

C-Level

Simplify

1. $\frac{-4x^6y^4}{8x^2y^3}$

$$\frac{-4 \div 4}{8 \div 4} = \frac{-1}{2}$$

$$\frac{-1x^4y^1}{2}$$

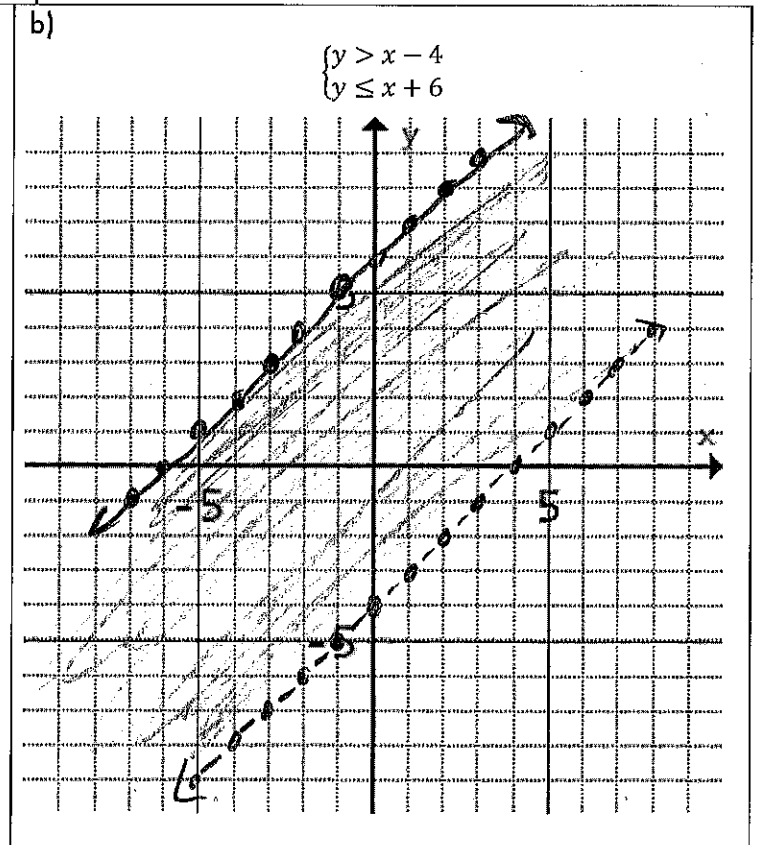
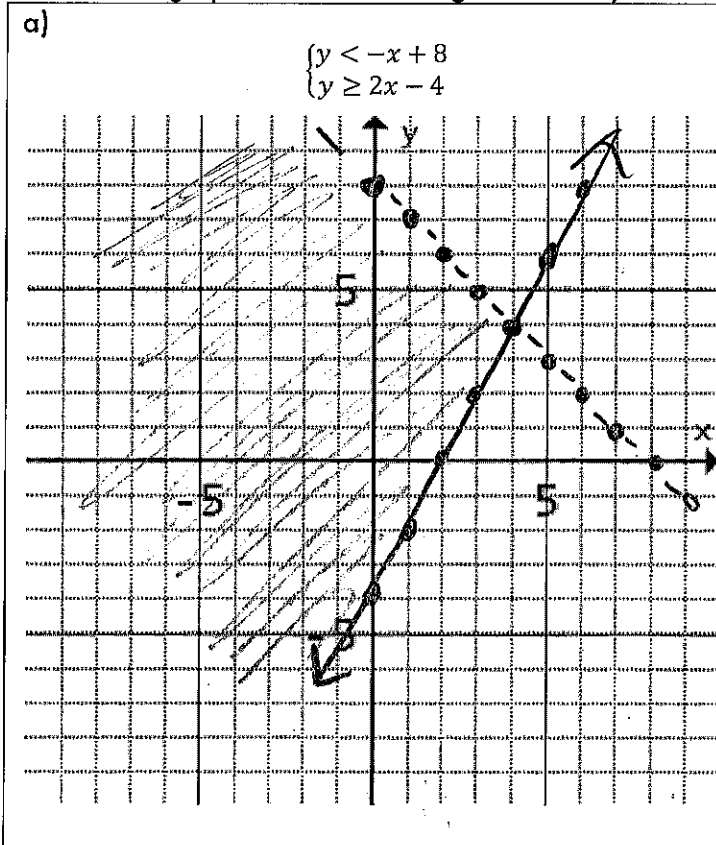
2. $\frac{-6x^5y^6}{2xy}$

