

FUNCTIONS AND LINEAR EQUATIONS

REVIEW

Functions:

Determine if the following relations are **functions**.

1)

x	y
-3	6
0	0
3	6
6	0

YES

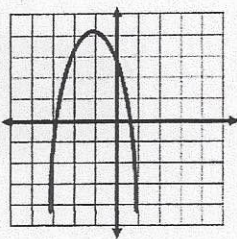
2)

input	output
25	20
15	30
5	45
5	55

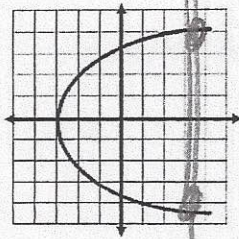
NO

x s repeat

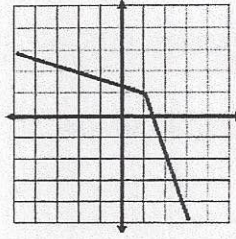
3) YES



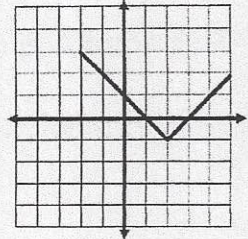
4) NO



5) YES



6) YES



use vertical line test!

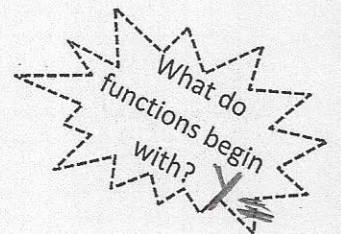
Do the following equations represent **LINEAR** functions?

7) $y = 3x^2 + 4x + 1$

8) $y = 7$

9) $x = -2$

10) $2x + 3y = 9$



- 11) a. Tell whether the relationship is a **function**.

yes

(1, 3), (2, 5), (3, 0), (4, -1), (5, 5)

Do the x's
repeat?

b. What is the **domain**? (1, 2, 3, 4, 5)

c. What is the **range**? (3, 5, 0, -1)

- 12) The table shows the approximate growth of a plant after x days.

Days (x)	0	1	2	3
Height (y)	0	1.5	3.0	4.5

$+2$
 $+3$

What is the **input variable**?

x

What is the **output variable**?

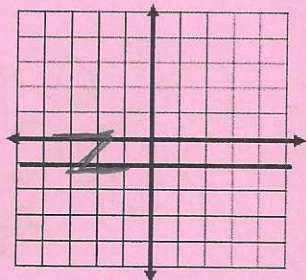
y

Find the **RATE OF CHANGE (Slope)**: use proper units.

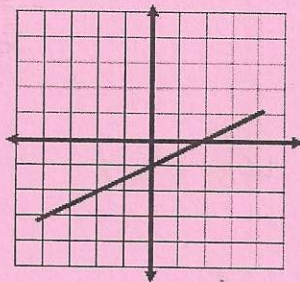
$$m = \frac{3 \text{ inches}}{2 \text{ days}}$$

~~x~~ No Decimals
in Fractions!

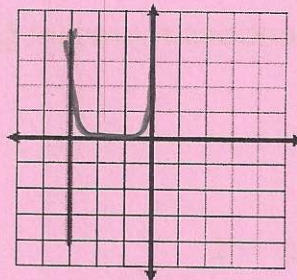
- 13) Identify each slope as **positive**, **negative**, **zero** and **undefined**.



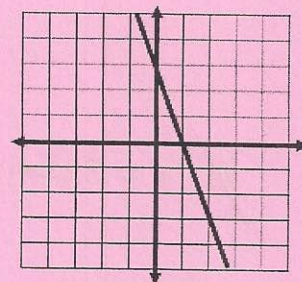
zero



positive



undefined



negative

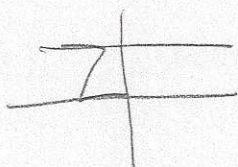
What is the rate of change (slope) and y-intercept (b) of the following questions?

