Answer Sheet

PRACTICE TEST 1

Start with number 1 for each new section. If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

SECTION 1

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	6 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	11 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	16 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	7 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	12 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	17 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	8 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	13 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	18 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	9 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	14 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	19 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	10 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	15 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	20 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

SECTION 2

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	5 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	6 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	7 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	8 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ONLY ANSWERS ENTERED IN THE OVALS IN EACH GRID AREA WILL BE SCORED.
YOU WILL NOT RECEIVE CREDIT FOR ANYTHING WRITTEN IN THE BOXES ABOVE THE OVALS.

9 10 11 12 13

14 15 16 17 18

SECTION 3

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	6 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	11 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	16 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	7 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	12 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	17 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	8 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	13 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	18 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	9 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	14 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	19 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	10 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	15 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	20 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

BE SURE TO ERASE ANY ERRORS OR STRAY MARKS COMPLETELY.

Practice Test 1

Section 1 TIME: 25 MINUTES, 20 QUESTIONS

In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
2. Figures that accompany problems in this test are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that the figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.
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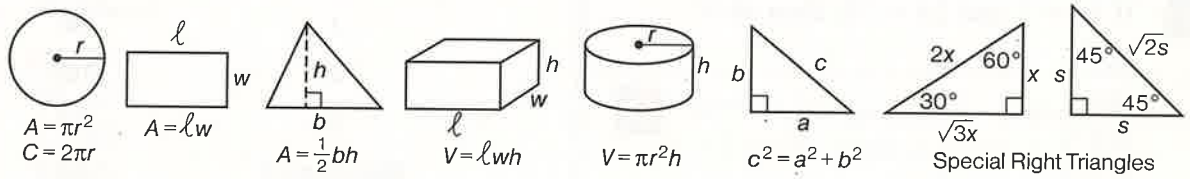
Reference Information



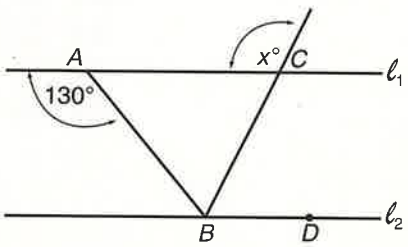
$A = \pi r^2$, $C = 2\pi r$ $\quad A = \ell w$ $\quad A = \frac{1}{2}bh$ $\quad V = \ell wh$ $\quad V = \pi r^2 h$ $\quad c^2 = a^2 + b^2$ $\quad$ Special Right Triangles

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

1 How many positive integers less than 36 are equal to 4 times an *odd* integer ?

(A) Two
(B) Three
(C) Four
(D) Five
(E) Six

2



If, in the figure above, $\ell_1 \parallel \ell_2$ and BC bisects $\angle ABD$, then $x =$

(A) 75
(B) 95
(C) 105
(D) 115
(E) 150

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3 A long-distance telephone call costs \$1.80 for the first 3 minutes and \$0.40 for each additional minute. If the charge for an x-minute long-distance call at this rate was \$4.20, then $x =$

(A) 7
(B) 8
(C) 9
(D) 10
(E) 12

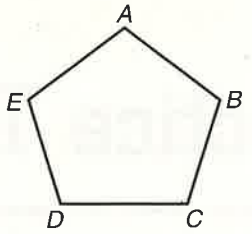
4 What is the LEAST number of squares each of side length 2 inches that is needed to cover completely, without overlap, a larger square with side length 8 inches?

(A) 4
(B) 8
(C) 9
(D) 16
(E) 32

5 If $3a = 2$ and $2b = 15$, then $ab =$

(A) 1
(B) 2
(C) 5
(D) 7
(E) 12

6



In figure $ABCDE$ above, the length of each side is 1 unit. If a point starts at vertex A and moves along each side in a clockwise direction, at which vertex will the point be when it has traveled a distance of exactly 715 units?

(A) A
(B) B
(C) C
(D) D
(E) E

7

Number of Television Sets	Number of Families
0	32
1	80
2	160
3	83
More than 3	45

The table above summarizes the results of a survey in which families reported the number of television sets they have in their homes. What percent of the families surveyed have two or fewer television sets?

(A) 75%
(B) 68%
(C) 60%
(D) 40%
(E) 33%

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8 If $0 < x < 1$, which of the following expressions must decrease in value as x increases?

