^{-3\cdot(-1)}$

$p^{-2}q^3 = \frac{q^3}{p^2}$ **D.**

72. $p^{-2\cdot(2)} q^{-1\cdot(2)}$

$p^{-4}q^{-2} = \frac{1}{p^4q^2}$ D.

73. $2x(x^2-9x+20)$

$2x(x-5)(x-4)$ D.

74. $5x(x^2+5x+6)$

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

75. $-x(x^2-7x+12)=0$

$-x(x-4)(x-3)=0$

$x=0, 4, 3$

76. $4x(x^2-x-2)=0$

$4x(x-2)(x+1)=0$

$x=0, 2, -1$ D.

77. $\sqrt{98} = \sqrt{49}\sqrt{2}$

$7\sqrt{2}$

78. $\sqrt[3]{120} = \sqrt[3]{8}\sqrt[3]{15}$

$2\sqrt[3]{15}$

79. $\sqrt[3]{192} = \sqrt[3]{64}\sqrt[3]{3}$

$4\sqrt[3]{3}$

80. $64^{\frac{1}{2}} = \sqrt{64} = 8$ B.

81. $\sqrt[3]{108} = \sqrt[3]{27}\sqrt[3]{4}$

$3\sqrt[3]{4}$ B.

82. $343^{\frac{1}{3}} = \sqrt[3]{343} = 7$ B

83. $16^{\frac{3}{2}} = (\sqrt{16})^3 = 64$

84. $27^{\frac{2}{3}} = (\sqrt[3]{27})^2 = 9$

85. $\sqrt{2x+2} = 8$

$(\sqrt{2x} = 6)^2$

$2x = 36$

$x = 18$ D.

86. $\sqrt{5x} - 5 = 10$

$(\sqrt{5x} = 15)^2$

$5x = 225$

$x = 45$

87. $(\sqrt{-x+6} = x)^2$

$-x+6 = x^2$

$0 = x^2 + x - 6$

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

$x = -3 \quad x = 2$

check $\sqrt{-(-3)+6} = -3$

$\sqrt{9} = -3$ false $x=-3$ extraneous solution

$\sqrt{-(2)+6} = 2$

$\sqrt{4} = 2$ true $x=2$

88. $(\sqrt{4x+16} = 8)^2$

$4x+16 = 64$

$4x = 48$

$x = 12$ C.

89. C.

90. B.

91. $4000(1+0.02)^{12}$ D.

92. $2000(1-0.05)^{20} \approx$ 1470 pandas

93. $2000\left(1+\frac{0.115}{12}\right)^{12\cdot 2}$ C.

94. $4500\left(1+\frac{0.1499}{12}\right)^{12\cdot 3} \approx \$7035.66$

95. $5000e^{0.034\cdot 50}$ A.

96. $3000e^{0.045\cdot 25} \approx \$9240.65$

97. $\log_{36} 216 \longrightarrow 36^x = 216$

$6^{2x} = 6^3$

$2x = 3 \rightsquigarrow x = \frac{3}{2}$ B.

98. $\log_8 \frac{1}{512} \rightsquigarrow 8^x = \frac{1}{512}$

$8^x = \frac{1}{8^3}$

$8^x = 8^{-3}$

$x = -3$ **A.**

99. $\log_{25} \frac{2}{3} \cdot \frac{3}{10}$

$\log_{25} \frac{6}{30} = \log_{25} \frac{1}{5} \rightsquigarrow 25^x = \frac{1}{5}$

$5^{2x} = 5^{-1}$

$2x = -1$

$x = \boxed{-\frac{1}{2}}$

100. $\log_5 4 \div 20$

$\log_5 \frac{4}{20} = \log_5 \frac{1}{5} \rightsquigarrow 5^x = \frac{1}{5}$

$5^x = 5^{-1}$

$x = \boxed{-1}$ **A.**

101. $\log(3x+25) = 2 \rightsquigarrow 10^2 = 3x+25$

$100 = 3x + 25$

$75 = 3x$

$\boxed{25 = x}$ **A.**

102. $2^{3x+1} = 7$

$\log 2^{3x+1} = \log 7$

$(3x+1)\cdot \log 2 = \log 7$

$3x + 1 = \frac{\log 7}{\log 2}$

$\frac{1}{3} \cdot (3x) = \left(\frac{\log 7}{\log 2} - 1\right) \cdot \frac{1}{3}$

