EOCT Review Topics

Unit 1: Relationships Between Quantities

- Converting between units
  - 5280 feet/mile

Example 1: Convert 5 miles to feet

Example 2: A rectangle has a length of 2 meters and a width of 40 centimeters. What is the perimeter of the rectangle?

Example 3: Convert 60 miles per hour to feet per minute

- Appropriate units of measure

Example 4: d = m/v
If mass is measure in kilograms and volume is measured in cubic meters. what is the unit rate for density?

Example 5: The number of calories a person burns doing an activity can be approximated using the formula $C = kmt$, where m is the person's weight in pounds and t is the duration of the activity in minutes. Find the units for the coefficient k.

- Quantities can be counts or measures. These can be exact or approximate.
- Term, Coefficient, Constant, Factors

Example 6: $4x^2 + 7xy - 3$

Example 7: $4x(x + 2)(5x-8)$

- Interpreting formulas

Example 8: To interpret a formula, it is important to know what each variable represents and to understand the relationships between the variables. For example, look at the compound interest formula $A = P(1 + r)^t$

Example 9: The number of calories burned during exercise depends on the activity. The formulas for two activities are given. $C1 = 0.012mt$ and $C2 = 0.032mt$

- Writing and Solving Equations
    - Inequalities – look for words such as at least, greater/less than, no more than, etc.

Example 10: The Jones family has twice as many tomato plants as pepper plants. If there are 21 plants in their garden how many plants are pepper plants?

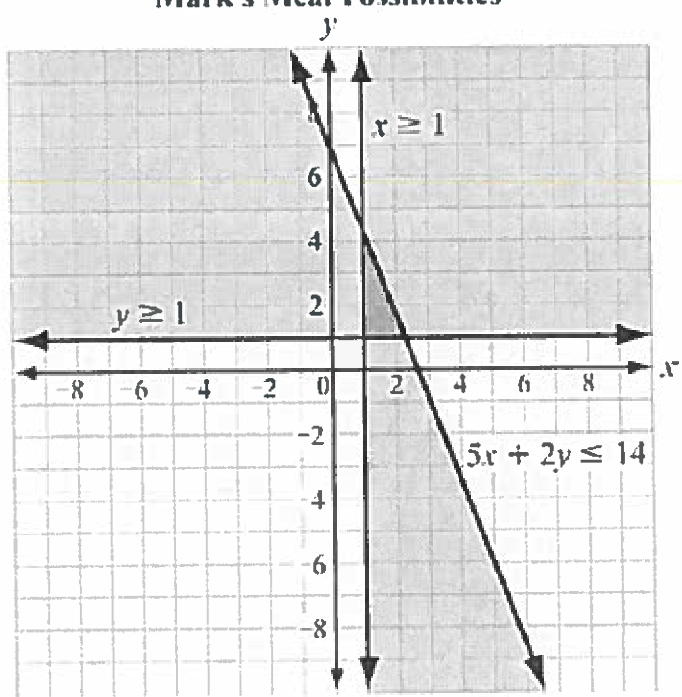
Example 11: Find two consecutive integers whose sum is 225.

Example 12: A rectangle is 7 cm longer that it is wide. Its perimeter is at least 58 cm. What are the smallest possible dimensions for the rectangle?

Example 13: The city of Arachna has a spider population that has been doubling every year. If there are about 100,000 spiders this year, how many will there be 4 years from now?

Example 14: Constraints
Mark has $14 to buy lunch for himself and his sister. He wants to buy at least one sandwich and one drink. If sandwiches cost $5 and drinks cost $2, what combinations of numbers of sandwiches and drinks could Mark buy?

Mark's Meal Possibilities



Unit 2: Reasoning with Equations and Inequalities

- Properties – be able to justify the steps of solving an equation using the properties
  - Substitution
  - Addition Property of Equality
  - Subtraction Property of Equality
  - Multiplication Property of Equality
  - Division Property of Equality
  - Reflexive Property
  - Transitive Property
  - Symmetric Property
  - Distributive Property

Example 1: Solve and justify each step 16 = 3(x + 8)

- Solving Equations and Inequalities
  - What are equivalent expressions?

