Sharyland ISD
Study Guide

Math Models
Semester 2

Student Name: _____

Student ID: _____

MMA Final Review

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. A biologist studied the populations of white-sided jackrabbits and black-tailed jackrabbits over a 5-year period. The biologist modeled the populations, in thousands, with the following polynomials where x is time, in years.

White-sided jackrabbits: $9.7x^2 - 0.8x + 2.3$
Black-tailed jackrabbits: $-1.1x^2 + 7.7x + 5.4$

What polynomial models the total number of white-sided and black-tailed jackrabbits?

a. $-8.6x^2 + 6.9x - 7.7$
b. $8.6x^2 - 6.9x + 7.7$
c. $8.6x^2 + 6.9x + 7.7$
d. $8.6x^2 - 6.9x - 7.7$

____ 2. Which two lines are parallel?

I. $5y = 2x - 5$
II. $5y = 4 + 3x$
III. $5y - 3x = -1$

a. II and III
b. I and II
c. I and III
d. No two of the lines are parallel.

____ 3. Are the lines $y = -x - 2$ and $4x + 4y = 16$ perpendicular? Explain.
a. Yes; their slopes have product –1.
b. No; their slopes are not opposite reciprocals.
c. Yes; their slopes are equal.
d. No; their slopes are not equal

Numeric Response

4. Simplify $\sqrt{27} \cdot \sqrt{3}$.

5. Simplify $\sqrt[3]{-8}$.

Problem

Simplify.

6. $\sqrt{8h^{11}}$

7. Simplify. $\sqrt{28} + \sqrt{20} + \sqrt{63}$

8. Simplify the expression.
$\sqrt{125} \cdot \sqrt{50}$

Short Answer

9. Simplify $\sqrt{144}$.

10. Simplify $\sqrt{81}$.

11. Add.
$(-6c^5 - 3c - 4) + (5c^5 + 2c - 4)$

12. Subtract.
$(3y^5 + 8y - 5) - (-8y^5 - 5y + 7)$

13. Solve the system $\begin{cases} 3x + 4y = -36 \\ -2x + 4y = -16 \end{cases}$ by graphing.

14. Multiply.
$2m^4n(3m^4n^3 + 7mn^4 - 2mnp)$

15. Multiply.
$(h + 7)(h - 3)$

16. Multiply.
$(5x - 3)(x^3 - 5x + 2)$

17. Solve $\begin{cases} y = 5x + 4 \\ y = 7x + 6 \end{cases}$ by substitution.

18. Solve $\begin{cases} 3x + y = -3 \\ y = x + 5 \end{cases}$ by substitution.

19. Multiply.
$(d + g)^2$

20. Multiply.
$(6w + 6z)^2$

21. Multiply.
$(c + 5)(c - 5)$

22. Factor $27x^2z + 36xz + 12z$ completely.

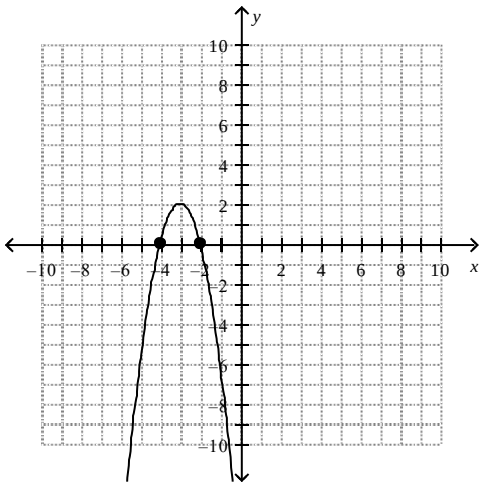
23. Factor $x^4 + 50x^2 + 625$.

24. Tell whether the graph of the quadratic function $f(x) = -x^2 - 10x + 1$ opens upward or downward. Explain.

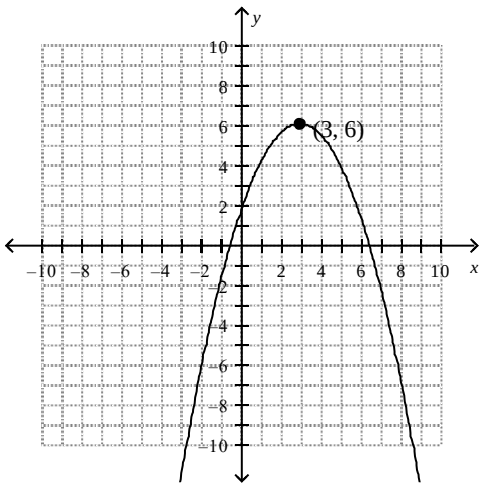
25. Factor $15x^3 - 6x^2 - 25x + 10$.

