Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

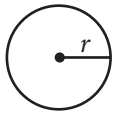
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

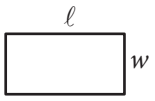
NOTES

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

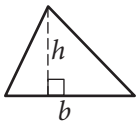
REFERENCE



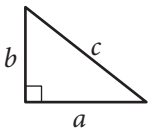
$A = \pi r^2$
$C = 2\pi r$



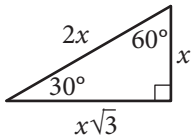
$A = \ell w$

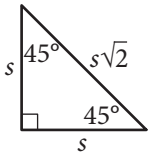


$A = \frac{1}{2}bh$

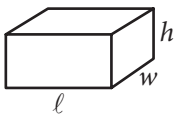


$c^2 = a^2 + b^2$

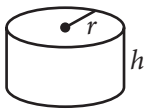




Special Right Triangles

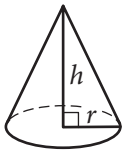


$V = \ell wh$

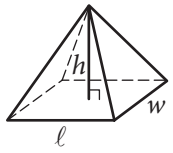


$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

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CONTINUE

1

Feeding Information for Boarded Pets

	Fed only dry food	Fed both wet and dry food	Total
Cats	5	11	16
Dogs	2	23	25
Total	7	34	41

The table above shows the kinds of foods that are fed to the cats and dogs currently boarded at a pet care facility. What fraction of the dogs are fed only dry food?

A) $\frac{2}{41}$

B) $\frac{2}{25}$

C) $\frac{7}{41}$

D) $\frac{2}{7}$

2

$$(x^2 - 3) - (-3x^2 + 5)$$

Which of the following expressions is equivalent to the one above?

A) $4x^2 - 8$

B) $4x^2 - 2$

C) $-2x^2 - 8$

D) $-2x^2 - 2$

3

A certain package requires 3 centimeters of tape to be closed securely. What is the maximum number of packages of this type that can be secured with 6 meters of tape? (1 meter = 100 cm)

A) 100

B) 150

C) 200

D) 300

4

A market researcher selected 200 people at random from a group of people who indicated that they liked a certain book. The 200 people were shown a movie based on the book and then asked whether they liked or disliked the movie. Of those surveyed, 95% said they disliked the movie. Which of the following inferences can appropriately be drawn from this survey result?

A) At least 95% of people who go see movies will dislike this movie.

B) At least 95% of people who read books will dislike this movie.

C) Most people who dislike this book will like this movie.

D) Most people who like this book will dislike this movie.

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CONTINUE

5

Which of the following ordered pairs (x, y) satisfies the inequality $5x - 3y < 4$?

I. $(1, 1)$

II. $(2, 5)$

III. $(3, 2)$

A) I only

B) II only

C) I and II only

D) I and III only

6

In the equation $(ax + 3)^2 = 36$, a is a constant. If $x = -3$ is one solution to the equation, what is a possible value of a ?

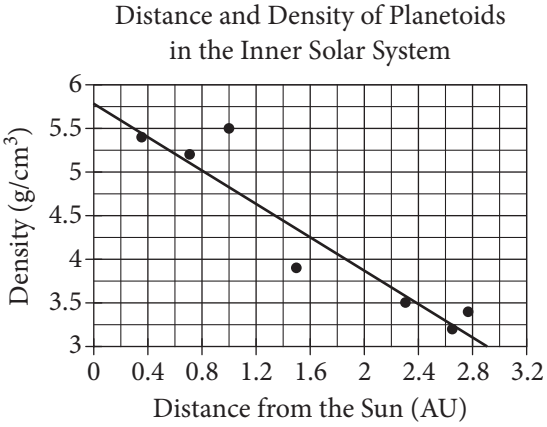
A) -11

B) -5

C) -1

D) 0

Questions 7 and 8 refer to the following information.



The scatterplot above shows the densities of 7 planetoids, in grams per cubic centimeter, with respect to their average distances from the Sun in astronomical units (AU). The line of best fit is also shown.

7

According to the scatterplot, which of the following statements is true about the relationship between a planetoid's average distance from the Sun and its density?

A) Planetoids that are more distant from the Sun tend to have lesser densities.