I. $\frac{1}{1-x}$

II. $\frac{1}{x^2}$

III. $1 - \sqrt{x}$

(A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) II and III only

9 After $\frac{1}{8}$ of a ribbon is thrown away, the remaining part is cut into two pieces whose lengths are in the ratio of 4 : 5. If 9 inches of the original ribbon was thrown away, how many inches long is the shorter of the two remaining pieces of ribbon?

(A) 21
(B) 28
(C) 30
(D) 35
(E) 42

10 If a cube with edge length π has the same volume as a cylinder with a height of π, then the radius of the base of the cylinder is

(A) π
(B) $\sqrt{\pi}$
(C) $\frac{1}{\sqrt{\pi}}$
(D) $\frac{1}{\pi}$
(E) $\frac{1}{\pi^2}$

11 If $\frac{5}{a} = b$ and $a = 3$, then $a(b + 1) =$

(A) 8
(B) $7\frac{1}{3}$
(C) $6\frac{2}{3}$
(D) 4
(E) 3

12 A person spent a total of \$720 for dress shirts and sport shirts, each priced at \$35 and \$20, respectively. If the person purchased two \$35 dress shirts for each \$20 sport shirt, what is the total number of shirts purchased?

(A) 16
(B) 21
(C) 24
(D) 28
(E) 32

13 If 10 cubic centimeters of blood contains 1.2 grams of hemoglobin, how many grams of hemoglobin are contained in 35 cubic centimeters of the same blood?

(A) 2.7
(B) 3.0
(C) 3.6
(D) 4.2
(E) 4.8

GO ON TO THE NEXT PAGE

14

Favorite Sports Activities

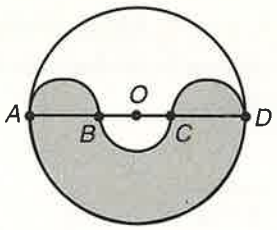
The circle graph above summarizes the results of a survey of 2500 students who named their favorite sports activities. If each student in the survey named exactly one activity, what is the total number of students who named either swimming or biking as their favorite sports activity?

(A) 1000
(B) 875
(C) 750
(D) 600
(E) 400

15 If $x - 3$ is 1 less than $y + 3$, then $x + 2$ exceeds y by what amount?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 9

16



In the figure above, arcs AB, BC, and CD are semicircles with diameters $AB = BC = CD$. If the diameter of the largest circle with center O is 12, what is the area of the shaded region?

(A) 20π
(B) 24π
(C) 30π
(D) 36π
(E) 40π

17 For all positive integers p, let $\triangledown p$ be defined by the equation

$$\triangledown p = p + \frac{p}{k}$$

where k is the largest prime number that is a factor of p, and $k < p$. If $\triangledown 110 = x$, what is the value of $\triangledown x$?

(A) 120
(B) 133
(C) 144
(D) 148
(E) 160

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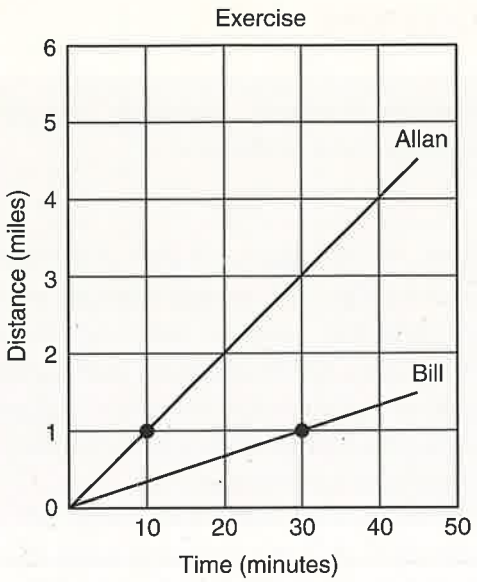
18



At 9:00 A.M. Allan began jogging and Bill began walking at constant rates around the same circular $\frac{1}{4}$ mile track. The figure above compares their times in minutes and corresponding distances in miles. Which statement or statements must be true?

