

### Slope y-intercept Class Work

Identify the slope (m) and y-intercept (b) for each equation:

1. $y = 3x - 4$	2. y = -2x	3. y = 7	4. x = -5	5. y :	= 0
m = 3 b = -4	m = -2 b = 0	m = 0 b = 7	m = undef. b = none	m = 0 b = 0	)
6. $y - 3 = 4(x + 6)$	7. y + 2 = -0.5(x + 7)	8. 2x	+ 3y = 9	9. 4x – 7y =	11
m = 4 b = 27	m = -0.5 b  = -5.5	m = -2 b = 3	2/3x	m = 4/7 b = -11/7	

Write the equation of the given line from the graph to the right.



16. Write an equation for the following situation: Cal drives past mile marker 27 at 11am and mile marker 145 at 1pm.

y = 59x + 27

x= hours past 11am y= mile marker Slope y-intercept



### Homework

Identify the slope (m) and y-intercept (b) for each equation:

17. y = -5x -2	18. y = 3x	19. y = -2	20. x = 10	21. x= 0
m = -5	m = 3	m = 0	m = undef.	m = undef.
b = -2	b = 0	b = -2	b  = none	b  = none
22. $y - 4 = 2(x - 8)$	23. y + 3 = -0.4(x+6)	24. 3	x + 4y = 9	25. 2x – 6y = 15
m = 2	m = -0.4	m = -3	8/4	m = 1/3
b = -12	b = -5.4	b = 9/	/4	b = -2.5

Write the equation of the given line from the graph to the right.

26. A $y = \frac{5}{4}x - 4$	C <sup>6</sup> B
27. B $y = -5x + 10$	
28. C $x = -6$	
29. D $y = -\frac{1}{3}x - 1$	
30. E $y = \frac{1}{4}x - 2$	
31. F $y = -6$	F /

32. Write an equation for the following situation: Jessie drives past mile marker 45 at 11am and mile marker 225 at 2pm.

$$y = 60x + 45$$

x= hours past 11am y= mile marker

#### **Spiral Review**

34.  $\frac{-3xy^3}{2}$ 

**35**.  $8x^{3}-16x^{2}+12x-6$ 

8

**36**. 81x<sup>2</sup>+18x+1

### **Different Forms of Lines**



### Class Work

The following equations of lines are in **standard form**. Find the x and y intercepts for each equation.

37. 2x + 3y = 12	38. 4x + 5y = 10	39. x – 3y = 10	40. 4x =9	41. y = 0
x=(6,0)	x=(2.5,0)	x=(10,0)	x=(2.25,0)	x=N/A
y=(0,4)	y=(0,2)	y=(0,3.33)	y=none	y=(0,0)
Write the equation f	or the described line ir	n <b>point-slope</b> form.		
42. Slope of 6 throu	ugh (5, 1)	43. Slope c	of -2 through (-4	, 3)
y-1=6(x-5)		y - 3 = -20	(x + 4)	
44. Slope of 1 throu	ugh (8, 0)	45. Slope c	of $\frac{1}{2}$ , through (1,	-6)
y = x - 8		$y + 6 = \frac{1}{2}(x - $	- 1)	

Convert the following equations to <u>both</u> **slope-intercept** form and **standard form**.

46. $y - 4 = 5(x + 3)$	47. $y = -2(x - 1)$	48. y + 7 = $\frac{1}{5}$ (x - 8)
y = 5x + 19	y = -2x + 2	$y = \frac{1}{5}x - 8.6$
-5x + y = 19	2x + y = 2	-x + 5y = -43

### **Different Forms of Lines**

#### Homework

The following equations of lines are in **standard form.** Find the x and y intercepts for each equation.