$x = \frac{1}{3}\left(\frac{\log 7}{\log 2} - 1\right)$ **D.**

103. $\frac{3 \cdot 5 \cdot 5 \cdot x \cdot x \cdot x \cdot x}{3 \cdot 3 \cdot 5 \cdot x \cdot x} = \frac{5x^2}{3}$ **C.**

104. $\frac{x-3}{(x-3)(x+9)} = \boxed{\frac{1}{x+9}}$

$\boxed{x \neq 3,\ x \neq -9}$

105. $\frac{3(x-2)}{(x-5)(x+2)} \cdot \frac{3x(x+2)}{x-2}$

$\frac{x}{x-5}$; $x \neq 2, -2, 5$

106. $\frac{x^2-x-30}{10x^2-60x} \cdot \frac{10x^2-10x}{x+5}$

$\frac{(x-6)(x+5)}{10x(x-6)} \cdot \frac{10x(x-1)}{x+5}$

$x-1$; $x \neq 0, 6, 1, -5$ **B.**

107. cross multiply

$4(x-3) = 1(3x)$

$4x - 12 = 3x$

$-12 = -x$

$\boxed{12 = x}$ C.

108. $\frac{1}{4x-6} = \frac{2}{x^2}$

$\frac{1}{2(x-3)} = \frac{2}{x^2}$ LCD: $2x^2(x-3)$

$\left[\frac{1}{2(x-3)} = \frac{2}{x^2}\right] \cdot 2x^2(x-3)$

$\frac{(1)(2x^2)(x-3)}{2(x-3)} = \frac{(2)(2x^2)(x-3)}{x^2}$

$x^2 = (2)(2)(x-3)$

$x^2 = 4x - 12 \rightsquigarrow x^2 - 4x + 12 = 0$

$(x-6)(x+2) = 0$

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

109. 5, ___, ___, 62 $\quad a_n = a_1 + (n-1)d$

a_1 $\qquad$ a_4 $\quad a_4 = 5 + (4-1)d$

$62 = 5 + (3)d$

$57 = 3d$

$19 = d$

$a_2 = 5 + 19 = 24$

$a_3 = 24 + 19 = 43$ **C.**

110. 197, ___, 173 $\quad \frac{x+y}{2}$

a_7 $\qquad$ a_9

$\frac{197+173}{2} = 185$

C.

111. 4, 11, 18, 25, ... $d = 7$

$a_{20} = 4 + (20-1)(7)$

$= 4 + 19(7)$

$= 137$ **D.**

112. **D.**

113. -12, ___, $-\frac{3}{4}$ $\quad \sqrt{xy}$

a_1 $\qquad$ a_3 $\quad \sqrt{-12 \cdot -\frac{3}{4}}$

$\sqrt{\frac{36}{4}}$

$\sqrt{9} = 3$ **C.**

OR

$a_3 = -12(r)^{3-1}$

$(\frac{-1}{12}) - \frac{3}{4} = -12r^2(\frac{-1}{12})$

$\frac{3}{48} = R^2$

$\sqrt{\frac{1}{16}} \sqrt{R^2}$

$\pm \frac{1}{4} = R$

$a_2 = -12(-\frac{1}{4}) = 3$

114. **B.**

115. $\frac{{}_4C_1 \cdot {}_{48}C_4}{{}_{52}C_5} = 0.2995$ or 29.95%

116. $A = \pi R^2$ pool

$= \pi(12)^2$

$= 452.39$

$A = LW$ yard

$= 50(100)$

$= 5000$

$\frac{452.39}{5000} = 0.09048$ or 9.05%

117. $A = \frac{1}{2}bh$ garden

$= \frac{1}{2}(8)(6)$

$= 24$

$\frac{24}{5000} = 0.0048$ or $.48\%$

118. $\frac{452.39 + 24}{5000} = 0.09528$ or 9.53%

119. $\frac{5000 - 476.39}{5000} = 0.90472$ or 90.47%

1) (a) Degree = 3 2 Turning Points maximum

Positive lead coefficient End Behavior – Left: Down Right: Up.

