Parallel or Perpendicular? How Can You Tell?

Teacher Notes

How can a student be sure when lines are parallel or perpendicular to a given graph using the graphing calculator? The difficulty lies in matching a mechanical graph that is on a rectangular calculator screen to a square graph on the test document.

Look at the TAKS question below for the given Student Expectation from Geometry.

TAKS Objective 7

G.7 Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(B) The student is expected to use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons.

Which graph best represents a line parallel to the line with the equation $y = 3x + 4$?
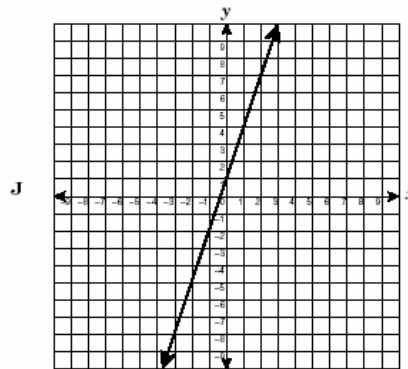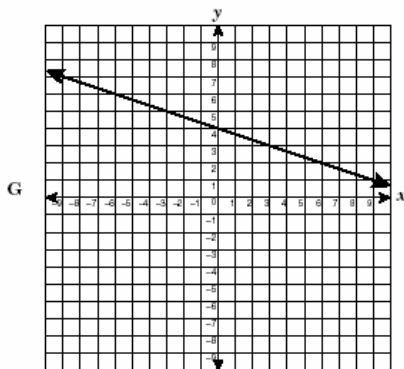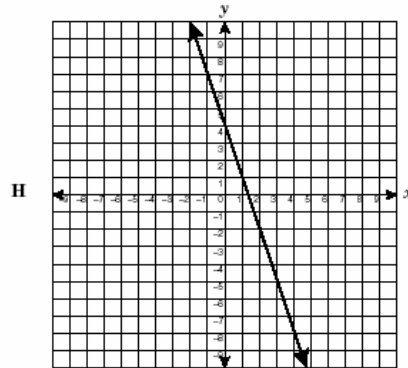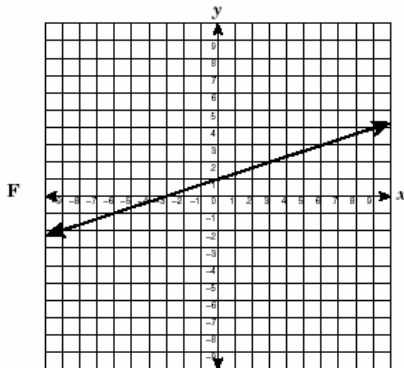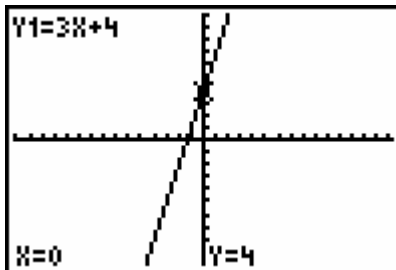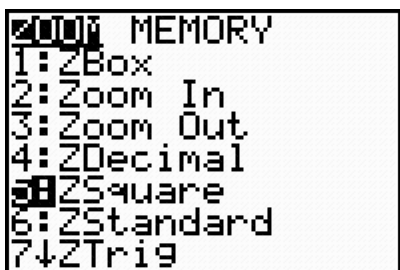
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When the student enters the given equation into the equation editor and graphs it in a standard viewing window, they may or may not be able to recognize the correct response.
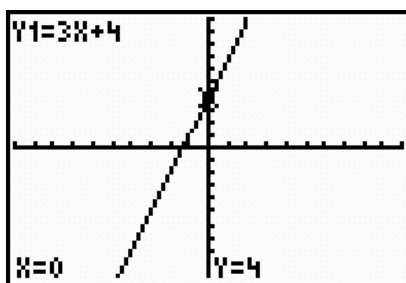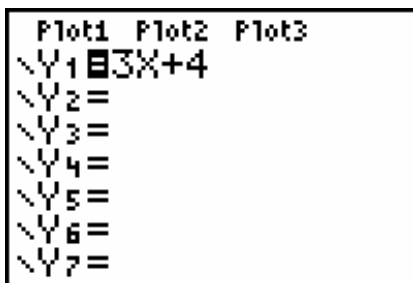
When viewed in a standard viewing window, none of the graphs appear to be parallel. To tell for sure, square the window to compare to the given graphs.

