WEEK1.6

# SAT Prep Test 1—Math
## Module 2—Harder

**Turn to Section 2 of your answer sheet (p. 76) to answer the questions in this section.**

**DIRECTIONS**

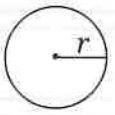
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

**NOTES**

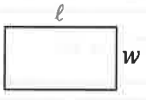
Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function $f$ is the set of all real numbers $x$ for which $f(x)$ is a real number.

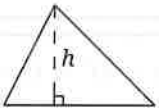
**REFERENCE**



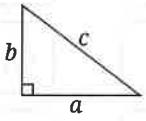

$A = \pi r^2$
$C = 2\pi r$



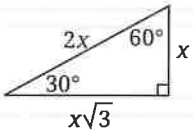

$A = \ell w$

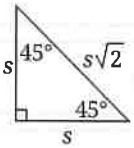



$A = \frac{1}{2}bh$

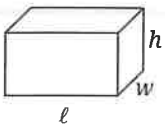



$c^2 = a^2 + b^2$

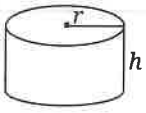



**Special Right Triangles**

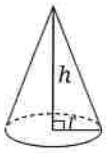



$V = \ell wh$

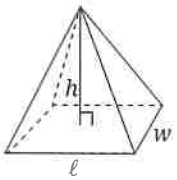



$V = \pi r^2 h$

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




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




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

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

CONTINUE

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**For multiple-choice questions,** solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled or for questions with no answers circled.

**For student-produced response questions,** solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction (7/2) or its decimal equivalent (3.5).
- Don't enter **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

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**1** Mark for Review

A fruit stand sells a total of 200 apples and bananas. The apples are sold in bags of 4 apples per bag, and the bananas are sold in bunches of 6 bananas each. Which of the following equations best represents the number of bags of apples, $a$, and bunches of bananas, $b$, that could be sold at the fruit stand?

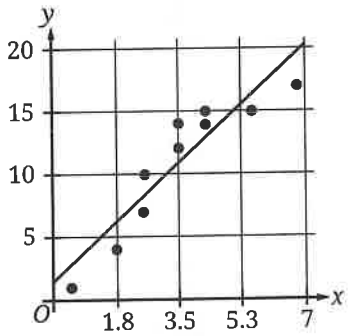
(A) $(a + b)(4 + 6) = 200$

(B) $(4 + a)(6 + b) = 200$

(C) $4a + 6b - 200$

(D) $6a + 4b = 200$

**2** Mark for Review




The relationship between two variables, $x$ and $y$, is shown on the scatterplot, and a line of best fit is also shown. Which of the following equations best represents the line of best fit?

(A) $y = -1.5 - 2.7x$

(B) $y = -1.5 + 2.7x$

(C) $y = 1.5 - 2.7x$

(D) $y = 1.5 + 2.7x$

**3** Mark for Review

A random sample of the 120 members of a cycling club was given a survey. The survey asked the cycling club members whether they plan to compete in an upcoming race. Of those surveyed, 45% responded that they do not plan to compete in the upcoming race. Which of the following is the best estimate of the total number of cycling club members who do not plan to compete in the upcoming race, based on the survey?

(A) 45

(B) 54

(C) 66

(D) 120

**4** Mark for Review

| $x$ | $g(x)$ |
|---|---|
| −1 | −11 |
| 0 | −5 |
| 1 | −7 |
| 2 | −17 |

The table shows four values of $x$ and their corresponding values of $g(x)$ for the quadratic function $g$. Which of the following equations defines function $g$?

(A) $g(x) = -x^2 - 4x - 5$

(B) $g(x) = -5x^2 + 3x - 5$

(C) $g(x) = -4x^2 + 2x - 5$

(D) $g(x) = -2x^2 + 4x - 5$

CONTINUE

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**5** Mark for Review

$$f(x) = \frac{x-12}{8}$$

The equation given defines function $f$. If $c$ is a constant, for which value of $c$ does $f(c) = 20$?

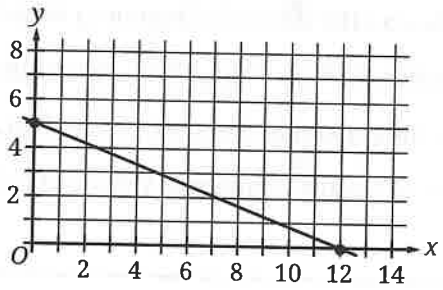
(A) 1

(B) 20

(C) 148

(D) 172

**6** Mark for Review




The point with coordinates $(3, n)$ lies on the line shown. What is the value of $n$?

(A) $\frac{13}{4}$

(B) $\frac{15}{4}$

(C) $\frac{19}{5}$

(D) $\frac{24}{7}$

**7** Mark for Review

Line $l$ is graphed in the $xy$-plane and is defined by $7 + 4y = -16x$. If line $m$ is parallel to line $l$, what is the slope of line $m$?

(A) $-4$

(B) $-\frac{1}{4}$

(C) $\frac{1}{4}$

(D) 4

**8** Mark for Review

A concrete block in the shape of a rectangular solid has a mass of 1,690 kilograms. The block has a length of 1.1 meters, a width of 0.8 meters, and a height of 0.8 meters. To the nearest whole number, what is the density, in kilograms per cubic meter, of the concrete block?

(A) 1,082

(B) 1,190

(C) 2,401

(D) 2,641

CONTINUE

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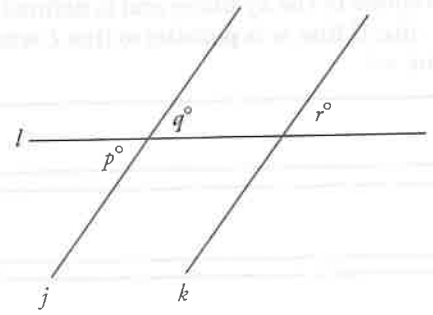
**9** Mark for Review




Note: Figure not drawn to scale.