49. 3x – 5y = 15	50. 7x + 2y = 14	51. x – y =9	52. y = 7	53. x = 0
x=(5,0)	x=(2,0)	x=(9,0)	x=none	x=(0,0)
y=(0,-3)	y=(0,7)	y=(0,-9)	y=(0,7)	y=none
Write the equation f	or the described line ir	n <b>point-slope</b> form.		
54. Slope of -4 thro	ough (4,-2)	55. Slope	of 3 through (0,-	-9)
y+2=-4(x-4)		y + 9 = 3x		
56. Slope of $^{1}/_{4}$ through	ough (6,0)	57. Slope	of 2 through (5,	-2)
$y = \frac{1}{4}(x - 6)$		y + 2 = 2(x	— 5)	

Convert the following equations to <u>both</u> **slope-intercept** form and **standard form**.

58. $y - 3 = 7(x - 2)$	59. $y + 1 = -4(x - 7)$	60. $y + 3 = \frac{1}{6}(x - 8)$
y = 7x - 11	y = -4x + 27	$y = \frac{1}{6}x - 4\frac{1}{3}$
-7x + y = 11	4x + y = 27	-x + 6y = -26

#### **Spiral Review**

•			2	
~ 4	(0, 2, 2, (2), (4, -07)		$-3b^3$	$ad^3$
61.	$(8x^3 - 36x^2 + 54x - 27)$	<b>62.</b> $2x^{2}(2x-5)(3x-2)$	63. — <u>3</u>	64. $\frac{1}{h^2 a}$
			<i>u</i> -	<i>n=r</i>

Horizontal and Vertical Lines Class Work



Write the equation for the described line 65. vertical through $(1,3)$ $x = 1$	66. horizontal through (1,3) y = 3
67. vertical through (-2, 4) $x = -2$	68. horizontal through (-2, 4) y = 4
Horizontal and Vertical Lines Homework Write the equation for the described line 69. vertical through $(4,7)$ x = 4	70. horizontal through (8,-10) y = -10
71. vertical through (8, -10) $x = 8$	72. horizontal through (4, 7) y = 7
Parallel and Perpendicular Lines Class Work Write the equation for the described line: 73 Parallel to $y=3x+4$ through (1.3)	74 Perpendicular to $y = 3x + 4$ through

74. Perpendicular to y= 3x + 4 through (1,3)  $y = -\frac{1}{3}x + \frac{10}{3}$ 73. Parallel to y = 3x + 4 through (1,3) y = 3x75. Parallel to  $y = -\frac{1}{2}x + 6$  through (5, -2) 76. Perpendicular to  $y = -\frac{1}{2}x + 6$  through (5, -2)  $y = -\frac{1}{2}x + \frac{1}{2}$ y = 2x - 1277. Parallel to y = 5 through (-1,-8) 78. Perpendicular to y = 5 through (-1,-8) x = -1y = -8

### Parallel and Perpendicular Lines Homework

Write the equation for the described line 79. Parallel to y = -2x + 1 through (1,-6) y = -2x - 481. Parallel to  $y = \frac{1}{3}x - 5$  through (-5, 0)  $y = \frac{1}{3}x + \frac{5}{3}$ 83. Parallel to x = 5 through(-3, 7) x = -3

**Spiral Review**  $85.\frac{4}{3x^2}$ 86. 16x<sup>2</sup>-8x+1 Writing Linear Equations **Class Work** 

80. Perpendicular to y = -2x + 1 through (1,-6)  $y = \frac{1}{2}x - \frac{13}{2}$ 82. Perpendicular to  $y = \frac{1}{3}x - 5$  through (-5, 0) y = -3x - 1584. Perpendicular to x = 5 through (-3,7) y = 7