$$\frac{-3x^4y^5}{1}$$

3. $\frac{2x^7y^6}{10x^4y}$

$$\frac{1x^3y^5}{5}$$

4. Draw the graph of the solution region for the system of inequalities below.



5. You want to buy one drink and some tacos. A drink costs \$2.25 and tacos cost \$1.75. You have \$10. Write an inequality. How many tacos can you buy?

$$\begin{array}{r} 2.25 + 1.75x \leq 10 \\ -2.25 \quad -2.25 \\ \hline 1.75x \leq 7.75 \\ \hline 1.75 \quad 1.75 \\ \hline x \leq 4.42 \end{array}$$

You can buy at most 4 tacos

6. To honor 1000 years in business, All Strikes Bowling is having an anniversary special. Shoes rent for \$2.75 and each game is \$3.25. If Davian has \$15 and needs to rent shoes, how many games can Davian bowl? Write an inequality and use it to solve.

$$\begin{array}{r} 2.75 + 3.25x \leq 15 \\ -2.75 \quad -2.75 \\ \hline 3.25x \leq 12.25 \\ \hline 3.25 \quad 3.25 \\ \hline x \leq 3.77 \end{array}$$

Davian can bowl at most 3 games

Write an exponential equation to represent the information in each table.

7.

x	y
0	1600
1	2000
2	2500
3	3125

$$\frac{2000}{1600} = 1.25$$

$$y = 1600(1.25)^x$$

8.

