

## **Session 1**

All packets with solutions will be posted at [vmhs.net](http://vmhs.net) / Teachers / Alan Tupaj / Test Prep

### **I. SAT Math Test Format**

Section	Questions	Time
3	20 Questions – 15 multiple choice, 5 grid in answers No Calculator Allowed	25 minutes
4	38 Questions – 30 multiple choice, 8 grid in answers Calculator Allowed	55 minutes

No penalty for guessing

### **II. General Breakdown of Questions**

Categories of questions:

1. Algebra I (19 questions)
2. Problem Solving / Data Analysis (17 questions)
3. Advanced Math (16 questions)
4. Geometry (6 questions)

No logarithms. All other Algebra 2 topics are included along with some trigonometry

### **III. General Strategies**

1. Read and re-read the problem carefully. Don't rush the reading.
2. Identify what the problem is asking for. Don't answer  $x$  if the problem asks for  $2x$ .
3. Write in the test booklet. Draw and label diagrams if not to scale.
4. Pace yourself – Approximately 1 minute per problem on section 3 and 1.5 minutes per problem on section 4.
5. Don't leave any problem blank
6. Know the rules for grid-ins.
7. Look for a known relationship, plug in given values, and solve for missing value
8. Identify a specific algebra skill. Factoring, simplifying, equation solving
9. Work backwards. Plug in the answer choices.

#### **IV. How to Prepare**

1. Get LOTS of problems wrong and learn what you did wrong

Identify the type of mistake:

- a. Arithmetic
- b. Algebra
- c. Lack of knowledge (don't know the relationship)
- d. Mis-read question
- e. Did not answer the question

2. Master the math skills. Know all relationships.

3. Practice under time constraints.

4. Plan on three tests dates: First time – Practice, Second time – Real, Third time – Goal

Questions: Email me at [amtupaj@murrieta.k12.ca.us](mailto:amtupaj@murrieta.k12.ca.us)

#### **VI. SAT Prep Websites:**

<http://www.erikthered.com/tutor/>

Good summary of strategies. Lots of practice broken down into smaller categories. Detailed answers and hints.

<http://www.majortests.com/sat/>

Lots of practice tests with explanations for wrong answers.

<https://sat.collegeboard.org/practice/sat-practice-questions-math/math-concepts>

Collegeboard creates the test, so practice questions will be most similar to the real questions.

<https://www.khanacademy.org/test-prep/sat>

Video instruction to go along with practice

<http://www.proprofs.com/sat/study-guide/>

Study guides for specific topics along with practice tests

<http://www.4tests.com/sat>

Practice tests with answers and explanations

<http://magoosh.com/sat/2014/how-to-study-sat-math/>

Good strategies, no real practice.

<http://www.veritasprep.com/sat-prep-algebra-resources-galore/>

A collection of math skill review sites

<http://www.brightstorm.com/test-prep/sat/sat-math/>

Video instruction on SAT Math topics

## Problem Set 1: Pre-Algebra and Algebra 1

1.

Johanna picked 3 pounds of strawberries at a "pick-your-own" patch. At this particular patch, the cost is \$1.50 for the pail and \$3.99 per pound of strawberries picked. If a linear equation is created to represent the situation and written in the form  $y = mx + b$ , which piece of the equation would the value 13.47 in this scenario most likely represent?

- (A)  $b$
- (B)  $m$
- (C)  $x$
- (D)  $y$

2.

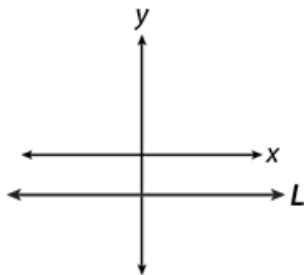
If  $y = 12 - x$  and  $\frac{3y}{4} + 11 = \frac{-x}{2}$ , what is the value of  $\frac{x}{5} + \frac{y}{4}$ ?

- (A) -1
- (B)  $\frac{75}{4}$
- (C)  $\frac{19}{4}$
- (D) 33

### 3. Calculator

Rasha volunteers at a charity that helps feed the homeless. He collects donations and then uses the money to buy food for care packages. This week, he collected \$145. Each care package will include canned vegetables and bags of rice in the ratio 3:1. The cans cost \$0.89 each, and the bags of rice cost \$3.49 each. Using the given ratio, what is the maximum number of complete vegetable/rice care packages Rasha can make?

4.



Line  $L$  shown in the graph could be the graph of which equation?