In the figure shown, line $l$ intersects parallel lines $j$ and $k$. If $q = 10c - 11$ and $r = 15c + 41$, what is the value of $p$?

(A) 6

(B) 49

(C) 115

(D) 131

**10** Mark for Review

$$-7(px + q) = \frac{42}{23}x + \frac{35}{9}$$

The given equation, where $p$ and $q$ are constants, has infinitely many solutions. If $p < 0$, what is the value of $q$?

**11** Mark for Review

During the last business quarter, the number of unique visitors to a small e-commerce website decreased by 25% from its previous average of 620 unique visitors each day. At the start of the upcoming quarter, the website will launch a promotion, and the resulting number of unique visitors per day is projected to be 180% of the number of visitors last quarter. What is the projected average number of unique visitors per day the website will receive during its promotion?

**12** Mark for Review

The amount, in micrograms, of a certain radioactive isotope $h$ hours after its initial creation is modeled by the function $M(h) = 302(0.87)^{\left(\frac{4}{5}\right)h}$. According to the model, the amount of the isotope is predicted to decrease by $d$% every 75 minutes. What is the value of $d$?

(A) 0.87

(B) 13

(C) 16.25

(D) 87

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**13** Mark for Review

Packages in a warehouse are split into two groups. Group X contains 40 packages, and group Y contains 110 packages. If the mean mass of the packages in group X is 24 kilograms (kg), and the mean mass of the packages in group Y is 9 kg, what is the mean mass, in kg, of all 150 packages?

**14** Mark for Review

$$11x^2 - kx + 63$$

The given expression, where $k$ is a constant, can be rewritten as $(px - q)(x - r)$, where $p$, $q$, and $r$ are integer constants. Which of the following must be an integer?

(A) $\frac{63}{r}$

(B) $\frac{63}{p}$

(C) $\frac{k}{r}$

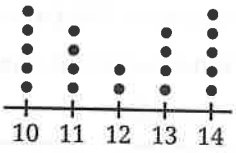
(D) $\frac{k}{p}$

**15** Mark for Review

The equation $3x^2 - 36x + k = 0$ has exactly two real solutions. If $k$ is a constant and $k < m$, what is the least possible value of $m$?

**16** Mark for Review

Data Set R




There are 20 values in data set R, represented by the dot plot shown. Data set S is created by subtracting 8 from each of the values in data set R. Which of the following correctly compares the ranges and the means of data sets R and S?

(A) The range of data set S is less than the range of data set R, and the mean of data set S is equal to the mean of data set R.

(B) The range of data set S is less than the range of data set R, and the mean of data set S is less than the mean of data set R.

(C) The range of data set S is equal to the range of data set R, and the mean of data set S is equal to the mean of data set R.

(D) The range of data set S is equal to the range of data set R, and the mean of data set S is less than the mean of data set R.

CONTINUE

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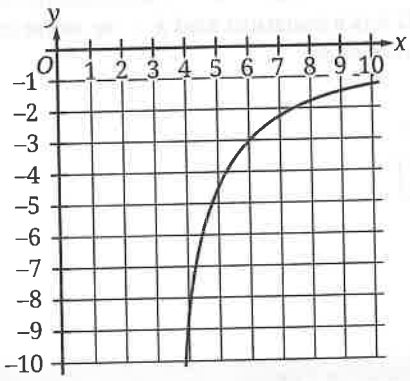
**17** Mark for Review




The function $g$ is defined by the equation $g(x) = \frac{c}{x-d}$, where $c$ and $d$ are constants. The partial graph of $y = g(x)$ is shown. Which equation could define function $h$ if $h(x) = g(x-3)$?

(A) $h(x) = -\frac{9}{x-6}$

(B) $h(x) = -\frac{9}{x-3}$

(C) $h(x) = \frac{-9}{x}$

(D) $h(x) = \frac{-9(x-3)}{x-3}$

**18** Mark for Review

$$y = x^2 - 6x - c$$
$$y = 3.5$$

If the given system of equations has exactly one real solution, and $c$ is a negative constant, what is the value of $c$?

**19** Mark for Review

A circle with the equation $x^2 - \frac{1}{2}x + y^2 - \frac{1}{2}y = \frac{7}{8}$ is graphed in the $xy$-plane. What is the length of the radius of this circle?

**20** Mark for Review

In the equation $18x^2 - (18n - m)x - mn = 0$, $m$ and $n$ are positive constants. If the product of the solutions to the given equation is $kmn$, where $k$ is a constant, what is the value of $k$?

(A) $-18$

(B) $-\frac{1}{18}$

(C) $\frac{1}{9}$

(D) $1$

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**21** Mark for Review

The equation of a parabola is written in the form $y = ax^2 + bx + c$, where $a$, $b$, and $c$ are constants. When graphed in the $xy$-plane, the parabola has vertex $(-1, 4)$ and does not intersect the $x$-axis. Which of the following could be the value of $a - b - c$?

(A) $-5$

(B) $-4$

(C) $0$

(D) $4$

**22** Mark for Review

A rectangular prism has a height of 50 centimeters (cm). The base of the prism is a square and the surface area of the prism is $S$ cm$^2$. If the prism is divided into two identical rectangular prisms by making a cut parallel to the square base, each resulting prism has a surface area of $\frac{31}{56}S$ cm$^2$. What is the side length, in cm, of each square base?

(A) 5

(B) 6

(C) 12

(D) 24

**STOP**

**If you finish before time is called, you may check your work on this module only. Do not turn to any other module in the test.**