Algebra 1 | Comparing Functions | Notes

Day 1: Identifying Functions

Review: Write an example of a linear, quadratic, and exponential function.

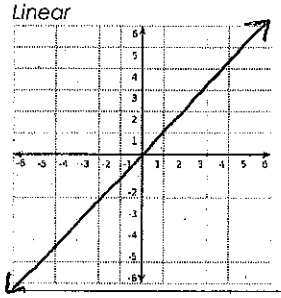
Linear $y = mx + b$

Quadratic $y = ax^2 + bx + c$

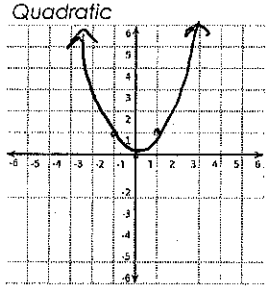
Exponential $y = a(b)^x$

Sketch a graph of a linear, quadratic, and exponential function.

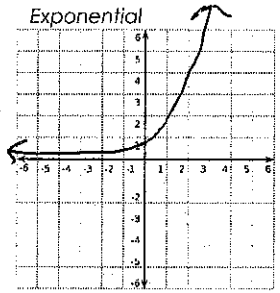
Linear



Quadratic



Exponential



From the review... If you have an equation, how can you determine whether it is an equation of a linear, quadratic, or exponential function?

x **Linear:** No exponent – exponent = 1, two terms

x^2 **Quadratic:** Squared leading variable, three terms

Exponential: parent function – exponent is x
b^x

Practice: Determine whether the functions below are linear, quadratic, or exponential.

1) $y = 6x + 4$ L

2) $f(x) = 8x^2 + 7x$ Q

3) $f(x) = 4^x$ E

4) $y = 0.5^x + 4$ E

5) $y = 1$ L

6) $y = -2x^2$ Q

7) $y = x$ L

8) $y = -1^{2x}$ E

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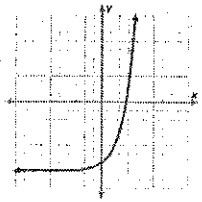
If you have a graph, how can you determine whether it is a graph of a linear, quadratic, or exponential function?

Linear: Straight line

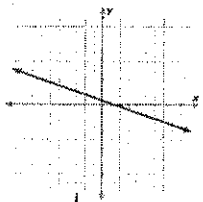
Quadratic: U Shaped curve – parabola

Exponential: curve – L Shaped – asy.

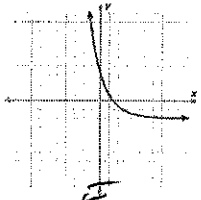
Practice: Determine whether the graphs below are linear, quadratic, or exponential.



E



L



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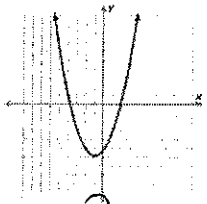
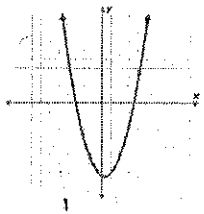
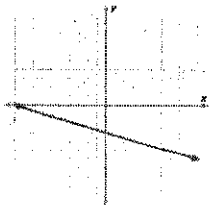


Q



Q



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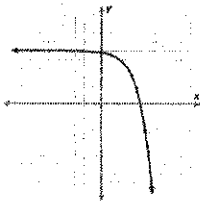

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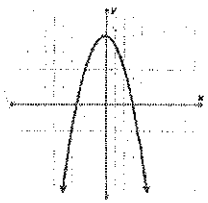
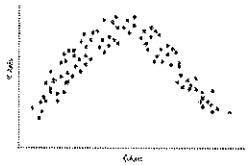
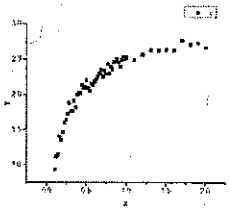


Q



Q



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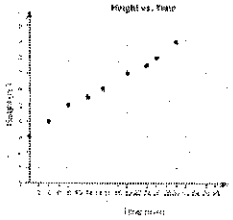

L

If you have a table, how can you determine whether it is a graph of a linear, quadratic, or exponential function?

Linear: X increases by 1 and y values increase (+)/decrease (-) at a constant rate

Quadratic: Vertex - Mirror pt. OR looking for a second common diff.

Exponential: X increase by 1, y values increase (*) at an increasing rate

Practice: Determine whether the tables below are linear, quadratic, or exponential.

x	−3	−2	−1	0	1	2	3
y	14	10	6	2	−2	−6	−10

−4 −4 −4

L - constant (−)

x	−3	−2	−1	0	1	2	3
y	½	1	2	4	8	16	32

*2 *2 *2

E

x	−3	−2	−1	0	1	2	3
y	−16	−13	−10	−7	−4	−1	2

+3 +3 +3

L

x	−3	−2	−1	0	1	2	3
y	30	20	12	6	2	0	0

NL −10 −8 $\times\frac{1}{3}$ ×0 N.E

Q

x	−3	−2	−1	0	1	2	3
y	1	0	−1	−2	−1	0	1

Q

x	−3	−2	−1	0	1	2	3
y	21	12	5	0	−3	−4	−3

−9 −7 −5 ×? −1 +1

+2 +2

NL
NE
Q

x	−3	−2	−1	0	1	2	3
y	−14	−9	−4	1	6	11	16

+5 +5 +5

L

x	−3	−2	−1	0	1	2	3
y	⅛	¼	½	9	18	36	72

×2 ×2 ×2

E

Word Problems and Application Problems: Linear functions have a pattern of addition or subtraction. Quadratic functions are typically involved with projectiles (something being thrown, dropped, etc.). Exponential functions have a pattern of multiplication or addition. Linear and exponential functions are the most common word problems given when comparing functions.

For each function below, determine whether it represents a linear or exponential function. Then write the equation of the function.

Linear Function	Exponential Function
$f(x) = mx + b$	$f(x) = a \cdot b^x$
b is the *starting value*, m is the *rate* or the *slope*. m is positive for growth, negative for decay.	a is the *starting value*, b is the *growth rate*. $b > 1$ for growth, $0 < b < 1$ for decay.

1) A gym's customers must pay $50 for a membership, plus $3 for each time they use the gym.

Constant - Linear

$y = 3x + 50$

2) As a reward, you ask for a penny the first day and to double the amount each day for 30 days.

* - Exponential

1st day something happened → $1(2)^{30-1}$

3) Julie gets a pre-paid cell phone. Initially she has a $40.00 balance on the phone. Each minute of talking costs $0.15. Let

$y = -0.15x + 40$

4) At the start of a carnival, you have 50 ride tickets. Each time you ride the roller coaster, you have to pay 6 tickets.

$y = -6x + 50$

5) Ms. Cohen began spraying her garden with pesticide, and so, every day there were half as many weeds as there were the day before. Initially, there were 60 weeds in the garden.

$60(1/2)^x$