- (A)  $x + y = -2$
- (B)  $x + y = 0$
- (C)  $x + y - 2 = x$
- (D)  $x + y + 2 = x$

5.

At the grocery store, Gigi buys apples, a magazine, and a gallon of milk. The apples are priced per pound. In her state, there is no sales tax on food. If the total cost of her items is given by the function  $C(p) = 1.89p + 1.07(3.99) + 4.49$ , then the term  $1.07(3.99)$  most likely represents

- (A) the cost of one gallon of milk.
- (B) the per-pound cost of the apples.
- (C) the cost of the magazine, including tax.
- (D) the cost of the magazine, not including tax.

## 6.

A picture framing shop sells ready-made frames and also does custom framing using different kinds and widths of wood or metal. The shop has a three-day sale. During the sale, for an 11-inch  $\times$  14-inch frame, a ready-made frame costs \$12 and a custom frame costs \$30. Over the course of the three days, the shop sells ninety-two 11  $\times$  14 frames and collects \$1,788. Solving which system of equations would yield the number of 11  $\times$  14 ready-made frames  $r$  and the number of 11  $\times$  14 custom frames  $c$  that the shop sold during the three-day sale?

- (A) 
$$\begin{cases} r + c = 92 \\ 12r + 30c = \frac{1,788}{3} \end{cases}$$
- (B) 
$$\begin{cases} r + c = 1,788 \\ 12r + 30c = 92 \times 3 \end{cases}$$
- (C) 
$$\begin{cases} r + c = 1,788 \\ 12r + 30c = 92 \end{cases}$$
- (D) 
$$\begin{cases} r + c = 92 \\ 12r + 30c = 1,788 \end{cases}$$

## 7. Calculator

City	Cost per Square Foot
Detroit	\$62.45
Atlanta	\$74.19
New York City	\$288.58
San Francisco	\$420.99

In real estate, location is often the number one determinant of home prices. The table above shows the average price per square foot of houses in four cities. Assuming an average home size of 1,500 to 2,000 square feet, which inequality represents how much more in dollars a house in New York City would cost than in Detroit?

- (A)  $x \geq 226.13$
- (B)  $62.45 \leq x \leq 288.58$
- (C)  $93,675 \leq x \leq 432,870$
- (D)  $339,195 \leq x \leq 452,260$

## 8. Calculator

A student is doing a scale drawing of a woolly mammoth on a piece of poster board for her presentation on the last ice age. She was surprised to find that the woolly mammoth, reaching a height of only about 10 feet, 6 inches, was actually smaller than today's African elephant. Even more surprising is the fact that the woolly mammoth's tusks averaged 11.5 feet in length. If the student draws the mammoth 14 inches tall on her poster, approximately how many inches long should she make the tusks?

- (A) 12.78
- (B) 15.0
- (C) 15.33
- (D) 16.1

## 9. Calculator

In an effort to decrease reliance on fossil fuels, some energy producers have started to utilize renewable resources. One such power plant uses solar panels to create solar energy during the day and then shifts to natural gas at night or when there is cloud cover. One particularly bright morning, the company increases the amount of its power typically generated by solar panels by 60%. During a cloudy spell, it decreases the amount by 30%, and then when the sun comes back out, it increases the amount again by 75% before shutting the panels down for the night. What is the net percent increase of this company's reliance on solar panels during that day?

- (A) 75%
- (B) 96%
- (C) 105%
- (D) 165%

## 10. Calculator

Water is vital to human health. An average person should consume approximately 2.5 ounces of water per hour. However, because of the salt in it, seawater actually dehydrates the human body and should not be consumed. This is why boats must carry a supply of fresh water when embarking on long trips. Suppose a sailboat is traveling at an average speed of 4 nautical miles per hour with 3 people on board and the trip is 232 nautical miles. What is the minimum number of ounces of water the boat should stock before leaving?

- (A) 69.6
- (B) 145
- (C) 435
- (D) 1,113.6

## 11. Calculator

If  $M = 3x^2 + 9x - 4$  and  $N = 5x^2 - 12$ , what is  $2(M - N)$ ?

- (A)  $-2x^2 + 9x + 8$
- (B)  $-4x^2 + 18x - 32$
- (C)  $-4x^2 + 18x + 16$
- (D)  $8x^2 + 9x - 16$

## 12.

$$T = 2\pi\sqrt{\frac{m}{k}}$$

When a spring is pressed tightly between two objects, it remains still. When one or both of those objects is disturbed, the spring starts to move. The equation above can be used to find the time period  $T$  in which a mass  $m$ , attached to a spring, makes a single oscillation (going all the way down and then back up). The variable  $k$  is a constant. Which of the following equations could be used to find the mass of the object?