Example 2: Is the expression $\frac{6x+8}{2}$ equivalent to 3x + 4?

  - Tip: Eliminate denominators in fractions

Example 3: $\frac{m}{4} + \frac{m}{6} = 1$

  - Tip: Remember special rule when multiplying or dividing with negative numbers in inequalities

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- Writing Equations from Word Problems

Example 4: A ferry boat carries passengers back and forth between two communities on the Peachville River.

- It takes 30 minutes longer for the ferry to make the trip upstream than downstream.
- The ferry's average speed in still water is 15 miles per hour.
- The river's current is usually 5 miles per hour.

This equation can be used to determine how many miles apart the two communities are.

$$\frac{m}{15-5} = \frac{m}{15+5} + 0.5$$

What is *m*, the distance between the two communities?

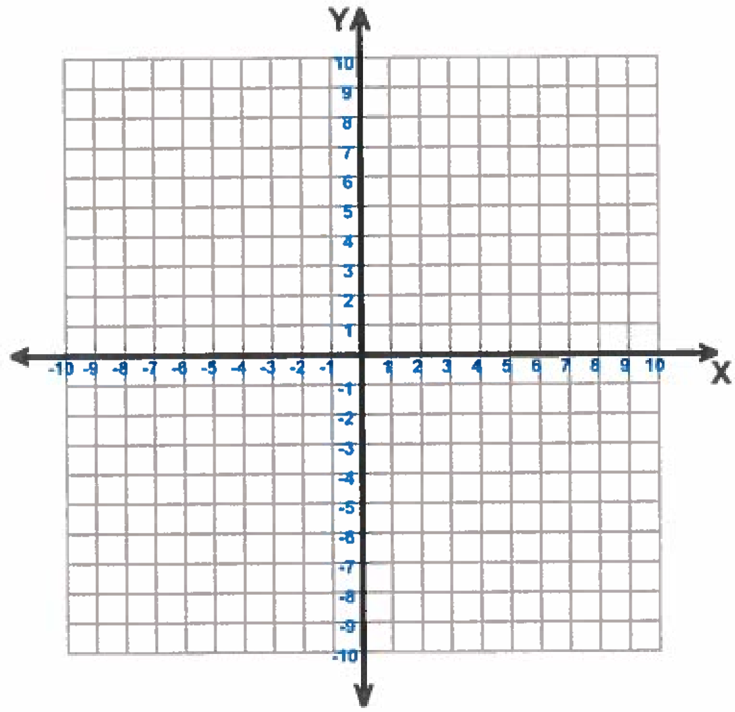
Example 5: Joachim wants to know if he can afford to add texting to his cell phone plan. He currently spends $21.49 per month for his cell phone plan, and the most he can spend for his cell phone is $30 per month. He could get unlimited texts added to his plan for an additional $10 each month. Or, he could get a "pay-as-you-go" plan that charges a flat rate of $0.15 per text message. He assumes that he will send an average of 5 text messages per day. Can Joachim afford to add a text message plan to his cell phone?

- Solving for Variables

Example 6: Solve for x 14 = ax + 6

Example 7: Solve for y 6a – 2y > 4

- Solving Systems of Equations
  - Solutions to systems are ordered pairs
  - Systems can have 0, 1 or infinite solutions
  - Three Methods for Solving: Substitution, Elimination, Graphing
  - Tip: Use calculators to create tables?



Example 8: Solve $\begin{cases} y = 2x - 4 \\ x = y + 1 \end{cases}$

Example 9: Solve $\begin{cases} 2x - y = 1 \\ 5 - 3x = 2y \end{cases}$

Example 10: Solve $\begin{cases} x - 3y = 6 \\ -x + 3y = -6 \end{cases}$

Example 11: Solve $\begin{cases} -3x - y = 10 \\ 3x + y = -8 \end{cases}$

Example 12: Is (3, -1) a solution to this system? $\begin{cases} y = 2 - x \\ 3 - 2y = 2x \end{cases}$

Example 13: Rebecca has five coins worth 65 cents in her pocket. If she only has quarters and nickels, how many quarters does she have? Use a system of equations to arrive at your answer and show all steps.