x	f(x)
1	40
2	32
3	25.6

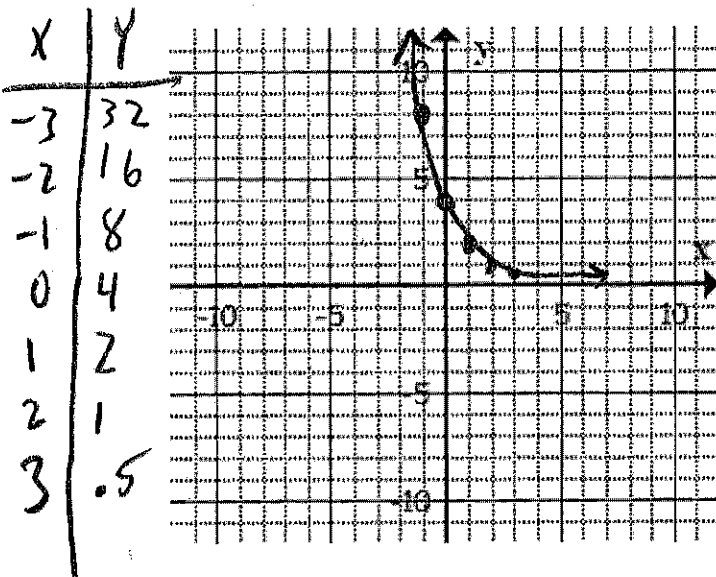
$$\frac{32}{40} = .8$$

$$40 \div .8 = 50$$

$$y = 50(.8)^x$$

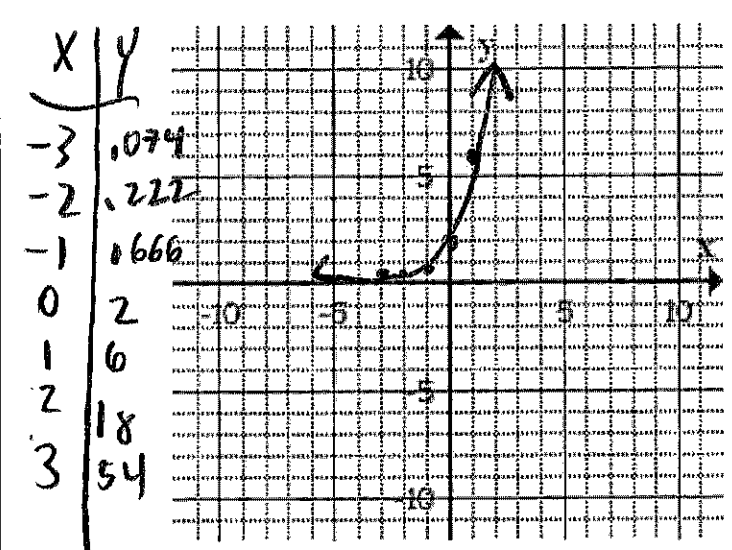
Make a table of values and draw a graph of each exponential function.

9. $y = 4(0.5)^x$



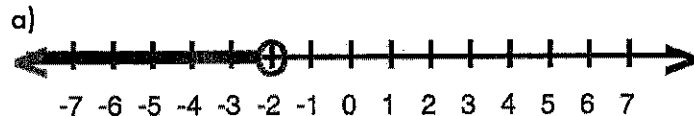
x-intercept(s)	y-intercept(s)	asymptote(s)
none	(0, 4)	y = 0

10. $y = 2(3)^x$

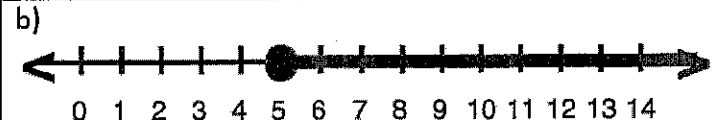


x-intercept(s)	y-intercept(s)	asymptote(s)
none	(0, 2)	y = 0

11. Write an inequality that represents the solutions shown on the number line below.



$$x < -2$$



$$x \geq 5$$

12. Evaluate $f(-6)$ for the function $f(x) = x^2 + 3x - 5$.

$$f(-6) = (-6)^2 + 3(-6) - 5$$

$$f(-6) = 13$$

13. Find the linear relationship between x and $f(x)$ in the table below and complete the relation.

x	-4	3	0	-2	4	6	-7	2	0.5
$f(x)$	-8	13	4	-2	16	22	-17	10	5.5

$$(6, 22) \quad (2, 10)$$

$$m = \frac{10 - 22}{2 - 6}$$

$$m = \frac{-12}{-4}$$

$$m = 3$$

$$y = mx + b \quad | \quad f(x) = 3x + 4$$

$$y = 3x + b \quad | \quad f(3) = 3(3) + 4$$

$$(6, 22) \quad | \quad f(3) = 13$$

$$22 = 3(6) + b \quad | \quad f(-2) = 3(-2) + 4$$

$$22 = 18 + b \quad | \quad f(-2) = -2$$

$$-18 \quad -18$$

$$4 = b$$

$$| \quad f(4) = 3(4) + 4$$

$$| \quad f(4) = 16$$

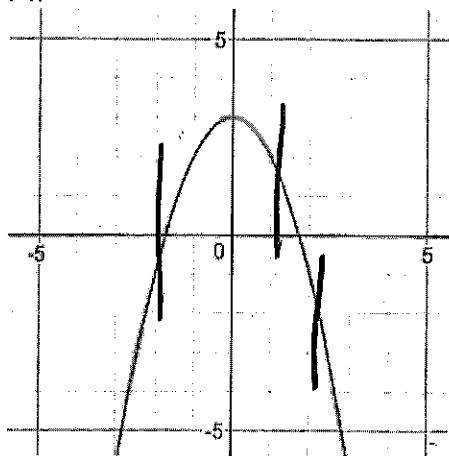
$$| \quad f(1.5) = 3(1.5) + 4$$

$$| \quad f(1.5) = 5.5$$

Relation: $f(x) = 3x + 4$

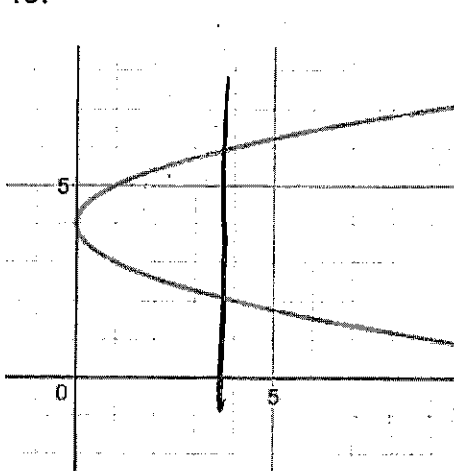
Is this a function? Defend your reasoning.