26. Factor $4x^3 - 16x^2 + 12 - 3x$.

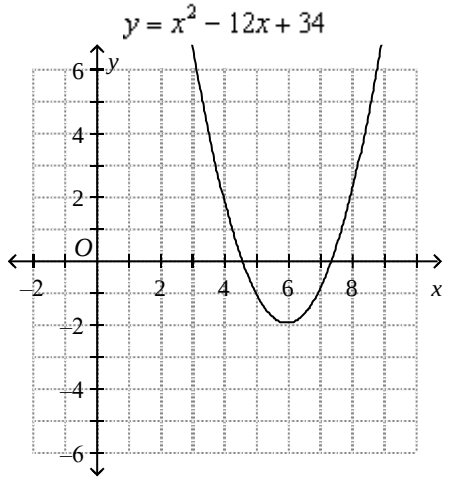
27. Find the vertex of the parabola $y = -2x^2 - 12x - 16$.



28. Find the vertex of the parabola. Then give the minimum or maximum value of the function.

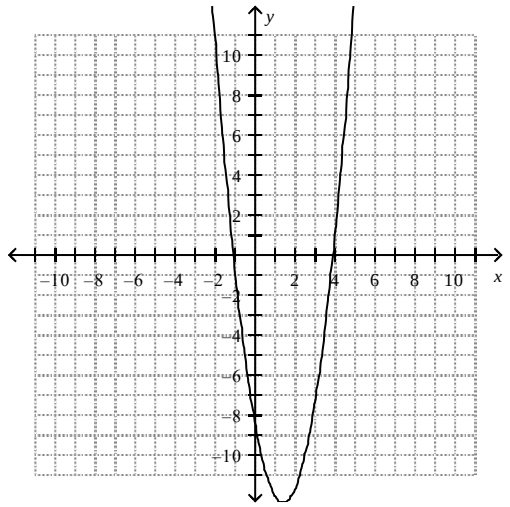


29. What is the minimum of the function in the graph?



30. What are the roots of $y = 3x^2 - 8x - 16$?

31. Find the zeros of the quadratic function $f(x) = 2x^2 - 6x - 8$ from the graph.



32. Find the roots of $-x^2 + 4x - 4$.

33. Solve $\begin{cases} y = x + 3 \\ y = x^2 + 10x + 23 \end{cases}$ by substitution. If necessary, round answers to the nearest hundredth.

Simplify the sum.

34. $(2u^3 + 6u^2 + 3) + (2u^3 - 7u + 6)$

35. Is the line through points $P(3, -5)$ and $Q(1, 4)$ parallel to the line through points $R(-1, 1)$ and $S(3, -3)$? Explain.

36. What is the equation in point-slope form for the line parallel to $y = 5x - 4$ that contains $P(-6, 1)$?

37. What is the equation in point-slope form for the line parallel to $y = -2x + 10$ that contains $J(6, 8)$?

38. What is an equation in point-slope form for the line perpendicular to $y = 2x + 13$ that contains $(8, -4)$?

39. Simplify the expression $\sqrt{9y^{10}}$. Assume any variables are positive.

40. Simplify the expression $\sqrt{14b}\sqrt{21b}$. Assume any variables are positive.

MMA Final Review
Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 DIF: L4
   REF: 7-1 Adding and Subtracting Polynomials
   OBJ: 7-1.1 To classify, add, and subtract polynomials STA: (10)(A)
   TOP: 7-1 Problem 4 Adding Polynomials KEY: polynomial | trinomial | standard form of a polynomial
2. ANS: A PTS: 1 DIF: L3
   REF: 3-8 Slopes of Parallel and Perpendicular Lines
   OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
   TOP: 3-8 Problem 1 Verifying Parallelism KEY: slopes of parallel lines | parallel lines
3. ANS: B PTS: 1 DIF: L3
   REF: 3-8 Slopes of Parallel and Perpendicular Lines
   OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
   TOP: 3-8 Problem 4 Writing Equations of Perpendicular Lines
   KEY: slopes of perpendicular lines | perpendicular lines | reasoning