Example 14: Peg and Larry purchased "no contract" cell phones. Peg's phone cost $25 plus $0.25 per minute. Larry's phone cost $35 plus $0.20 per minute. After how many minutes of use will Peg's phone cost more than Larry's phone?

- Graphing Equations and Inequalities
  - When do you use a number line?

Example 15: 3x + 8 < 14

  - When do you use a coordinate plane?

Example 16: 3x + y > -1

  - Remember the differences in graphing: $<, >, \leq, \geq$

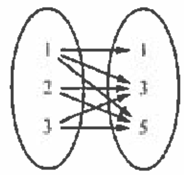
- Graphing Systems of Inequalities

EOCT Review Topics

Unit 3: Linear and Exponential Functions

- Linear Equations $y=mx+b$
- Exponential Equations $y = a(b)^x$ or $y = a(1 \pm \%)^x$

- Functions and function notation $f(x)$



x	y
1	1
1	2
1	3
1	4
2	1
2	4
3	1

- Domain and Range

$\{(1, 1), (2, 3), (3, 5)\}$

Example 1: Given $f(x) = 2x - 1$, find $f(7)$.

The equation describes the function rule.
f is the function. x is the input. f(x) is the output.

- Restrictions on domain and range?

Example 2: A manufacturer keeps track of her monthly costs by using a "cost function" that assigns a total cost for a given number of manufactured items, x. The function is $C(x) = 5{,}000 + 1.3x$.

a. What is the domain of the function?
b. What is the cost of 2,000 items?
c. If costs must be kept below $10,000 this month, what is the greatest number of items she can manufacture?

- Sequence Vocabulary: Sequence, Term, Finite, Infinite, Explicit (closed) form, Recursive form
- Arithmetic Sequences (linear)
  - Recursive form: $a_n = a_{n-1} + d$ $a_1 =$ ___
  - Explicit form: $a_n = dn + d_0$

Example 3: Consider the sequence: 3, 6, 9, 12, 15, . . .

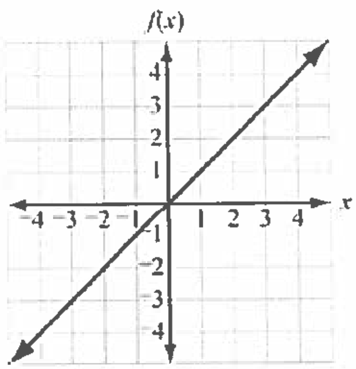
- Geometric Sequences (exponential)
  - Recursive form: $a_n = r \cdot a_{n-1}$ $a_1 =$ ___
  - Explicit form: $a_n = a_1(r)^{n-1}$

Example 4: Consider the sequence: $16, 8, 4, 2, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}$

- Properties of functions – from graphs and tables
  - Domain
  - Range
  - Intercepts
  - Increasing/decreasing
  - Positive/negative
  - Maximum/minimum
  - Rate of change
  - Even or odd

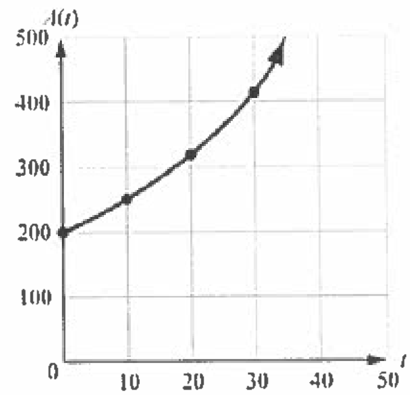
Example 5:

Linear Function
$f(x) = x$



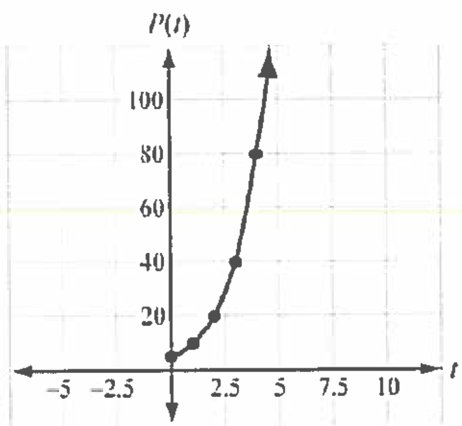
Example 6:

The amount accumulated in a bank account over a time period t and based on an initial deposit of \$200 is found using the formula $A(t) = 200(1.025)^t$, $t \geq 0$. Time, t, is represente on the horizontal axis. The accumulated amount, $A(t)$, is represented on the vertical axis.



a. What are the intercepts of the function?
b. What is the domain of the function?
c. Why are all the t values non-negative?
d. What is the range of the function?
e. Does the function have a maximum or minimum value?