I. Bill's average rate of walking was 2 miles per hour.
II. At 9:10 A.M., Allan had jogged $\frac{3}{5}$ mile more than Bill had walked.
III. At 9:30 A.M., Allan had completed 8 more laps around the track than Bill.

(A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) I, II, and III

19

A group of p people plan to contribute equally to the purchase of a gift that costs d dollars. If n of the p people decide not to contribute, by what amount in dollars does the contribution needed from each of the remaining people increase?

(A) $\frac{d}{p-n}$
(B) $\frac{pd}{p-n}$
(C) $\frac{pd}{n(p-n)}$
(D) $\frac{nd}{p(p-n)}$
(E) $\frac{d}{n(pd-1)}$

20

In a certain class, exactly $\frac{2}{3}$ of the students applied for admission to a 4-year college and, of these, $\frac{1}{8}$ applied also to a 2-year junior college. If more than one student applied to both 4-year and 2-year colleges, what is the LEAST number of students who could be in this class?

(A) 12
(B) 24
(C) 28
(D) 30
(E) 36

STOP

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

Section 2 TIME: 25 MINUTES, 18 QUESTIONS

This section contains two types of questions. You have 25 minutes to complete both types. You may use any available space for scratchwork.

Notes:

1. The use of a calculator is permitted. All numbers used are real numbers.
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3. Unless otherwise indicated, the domain of any function f is assumed to be the set of all real numbers for which $f(x)$ is a real number.

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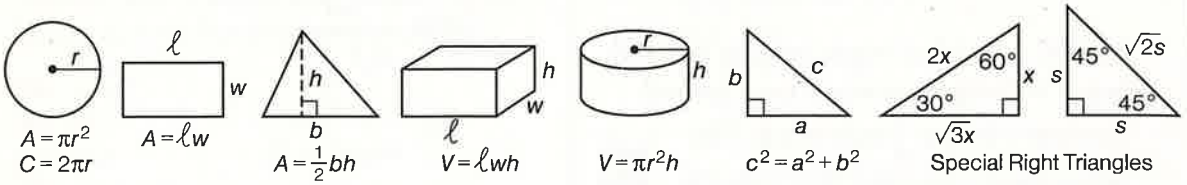

$A = \pi r^2$ $C = 2\pi r$ | $A = \ell w$ | $A = \frac{1}{2}bh$ | $V = \ell wh$ | $V = \pi r^2 h$ | $c^2 = a^2 + b^2$ | Special Right Triangles

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

1 If $x^{-2} = 64$, what is the value of $x^{\frac{1}{3}}$?

(A) $\frac{1}{8}$
(B) $\frac{1}{4}$
(C) $\frac{1}{2}$
(D) 2
(E) 4

2 Set $X = \{21, 22, 23, 24, 25\}$
Set $Y = \{18, 20, 22, 24, 26, 28\}$

Sets X and Y are shown above. If a number is picked at random from set X, what is the probability that the number selected is also in set Y?

(A) 0.2
(B) 0.25
(C) 0.4
(D) 0.6
(E) 0.8

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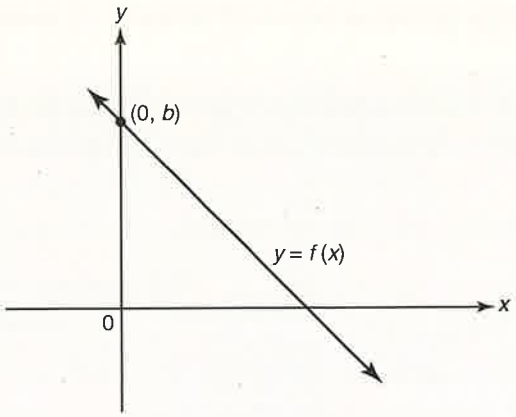
3



Note: Figure is not drawn to scale.

The figure above shows the graph of the linear function $y = f(x)$. If the slope of line is -2 and $f(3) = 4$, what is the value of b?