NUMERIC RESPONSE

4. ANS: 9

   PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
   NAT: NCTM NO.2a TOP: Benchmark Test 2
   MSC: Alg2_S04_00065
5. ANS: –2

   PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
   NAT: NCTM NO.2a TOP: Cumulative Test 8
   MSC: Alg2_S04_00066

PROBLEM

6. ANS:
   $2h^5\sqrt{2h}$

   PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
   NAT: NCTM A.2a TOP: Cumulative Test 11 MSC: Alg2_S04_00110
7. ANS:
   $5\sqrt{7} + 2\sqrt{5}$

   PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
   NAT: NCTM NO.2a TOP: Cumulative Test 16
   MSC: Alg2_S04_00112
8. ANS:

$25\sqrt{10}$

PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
NAT: NCTM NO.2a TOP: Cumulative Test 19
MSC: Alg2_S04_00113

SHORT ANSWER

9. ANS:
12

PTS: 1 REF: Lesson 46: Simplifying Expressions with Square Roots and Higher-Order Roots
NAT: NCTM NO.2a MSC: Alg1_S05_00031

10. ANS:
9

PTS: 1 REF: Lesson 46: Simplifying Expressions with Square Roots and Higher-Order Roots
NAT: NCTM NO.2a MSC: Alg1_S05_00031

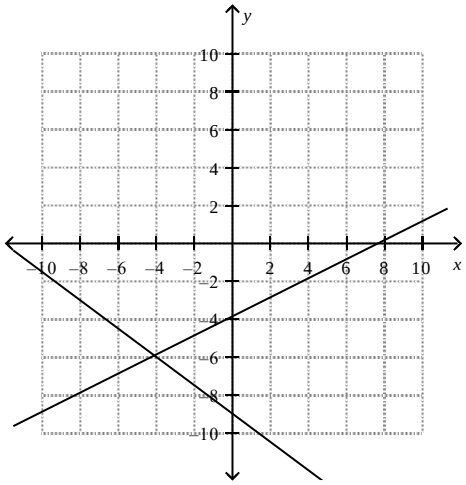
11. ANS:
$-c^5 - c - 8$

PTS: 1 REF: Lesson 53: Adding and Subtracting Polynomials
NAT: NCTM A.2a MSC: Alg1_S06_00012

12. ANS:
$11y^5 + 13y - 12$

PTS: 1 REF: Lesson 53: Adding and Subtracting Polynomials
NAT: NCTM A.2a MSC: Alg1_S06_00013

13. ANS:
$(-4, -6)$



PTS: 1 REF: Lesson 55: Solving Systems of Linear Equations by Graphing
NAT: NCTM A.1f MSC: Alg1_S06_00020

14. ANS:

$6m^8n^4 + 14m^5n^5 - 4m^5n^2p$

PTS: 1 REF: Lesson 58: Multiplying Polynomials
NAT: NCTM A.1e MSC: Alg1_S06_00032

15. ANS:
$h^2 + 4h - 21$

PTS: 1 REF: Lesson 58: Multiplying Polynomials
NAT: NCTM A.1e MSC: Alg1_S06_00033

16. ANS:
$5x^4 - 3x^3 - 25x^2 + 25x - 6$

PTS: 1 REF: Lesson 58: Multiplying Polynomials
NAT: NCTM A.1e MSC: Alg1_S06_00034

17. ANS:
(–1, –1)

PTS: 1 REF: Lesson 59: Solving Systems of Linear Equations by Substitution
NAT: NCTM A.2b MSC: Alg1_S06_00036

18. ANS:
(–2, 3)

PTS: 1 REF: Lesson 59: Solving Systems of Linear Equations by Substitution
NAT: NCTM A.2b MSC: Alg1_S06_00037

19. ANS:
$d^2 + 2dg + g^2$

PTS: 1 REF: Lesson 60: Finding Special Products of Binomials
NAT: NCTM A.2b MSC: Alg1_S06_00041

20. ANS:
$36w^2 + 72wz + 36z^2$

PTS: 1 REF: Lesson 60: Finding Special Products of Binomials
NAT: NCTM A.2b MSC: Alg1_S06_00042

21. ANS:
$c^2 - 25$

PTS: 1 REF: Lesson 60: Finding Special Products of Binomials
NAT: NCTM A.2b MSC: Alg1_S06_00044

22. ANS:
$3z(3x + 2)^2$

PTS: 1 REF: Lesson 83: Factoring Special Products
NAT: NCTM A.1e MSC: Alg1_S09_00010