Example 7: A population of squirrels doubles every year. Initially there were 5 squirrels. A biologist studying the squirrels created a function to model their population growth, $P(t) = 5(2t)$ where t is time. The graph of the function is shown. What is the range of the function?



- Translations of linear and exponential functions (Parent functions: $y = x$ and $y = 2^x$)
  - Horizontal shift
    - Linear $y = x + 2$ $\quad$ $y = 2^x + 3$
    - $y = x - 2$ $\quad$ $y = 2^x - 3$
  - Reflection
    - Linear $y = -x$ $\quad$ $y = -2^x$
  - Stretch (steeper) or shrink (less steep)
    - Linear $y = 2x$ $\quad$ $y = 2(2)^x$
    - $y = \frac{1}{2}x$ $\quad$ $y = \frac{1}{2}(2)^x$

- Parameters – slope (the coefficient) and y-intercept (the constant)
  - $y = mx + b$
  - Affect the shape and position of the function

EOCT Review Topics

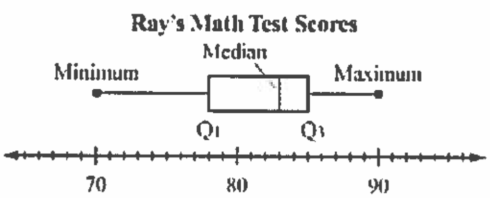
Unit 4: Describing Data

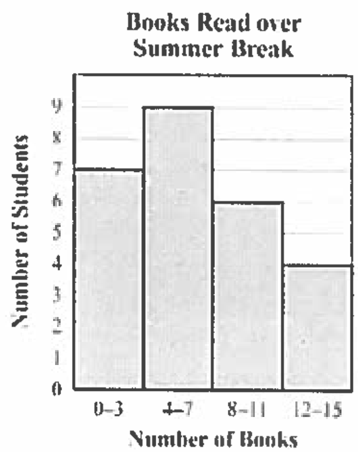
Summarize, Represent, and Interpret Data - Single Variable/Coumt

- Measures of central tendency
  - Mean
  - Median

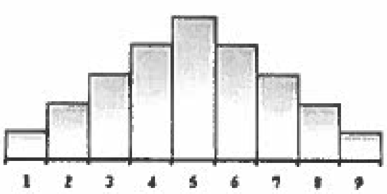
PRACTICE: 70, 78, 82, 83, 84, 85, 90

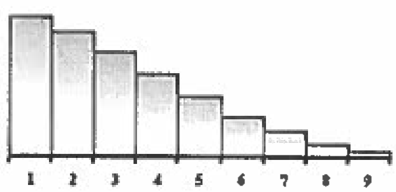
- Measures of spread
  - Interquartile range
  - Mean absolute deviation (MAD)
- Quartiles
  - First quartile/lower quartile/Q_1
  - Third quartile/upper quartile/Q_3
  - (BTW: the median is the Q_2)
- Representing Data
  - Histogram
  - Box plot
  - Dot plots

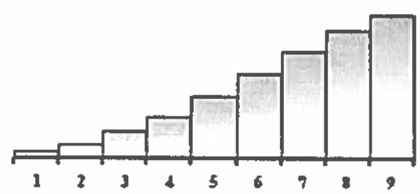


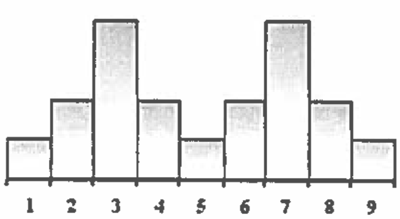


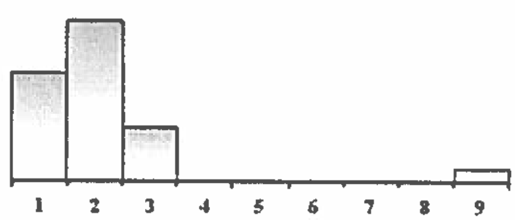
  - Frequency distribution
  - Normal distribution vs. Skewness
  - Bimodal and Multimodal