(A) 8
(B) 9
(C) 10
(D) 11
(E) 12

4 If $j - k = 9$ and $k = 6m$, and $3m = 7$, what is the value of j?

(A) 3
(B) 6
(C) 15
(D) 21
(E) 23

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

(A) $\sqrt[3]{5}$
(B) 9
(C) 27
(D) 81
(E) 729

6 Function f is a linear function such that $f(2) = 3$ and $f(3) = 2$. What is a possible equation for function f?

I. $y = x + 1$
II. $y = x - 1$
III. $y = -x + 5$

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) none

7 If $7^k = 100$, what is the value of $7^{\frac{k}{2}+1}$?

(A) 18
(B) 51
(C) 57
(D) 70
(E) 107

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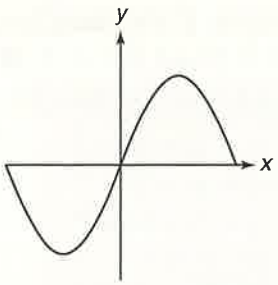
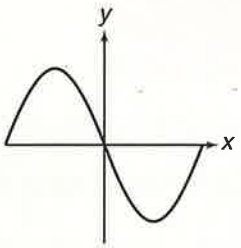
8

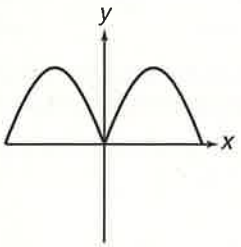


The graph of $y = f(x)$ is shown in the figure above. Which graph could represent the graph of $y = |f(x)|$?

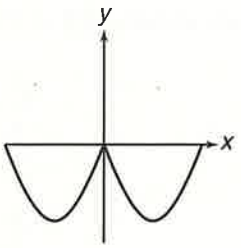
(A)



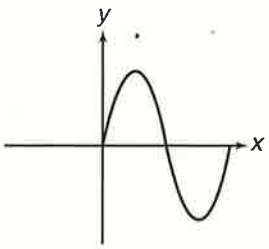
(B)



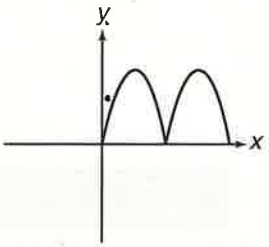
(C)



(D)



(E)



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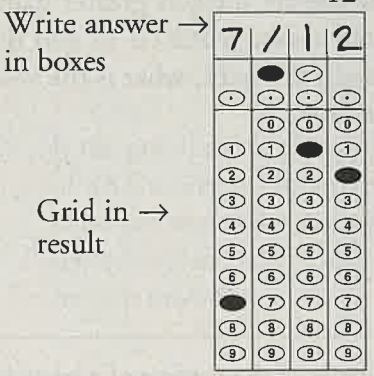
Directions for Student-Produced Response Questions

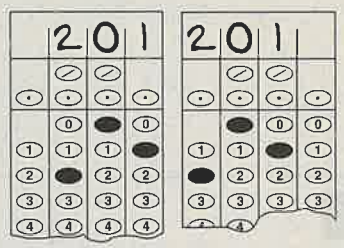
Each of the remaining 10 questions (9–18) requires you to solve the problem and enter your answer by marking the ovals in the special grid, as shown in the examples below.

Answer: $\frac{7}{12}$ or 7/12



Answer: 2.5

Answer: 201
Either position is correct.

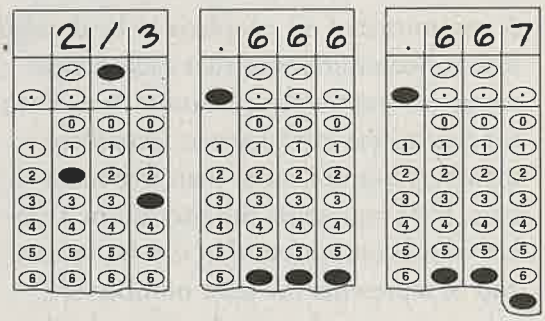


Note: You may start your answers in any column, space permitting. Columns not needed should be left blank.

- Mark no more than one oval in any column.
- Because the answer sheet will be machine-scored, **you will receive credit only if the ovals are filled in correctly.**
- 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 ovals accurately.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- No question has a negative answer.
- **Mixed numbers** such as $2\frac{1}{2}$ must be gridded as 2.5 or 5/2. (If  is gridded, it will be interpreted as $\frac{21}{2}$, not $2\frac{1}{2}$.)