B) Planetoids that are more distant from the Sun tend to have greater densities.

C) The density of a planetoid that is twice as far from the Sun as another planetoid is half the density of that other planetoid.

D) The distance from a planetoid to the Sun is unrelated to its density.

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CONTINUE

8

An astronomer has discovered a new planetoid about 1.2 AU from the Sun. According to the line of best fit, which of the following best approximates the density of the planetoid, in grams per cubic centimeter?

A) 3.6
B) 4.1
C) 4.6
D) 5.5

9

$$9ax + 9b - 6 = 21$$

Based on the equation above, what is the value of $ax + b$?

A) 3
B) 6
C) 8
D) 12

10

Lani spent 15% of her 8-hour workday in meetings. How many minutes of her workday did she spend in meetings?

A) 1.2
B) 15
C) 48
D) 72

11

A software company is selling a new game in a standard edition and a collector's edition. The box for the standard edition has a volume of 20 cubic inches, and the box for the collector's edition has a volume of 30 cubic inches. The company receives an order for 75 copies of the game, and the total volume of the order to be shipped is 1,870 cubic inches. Which of the following systems of equations can be used to determine the number of standard edition games, s, and collector's edition games, c, that were ordered?

A) $75 - s = c$
$20s + 30c = 1{,}870$

B) $75 - s = c$
$30s + 20c = 1{,}870$

C) $s - c = 75$
$25(s + c) = 1{,}870$

D) $s - c = 75$
$30s + 20c = 1{,}870$

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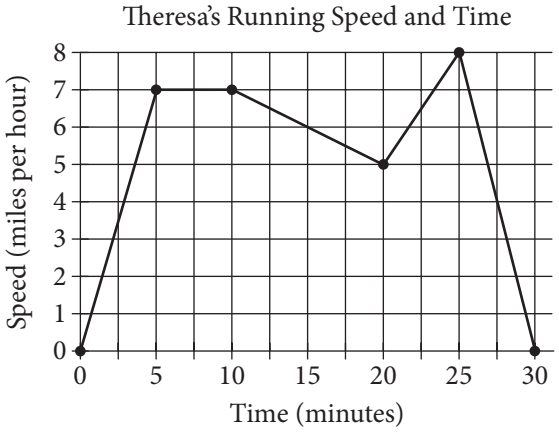
CONTINUE

12

A customer paid $53.00 for a jacket after a 6 percent sales tax was added. What was the price of the jacket before the sales tax was added?

A) $47.60
B) $50.00
C) $52.60
D) $52.84

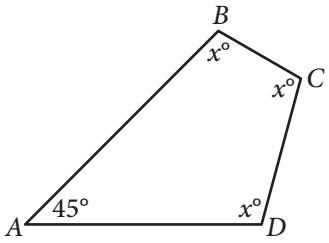
13



Theresa ran on a treadmill for thirty minutes, and her time and speed are shown on the graph above. According to the graph, which of the following statements is NOT true concerning Theresa's run?

A) Theresa ran at a constant speed for five minutes.
B) Theresa's speed was increasing for a longer period of time than it was decreasing.
C) Theresa's speed decreased at a constant rate during the last five minutes.
D) Theresa's speed reached its maximum during the last ten minutes.

14



In the figure above, what is the value of x ?

A) 45
B) 90
C) 100
D) 105

15

If 50 one-cent coins were stacked on top of each other in a column, the column would be approximately $3\frac{7}{8}$ inches tall. At this rate, which of the following is closest to the number of one-cent coins it would take to make an 8-inch-tall column?

A) 75
B) 100
C) 200
D) 390

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CONTINUE

16

If $a - b = 12$ and $\frac{b}{2} = 10$, what is the value of $a + b$?