87. 
$$15x^{3}+17x^{2}-34x+6$$
 88.  $\frac{12}{x^{4}y^{5}z^{3}}$ 



Write an equation based on the given information. Use any form. 89. A line through (7, 1) and (-3, 4) 90. A line through (8, 2) and (8, -2)  $y = -\frac{3}{10}x + \frac{31}{10}$ x = 891. A line perpendicular to y - 7 = 0.5(x + 2) through (-1, -8) y = -2x - 1092. A line parallel to 4x - 7y = 10 through (2, 2)  $y = \frac{4}{7}x + \frac{6}{7}$ 93. A function with constant increase passing through (1, 3) and (8, 9)  $y = \frac{6}{7}x + \frac{15}{7}$ 94. The cost of a 3.8 mile taxi ride cost \$5.50 and the cost of a 4 mile ride costs \$5.70 y = x + 1.795. A valet parking services charges \$45 for 2 hours and \$55 for 3 hours y = 10x + 25Writing Linear Equations

### Homework

Write an equation based on the given information. 96. A line through (4, 5) and (-5, -6)  $y = \frac{11}{9}x + \frac{1}{9}$ 97. A line through (-8, 2) and (8, 2)  $y = \frac{1}{9}x + \frac{1}{9}$ 98. A line perpendicular to 4x - 7y = 10 through (-1, -8)  $y = -\frac{7}{4}x - 9.75$ 99. A line parallel to y - 7 = 0.5(x + 2) through (2, 2) y = .5x + 1100. A function with constant decrease passing through (1, 3) and (8, -9)  $y = -\frac{12}{7}x + \frac{33}{7}$ 101. The cost of a 3.8 mile taxi ride cost \$8.25 and the cost of a 4 mile ride costs \$8.75  $y = \frac{5}{2}x - 1.25$ 102. A valet parking services charges \$55 for 2 hours and \$75 for 4 hours y = 10x + 35

### **Spiral Review**

Simplify:	Work out:	Multiply:	Simplify:
$103.\frac{3x^3}{4}$	10449	105.64x <sup>3</sup> +240x <sup>2</sup> +300x+125	106. $\frac{2xz}{3y^5}$

### Identifying Exponential Growth and Decay Class Work



State whether the given function is exponential growth or decay. Then find its horizontal asymptote and y-intercept.

107. Decay		108. Growth		
109. Growth	110. Growth	111. Decay		
112. Decay	113. Decay	114. Decay		
115.Growth				
Identifying Exponential Growth and Decay				

#### Homework

State whether the given function exponential growth or decay. Then find its horizontal asymptote and y-intercept.

116. Growth		117. Decay	117. Decay	
118. Decay	119. Decay	120.	Decay	
121. Growth	122. Growth	123.	Growth	
124. Decay				
<b>Spiral Review</b> 124. 4x <sup>2</sup> +20x+25	<b>125</b> . (9x+6)(9x-6)	126. Unfactorable	<b>127</b> . 15x <sup>10</sup> y+5x <sup>9</sup> y <sup>2</sup>	

Graphing Exponential Functions Class Work



Graph each equation. Make sure that the y-intercept and the horizontal asymptotes are clear. Please number the axes on your graphs. 128. 129. 130.







131.











134.



Graphing Exponential Functions Homework



Graph each equation. Make sure that the y-intercept and the horizontal asymptotes are clear. Please number the axes on your graphs. 135. 136. 137.







138.











142.