Using a squared standard window, you can see that J is the parallel line.
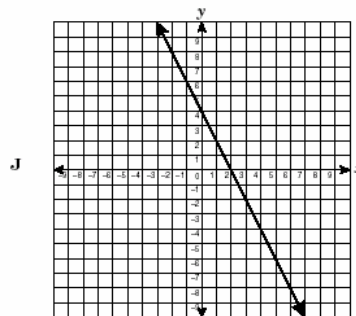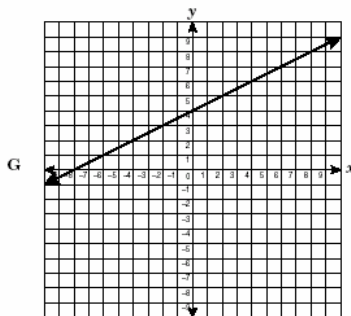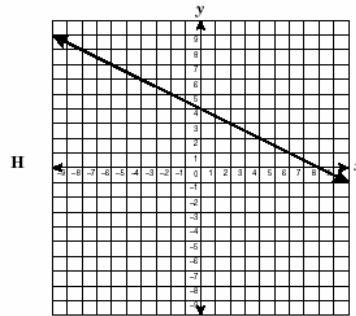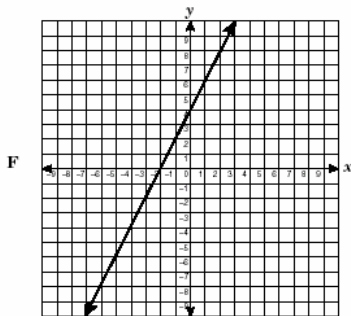
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The same issue arises with questions that look at perpendicular lines.
Look at the following TAKS question for the given TAKS Objective and Student Expectation.

11-Objective 7

G.7 **Dimensionality and the geometry of location.** The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(B) The student is expected to use slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and special segments of triangles and other polygons.

36   Which graph best represents the line passing through the point $(0, 4)$ and perpendicular to $y = -\frac{1}{2}x$?

Using a squared standard viewing window, you can see that only F can be perpendicular to the given line.
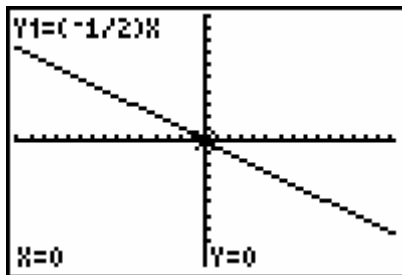
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Here is another example of a question that requires the student to understand parallel and perpendicular lines and the relationships between their slopes.

Is the slope of the line given below positive or negative?_____

What do you know about how this value appears in the equation?_____

Do you know anything about other values in the equation?_____

57 Line q is shown below.
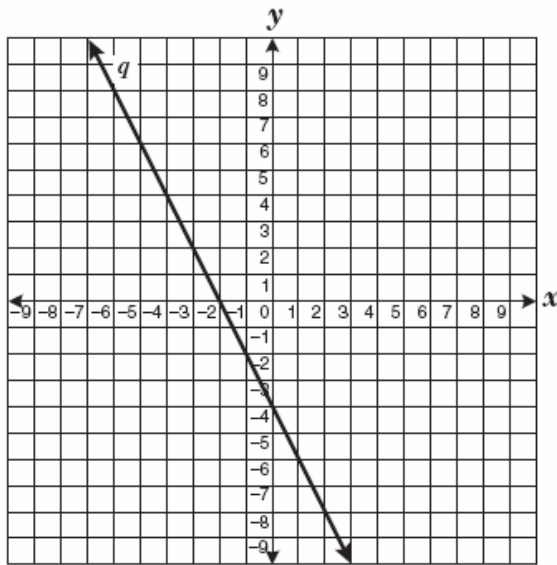
Which equation best represents a line parallel to line q?