A) 2
B) 12
C) 32
D) 52

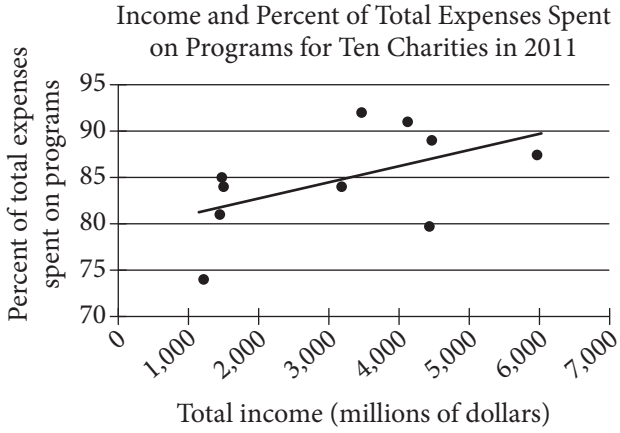
17

$$y = 19.99 + 1.50x$$

The equation above models the total cost y, in dollars, that a company charges a customer to rent a truck for one day and drive the truck x miles. The total cost consists of a flat fee plus a charge per mile driven. When the equation is graphed in the xy-plane, what does the y-intercept of the graph represent in terms of the model?

A) A flat fee of $19.99
B) A charge per mile of $1.50
C) A charge per mile of $19.99
D) Total daily charges of $21.49

18



The scatterplot above shows data for ten charities along with the line of best fit. For the charity with the greatest percent of total expenses spent on programs, which of the following is closest to the difference of the actual percent and the percent predicted by the line of best fit?

A) 10%
B) 7%
C) 4%
D) 1%

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CONTINUE

Questions 19 and 20 refer to the following information.

Mosteller's formula: $A = \frac{\sqrt{hw}}{60}$

Current's formula: $A = \frac{4 + w}{30}$

The formulas above are used in medicine to estimate the body surface area A, in square meters, of infants and children whose weight w ranges between 3 and 30 kilograms and whose height h is measured in centimeters.

19

Based on Current's formula, what is w in terms of A ?

A) $w = 30A - 4$

B) $w = 30A + 4$

C) $w = 30(A - 4)$

D) $w = 30(A + 4)$

20

If Mosteller's and Current's formulas give the same estimate for A, which of the following expressions is equivalent to $\sqrt{hw}$?

A) $\frac{4 + w}{2}$

B) $\frac{4 + w}{1{,}800}$

C) $2(4 + w)$

D) $\frac{(4 + w)^2}{2}$

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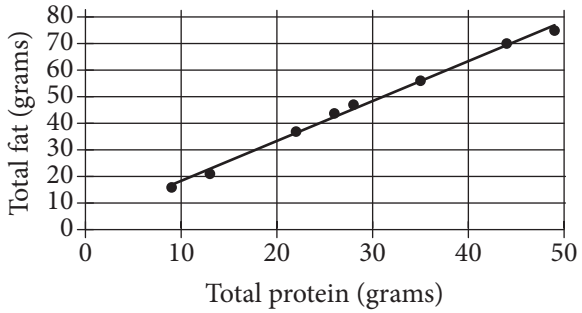
21

Total Protein and Total Fat
for Eight Sandwiches



The scatterplot above shows the numbers of grams of both total protein and total fat for eight sandwiches on a restaurant menu. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total fat, in grams, for every increase of 1 gram in total protein?

A) 2.5

B) 2.0

C) 1.5

D) 1.0

22

Percent of Residents Who Earned
a Bachelor's Degree or Higher

State	Percent of residents
State A	21.9%
State B	27.9%
State C	25.9%
State D	19.5%
State E	30.1%
State F	36.4%
State G	35.5%

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

A) 0.05%

B) 0.95%

C) 1.22%

D) 7.45%

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CONTINUE

23

A cylindrical can containing pieces of fruit is filled to the top with syrup before being sealed. The base of the can has an area of 75 cm^2, and the height of the can is 10 cm. If 110 cm^3 of syrup is needed to fill the can to the top, which of the following is closest to the total volume of the pieces of fruit in the can?

A) 7.5 cm^3

B) 185 cm^3

C) 640 cm^3

D) 750 cm^3

24

$$h(t) = -16t^2 + 110t + 72$$

The function above models the height h, in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

A) The initial height, in feet, of the object

B) The maximum height, in feet, of the object

C) The initial speed, in feet per second, of the object

D) The maximum speed, in feet per second, of the object

Questions 25 and 26 refer to the following information.

Energy per Gram of Typical Macronutrients

Macronutrient	Food calories	Kilojoules
Protein	4.0	16.7
Fat	9.0	37.7
Carbohydrate	4.0	16.7

The table above gives the typical amounts of energy per gram, expressed in both food calories and kilojoules, of the three macronutrients in food.