- Decimal Accuracy: If you obtain a decimal answer, **enter the most accurate value the grid will accommodate.** For example, if you obtain an answer such as 0.6666 . . . , you should record the result as .666 or .667. **Less accurate values such as .66 or .67 are not acceptable.**

Acceptable ways to grid $\frac{2}{3}$ = .6666 . . .



9 If $x + 2x + 3x + 4x = 1$, then what is the value of x^2?

10 What is the least positive integer p for which $441p$ is the cube of an integer?

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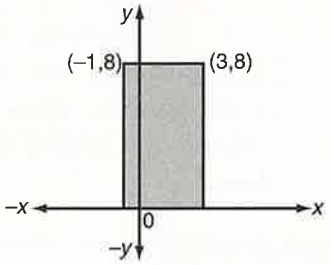
11 During a certain month, a car salesperson sold three economy cars for every two luxury cars. If during that month the total number of economy and luxury cars sold by this salesperson was 90, how many economy cars did she sell?

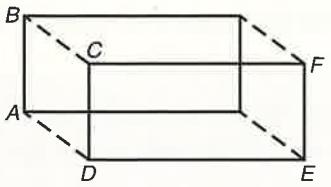
12



In the figure above, what is the perimeter of the shaded rectangle?

13 A committee of 43 people is to be divided into subcommittees so that each person serves on exactly one subcommittee. Each subcommittee must have at least three members but not more than five members. If M represents the maximum number of subcommittees that can be formed and m represents the least number of subcommittees that can be formed, what is the value of $M - m$?

14



In the figure above, the dimensions of the rectangular box are integers greater than 1. If the area of face $ABCD$ is 12 and the area of face $CDEF$ is 21, what is the volume of the box?

15 The coordinates of the vertices of a triangle are $(1,-2)$, $(9,-2)$, and (h,k). If the area of the triangle is 40, what is a possible value for k?

16 In the games that the Bengals played against the Lions, the Bengals won $\frac{2}{3}$ of the games and lost $\frac{3}{4}$ of the other games. If the teams tied in two games, how many games did the Bengals play against the Lions?

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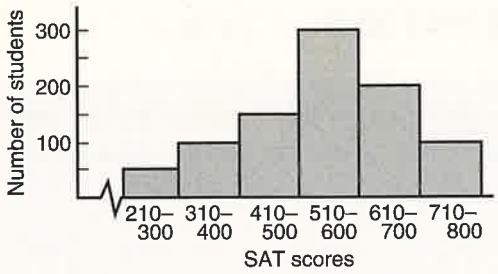
17



SAT Scores of Students
at Oceanview High School

If the graph above shows the distribution of SAT scores at Oceanview High School, what percent of the students in this school scored at least 610? (Omit the percent sign in your answer.)

18 Let f be the function defined by $f(x) = 8^x - [x]$, where the symbol $[x]$ represents the greatest integer that is *less than or equal to* x. For example, $[4.2] = 4$. What is the numerical value of $f\left(-\frac{2}{3}\right)$?

STOP

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

Section 3 TIME: 20 MINUTES, 16 QUESTIONS

In this section solve each problem, using any available space on the page for scratchwork. Then decide which is the best of the choices given and fill in the corresponding oval on the answer sheet.

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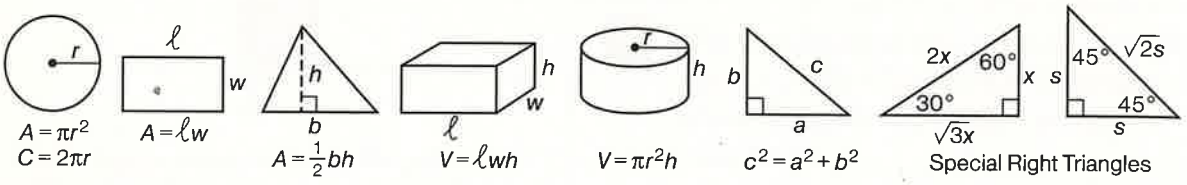

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The number of degrees of arc in a circle is 360.
The sum of the measures in degrees of the angles of a triangle is 180.

1 A bell that rings every m minutes and another bell that rings every n minutes, where m and n are prime numbers, ring at the same time. What is the LEAST number of minutes that must elapse before the two bells again ring at the same time?