(b)

3	1	0	−7	−6
		3	9	6
	1	3	2	0

$= x^2 + 3x + 2$

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

$x = 3$ $x = -2$ $x = -1$

x-intercepts: $(-2, 0), (-1, 0), (3, 0)$

(c) Constant: y-intercept, so $(0, -6)$

(d) $(-1.5, 1.125)$ $(-1.5)^3 - 7(-1.5) - 6 = 1.125$

$(2.5, -7.875)$ $(2.5)^3 - 7(2.5) - 6 = -7.875$

3) (a) $5000 + 1000 = \$6000$

(b) $y = 6000\, e^{(0.068x)}$

(c) $y = 6000\, e^{(0.068 \cdot 4)}$

$y = \$7875.52$

Dipak owes $7875.52 at the end of his senior year.

(d) $12{,}000 = 6000\, e^{(0.068x)}$

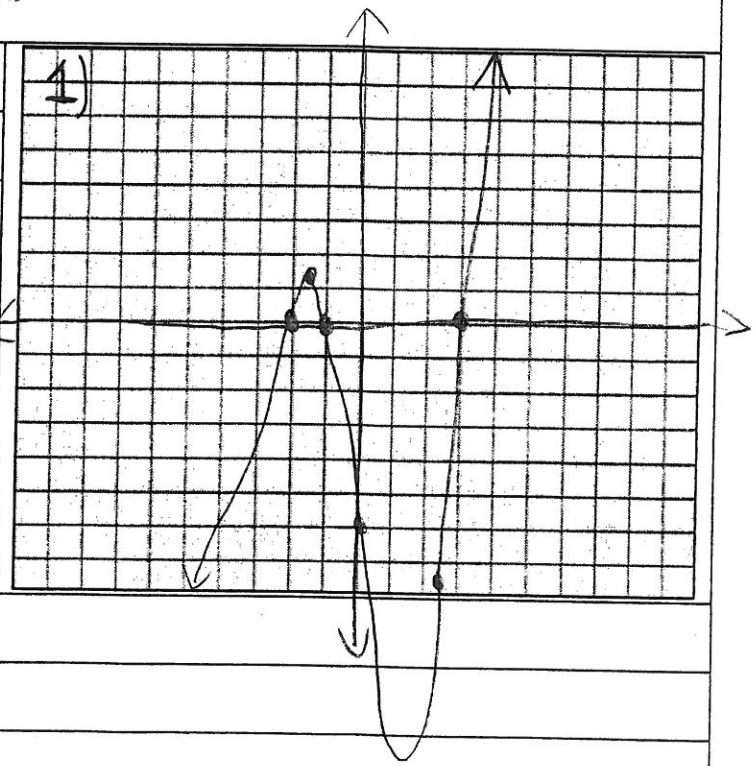
$2 = e^{(0.068x)}$

$\ln 2 = \ln e^{(0.068x)}$

$\frac{\ln 2}{0.068} = \frac{0.068x}{0.068}$

$x = 10.19$

A little over 10 years for his debt to double.



$\frac{x+5}{x^2+6x+5}$

2) (a) $\frac{x+5}{(x+1)(x+5)} = \frac{1}{x+1}$ $x \neq -1 \rightarrow$ Vertical Asymptote

$x = -5 \rightarrow$ Hole $(-5, -\frac{1}{4})$

$\frac{1}{-5+1} = \frac{1}{-4}$

(b) Degree of denominator > degree of numerator

So horizontal asymptote at $y = 0$

(c) y-intercept $x = 0$ $\frac{1}{0+1} = \frac{1}{1} = 1$ $(0, 1)$

x-intercept set numerator $= 0$ $1 = 0 \rightarrow$ never

no x-intercept

(d) $(1, \frac{1}{2})$ $\frac{1}{1+1} = \frac{1}{2}$

$(-2, -1)$ $\frac{1}{-2+1} = \frac{1}{-1} = -1$

$(-1.5, -2)$ $\frac{1}{-1.5+1} = \frac{1}{-0.5} = -2$

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4) (a) $\frac{0.15}{100} = 0.0015$ $1 + 0.0015 = \boxed{1.0015}$