25

If x food calories is equivalent to k kilojoules, of the following, which best represents the relationship between x and k ?

A) $k = 0.24x$

B) $k = 4.2x$

C) $x = 4.2k$

D) $xk = 4.2$

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CONTINUE

26

If the 180 food calories in a granola bar come entirely from p grams of protein, f grams of fat, and c grams of carbohydrate, which of the following expresses f in terms of p and c ?

A) $f = 20 + \frac{4}{9}(p + c)$

B) $f = 20 - \frac{4}{9}(p + c)$

C) $f = 20 - \frac{4}{9}(p - c)$

D) $f = 20 + \frac{9}{4}(p + c)$

27

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population P, in billions of people, t years since 1975 ? (1 billion = 1,000,000,000)

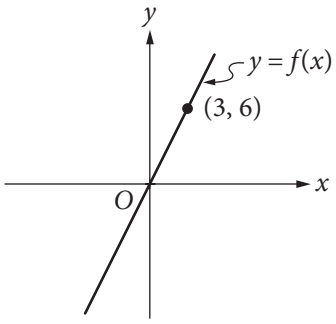
A) $P(t) = 4(1.019)^t$

B) $P(t) = 4(1.9)^t$

C) $P(t) = 1.19t + 4$

D) $P(t) = 1.019t + 4$

28



In the xy-plane above, a point (not shown) with coordinates (s, t) lies on the graph of the linear function f. If s and t are positive integers, what is the ratio of t to s ?

A) 1 to 3

B) 1 to 2

C) 2 to 1

D) 3 to 1

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29

A circle in the xy-plane has equation $(x+3)^2+(y-1)^2=25$. Which of the following points does NOT lie in the interior of the circle?

A) $(-7, 3)$

B) $(-3, 1)$

C) $(0, 0)$

D) $(3, 2)$

30

Year	Subscriptions sold
2012	5,600
2013	5,880

The manager of an online news service received the report above on the number of subscriptions sold by the service. The manager estimated that the percent increase from 2012 to 2013 would be double the percent increase from 2013 to 2014. How many subscriptions did the manager expect would be sold in 2014?

A) 6,020

B) 6,027

C) 6,440

D) 6,468

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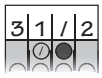
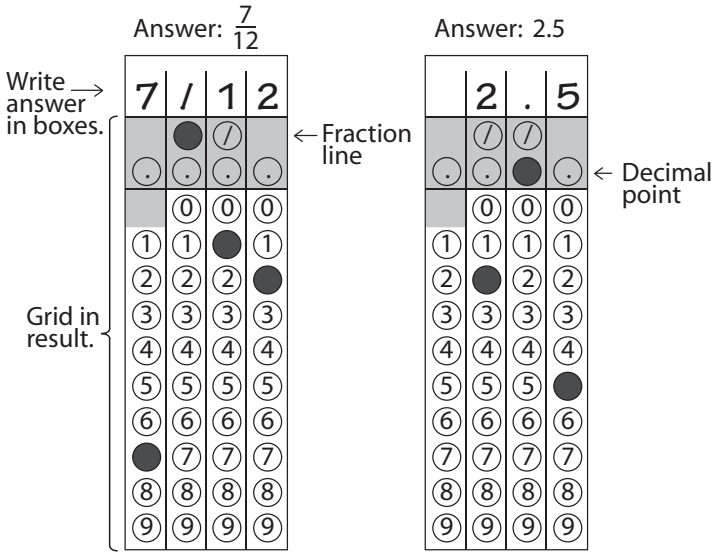
CONTINUE

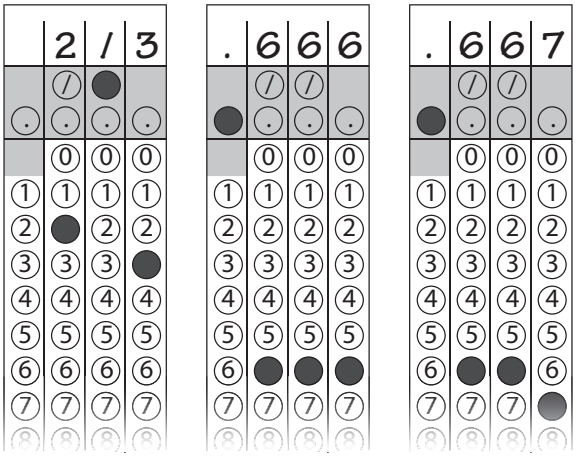
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