(A) $m + n$
(B) $\frac{m}{n}$
(C) mn
(D) $60mn$
(E) $\frac{60}{m + n}$

2 Pens that usually sell at two for \$3 are on sale at three for \$4. How much money is saved when 18 pens are purchased at the sale price rather than at the usual price?

(A) \$2
(B) \$3
(C) \$4
(D) \$5
(E) \$6

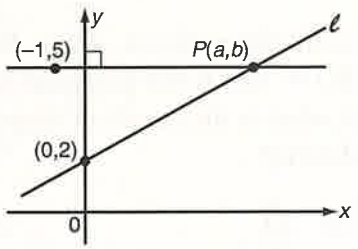
GO ON TO THE NEXT PAGE

3 5, 10, 14, 16, 20, 23

If each of the six numbers above is increased by x, the average of the resulting set of six numbers is 15. The value of x is

(A) $\frac{1}{6}$
(B) $\frac{1}{3}$
(C) $\frac{1}{2}$
(D) $\frac{2}{3}$
(E) $\frac{5}{6}$

4



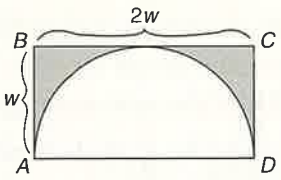
In the figure above, if the slope of line ℓ is $\frac{1}{4}$, what are the coordinates (a, b) of point P?

(A) (12,5)
(B) (12,8)
(C) (8,4)
(D) (5,20)
(E) $\left(\frac{3}{4},5\right)$

5 If x is an odd integer, for how many values of x is $3 \leq 2x \leq 56$?

(A) 11
(B) 12
(C) 13
(D) 14
(E) 15

6



In the figure above, semicircle AD is inscribed in rectangle $ABCD$. What is the area of the shaded region in terms of w?

(A) $w^3\left(4 - \frac{\pi}{2}\right)$
(B) $w^2\left(2 - \frac{\pi}{4}\right)$
(C) $w^2\left(2 - \frac{\pi}{2}\right)$
(D) $\pi w^2 - 2$
(E) $2\pi w^2 - 1$

7 If $\frac{z}{2b} = 4$, $\frac{z}{2c} = 6$, and $2b + 3c = 12$, what is the value of z?

(A) 8
(B) 16
(C) 20
(D) 24
(E) 30

8 If $3a + b = 24$ and a is a positive even integer, which of the following statements must be true?

I. b is divisible by 3.
II. b is an even integer.
III. a is less than 8.

(A) II only
(B) I and II only
(C) I and III only
(D) II and III only
(E) I, II, and III

GO ON TO THE NEXT PAGE

9 After the length and width of a rectangle are each reduced by 40%, the length and width of the new rectangle are each increased by $\frac{1}{3}$ of their new values. In producing the final rectangle, by what percent is the area of the original rectangle reduced?

(A) 20%
(B) 24%
(C) 30%
(D) 36%
(E) 40%

10 If 1 blip + 4 beeps = 1 glitch and 3 blips + 1 beep = 2 glitches, how many beeps equal a glitch?

(A) 3
(B) 5
(C) 8
(D) 11
(E) 13

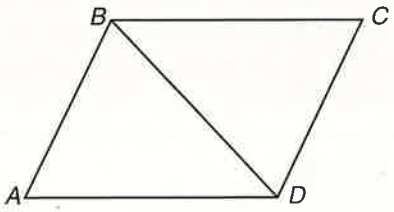
11 Tom loaded $\frac{1}{2}$ of the cartons at a shipping dock on a truck. When Tom went to lunch, George loaded $\frac{1}{3}$ of the remaining cartons on the truck. After George finished, 40 cartons remained to be loaded on the truck. How many cartons were on the shipping dock before any were loaded on the truck?

(A) 60
(B) 80
(C) 120
(D) 150
(E) 180

12 If $k^{-\frac{1}{2}} = 4$ and $j^{-3} = 8$, then $\frac{j}{k} =$

(A) $\frac{1}{8}$
(B) $\frac{1}{2}$
(C) 2
(D) 4
(E) 8

13



Note: Figure is not drawn to scale.

In the figure above, $AB = BC = CD = AD = BD$. If the perimeter of $ABCD$ is 8, what is the length of diagonal $\overline{AC}$ (not shown)?