14.



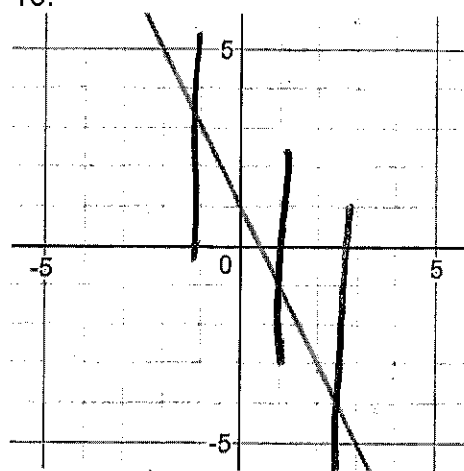
Yes! It passes the vertical line test

15.



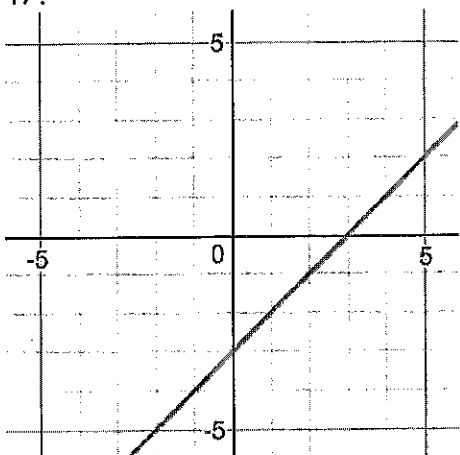
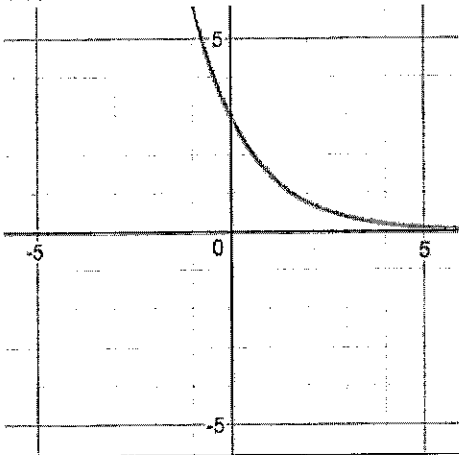
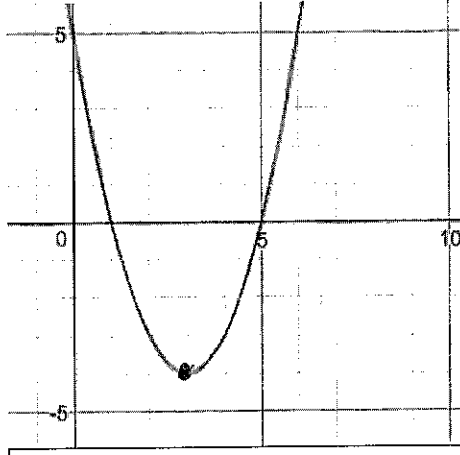
No! It fails the VLT.

16.



Yes! It passes the VLT.

Find the domain and the range of the representations.