- (A)  $m = \frac{2\pi k}{T^2}$
- (B)  $m = \frac{kT^2}{4\pi^2}$
- (C)  $m = \frac{T^2}{4\pi^2 k}$
- (D)  $m = \sqrt{\frac{T}{2\pi k}}$

## Practice 1: Pre-Algebra and Algebra 1

### 1.

A publishing company ships books to schools, some of which are hardback textbooks and some are paperback workbooks. Each shipping box can hold a maximum of 20 textbooks or 64 workbooks. Each textbook takes up 192 cubic inches of space, and each workbook takes up 60 cubic inches of space. One box can hold a maximum of 3,840 cubic inches. The shipping department is packing a box containing both types of books. Which of the following systems of inequalities can the department use to determine how many textbooks,  $t$ , and workbooks,  $w$ , can be shipped in one box?

- (A)  $t \leq 20$   
 $w \leq 64$   
 $60t + 192w \leq 3,840$
- (B)  $t \geq 20$   
 $w \geq 64$   
 $192t + 60w \geq 3,840$
- (C)  $t \leq 20$   
 $w \leq 64$   
 $192t + 60w \leq 3,840$
- (D)  $t \leq 192$   
 $w \leq 60$   
 $20t + 64w \leq 3,840$

2.

Which of the following does not represent a linear relationship?

(A)

<b>x</b>	-1	-4	-7	-10	-13
<b>y</b>	8	6	4	2	0

(B)

<b>x</b>	-3	-1	1	3	5
<b>y</b>	5	3	1	-1	-3

(C)

<b>x</b>	1	2	3	4	5
<b>y</b>	-5	-5	-5	-5	-5

(D)

<b>x</b>	-2	-1	0	1	2
<b>y</b>	4	1	0	1	4

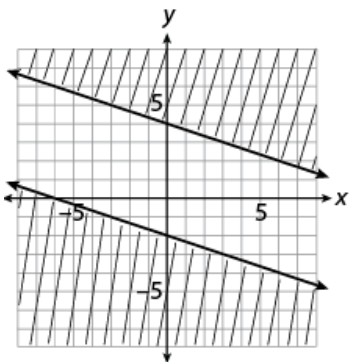
3.

$$\begin{cases} Ax - 2y = 18 \\ Bx + 6y = 26 \end{cases}$$

If the graphs of the lines in the system of equations above intersect at  $(4, -1)$ , what is the value of  $\frac{B}{A}$ ?

- (A) -3
- (B)  $-\frac{1}{3}$
- (C)  $\frac{1}{2}$
- (D) 2

4.



Which of the following systems of inequalities could be represented by the graph shown?

- (A)  $\begin{cases} 3x - y \geq 4 \\ 3x - y \leq -2 \end{cases}$
- (B)  $\begin{cases} 3x + y \geq 4 \\ 3x + y \leq -2 \end{cases}$
- (C)  $\begin{cases} x - 3y \geq 12 \\ x - 3y \leq -6 \end{cases}$
- (D)  $\begin{cases} x + 3y \geq 12 \\ x + 3y \leq -6 \end{cases}$

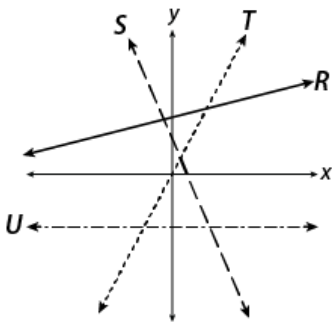
5.

Equation 1	
$x$	$y$
5	-8
4	-5
3	-2
2	1

Equation 2	
$x$	$y$
-8	3
-6	4
-4	5
-2	6

The tables above represent data points for two linear equations. If the two equations form a system, what is the  $x$ -coordinate of the solution to that system?

6.



Which of the following lists correctly orders the lines in the figure above according to their slopes, from least to greatest?