23. ANS:
$(x^2 + 25)^2$

PTS: 1 REF: Lesson 83: Factoring Special Products
NAT: NCTM A.1e MSC: Alg1_S09_00011

24. ANS:
Because $a < 0$, the parabola opens downward.

PTS: 1 REF: Lesson 84: Identifying Quadratic Functions
NAT: NCTM A.1e MSC: Alg1_S09_00018

25. ANS:
$(5x - 2)(3x^2 - 5)$

PTS: 1 REF: Lesson 87: Factoring Polynomials by Grouping
NAT: NCTM A.1e MSC: Alg1_S09_00028

26. ANS:
$(x - 4)(4x^2 - 3)$

PTS: 1 REF: Lesson 87: Factoring Polynomials by Grouping
NAT: NCTM A.1e MSC: Alg1_S09_00029

27. ANS:

(–3, 2)

PTS: 1 REF: Lesson 89: Identifying Characteristics of Quadratic Functions
NAT: NCTM A.1e MSC: Alg1_S09_00036

28. ANS:
The vertex is $(3, 6)$, and the maximum is 6.

PTS: 1 REF: Lesson 89: Identifying Characteristics of Quadratic Functions
NAT: NCTM A.1e MSC: Alg1_S09_00037

29. ANS:
–2

PTS: 1 REF: Lesson 89: Identifying Characteristics of Quadratic Functions
NAT: NCTM A.2b TOP: End-of-Course Exam MSC: Alg1_S09_00050

30. ANS:
$-\frac{4}{3}$, 4

PTS: 1 REF: Lesson 98: Solving Quadratic Equations by Factoring
NAT: NCTM A.2b TOP: End-of-Course Exam MSC: Alg1_S10_00008

31. ANS:
4 and –1

PTS: 1 REF: Lesson 96: Graphing Quadratic Functions
NAT: NCTM A.1e MSC: Alg1_S10_00027

32. ANS:
The only root is 2.

PTS: 1 REF: Lesson 100: Solving Quadratic Equations by Graphing
NAT: NCTM A.2b MSC: Alg1_S10_00047

33. ANS:
(–5, –2) and (–4, –1)

PTS: 1 REF: Lesson 112: Graphing and Solving Systems of Linear and Quadratic Equations
NAT: NCTM A.2b MSC: Alg1_S12_00008

34. ANS:
$4u^3 + 6u^2 - 7u + 9$

PTS: 1 DIF: L3 REF: 7-1 Adding and Subtracting Polynomials
OBJ: 7-1.1 To classify, add, and subtract polynomials STA: (10)(A)
TOP: 7-1 Problem 4 Adding Polynomials KEY: polynomial | standard form of a polynomial | trinomial

35. ANS:
No; the lines have unequal slopes.

PTS: 1 DIF: L2 REF: 3-8 Slopes of Parallel and Perpendicular Lines
OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
TOP: 3-8 Problem 1 Verifying Parallelism
KEY: slopes of parallel lines | graphing | parallel lines

36. ANS:
$y - 1 = 5(x + 6)$

PTS: 1 DIF: L3 REF: 3-8 Slopes of Parallel and Perpendicular Lines
OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
TOP: 3-8 Problem 2 Writing Equations of Parallel Lines KEY: slopes of parallel lines | parallel lines

37. ANS:
$y - 8 = -2(x - 6)$

PTS: 1 DIF: L3 REF: 3-8 Slopes of Parallel and Perpendicular Lines
OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
TOP: 3-8 Problem 2 Writing Equations of Parallel Lines KEY: slopes of parallel lines | parallel lines

38. ANS:
$y + 4 = -\frac{1}{2}(x - 8)$

PTS: 1 DIF: L3 REF: 3-8 Slopes of Parallel and Perpendicular Lines
OBJ: 3-8.1 To relate slope to parallel and perpendicular lines STA: (2)(B)| (2)(C)
TOP: 3-8 Problem 4 Writing Equations of Perpendicular Lines
KEY: slopes of perpendicular lines | perpendicular lines

39. ANS:
$3y^5$

PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
NAT: NCTM A.2a MSC: Alg2_S04_00050

40. ANS:
$\left(7\sqrt{6}\right)b$

PTS: 1 REF: Lesson 40: Simplifying Radical Expressions
NAT: NCTM A.2a MSC: Alg2_S04_00051