<p>17.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Domain</p> $-\infty < x < \infty$ <p>Range</p> $-\infty < y < \infty$ </div>	<p>18.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Domain</p> $-\infty < x < \infty$ <p>Range</p> $0 < y < \infty$ </div>	<p>19.</p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>Domain</p> $-\infty < x < \infty$ <p>Range</p> $-4 \leq y < \infty$ </div>
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B- and A-Level

20. Consider the function $f(x) = x^2 + 10x + 12$. If $f(x) = 3$, solve for x .

$$x^2 + 10x + 12 = 3$$

$$x^2 + 10x + 9 = 0$$

9	9x	9
x	x^2	x
	10x	

$$(x+9)(x+1) = 0$$

$$(x+9)(x+1) = 0$$

$$x+9=0 \quad x+1=0$$

$$x=-9 \quad x=-1$$

21. Determine which expressions are equivalent to $2x^2$ after simplifying. Justify your answer.

a. $(4x^4)^{\frac{1}{2}}$	b. $\sqrt{-4x^4}$	c. $\frac{-6x^5}{3x^3}$	d. $\frac{2}{x^{-2}}$	e. $\frac{1}{(2x^2)^{-1}}$	f. $(2x)^2$
$2x^2$ Yes!	No solution No!	$-2x^2$ No!	$2x^2$ Yes	$1 \cdot (2x^2)^1$ $2x^2$ Yes	$4x^2$ No

Simplify

22. $\frac{2m^3 \cdot m}{-8m^{-4}}$

$$\frac{1m^4}{-4m^{-4}} = \frac{1m^4 m^4}{-4} = \frac{1m^8}{-4}$$

23. $\left(\frac{1}{x^3}\right)^{-2} \cdot x^0 \cdot x$

$$\frac{1^{-2}}{x^{-6}} \cdot 1 \cdot x^1 = x^6 \cdot x = x^7$$

$$24. \frac{3m^4 \cdot m^2}{6m^{-3}}$$

$$\frac{1m^6}{2m^{-3}}$$

$$\frac{1m^9}{2}$$

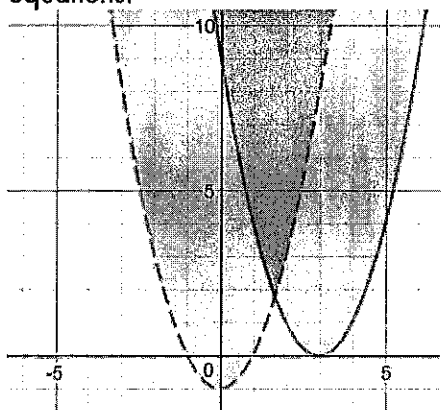
$$25. x^0 \cdot x \cdot \left(\frac{1}{x^5}\right)^{-2}$$

$$1 \cdot x^1 \cdot \frac{1}{x^{-10}}$$

$$x^1 \cdot x^{10}$$

$$x^{11}$$

26. Write two inequalities for the system below. Choose a point in the shaded region and verify your solution to both equations.



$$y > x^2 - 1$$

$$y \geq (x - 3)^2$$

(2, 5)

$$y > x^2 - 1$$

$$y \geq (x - 3)^2$$

$$5 > (2)^2 - 1$$

$$5 \geq (2 - 3)^2$$

$$5 > 3$$

$$5 \geq (-1)^2$$

True 5 > 1

True

27. Dinner at your grandfather's favorite restaurant now costs \$25.25 and has been increasing steadily at 4% per year. How much did it cost 35 years ago?

$$\frac{4}{100} = .04$$

$$1 + .04$$

$$1.04$$

$$y = 25.25 (1.04)^x$$

$$y = 25.25 (1.04)^{-35}$$

$$y = 6.40$$

35 years ago
Dinner cost
\$6.40

28. Feruse graphed the equation $g(x) = 3(2)^x$ and made the summary statements listed below. Which statements are correct? Explain why the other reasons are incorrect.

a. As x gets larger, y gets smaller.

b. The graph has no y -intercepts.

c. The values for y are both positive and negative.

d. The graph has symmetry.

e. The graph has an asymptote.

False, as x gets larger, y gets larger.