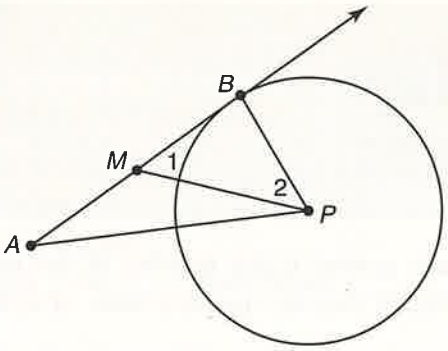
(A) $\sqrt{2}$
(B) $\sqrt{3}$
(C) $2\sqrt{2}$
(D) $2\sqrt{3}$
(E) 3

14 If $2^x \cdot 4^y = 8^{x+y}$, then $\frac{x}{y} =$

(A) $-\frac{3}{2}$
(B) $-\frac{1}{2}$
(C) $\frac{3}{4}$
(D) 2
(E) $\frac{5}{2}$

GO ON TO THE NEXT PAGE

15

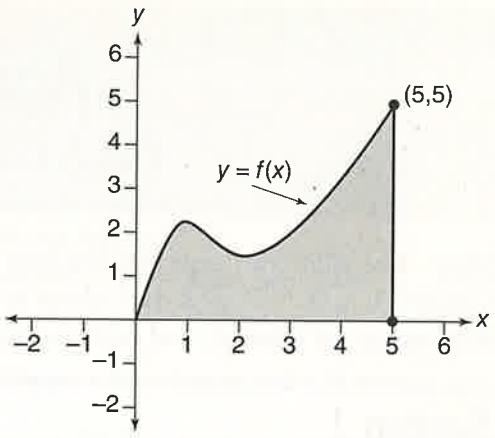


Note: Figure is not drawn to scale.

In the figure above, $\overline{AB}$ is tangent to circle P at point B. Line segment PM bisects $\overline{AB}$, and the measure of angle 1 is equal to the measure of angle 2. If r represents the radius length of the circle, what is the length of $\overline{AP}$ in terms of r?

(A) $\sqrt{2}r$
(B) $\sqrt{r^2 + 2}$
(C) $\sqrt{3}r$
(D) $2r$
(E) $\sqrt{5}r$

16



Function f is defined for $0 \leq x \leq 5$, as shown in the accompanying figure. If (r,s) is a point inside the shaded region bounded by the x-axis, the line $x = 5$, and $y = f(x)$, which statement must be true?

I. $r + s \leq 5$
II. $s \leq f(r)$
III. $r \neq s$

(A) I only
(B) II only
(C) III only
(D) I and III only
(E) II and III only

STOP

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

Answer Key

PRACTICE TEST 1

Note: The number inside the brackets that follows each answer is the number of the lesson in Chapter 3, 4, 5, 6, 7, or 8 that relates to the topic or concept that the question tests. In some cases two lessons are relevant, and both numbers are given.

Section 1

1. C [3-1]
2. D [6-1]
3. C [3-5]
4. D [6-5]
5. C [4-2]
6. A [3-3]
7. B [7-4]
8. E [3-5]
9. B [5-4]
10. B [6-7]
11. A [4-2]
12. C [5-1]
13. D [5-4]
14. A [7-4]
15. D [5-1]
16. A [6-6]
17. C [7-5]
18. D [8-5]
19. D [5-1]
20. B [3-5]

Section 2

1. C [8-1]
2. C [7-3]
3. C [8-5]
4. E [4-1]
5. B [8-2]
6. C [8-5]
7. D [8-1]
8. B [8-3, 8-4]
9. .01 [4-1]
10. 21 [3-2]
11. 54 [5-1]
12. 24 [6-5]
13. 5 [7-2]
14. 84 [6-7]
15. 8 [6-8]
16. 24 [3-7]
17. 33.3 [7-4]
18. 5/4 [8-4]

Section 3

1. C [3-3]
2. B [3-1]
3. B [7-1]
4. A [6-8]
5. C [3-1]
6. C [6-5, 6-6]
7. D [4-2]
8. B [3-3]
9. D [7-4, 6-5]
10. D [4-6]
11. C [3-7]
12. E [8-1]
13. D [6-4]
14. B [8-2]
15. E [6-6]
16. B [8-4]