## **Spiral Review**

**143**.9x<sup>2</sup>-24x+16

144.  $\frac{3n^4}{m^2}$ 

**145.**  $(5x-1)(25x^2+5x+1)$  **146.**  $(x+3)(x^2-3x+9)$ 

Introduction to Logarithms Class Work



Write 147.	each of the follo $\log 100 = 2$	wing exponentia 148. log	Is in logarithmic form $r_2 16 = 4$	1. $\log_3 27 = 3$
Write 150.	each of the follo $5^3 = 125$	wing logarithms 151.  6 <sup>2</sup>	in exponential form. = 36	152. $7^3 = 343$
Solve 153.	the following eq $x = 3$	uations 154. <i>x</i> =	6	155. <i>y</i> = 243
156.	<i>y</i> = 216	157. <i>b</i> =	= 3	158. <i>b</i> = 1
Intro Home Write 159.	duction to Loga ework each of the follo $\log_9 81 = 2$	<b>rithms</b> wing exponentia 160. loş	Is in logarithmic form $g_2 32 = 5$	i. 161. log <sub>3</sub> 81 = 4
Write 162.	each of the follo $8^2 = 64$	wing logarithms 163. 4 <sup>4</sup>	in exponential form. = 216	164.3 <sup>4</sup> = 81
Solve 165.	the following eq $x = 5$	uations 166. <i>x</i> =	: 7	167. <i>y</i> = 625
168.	<i>y</i> = 2401	169. <i>b</i> = 10	170. <i>b</i>	= 2
Spira 171. <u>Prop</u> Class	Review	172.	173. (x+3)(x-3)	174. 3x <sup>4</sup> +x <sup>3</sup> +6x+2



Using Properties of Logs, fully expand each expression. 175.  $\log_4 x + \log_4 y$ 176.  $\log_3 x + 3 \log_3 y + 4 \log_3 z$ 177.  $\log w - 2 \log x$ 

178.  $\log_5 1 - (3 \log_5 c + 4 \log_5 d)$  179.  $(\log_7 7 + 2 \log_7 m) - 4(\log_7 u + \log_7 v)$ 

Using Properties of Logs, rewrite expression as a single log. 180.  $\log \frac{xy}{z}$  181.  $\log \frac{c^2}{d^4}$  182.  $\log_5 \frac{5}{m^3}$ 

183. 
$$\log \frac{f^2 g^3}{h^4}$$
 184.  $\log \frac{k^5}{(rt)^3}$ 

### Properties of Logs Home Work

Using Properties of Logs, fully expand each expression. 185.  $5 \log_4 x + 2 \log_4 y$  186.  $1 + \log_3 x + 2 \log_3 y + 5 \log_3 z$  187.  $1 + \log_4 w - 2 \log_4 x$ 

188.  $-2\log_5 c + 5\log_5 d$  189.  $1 + 4\log_8 m - 3(2\log_8 u + \log_8 v)$ 

Using Properties of Logs, rewrite expression as a single log.

190.  $\log x^2 y^3 z^4$  191.  $\log \frac{c^3}{d^5}$  192.  $\log_4 \frac{4}{m^2}$ 

193. 
$$\log \frac{f^5}{g^2 h^6}$$
 194

94. 
$$\log \frac{k^3 t^5}{r^5}$$



197. $\frac{y}{6x^{-5}}$ 

#### 198. -32mn<sup>4</sup>



## **Class Work**

Solve the following equations: 199. $x = 5$	200. <i>x</i> = 8	
201. $x = 60.75$	202. <i>x</i> = 1	
203. <i>x</i> = 29.39	204. <i>x</i> = 34.2	
205. $x = 1$	206. <i>x</i> = 7	
207. <i>x</i> = 8	208. <i>x</i> = 8	
Solve for the variable. 209. $x = 1.49$	210. <i>b</i> = 3.5	211. <i>d</i> = 2.55
212. $n = 4.59$	213. $t = 26.85$	

Find	the approximate	value for each			
214.	1.63	215. 1.76	216. 2.02	217.	2.44

## Solving Logarithmic Equations



## Home Work

Spiral Review			
Find the approximate value for e 233. 2.1 23	each: 4. 1.86	235. 1.9	<b>236</b> . 1.68
231. <i>n</i> = 1.31	232. $t = 11.0$	05	
228. <i>x</i> = 1.46	229. <i>b</i> = 7.7		230. <i>d</i> = .75
Solve for the variable.			
226. <i>x</i> = 15		227. $x = 6$ .	5
224. $x = 64$		225. <i>x</i> = 3	
222. $x = 4.76$		223. $x = 5$	5.9
220. $x = 3.375$	221.	<i>x</i> = 4	
Solve the following equations 218. $x = 6$	219.	<i>x</i> = 8	

