

# **Math I**

## **Student/Parent Guide**

**This guide will be sent to you throughout the term to help guide you and your child through Math I. As the term progresses, a new unit outline, terminology, and sample test will be added. If you have any questions about your child's progress, please contact his/her teacher.**

## How does Math I Look in Your Child's Classroom?

- **Students will be doing more than arithmetic:** Students will be seeing that math is much more than arithmetic (knowing the facts and number operations): it involves estimation, algebra, geometry, probability, statistics, and more.
- **Students will be striving to achieve high goals:** Students will be achieving high standards of understanding, complexity, and accuracy set for them by their parents, teachers, schools, and the state of Georgia.
- **Students will be actively involved in the study of mathematics:** Students will be doing tasks that involve investigations. They will be talking and writing explanations for their thinking.
- **Students will be working with one another:** Students will be collaborating to make discoveries, draw conclusions, and discuss math.
- **Students will be evaluated in a variety of ways:** Teachers will use many different ways to determine if children know and understand math concepts. Some of these will include writing samples, projects, or written tests. Not all evaluation will be the same for every classroom or every child.
- **Students will be using calculators to solve problems:** They will be using calculators not as crutches but as tools to solve more complex problems with bigger numbers than they could do otherwise.

## Helping Your Child Achieve in Math I

- **Positive attitudes about math will reinforce encouragement.** Your feeling will have an impact on how your children think about math and themselves as mathematicians. Positive attitudes about math are important in encouraging your child to think mathematically.
- **The unit outline will help your child preview upcoming material.** Even if all of the material is new to you, discuss with your child what they will be learning and tell them that you are looking forward to learning with them.
- **The terminology will help familiarize your child with the language of mathematics.** These words can be thought of as a spelling list for the students, where knowing the definition is important.
- **The practice test is a great review and helps alleviate test anxiety.** Before the end of unit assessment, make sure that your child has worked through the practice assessments and encourage him/her to ask the teacher questions about any problems that seem difficult or confusing.

## Unit I Outline

- I. Students will explore and interpret the characteristics of functions (mathematical formulas), using graphs, tables and simple algebraic techniques.
- A. Basic Functions that Students MUST know.
- $$f(x) = x$$
- $$f(x) = x^2$$
- $$f(x) = x^3$$
- $$f(x) = \sqrt{x}$$
- $$f(x) = |x|$$
- $$f(x) = \frac{1}{x}$$
- B. Transformations of Basic Functions
1. Vertical Shifts
  2. Stretches
  3. Shrinks
  4. Reflections across axis
  5. Rates of change, constant versus variable (speed)
- C. Characteristics of Functions
1. Domain and Range
  2. Zeros
  3. Intervals of Increase and Decrease
  4. Maximum/Minimum
  5. End Behavior
  6. Patterns (sequences)
- II. Students will understand and use the language of mathematical argument and justification.
1. If then statements
  2. Converse
  3. Inverse
  4. Contrapositive
  5. Conjecture
  6. Inductive reasoning
  7. Deductive reasoning
  8. Counter examples
  9. Indirect proofs

## **Terminology:**

**Contrapositive:** A conditional statement that negates and reverses the hypothesis and the conclusion.

**Converse:** A conditional statement that reverses the hypothesis and the conclusion.

**Continuous:** A set of data that can include any Real-numbered value in a given interval such temperature, time, and length.

**Discrete:** A set of data that represents a situation where the possibilities are distinct and separated from each other such as counts of people.

**Domain:** The set of all possible values for the independent or input variable in a function.

**Hypothesis:** In a conditional statement, the part that follows "if."

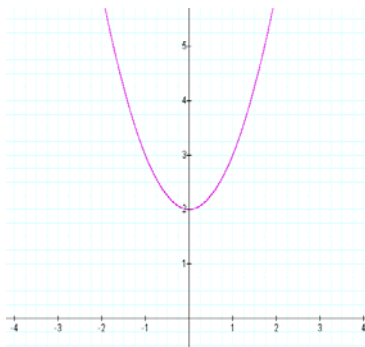
**Inverse:** A conditional statement that negates the hypothesis and the conclusion.

**Range:** The set of all possible values for the dependent or output variable in a function.

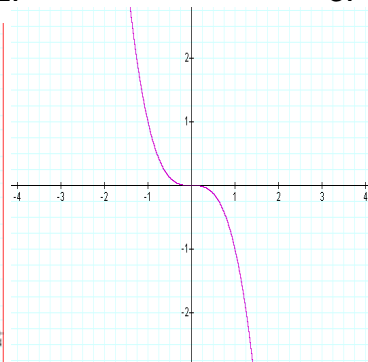
This paper is yours to keep.