A $y = -\dfrac{1}{2}x + 4$

B $y = \dfrac{1}{2}x - 3$

C $y = 2x - 5$

D $y = -2x + 1$

Student should recognize that the slope is negative and the y-intercept is -4. It is important that the students understand that the relationship of the slopes of the lines and not the y-intercepts that are necessary for answering this question. This means that only the equations with the same slope should be checked with the calculator.
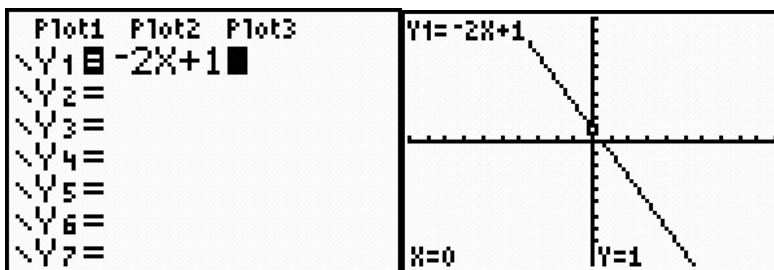
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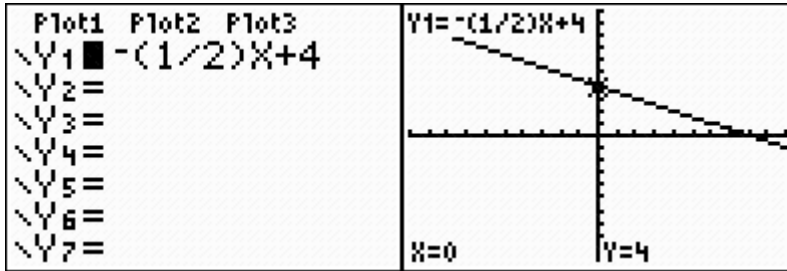
In order to see if the line is parallel, the window needs to be the same, a square window.
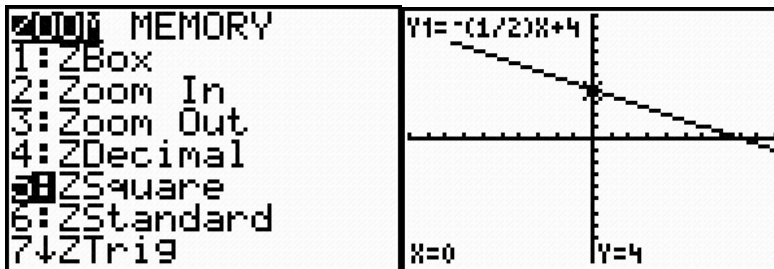
This line does not appear to be parallel to the given graph.

This graph, shown in a square window, appears to be parallel to the given graph. Answer choice D is the correct answer.
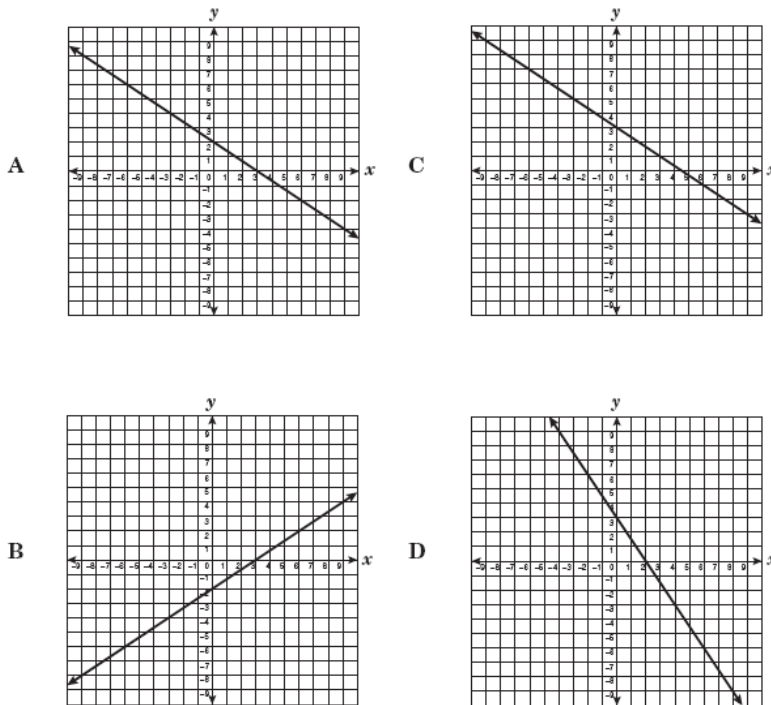
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The same strategy for checking the graph of the following equation will give students the most efficient path to the correct answer.

What is the slope of the equation given below and what is the y-intercept?_____

Which graph is the correct answer?_____

15 Which of the following is a graph of $y = -\frac{2}{3}x + 3$?

A

B

C

D

The student should recognize that the only graph with a negative slope and y-intercept of 3 is answer choice C. This should be confirmed with the graphing calculator set with a square window.

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Plot1  Plot2  Plot3
\Y1 ◘( -2/3)X+3■
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

```
Y1=(-2/3)X+3




X=0            Y=3
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