14) $y = -\frac{2}{3}x + 7$ $m = -\frac{2}{3}$ $b = 7$ (0,7)

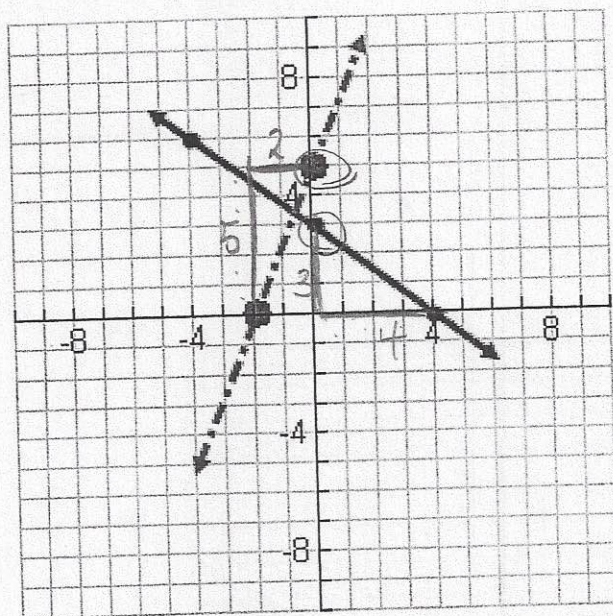
15) $y = 5x - 8$ $m = 5$ $b = -8$ (0,-8)

16) What type of line has a ZERO slope? *Sketch graph if necessary!*

- a. Vertical b. Oblique c. Horizontal d. Parallel



17) What are the slopes of the following lines:



Slope of **dashed** line:

$$m = \frac{5}{2}$$

Slope of **solid** line:

$$m = -\frac{3}{4}$$

18) What are the y-intercepts (b) for each line **above**. Dashed 5 Solid 3

Equation of a Line (slope-intercept form)

$$y = mx + b$$

$b =$ y-intercept

$$m = \frac{\Delta y}{\Delta x}$$

Write the equation of a line with the given slope and y-intercept.

19) $m = \frac{2}{5}$, $b = -3$

Equation: $y = \frac{2}{5}x - 3$

20) $m = -1$, y-intercept = $(0, 4)$

Equation: $y = -1x + 4$

Write the equation of a line given the slope and a point. (use of graph optional)

21) $m = -4$; $(1, -4)$

Equation: $y = -4x$

$m = -4$

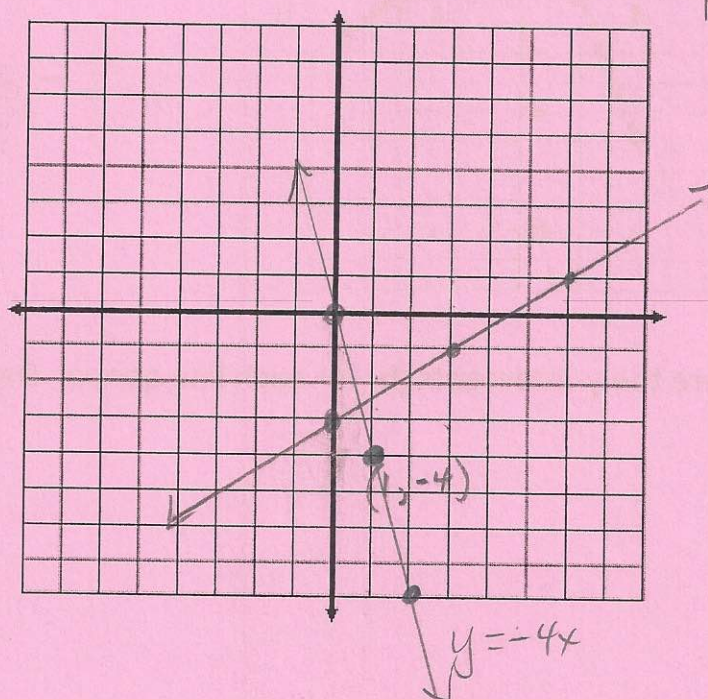
$b = 0$

21) $m = \frac{2}{3}$; $(3, -1)$

Equation: $y = \frac{2}{3}x - 3$

$m = \frac{2}{3}$

$b = -3$ $(0, -3)$



Bonus

Write the equation of a line that passes through 2 points. (use of graph optional)