- (A)  $R, T, S, U$
- (B)  $S, U, R, T$
- (C)  $S, R, U, T$
- (D)  $U, S, R, T$

## 7. Calculator

Price per Pencil	Projected Number of Units Sold
\$0.20	150,000
\$0.25	135,000
\$0.30	120,000
\$0.35	105,000
\$0.40	90,000
\$0.45	75,000

Generally, the price of an item is a good indicator of how many units of that item will be sold. The lower the price, the more units will be sold. A marketing department develops a table showing various price points and the projected number of units sold at that price point. Which of the following represents the linear relationship shown in the table, where  $x$  is the price and  $y$  is the number of units sold?

- (A)  $y = 0.03x + 150,000$
- (B)  $y = 300,000x + 75,000$
- (C)  $y = -300,000x + 90,000$
- (D)  $y = -300,000x + 210,000$

## 8. Calculator

A mailing supply store sells small shipping boxes in packs of 8 or 20. If the store has 61 packs in stock totaling 800 small shipping boxes, how many packs have 20 boxes in them, assuming all the packs are full?

- (A) 26
- (B) 32
- (C) 35
- (D) 40

## 9. Calculator

The American political system is largely a two-party system. In fact, only six candidates who were not associated with either the Republican or the Democratic Party have been elected governor in any state since 1990. In one such election, the ratio of votes received for the Independent candidate to the Democratic candidate to the Republican candidate was approximately 19:18:13. If 510,000 votes were cast in the election, how many more votes were cast for the Independent candidate than for the Republican candidate?

- (A) 6,000
- (B) 10,200
- (C) 61,200
- (D) 193,800

## 10.

$x$	$y$
-1	7
0	5
1	3
2	1

If graphed, the ordered pairs in the table above would form a line. Where would this line intersect the  $x$ -axis?

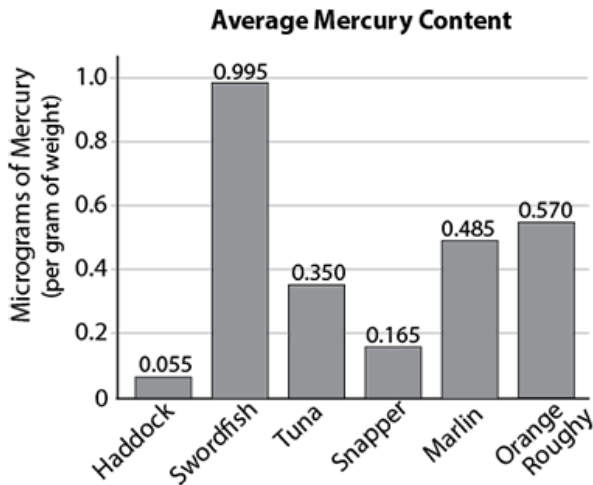
- (A)  $-2\frac{1}{2}$
- (B)  $-\frac{1}{2}$
- (C)  $2\frac{1}{2}$
- (D) 5



## Problem Set 2: Algebra 2 and Statistics

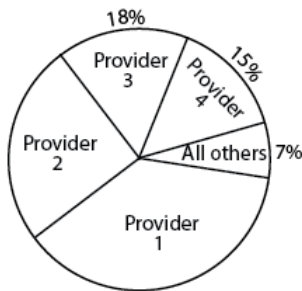
### 1. Calculator

Mercury is a naturally occurring metal that can be harmful to humans. The current recommendation is for humans to take in no more than 0.1 microgram for every kilogram of their weight per day. Fish generally carry high levels of mercury, although certain fish have higher mercury content than others. Fish, however, are healthy sources of many other nutrients, so nutritionists recommend keeping them in the human diet. The figure below shows the average mercury content of several types of fish.



If a person weighs 82 kilograms, how many grams of snapper can he safely consume per day? Round your answer to the nearest gram.

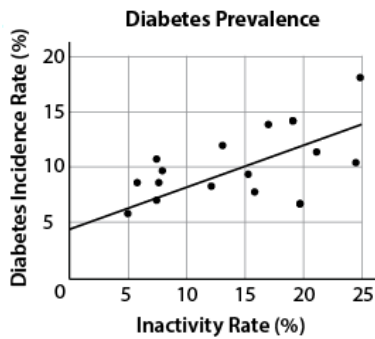
### 2. Calculator



A company's market share is the percent of consumers who utilize the services or buy the products of that company. The pie chart above shows the different market shares of cable providers in a certain region. If the ratio of the market shares of Provider 1 to Provider 2 is 3:2, what is Provider 1's market share?

- (A) 24%
- (B) 30%
- (C) 36%
- (D) 42%

3.