237.  $f \circ g = 4x^4 + 20x^2 + 25$  238. (9m+5n)(9m-5n) 239. -27x<sup>6</sup>y<sup>21</sup> 240. H. shrink 2, flip x, 1

## <u>e and In</u>



Class Work Solve the following equations		
241. <i>x</i> = 6	242. <i>x</i> = 10	243. <i>x</i> = 1
244. <i>x</i> = 2	245. <i>x</i> = .97	246. $x = -0.1$
247. <i>x</i> = 1095.63	248. <i>x</i> = 403.43	
e and In		
Homework Solve the following equations	;	
249. <i>x</i> = 3	250. <i>x</i> = 2	251. <i>x</i> = 11
252. <i>x</i> = 1	253. <i>x</i> = .26	254. $x = -0.85$
255. <i>x</i> = 8104.08	256. <i>x</i> = 22026.47	
Spiral Review		
$257.f \circ g = 3x^6 - 1$	258.(3x-2y)(9x <sup>2</sup> +6xy+4y <sup>2</sup> )259.12	$28x^{11}y^6$ 260. ←2, flip x, $J3$

## Growth and Decay



### Class Work

Solve the following problems

261. \$250 is deposited in an account earning 5% that compounds quarterly, what is the balance in the account after 3 years?\$290.19

262. A bacteria colony is growing at a continuous rate of 3% per day. If there were 5 grams to start, what is the mass of the colony in 10 days?6.75 grams

263. A bacteria colony is growing at a continuous rate of 4% per day. How long till the colony doubles in size?17.33 days

264. If a car depreciates at an annual rate of 12% and you paid \$30,000 for it, how much is it worth in 5 years? \$15,831.96

265. An unknown isotope is measured to have 250 grams on day 1 and 175 grams on day 30.At what rate is the isotope decaying? At what point will there be 100 grams left?1%, Day 93

266. An antique watch made in 1752 was worth \$180 in 1950; in 2000 it was worth \$2200. If the watch's value is appreciating continuously, what would its value be in 2010? \$3,315.40

267. A furniture store sells a \$3000 living room set and doesn't require payment for 2 years. If interest is charged at a 5% annual rate compounded daily and no money is paid early, how much money is repaid at the end? \$3,315.49

**Growth and Decay** 



### Homework

268. Solve the following problems\$50 is deposited in an account that earns 4% compounds monthly, what is the balance in the account after 4 years?

\$61.04

269. A bacteria colony is growing at a continuous rate of 5% per day. If there were 7 grams to start, what is the mass of the colony in 20 days? 19.03 grams

270. A bacteria colony is growing at a continuous rate of 6% per day. How long till the colony doubles in size? 11.55 days

271. If a car depreciates at an annual rate of 10% and you paid \$20,000 for it, how much is it worth in 4 years?\$13,122

272. An unknown isotope is measured to have 200 grams on day 1 and 150 grams on day 30.At what rate is the isotope decaying? At what point will there be 50 grams left?1%, Day 139

273. An antique watch made in 1752 was worth \$280 in 1940; in 2000 it was worth \$3200. If the watch's value is appreciating continuously, what would its value be in 2010? \$4,604.50

274. A \$9000 credit card bill isn't paid one month, the credit company charges .5% daily continuously on unpaid amounts. How much is owed 30 days later? (assume no other charges are made)
\$10,456.51

Spiral Review

 $275.y = \sqrt{x+2} - 2$ 

 $276.y = (2-x)^3 + 1 \qquad 277. \ \frac{-4a^6}{h^9}$ 

Logistic Growth



### **Class Work**

Scientists measure a wolf population growing at a rate of 3% annually. They calculate the carrying capacity of the region to be 100 members.