- Outliers

Student P: {8, 9, 9, 9, 10}
Student Q: {3, 9, 9, 9, 10}

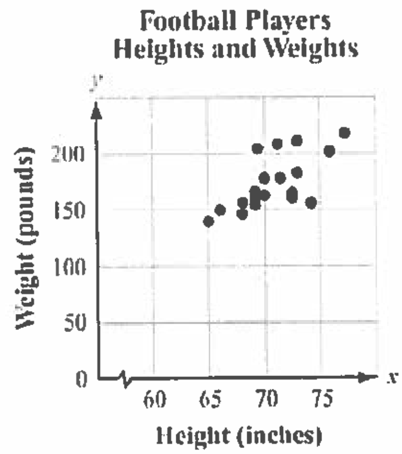
Summarize, Represent, and Interpret Data - Two Variable/Category

- Two main types of data – categorical and quantitative
- Bivariate data
  - Can be represented as an ordered pair
  - Scatter plots
- Two-way frequency chart (Categorical Data)
  - Joint frequency
  - Marginal frequency
  - Conditional frequency

Participation in School Activities

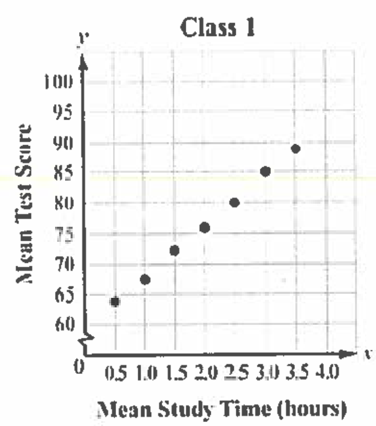
School Club	Gender		
	Male	Female	Totals
Band	12	21	33
Chorus	15	17	32
Chess	16	3	19
Latin	7	9	16
Yearbook	28	7	35
Totals	78	57	**135**

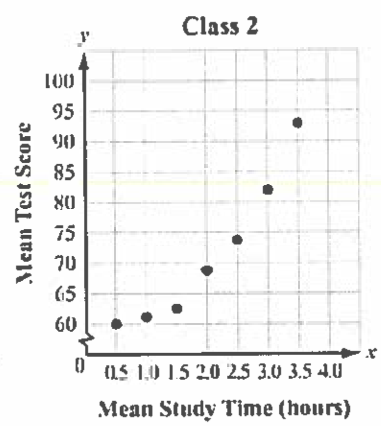
- Scatter plot (Quantitative Data)
  - Line of best fit
  - Regression
  - Residuals
  - Correlation coefficient

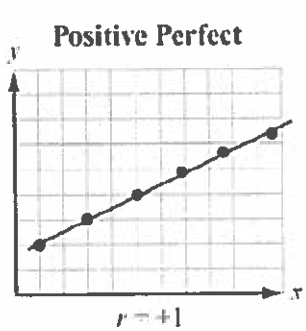


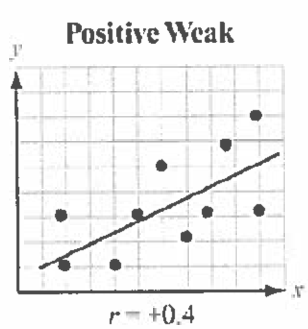
Class 1 Test Score Analysis

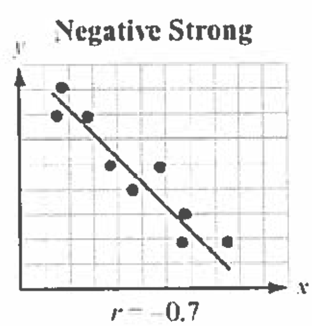
Mean Study Time (hours)	Mean Test Score
0.5	63
1	67
1.5	72
2	76
2.5	80
3	85
3.5	89