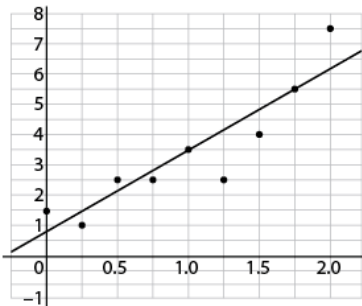


Increased physical activity has been linked to a lower incidence rate of diabetes. The scatterplot above shows the relationship between the percent of people in a certain country whose daily activity qualifies them as "inactive" and the incidence rate of diabetes in that country. The line of best fit for the data is also shown. Which of the following best represents the meaning of the  $y$ -intercept of the line of best fit in the context of this question?

- (A) The predicted incidence rate of diabetes when the entire country is considered active
- (B) The predicted incidence rate of diabetes when the entire country is considered inactive
- (C) The predicted percent of people who will be active when the incidence rate of diabetes is 0%
- (D) The predicted percent of people who will be inactive when the incidence rate of diabetes is 0%

4.

Use the data in the scatterplot and the line of best fit shown to answer the following question



Which of the following values most accurately reflects the average rate of change of the data based on the line of best fit?

- (A)  $\frac{3}{8}$
- (B)  $\frac{3}{4}$
- (C)  $\frac{4}{3}$
- (D)  $\frac{8}{3}$

5.

Which of the following functions has a domain of  $x \geq 2$ ?

- (A)  $f(x) = -x^2 + 2$
- (B)  $g(x) = -\sqrt{x - 2}$
- (C)  $h(x) = -\sqrt{x} + 2$
- (D)  $k(x) = -|x - 2|$

6.

$$g(x) = \begin{cases} x^2 - 1, & \text{if } x \leq 0 \\ \frac{x^2}{3} + 1, & \text{if } 0 < x \leq 3 \\ 5x + 3, & \text{if } x > 3 \end{cases}$$

For the piecewise defined function  $g(x)$  shown above, what is the value of  $g(2)$ ?

7.

$$\frac{x}{x-1} - \frac{2}{x} = \frac{1}{x-1}$$

What is one possible solution to the rational equation shown above?

8.

$$(36x^4y^7)^{\frac{1}{2}}$$

Which of the following is equivalent to the expression given above?

(A)  $\frac{36x^4y^7}{2}$

(B)  $6xy^2\sqrt{y}$

(C)  $6x^2y^3\sqrt{y}$

(D)  $(36x^4y^7)^{-2}$

9.

Given the function  $f(x) = \frac{1}{4}x - 2$ , what domain value corresponds to a range value of  $-\frac{5}{3}$ ?

(A)  $-\frac{29}{12}$

(B)  $\frac{4}{3}$

(C)  $\frac{7}{3}$

(D)  $\frac{29}{12}$

10.

$$\frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$

In electronic circuits, resistors are often paired to manage the flow of the electrical current. To find the total resistance of a pair of parallel resistors, electricians use the formula shown above, where  $R_1$  is the resistance of the first resistor and  $R_2$  is the resistance of the second resistor. Which of the following is another way to represent this formula?

(A)  $\frac{R_1 R_2}{R_1 + R_2}$

(B)  $\frac{R_1 + R_2}{R_1 R_2}$

(C)  $\frac{1}{R_2} - \frac{1}{R_1}$

(D)  $R_1 + R_2$

11.

Which of the following are solutions to the quadratic equation  $(x - 2)^2 = \frac{16}{25}$ ?

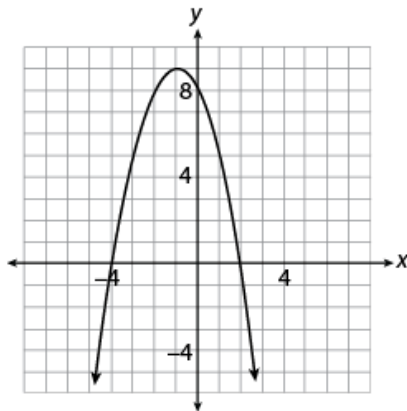
(A)  $x = \pm \sqrt{\frac{4}{5}}$

(B)  $x = -\frac{4}{5}, x = \frac{4}{5}$

(C)  $x = \frac{6}{5}, x = \frac{14}{5}$

(D)  $x = \frac{14}{5}, x = -\frac{14}{5}$

12.



The graph of the function  $f(x) = -x^2 - 2x + 8$  is shown in the figure above. For what values of  $x$  does  $f(x) = 5$ ?