False, the y -intercept is (0, 3)

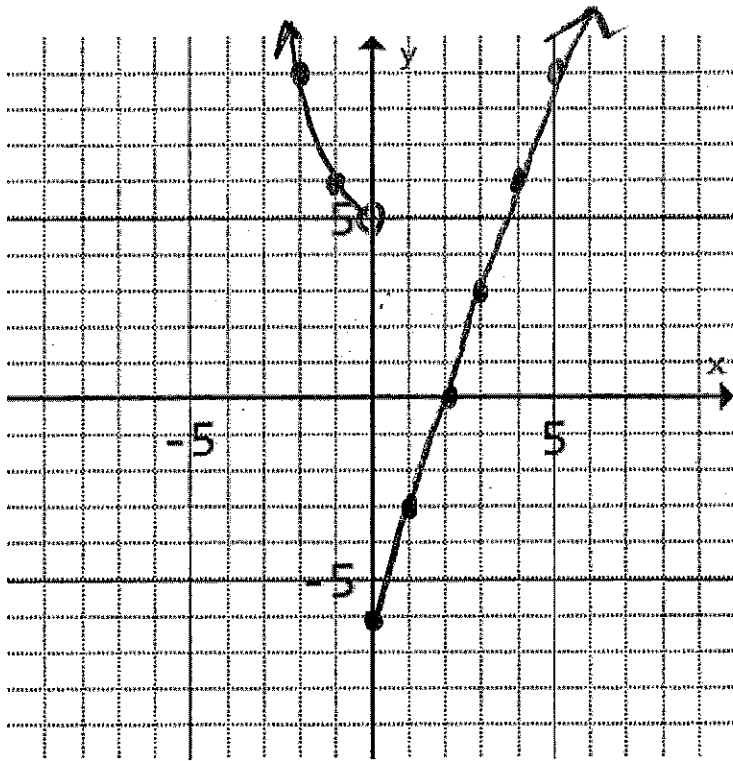
False, the y -values are only positive.

False, the graph isn't symmetrical.

True!

29. Graph the piece-wise function

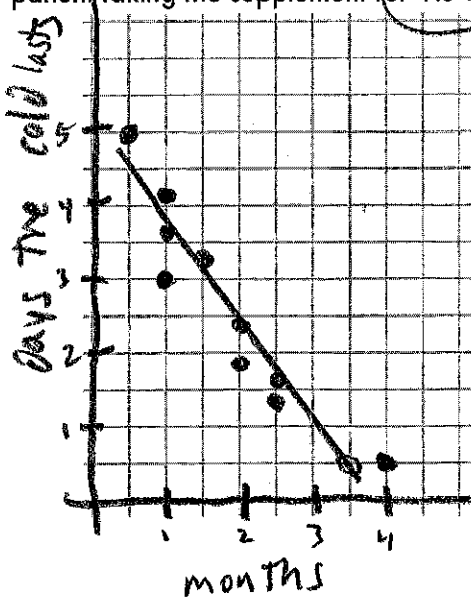
$$f(x) = \begin{cases} x^2 + 5 & x < 0 \\ 3x - 6 & x \geq 0 \end{cases}$$



30. A study has been done for a vitamin supplement that claims to shorten the length of the common cold. The data the scientists collected from ten patients in an early study are shown in the table below.

Number of months taking the supplement	0.5	2.5	1	2	0.5	1	2	1	1.5	2.5
Number of days the cold lasted	4.5	1.6	3	1.8	5	4.2	2.4	3.6	3.3	1.4

a. Model the data with a line of best fit. According to your model, how many days do expect a cold to last for a patient taking the supplement for 1.5 months.



Handwritten calculations for the slope (m):

$$m = \frac{.5 - 2.4}{3.5 - 2}$$

$$m = \frac{-1.9}{1.5}$$

$$m = -1.3$$

Handwritten calculations for the line of best fit:

$$y = -1.3x + b$$

$$2.4 = -1.3(2) + b$$

$$2.4 = -2.6 + b$$

$$+2.6 \quad +2.6$$

$$5 = b$$

$$y = -1.3x + 5$$

$$y = -1.3(1.5) + 5$$

$$y = 3.05$$

The cold lasts 3.05 days after taking the supplement for 1.5 months

b. Interpret the y-intercept in context.

The cold lasts 5 days if you take 0 months of supplement

c. Interpret the slope in context.

-1.3
1
For each month you take the supplement, your cold length goes down 1.3 days.

d. Calculate the residual (or error) for 1.5 months. Interpret the residual in the context of the problem.

$$3.33 - 3.05 = .28$$