Name:________________________________

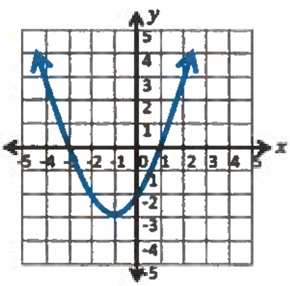
Review for Test 9: Quadratic Functions

1. Which of the following statements about quadratic functions are true?

   I. The graph can have one solution
   II. The graph can have two solutions
   III. The graph can have three solutions
   IV. The graph will always cross the x-axis

A. I, II and III B. I, II, III and IV
C. I, II and IV D. I and II

Use the graph below to answer questions #2-7



2. What is the axis of symmetry for the graph?

A. $y = -3$ B. $y = -1$
C. $x = -3$ D. $x = -1$

3. What is the vertex?

A. $(-1, -3)$ B. $(1, 0)$
C. $(-3, 0)$ D. $(-3, 1)$

4. What is the domain for the graph?

A. $y \geq -3$ B. $-3 \leq x \leq 1$
C. $-\infty < x < \infty$ D. $\{-3, 1\}$

5. What is the range of the function?

A. $y \geq -3$ B. $-3 \leq y \leq 1$
C. $-\infty < y < \infty$ D. $y = -3$

6. Which of the following statements is true?

A. minimum at $x = -3$ B. minimum at $y = -3$
C. maximum at $y = 4$ D. maximum at $y = -3$

7. What is y-intercept?

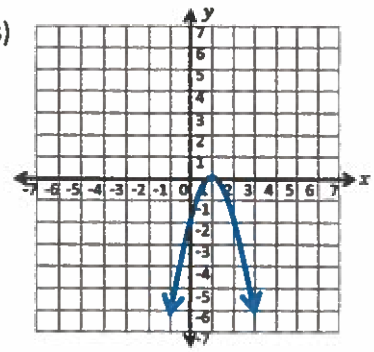
A. $(-3, 0)$ B. $(1,0)$
C. $(-2, 0)$ D. $(0, -2)$

8. What is the parent function for the following equation:

$$f(x) = (x-2)(x+1)$$

A. $y = x$ B. $y = x^2$
C. $y = \sqrt{x}$ D. $y = |x|$

9. What is/are the solution(s) to the quadratic function:



A. (1,0)
B. (1,0) and $(0, -2)$
C. $(-2,0)$
D. None

10. What is the solution set for the quadratic function: $x^2 + 8x + 12 = 0$

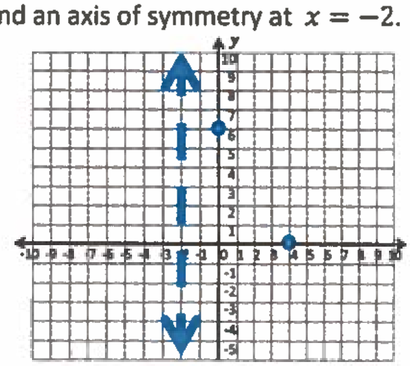
A. $\{12\}$ B. *None*
C. $\{-6, -2\}$ D. $\{2, 6\}$

11. What are the roots for the quadratic function given in the table to the right?

x	$f(x)$
-6	0
-5	-18
-4	-30
-3	-36
-2	-36
-1	-30
0	-18
1	0
2	24

A. -3 and -2
B. -6 and 1
C. -18
D. None

12. The quadratic function g has an x-intercept at (4,0), a y-intercept at (0,6), and an axis of symmetry at $x = -2$. What are the solutions of function g?



A. (4,0) and(0,6)
B. (0,6)
C. $(-8,0)$, (4,0), (0,6)
D. $(-8,0)$ and (4,0)

13. What is the vertex of the quadratic function:

$$f(x) = x^2 + 4x - 8$$

A. $(0, -8)$ B. $(-2, -12)$
C. $(-1, -11)$ D. $(-4, -8)$

14. What are the zeros of the quadratic function:

$$y = 2x^2 - 6x + 9$$

A. 9 B. 1 and 2

C. None D. 5

15. Given a quadratic function has solutions at $(4, 0)$ and $(6, 0)$ which of the following is one of the linear factors of the function?