(A) -4 and 2

(B) -3 and 1

(C) -1 and 9

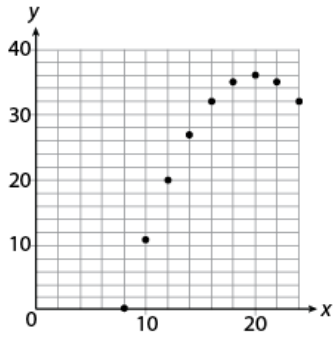
(D) 5 and 8

13.

If the equation  $\frac{2}{9}x^2 + \frac{8}{3}x - 7 = 3$  has solutions  $x_1$  and  $x_2$ , what is the product of  $x_1$  and  $x_2$ ?

- (A) -45
- (B) -15
- (C) -5
- (D) 3

14. Calculator

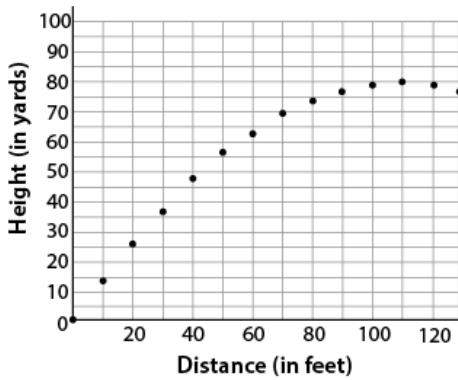


If a quadratic equation is used to model the data shown in the scatterplot above, and the model fits the data exactly, which of the following is a solution to the quadratic equation?

- (A) 28
- (B) 32
- (C) 34
- (D) 36

## Practice 2: Algebra 2 and Statistics

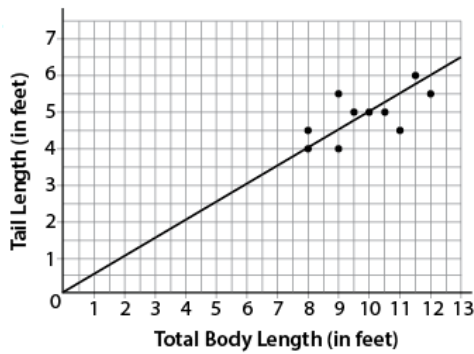
1.



The figure above shows part of the path of a planned roller coaster hill. What is the sum, in feet, of the vertical height and the horizontal distance that the roller coaster will travel while on this particular hill?

- (A) 220
- (B) 300
- (C) 460
- (D) 900

2.



The Florida Department of Wildlife caught and tagged 10 adult female alligators as part of an effort to protect this endangered species. They took various measurements and readings related to body size and health. The total body length is plotted against the tail length in the scatterplot shown above, along with a line of best fit. Which of the following equations best models the data?

- (A)  $y = 0.5x$
- (B)  $y = 2x$
- (C)  $y = 0.4x + 1$
- (D)  $y = 0.6x - 1$

### 3. Calculator

A dendrologist (a botanist who studies trees exclusively) is examining the way in which a certain tree sheds its leaves. He tracks the number of leaves shed each day over the period of a month, starting when the first leaf is shed. He organizes the data in a scatterplot and sees that the data can be modeled using an exponential function. He determines the exponential model to be  $f(x) = 6(1.92)^x$ , where  $x$  is the number of days after the tree began to shed its leaves. What does the value 1.92 in the function tell the dendrologist?

- (A) The number of leaves shed almost doubles each day.
- (B) The number of leaves shed almost doubles every six days.
- (C) The number of leaves left on the tree is reduced by about 92% each day.
- (D) The number of leaves left on the tree is reduced by about 92% every six days.

### 4 and 5. Calculator

Plants are capable of cross-pollinating with related but different plants. This creates a hybrid. Sometimes, a hybrid plant is superior to the two different plants from which it was derived. This is "hybrid vigor." Scientists can examine the DNA of a plant to see if it is a hybrid. This can be information because if the plant appears superior, it would be beneficial to develop more of these. An agricultural scientist examines an orchard that has several types of apple trees and orange trees which ones are hybrids. Some of the information she collected is shown in the table below.

	Apple Trees	Orange Trees	Total
Hybrid			402
Non-hybrid		118	
Totals			628

4.

Based on the data, if 45% of the apple trees are not hybrids, how many apple trees are hybrids?