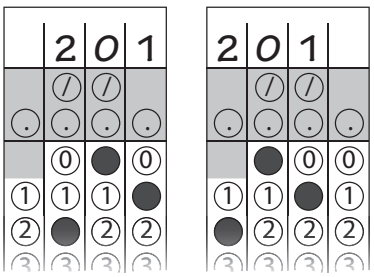
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

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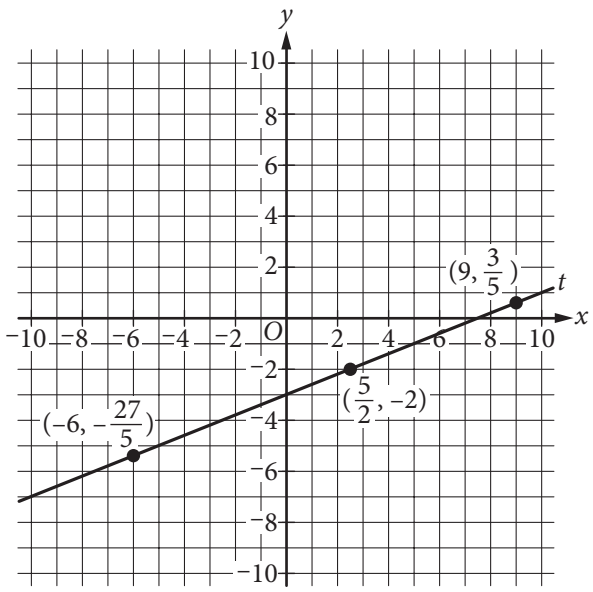
CONTINUE

31

In 1854, during the California gold rush, each ounce of gold was worth $20, and the largest known mass of gold found in California was worth $62,400 in that year. What was the weight, in pounds, of this mass of gold? (16 ounces = 1 pound)

32

Line t is shown in the xy-plane below.



What is the slope of line t ?

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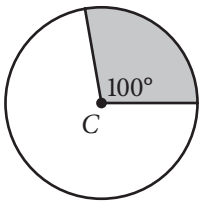
33

The score on a trivia game is obtained by subtracting the number of incorrect answers from twice the number of correct answers. If a player answered 40 questions and obtained a score of 50, how many questions did the player answer correctly?

34



Point C is the center of the circle above. What fraction of the area of the circle is the area of the shaded region?

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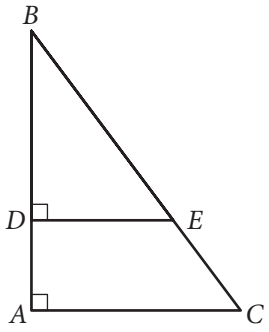
35

$$y = x^2 - 4x + 4$$
$$y = 4 - x$$

If the ordered pair (x, y) satisfies the system of equations above, what is one possible value of x ?

36



In the figure above, $\tan B = \frac{3}{4}$. If $BC = 15$ and $DA = 4$, what is the length of $\overline{DE}$?

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Questions 37 and 38 refer to the following information.

Number of Contestants by Score and Day

	5 out of 5	4 out of 5	3 out of 5	2 out of 5	1 out of 5	0 out of 5	Total
Day 1	2	3	4	6	2	3	20
Day 2	2	3	5	5	4	1	20
Day 3	3	3	4	5	3	2	20
Total	7	9	13	16	9	6	60

The same 20 contestants, on each of 3 days, answered 5 questions in order to win a prize. Each contestant received 1 point for each correct answer. The number of contestants receiving a given score on each day is shown in the table above.

37

What was the mean score of the contestants on Day 1 ?

38

No contestant received the same score on two different days. If a contestant is selected at random, what is the probability that the selected contestant received a score of 5 on Day 2 or Day 3, given that the contestant received a score of 5 on one of the three days?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

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No Test Material On This Page