22) (2, 3) and (-1, -6)

$$-3(-1-6) = -9$$

$$m = \frac{+9 \div 3}{+3 \div 3} = \frac{3}{1}$$

$$b = -3 \quad (0, -3)$$

$$y = 3x - 3$$

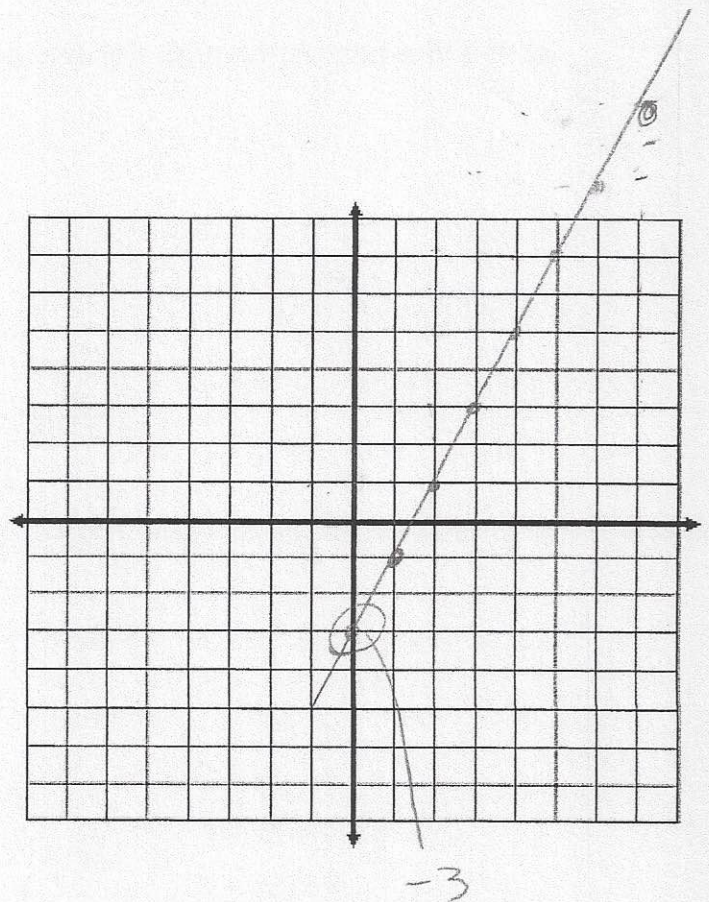
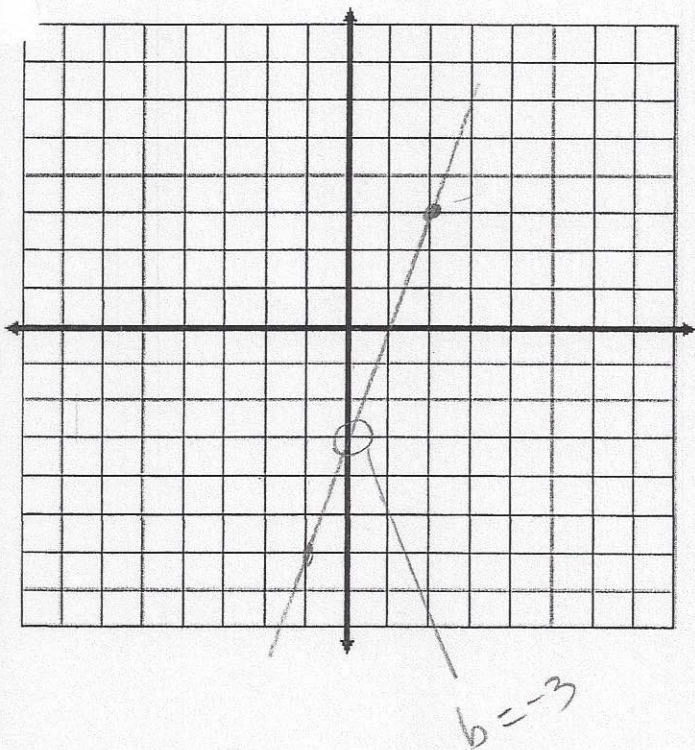
23) (1, -1) and (7, 11)