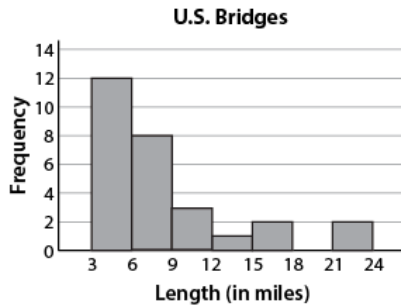
- (A) 50
- (B) 132
- (C) 226
- (D) 240

5.

The scientist wants to study the orange trees to check for hybrid vigor. If she chooses one orange tree at random, what is the probability that it will be a hybrid?

- (A)  $\frac{59}{194}$
- (B)  $\frac{97}{157}$
- (C)  $\frac{135}{314}$
- (D)  $\frac{135}{194}$

## 6. Calculator



The Lake Pontchartrain Causeway Bridge in Louisiana is the longest bridge in the United States, at 23.83 miles long. The histogram above shows the distribution of the lengths, in miles, of 28 of the longest bridges in the United States, including Lake Pontchartrain Causeway Bridge. Which of the following could be the median length of the 28 bridges represented in the histogram?

- (A) 5.9
- (B) 7.9
- (C) 9.2
- (D) 9.9

## 7. Calculator

In the United States, the original full retirement age was 65. The retirement age has since been pushed to 66 and will soon move to 67, as life expectancies go up. The Social Security Administration periodically conducts studies regarding retirement age. One such study focused on whether or not retiring early lowers a person's life expectancy. The study found a weak positive correlation between retirement age and life expectancy. If data from the study were graphed in a scatterplot, which of the following statements would be true?

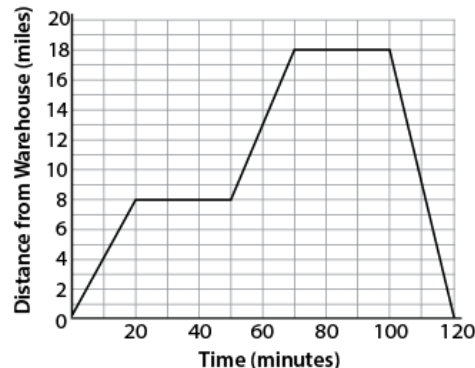
- (A) The slope of the line of best fit would be a large positive number.
- (B) The slope of the line of best fit would be a negative number close to 0.
- (C) The data points would follow, but not closely, an increasing line of best fit.
- (D) The data points would be closely gathered around an increasing line of best fit.

## 8.

Given the polynomial  $6x^4 + 2x^2 - 8x - c$ , where  $c$  is a constant, for what value of  $c$  will  $\frac{6x^4 + 2x^2 - 8x - c}{x + 2}$  have no remainder?

- (A) -120
- (B) -60
- (C) 60
- (D) 120

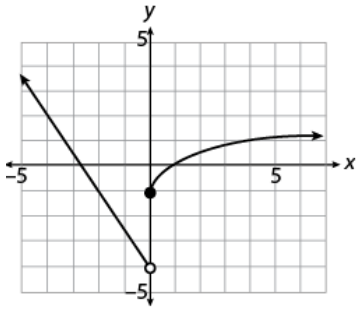
## 9. Calculator



The graph above shows a delivery truck's distance from the company's warehouse over a two-hour period, during which time the delivery people made two deliveries and then returned to the warehouse. Based on the graph, which of the following statements could be true?

- (A) Each delivery took 30 minutes to complete, not including driving time.
- (B) The location of the second delivery was about 70 miles from the warehouse.
- (C) The truck traveled about 18 miles from the time it left the warehouse until it returned.
- (D) The second delivery was about 18 miles farther from the warehouse than the first delivery.

10.



Which of the following piecewise functions could have been used to generate the graph above?

(A)  $g(x) = \begin{cases} -\frac{3}{2}x - 4, & \text{if } x < 0 \\ \sqrt{x-1}, & \text{if } x \geq 0 \end{cases}$

(B)  $g(x) = \begin{cases} -\frac{3}{2}x - 4, & \text{if } x < 0 \\ \sqrt{x-1}, & \text{if } x \geq 0 \end{cases}$

(C)  $g(x) = \begin{cases} -\frac{3}{2}x - 4, & \text{if } x < 0 \\ \sqrt{x+1}, & \text{if } x > 0 \end{cases}$

(D)  $g(x) = \begin{cases} -\frac{2}{3}x - 4, & \text{if } x < 0 \\ \sqrt{x+1}, & \text{if } x \geq 0 \end{cases}$

11.

$$18 - \frac{(3x)^2}{2} = 15$$

What value of  $x$  satisfies the equation above?

