Name _____ Date _____ Class _____

CHAPTER 5

Performance Assessment Teacher Support

Quadratic Functions

Purpose:

To assess student understanding of solving quadratic equations and using quadratic equations to solve related problems.

Time:

20–30 minutes

Grouping:

Individuals or partners

Preparation Hints:

Review the Pythagorean Theorem and that the graph of a function $f(x)$ is the set of points $(x, f(x))$.

Introduce the Task:

Students study the distance between a line and the origin. They use the properties of quadratic equations in standard form to find a point on the line that is nearest to the origin. They then use the slope of the line that passes through that point and the origin to draw a conclusion about the location of a point on any line that is nearest the origin.

Performance Indicators:

_____ Uses Pythagorean Theorem to determine equation.

_____ Uses properties of quadratic equations to find point on line nearest to the origin.

_____ Uses fact that, for a line having slope m, another line with slope $-\frac{1}{m}$ is perpendicular to it, to conclude that for a point on any line that is nearest to the origin, the line joining the point and the origin is perpendicular to the original line.

Scoring Rubric:

Level 4: Student solves problems correctly and gives good explanations.

Level 3: Student solves problems but does not give satisfactory explanations.

Level 2: Student solves some problems but does not give satisfactory explanations.

Level 1: Student is not able to solve any of the problems.

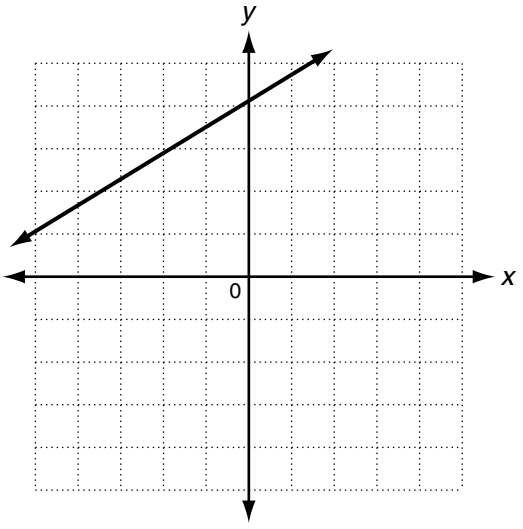
Name _____ Date _____ Class _____

CHAPTER 5

Performance Assessment

Quadratic Functions

Consider the graph of the function $f(x) = \frac{2}{3}x + \frac{13}{3}$ shown below.



1. Use the Pythagorean Theorem to write a quadratic function expressing the **square** of the distance from a point on that line to the origin.

_____

2. What point (x, y) is the minimum of that quadratic function?

_____

3. What does the point represent?

_____

4. What is the slope of the line that passes through that point and the origin?

_____

5. What does that slope tell you about the point on any line that is closest to the origin?

_____

13. One real solution

14. $x \leq -9$ or $x \geq \frac{1}{2}$

15. $-1 < x < \frac{2}{3}$

16. $f(x) = -2x^2 + 13x - 5$

17. 1.25 seconds

18. $2i + 1$

19. $-3\frac{1}{2} - \frac{27}{5}i$

20. $5\sqrt{2}$

Chapter Test Form C

1. Horizontal stretch by 8, no horizontal translation, 9 units down

2. $f(x) = \frac{2}{5}(x - 8)^2 + 3$

3. $(-4.6, -72.9)$; $(0, -20)$

4. minimum at $(-15, -27.5)$

5. $x = -\frac{7}{3}$ or $x = \frac{1}{4}$

6. $\frac{14\sqrt{29}}{87}$

7. $f(x) = 12x^2 - 23x - 24$

8. $\left(-\frac{1}{10}, -\frac{2}{7}\right)$

9. $f(x) = \left(x - \frac{3}{8}\right)^2 + \frac{55}{64}$

10. $-\frac{\sqrt{66}}{13}$

11. $x = \frac{4\sqrt{7}}{7}i$

12. $-\frac{3}{5} \pm 17i$

13. Two complex solutions

14. $-\frac{3}{4} \leq x \leq \frac{1}{14}$

15. $x \leq \frac{\sqrt{5}}{3}$ or $x \geq \frac{\sqrt{5}}{2}$

16. $-\frac{13}{60}x^2 - \frac{47\sqrt{5}}{60}x + 8$

17. 2.75 seconds

18. $\frac{3 + 35i}{1234}$

19. $4 + 4\sqrt{2} + 7i + 7i\sqrt{2}$

20. 61

Performance Assessment

1. $D^2 = \frac{13}{9}x^2 + \frac{52}{9}x + \frac{169}{9}$

2. $(-2, 3)$

3. It is the point on the line that is closest to the origin.

4. $-\frac{3}{2}$

5. The point on a line that is closest to the origin lies on a line passing through the origin that is perpendicular to the original line.

Cumulative Test

1. A

2. J

3. D

4. G

5. C

6. G

7. D

8. H

9. B

10. H

11. B

12. F

13. D

14. G

15. B

16. H

17. A

18. G

19. B

20. J

21. C

22. F

23. C

24. J