$$+6(7-1) = +12$$

$$m = \frac{12}{6} = 2$$

$$b = -3 \quad (0, -3)$$

$$y = 2x - 3$$



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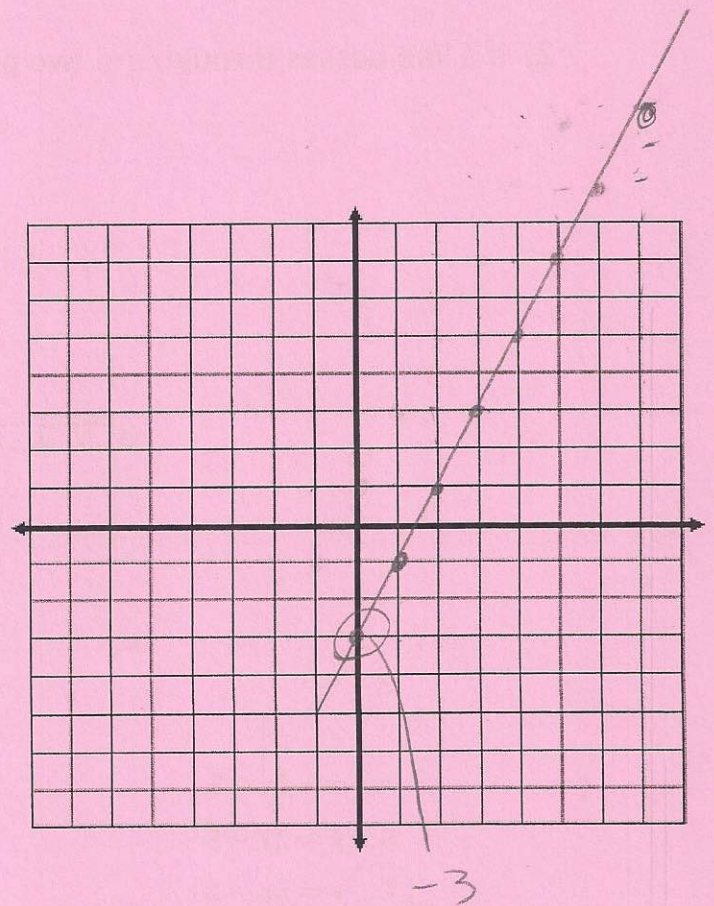
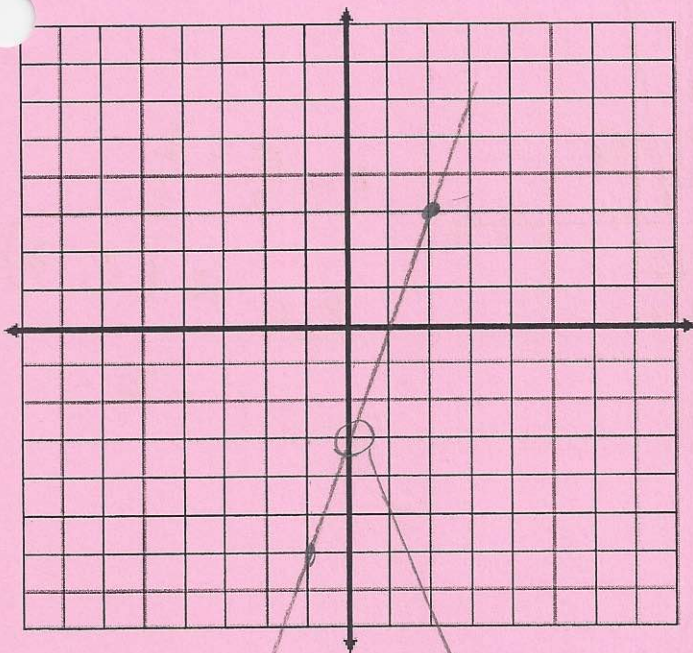
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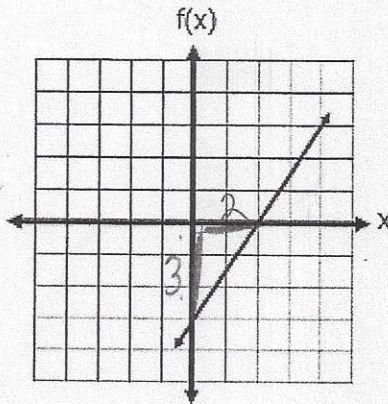
- 3) The three different linear functions below are represented in three different ways as shown.