278. Write a logistic equation to model this situation.

$$P(t) = \frac{100P_0e^{03t}}{100 + P_0(e^{03t} - 1)}$$

279. Create a table that shows the pack population over the next 10 years if  $P_0 = 30$ 

Year	0	1	2	3	4	5	6	7	8	9	10
Pop.	30	31	31	32	33	33	34	35	35	36	37

280. Draw a graph of the equation



281. How long till the pack population is 60? 41.7 years



### **Logistic Growth** Homework

A calculus class determines that a rumor spreads around the school at a rate of 15% per hour. The school population is 1600.

282. Write a logistic equation to model this situation.

$$P(t) = \frac{1600P_0e^{15t}}{1600 + P_0(e^{15t} - 1)}$$

283. Create a table that shows the number of people who know the rumor if the class that starts it has 20 members.

Hour	0	1	2	3	4	5	6	7	8	9	10
Pop.	20	23	27	31	36	42	48	56	65	74	86

284. Draw a graph of the equation



285. How long till the majority of the school has heard the rumor? 29.13 hours

### **Spiral Review**

286.(2x-3)(4x<sup>2</sup>+6x+9) 287. $\frac{2y^{5}}{5y^{2}z^{7}}$ 

 $288.\frac{4}{3yz}$ 

**289.**  $\frac{15+8xy}{10x}$ 



### **Multiple Choice**

- 1. Which equation has an x-intercept of (5,0) and a y-intercept of (0,-2.5)
  - a. y + 2.5 = 5(x 0)
  - b. y 2.5 = 5(x 0)
  - c.  $y = \frac{1}{2}(x-5)$

d. 
$$y = \frac{1}{2}(x + 5)$$

2. The equation of a line perpendicular to 2x + 3y = 7 and containing (5,6) is

a. 
$$3x - 2y = 3$$

b. 
$$y - 6 = \frac{-2}{3}(x - 5)$$

c. 3x - 2y = 4

d. 
$$y = \frac{2}{3}(x-6)$$

- 3. A line with no slope and containing (3, 8) has equation
  - a. y = 3
  - b. y = 8
  - c. x = 3
  - d. x = 8
- 4. The equation that models exponential decay passing through (0,5) and a  $\lim_{x \to \infty} f(x) = 4$  is
  - a.  $f(x) = e^x + 4$
  - b.  $f(x) = -1e^x + 4$
  - c.  $f(x) = e^{-x} + 4$
  - d.  $f(x) = -1e^{-x} + 4$
- 5. A forest fire spreads continuously, burning 10% more acres an hour. How long will it take for 1000 acres to be on fire after 200 acres are burning?
  - a. 23.026 hours
  - b. 16.094 hours
  - c. 6.932 hours
  - d. not enough information
- 6.  $\log_6 5 =$ 
  - a. .116
  - b. .898
  - c. 1.113
  - d. 1.308
- 7. Given  $4^x = 10$ , find x
  - a. 2.5
  - b. .602
  - c. .400
  - d. 1.661



- 8.  $\log m = .345$  and  $\log n = 1.223$ , find  $\log \frac{10m^2}{n^3}$ 
  - a. -1.979
  - b. .651
  - c. 6.507
  - d. 8.473
- 9. Which of the following would not influence the carrying capacity of a logistic growth model:
  - a. the population of a town
  - b. the food supply in an ecological preserve
  - c. the rate of spread of the flu
  - d. the area inside a Petri dish

### Extended Response

- 1. Entomologists introduce 20 of one variety of insect to a region and determine that the population doubles every 6 hours.
  - a. Write an equation to model this situation.

 $y = 20(2)^x$ 

- b. What will the population be in 10 days? 20,480 insects
- c. If those same scientists determine that the region can support a maximum of 100,000 of the species, rewrite your equation from part a.

$$P(t) = \frac{100000 * 20e^t}{100000 + 20(e^t - 1)}$$

- 2. A compostable bag breaks down such that only 10% remains in 6 months.
  - a. If the decomposition is continual, at what rate is the bag decomposing?
     38% per month
  - How much of the bag remained after 4 months? 22%
  - c. When will there be less than 1% of the bag remaining? After 12.12 months