

Name _____

Date _____

Class Period _____

Extension 2.7 Writing and Graphing Piecewise Functions

A town council has just approved the following fines for speeding:

For driving over the speed limit by ...	The fine is ...
at least 1 mi/h but less than 10 mi/h	\$75
at least 10 mi/h but less than 25 mi/h	\$130 for 10 mi/h over, with the fine increasing \$10 for each additional mi/h
at least 25 mi/h	\$375 (plus other possible penalties)

STEP 1 Determine fines

Complete the table below.

mi/h over speed limit	Fine (\$)	mi/h over speed limit	Fine (\$)	mi/h over speed limit	Fine (\$)
1		10		25	
5		12		28	
8		20		32	

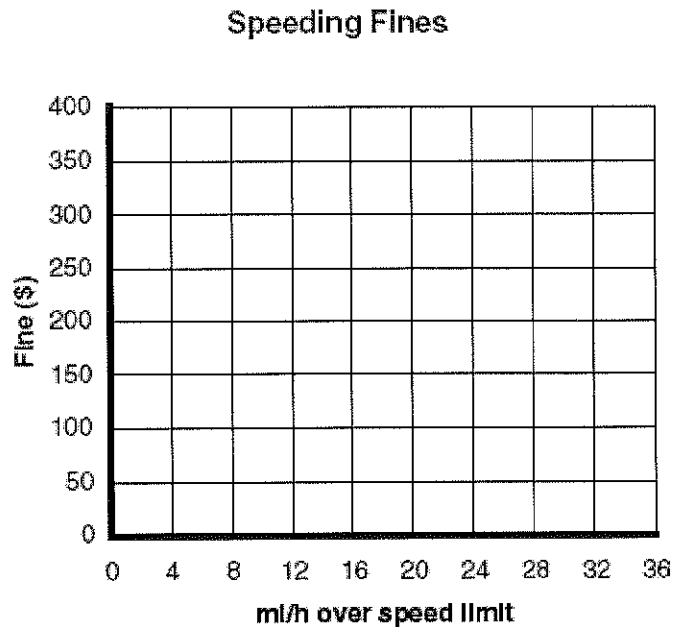
STEP 2 Write equations

Let x represent the number of miles per hour by which the speed limit is exceeded. Let y represent the fine in dollars.

For the domain ...	An equation for the fine is ...
$1 \leq x < 10$	$y = \underline{\hspace{2cm}}$
$10 \leq x < 25$	$y = \underline{\hspace{2cm}} + \underline{\hspace{2cm}}(x - \underline{\hspace{2cm}})$ This simplifies to $y = \underline{\hspace{2cm}}$.
$x \geq 25$	$y = \underline{\hspace{2cm}}$

STEP 3 Graph equations

Graph the equations from Step 2 for their given domains on the coordinate grid at the right. Use a solid dot to plot an endpoint of a segment or ray if the endpoint is included in the graph of an equation, and use an open dot if the endpoint is not included in the graph of an equation.



DRAW CONCLUSIONS Use your observations to complete these exercises

1. In Step 3, what is represented by the slope of the portion of the graph that has domain $10 \leq x < 25$?

A *piecewise function* is defined by different equations over different parts of its domain. Let $f(x)$ represent the fine in dollars for exceeding the speed limit by x miles per hour for speeds for which there is a fine.

- 2.a. Is $f(x)$ a piecewise function?

- b. If so, what is the domain of $f(x)$?

- 3.a. Does an absolute value equation of the form $y = a|x| + k$ represent a piecewise function?

- b. Explain your reasoning.

4. Write equations for a piecewise function that describes the interest I (in dollars) earned on an investment of p dollars for 1 year at a simple annual interest rate of
3.0% if the investment is at least \$1000 but less than \$5000,
3.5% if the investment is at least \$5000 but less than \$10,000,
and 4.0% if the investment is at least \$10,000.

(Use $I = prt$, where p = principle, r = interest rate as a decimal, and t = time in years. In this problem, $t = 1$.)

Then make a table and graph similar to Steps 2 and 3 above.