Get y by itself
 $y = mx + b$

x	y
-3	-9
3	3
6	9

$+6$ (from -3 to 3)
 $+3$ (from 3 to 6)
 $+12$ (from -9 to 3)
 $+6$ (from 3 to 9)

$$\frac{12}{6} = \frac{6}{3} = 2 \quad (I)$$



$$(II) \quad m = \frac{3}{2}$$

$$2y + 3 = 3x$$

$$\begin{array}{r} -3 \quad -3 \\ \hline 2y = 3x - \frac{3}{2} \\ \hline \end{array}$$

$$(III) \quad y = \frac{3}{2}x - \frac{3}{2}$$

$$m = \frac{3}{2}$$

Which function has the greatest rate of change (slope)?

The table has the greatest slope $m = 2$

Do any of the above functions have the same rate of change? Justify your answer.

The graph and equation have the same rate of change $m = \frac{3}{2}$

- 4) What function has the greater rate of change?

x	y
-1	-6
0	-3
2	3

$+1$ (from -1 to 0)
 $+2$ (from 0 to 2)
 $+3$ (from -6 to -3)
 $+6$ (from -3 to 3)

(I)

$$y = mx + b$$

$$y = 2x + 4$$

$$m = 2$$

(II)

$$\frac{3}{1} = \frac{6}{2} \quad m = 3$$

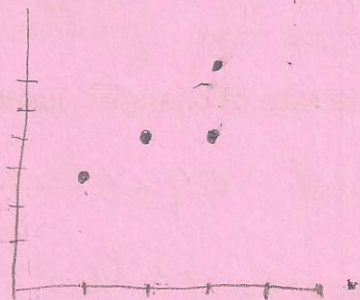
5) Which ordered pair prevent the following set from being a function?

$$\{(1,3), (2,4), (3,4), (3,6), (5,10), (6,3)\}$$

- A (3,4), (2,4)
- B. (3,4), (3,6)
- C. (1,3), (3,4)
- D. (3,6), (6,3)

6) If the data is graphed on a coordinate plane, would the graph be linear?

- A Yes, because the rule is $y = 2x$.
- B. Yes, because its graph is a straight line.
- C. No, because the graph is only in Quadrant I.
- D. No, because the rate of change is not constant.



7) Which equation represents a linear function?

~~A~~ $y = 10 + \frac{5}{7}x^3$ No exponents!

B $y = 1 - \frac{4}{3}x$

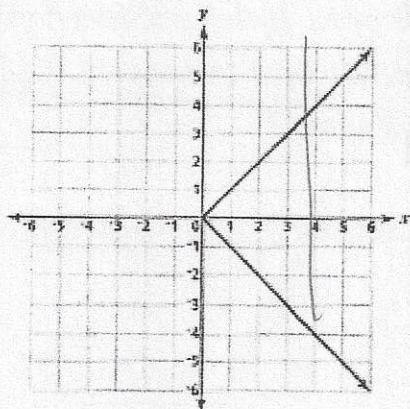
~~C~~ $y = -x^2$

NO exponents!

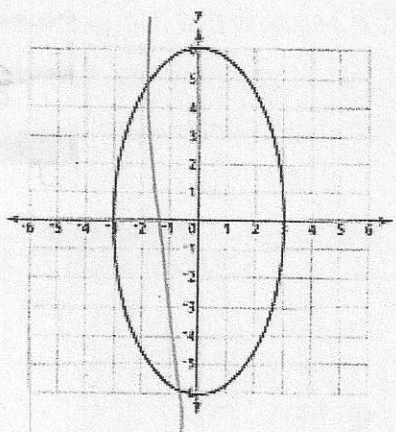
~~D~~ $y = \frac{1}{x} + 5$

can't have x in denominator

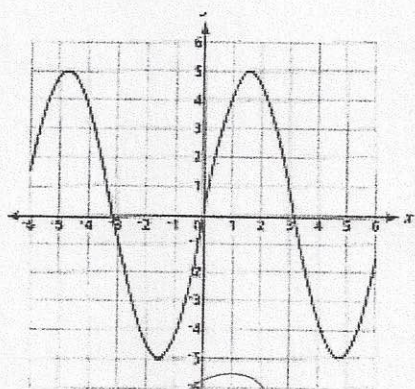
8) Which graph represents a function?



