

WS 5-1
Exponents and Linear vs. Exponential Growth

Negative Exponents: to evaluate negative exponents, find the reciprocal of the base, and then change the negative exponent to a positive exponent.

Example: $2^{-3} = \left(\frac{1}{2}\right)^3 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{2^3} = \frac{1}{8}$


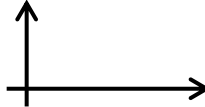
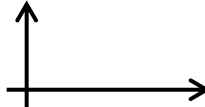
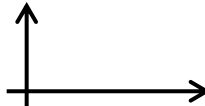
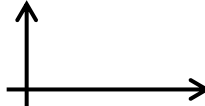
Zero Power: any non-zero base to the zero power (zero as an exponent) is equal to 1. Example: $7^0 = 1$

First Power: any number to the first power (one as an exponent) is equal to the number. Example: $\left(\frac{1}{5}\right)^1 = \frac{1}{5}$

Evaluate the following exponential expressions.

1. 2^1	2. 2^3	3. 2^{-3}
4. $\left(\frac{1}{2}\right)^{-3}$	5. $\left(\frac{1}{3}\right)^0$	6. 4^{-3}
7. 1.5673^0	8. 3^{-1}	9. $\left(\frac{1}{4}\right)^{-2}$
10. 45^1	11. $\left(-\frac{1}{2}\right)^{-2}$	12. $\left(-\frac{2}{3}\right)^2$
13. $\left(-\frac{1}{7}\right)^0$	14. $(-2)^2$	15. -2^2
16. 3^{-3}	17. 6^{-2}	18. $\left(\frac{1}{7}\right)^{-2}$
19. $\left(-\frac{1}{2}\right)^0$	20. 4^3	21. $\left(\frac{3}{2}\right)^{-1}$

Draw a graph that could represent the situation described. Then, determine if it is a linear or exponential model.

22. A helium balloon is released and it rises into the sky.	
23. The speed of a ball as it goes down a ramp.	
24. The population of a city increases each year.	
25. Each time you send a text, it costs 5 cents.	
26. The number of contestants in a single-elimination tournament, with a starting number of 128.	

Determine if the set of data is linear, exponential, or neither.

27.

x	1	2	3	4	5	6
y	-4	-2	0	2	4	6

28.

x	2	4	6	8	10	12
y	1	4	16	64	256	1024

29.

x	-6	-3	0	3
y	5	10	15	20

30.

x	20	30	40	50	60
y	1	0.4	0.16	0.064	0.0256

31.

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

32.

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

33.

x	-3	-2	-1	0	1	2	3
y	$\frac{1}{2}$	1	2	4	8	16	32

34.

x	-3	-2	-1	0	1	2	3
y	11	9	7	5	3	1	-1

35.

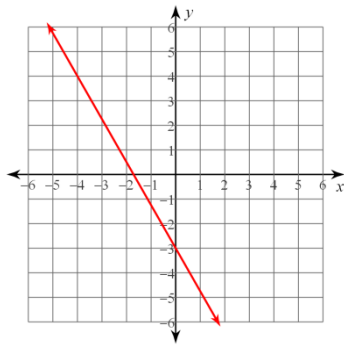
x	-3	-2	-1	0	1	2	3
y	$\frac{1}{27}$	$\frac{1}{9}$	$\frac{1}{3}$	1	3	9	27

36.

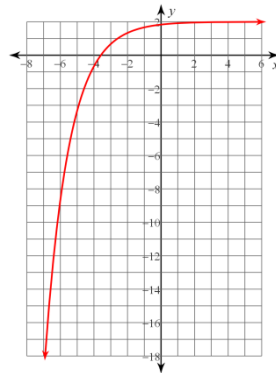
x	-3	-2	-1	0	1	2	3
y	1	0	-1	-2	-1	0	1

Determine if the graph shown is linear, exponential, or neither.

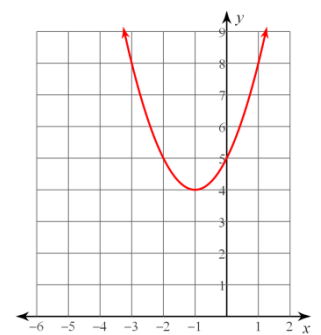
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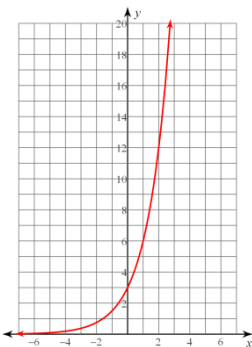
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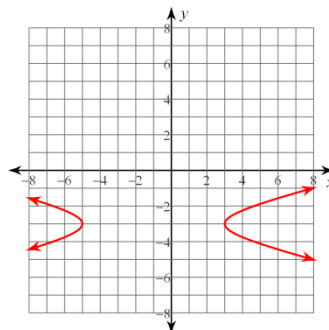
39.



40.



41.



42.