12. Calculator

$$\left(5x^4 - \frac{1}{4}x^3 + 3x\right) \div \frac{1}{2}x$$

What is the result of dividing the two expressions above?

(A)  $\frac{5}{2}x^3 - \frac{1}{8}x^2 + \frac{3}{2}$

(B)  $\frac{5}{2}x^3 - 2x^2 + \frac{3}{2}x$

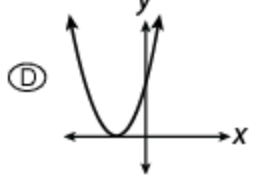
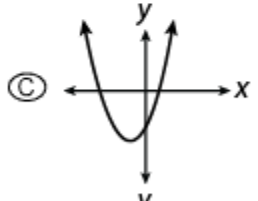
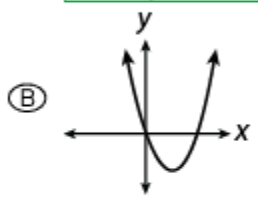
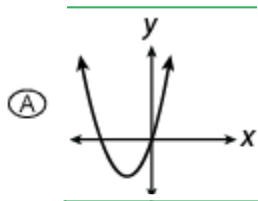
(C)  $10x^3 - \frac{1}{2}x^2 + 6$

(D)  $10x^3 - \frac{1}{8}x^2 + 6x$

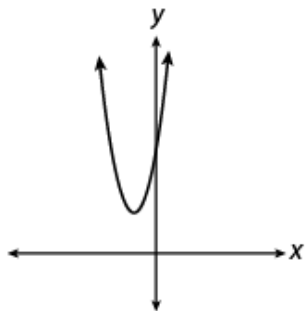


13.

If  $a = 0$  and  $b < 0$ , then which of the following could be the graph of  $f(x) = (x - a)(x - b)$ ?

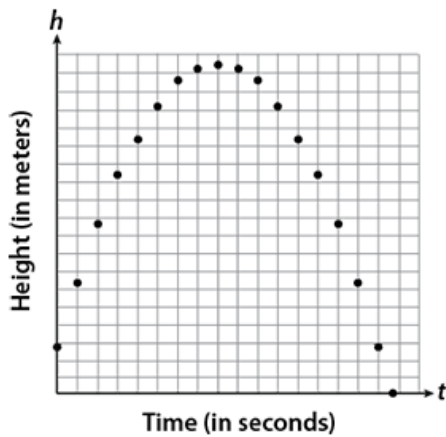


14. Calculator



If the equation of the graph shown above is  $y = 2(x + 3)^2 + 10$ , what is the  $y$ -intercept of the graph?

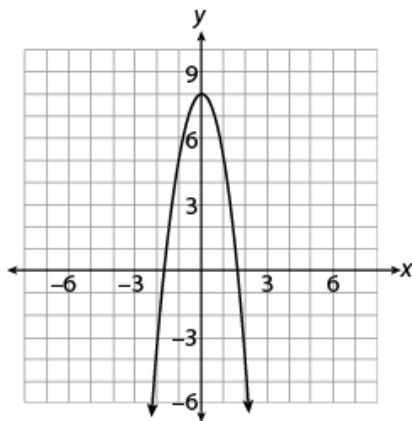
15.



A physics class is using simulation software to study water bottle rockets before attempting to build one for the National Physics Competition. Their first simulation is of a rocket without a parachute launched from the roof of the gymnasium. The scatterplot shows the approximate path of the rocket. The software program generates the equation  $h = -4.9t^2 + 39.2t + 14$  to model the data, where  $h$  is the height in meters of the rocket  $t$  seconds after it was launched. What does the number 14 most likely represent in this equation?

- (A) The number of seconds the rocket was in the air
- (B) The height of the gymnasium from which the rocket was launched
- (C) The number of seconds that it took the rocket to reach its maximum height
- (D) The maximum height of the rocket

16.



Vadim graphs the equation  $y = -3x^2 + 8$ , which is shown in the figure above. He realizes, however, that he miscalculated and should have graphed  $y = -\frac{1}{3}x^2 + 8$ . How will this affect his graph?

- (A) It will change the  $y$ -intercept.
- (B) It will make the parabola open in the opposite direction.
- (C) It will make the parabola cross the  $x$ -axis closer to the origin.
- (D) It will make the parabola cross the  $x$ -axis farther from the origin.