A. $(x + 4)$ B. $(x - 6)$

C. $(x - 2)$ D. $(x + 6)$

16. Which of the following represents the range of the quadratic function $f(x) = x^2 + 10x + 24$?

A. $\{y \mid y \geq -5\}$ B. $\{y \mid y \geq -4\}$

C. $\{y \mid y \geq -1\}$ D. $\{y \mid -\infty < y < \infty\}$

17. What are the solutions to the quadratic equation

$$2x^2 + 10x = 12\ ?$$

A. $x = -6$ and $x = 1$ B. $x = -6$ and $x = 12$

C. $x = -1$ and $x = 6$ D. $x = -3$ and $x = -2$

18. What is the solution set to the quadratic equation

$$(x - 2)(x + 3) = 0\ ?$$

A. $\{-2, 3\}$ B. $\{2, -3\}$

C. $\{-2, -3\}$ D. $\{2, 3\}$

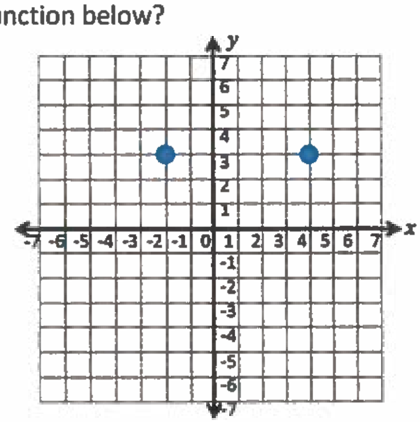
19. What is the equation for the axis of symmetry of the parabola in the function below?

A. $y = 1$

B. $x = 3$

C. $y = 3$

D. $x = 1$



20. Which of the following has the correct factored form **AND** the correct solutions for the quadratic equation $x^2 - 2x - 3 = 0$?

A. $(x - 1)(x + 3) = 0$ AND $x = -1$ and $x = 3$

B. $(x - 1)(x + 3) = 0$ AND $x = 1$ and $x = -3$

C. $(x + 1)(x - 3) = 0$ AND $x = -1$ and $x = 3$

D. $(x + 1)(x - 3) = 0$ AND $x = 1$ and $x = -3$

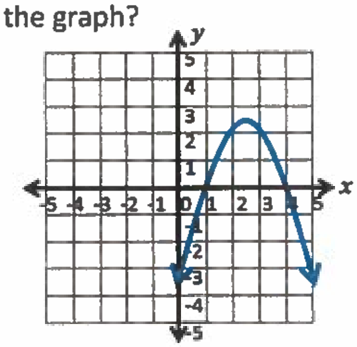
21. Which of the following quadratic functions would have the same solutions as the graph?

A. $(x - 1)(x + 4) = 0$

B. $(x - 1)(x - 4) = 0$

C. $(x + 1)(x + 4) = 0$

D. $(x + 1)(x - 4) = 0$



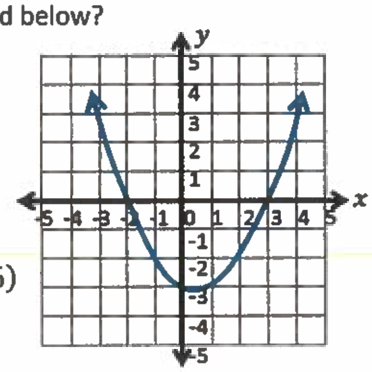
22. Which of the following correctly matches the quadratic function graphed below?

A. $f(x) = x^2 + 5x + 6$

B. $f(x) = -x^2 + x + 6$

C. $f(x) = x^2 + x - 6$

D. $f(x) = \frac{1}{2}(x^2 - x - 6)$



23. Given that the solutions to a quadratic equation are -7 *and* 8 , which of the following could represent the quadratic function?

A. $x^2 + x - 56$

B. $x^2 - x - 56$

C. $x^2 + 15x + 56$

D. $x^2 - 15x - 56$