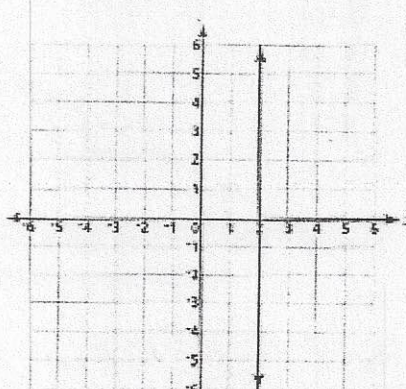
A



C



B



D

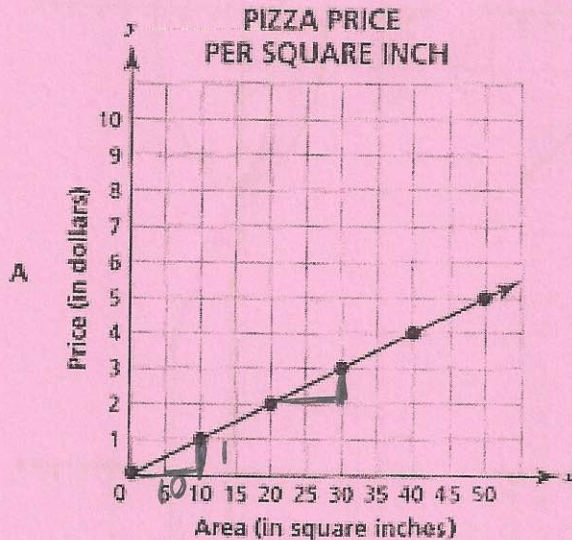
Vertical
Lines are
NOT
Functions

✖✖
The
x's Repeat

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

- 9) The price of a circular pizza is based on the diameter of the pizza and number of toppings. If P represents the price of the pizza, in dollars, and A represents the area of the pizza, in square inches, which function best represents the lowest price per square inch for a cheese pizza with no toppings?

GRAPH



$$m = \frac{\$1}{10 \text{ sq ft}} = \$0.10 \text{ per sq ft}$$

EQUATION

B $P = \$0.16 \times A$

TABLE

C

Area	Price
50 in. ²	\$4.00
100 in. ²	\$8.00
150 in. ²	\$12.00
200 in. ²	\$16.00

4
8

$\$8$
100 sq inches

$\$0.08 \text{ per square foot}$

SENTENCE

- D** A ten-inch pizza costs \$0.13 per square inch.

- 10) Which table represents a non-linear relationship?

Week	Total Deposit
1	\$25
2	\$50
3	\$75
4	\$100
5	\$125

Handwritten notes: $+1$ (next to Week 1), $+1$ (next to Week 2), $+1$ (next to Week 3), $+1$ (next to Week 4), $+1$ (next to Week 5). On the right, a bracket groups the deposit values with a handwritten $+25$ next to each row.

A

Month	Loan Payment
1	\$102.45
2	\$102.45
3	\$102.45
4	\$102.45
5	\$102.45

Handwritten notes: $+1$ (next to Month 1), $+1$ (next to Month 2), $+1$ (next to Month 3), $+1$ (next to Month 4), $+1$ (next to Month 5). On the right, a bracket groups the payment values with a handwritten 0 next to each row.

C

Year	Population
2001	10,000
2002	9,500
2003	9,000
2004	8,500
2005	8,000

Handwritten notes: $+1$ (next to Year 2001), $+1$ (next to Year 2002), $+1$ (next to Year 2003), $+1$ (next to Year 2004), $+1$ (next to Year 2005). On the right, a bracket groups the population values with a handwritten -500 next to each row.

B

Hours	Population
1	5
2	15
3	25
4	75
5	245

Handwritten notes: $+1$ (next to Hour 1), $+1$ (next to Hour 2), $+1$ (next to Hour 3), $+1$ (next to Hour 4), $+1$ (next to Hour 5). On the right, a bracket groups the population values with a handwritten $+10$ next to each row.

D