Use these five graphs to answer questions 1 through 12 below.

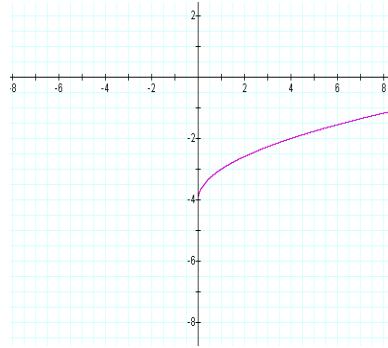
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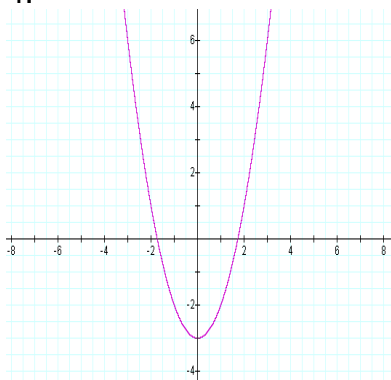
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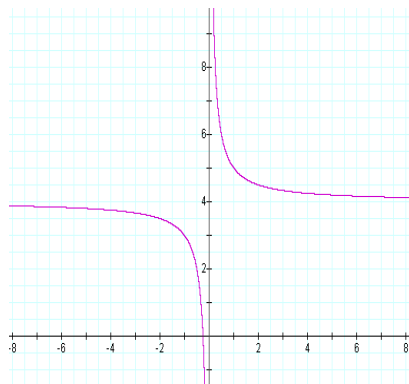
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4.



5.



**Questions:** write the best answer to each.

1. What is the domain of graph number 3?

- A.  $-\infty < x < \infty$       B.  $-4 \leq x < \infty$       C.  $-\infty < x < -4$       D.  $0 \leq x < \infty$

2. What is the range of graph number 3?

- A.  $-\infty < y < \infty$       B.  $-4 \leq y < \infty$       C.  $-\infty < y < -4$       D.  $0 \leq y < \infty$

3. What is the y-intercept of graph number 4?

- A. -3      B. 3      C. 0      D. -1.8, 1.8

4. Find the x-intercept(s) of graph number 5?

- A. -0.25      B. 0.25      C. 0      D. none

5. What is the region of increase for graph number 1?

- A.  $-\infty < x < \infty$       B.  $-\infty < x \leq 0$       C.  $-\infty < x < 3$       D.  $0 \leq x < \infty$

6. What is the domain of graph number 2?

- A.  $-\infty < x < \infty$       B.  $-\infty < x \leq 0$       C.  $-\infty < y < \infty$       D.  $0 \leq y < \infty$

7. What is the range of graph number 4?

- A.  $-\infty \leq y < -3$       B.  $-3 \leq y < \infty$       C.  $0 \leq x < \infty$       D.  $-\infty \leq y < \infty$

8. Find the x-intercept(s) of graph number 4?

- A. -1.8                      B. -3                      C. 1.8 and -1.8                      D. -3 and 3

9. Find the y-intercept(s) of graph number 1?

- A. -2                      B. 2                      C. 0                      D. none

10. What is the region of decrease for graph number 4?

- A.  $-\infty < x < \infty$                       B.  $-\infty < x \leq 0$                       C.  $-\infty < x \leq -3$                       D.  $0 \leq x < \infty$

11. Write the equation of graph number 5.

12. Write the equation of graph number 3.

Sketch the following.

13.  $f(x) = -4 - \frac{1}{2}x^2$

14. An absolute value function that is reflected and translated down 4 units.

15. A rational function that is reflected.

Describe the transformation(s) that are performed on the parent graph.

16.  $y = -5x + 23$

17.  $f(x) = 4 - \frac{1}{2}x^3$

Use the function  $f(x) = |x|$  to answer questions 18 and 19.

18. What is the rate of change between points (-2,2) and (0,0)?

19. What is the average rate of change between points (-2,2) and (2,2)?

20a. and 20b. Write the explicit and recursive relationships describing the sequence below.

1 3 5 7 9

21. Is the following sequence arithmetic or geometric?

3 6 12 24 48

22. In \_\_\_\_\_ reasoning, a person begins with a general rule and applies it to a specific situation to reach a conclusion about that situation. .

23. In \_\_\_\_\_ reasoning, a person uses a number of specific examples to arrive at a general rule that applies to those specific situations.

Answer questions 24-26 using this conditional statement: "If you study, then you are a loser." State what modification of the original conditional statement is given.