(b) $y = 10{,}000(1.0015)^x$

(c) $y = 10{,}000(1.0015)^5 = \$10{,}075.23$

Whitney's loan is worth $\$10{,}075.53$ after 5 years

(d) $15{,}000 = 10{,}000(1.0015)^x$

$1.5 = (1.0015)^x$

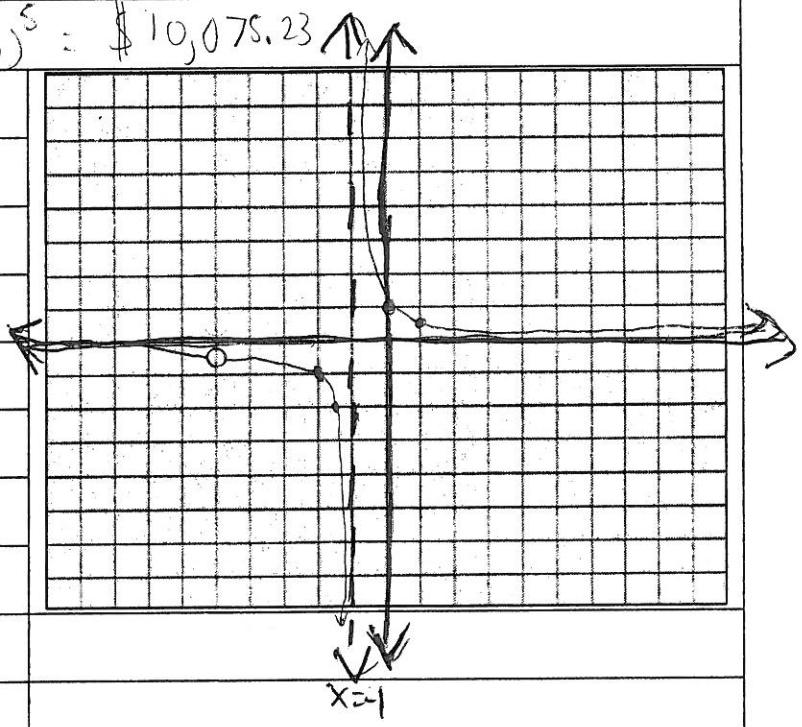
$\log 1.5 = \log(1.0015)^x$

$\log 1.5 = x \log 1.0015$

$\frac{\log 1.5}{\log 1.0015} = \frac{x \log 1.0015}{\log 1.0015}$

$x = 270.5$

About 270 and half years until it is worth $\$15{,}000$



5) (a) $\sqrt{100 \cdot 49} = \sqrt{4900} = 70$ cm

(b) $\frac{70}{100} = .7$ or $\frac{7}{10}$ 4th = 34.3 cm 5th = 24.01 cm

(c) $a_n = 100(.7)^{n-1}$

(d) $1 = 100(.7)^{n-1}$

$\frac{1}{100} = .7^{n-1}$

$\log .01 = \log .7^{n-1}$

$\frac{\log(.01)}{\log(.7)} = \frac{(n-1)\log(.7)}{\log(.7)}$

$12.91 = n-1$

$+1 \quad +1$

$n = 13.91$ → after the 14th bounce the height will be less than 1 cm

b) (a) pattern is adding four, $18+4 = 22$ units

(b) 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62

6 7 8 9 10 11 12 13 14 15

62 units is the perimeter

(c) $a_n = 6 + (n-1)4$

(d) $1000 = 6 + (n-1)4$

$994 = 4n - 4$

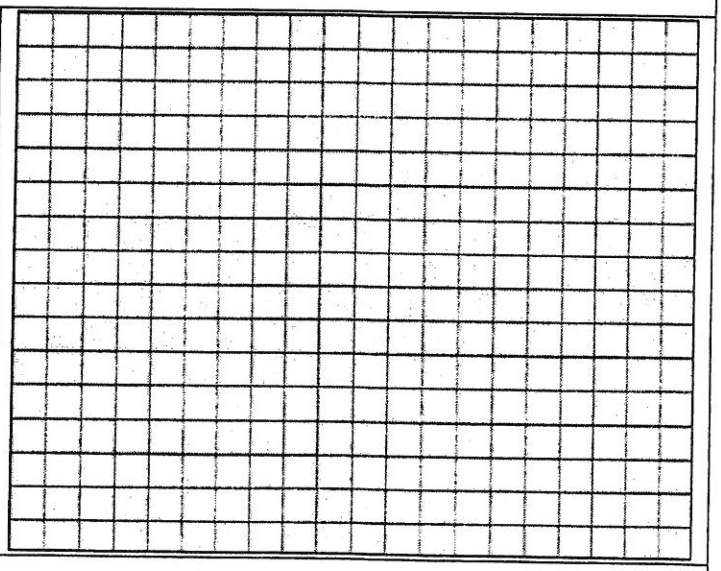
$998 = 4n$

$n = 249.5$

so 250

$6 + (250-1)4$

$6 + 249 \cdot 4 = 1002$



250th Figure