24. If you do not study, then you are not a loser. \_\_\_\_\_

25. If you are not a loser, then you do not study. \_\_\_\_\_

26. If you are a loser, then you study. \_\_\_\_\_

Memory Jogger:

$$y = x$$

$$y = |x|$$

$$y = x^2$$

$$y = x^3$$

$$y = \sqrt{x}$$

$$y = \frac{1}{x}$$

## Answers

1. D

2. B

3. A

4. A

5. D

6. A

7. B

8. C

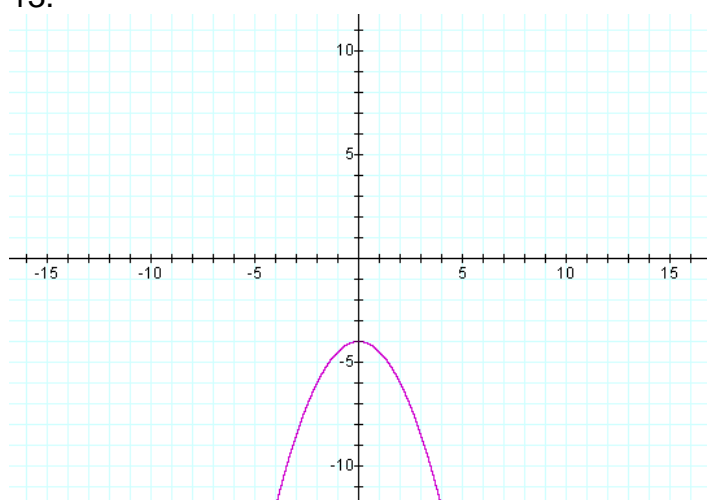
9. B

10. B

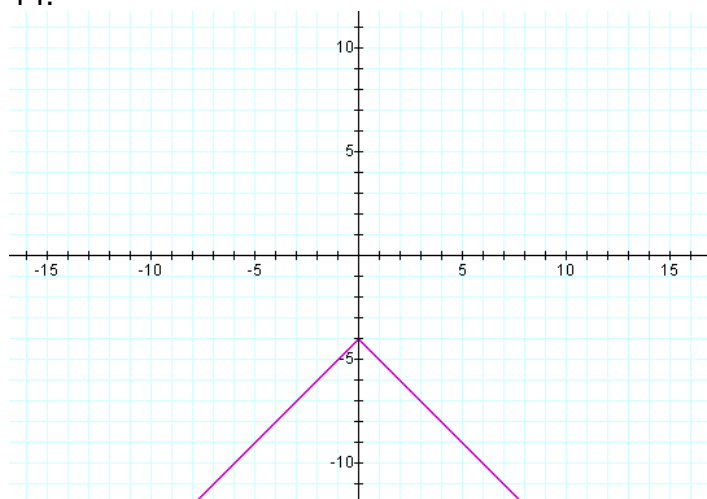
11.  $y = \frac{1}{x} + 4$

12.  $y = \sqrt{x} - 4$

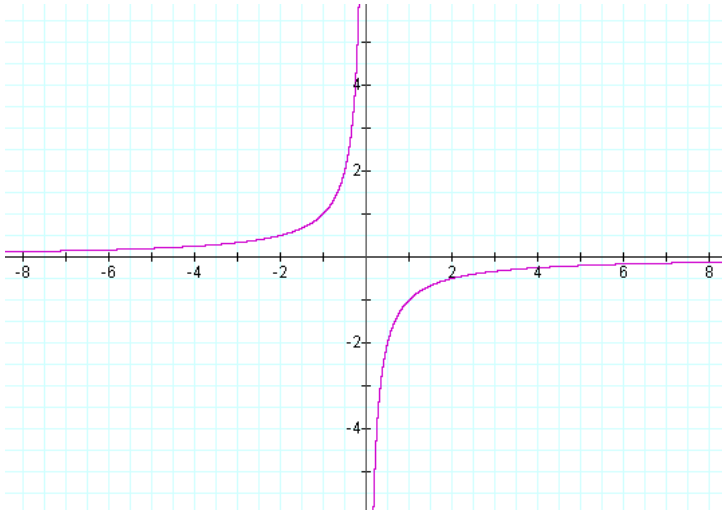
13.



14.



15.



For 16 – 19, the order of the transformations matters!

16. reflect; dilate by 5; shift (or translate) up by 23.

17. reflect; dilate by  $\frac{1}{2}$ ; shift up by 4

18. ROC = -1

19. average ROC = 0

20a.  $a_n = 1 + (N - 1)2$

20b.  $a_n = a_{n-1} + 2$

21. Geometric

22. Deductive

23. Inductive

24. Inverse

25. Contrapositive

26. Converse

(Myrna Olson and Ben Wagner/FBHS)

## Resources

Georgia Department of Education

Mathematics Teachers of Hall County

U. S. Department of Education