Chapter 3
Practice Test 1

MATHEMATICS LEVEL 1

For each of the following problems, decide which is the BEST of the choices given. If the exact numerical value is not one of the choices, select the choice that best approximates this value. Then fill in the corresponding oval on the answer sheet.

Notes: (1) A scientific or graphing calculator will be necessary for answering some (but not all) of the questions on this test. For each question, you will have to decide whether or not you should use a calculator.

(2) The only angle measure used on this test is degree measure. Make sure that your calculator is in degree mode.

(3) Figures that accompany problems on 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 its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

(4) Unless otherwise specified, the domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number. The range of f is assumed to be the set of all real numbers $f(x)$, where x is in the domain of f.

(5) Reference information that may be useful in answering the questions on this test can be found below.

THE FOLLOWING INFORMATION IS FOR YOUR REFERENCE IN ANSWERING SOME OF THE QUESTIONS ON THIS TEST.

Volume of a right circular cone with radius r and height h:

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

Volume of a sphere with radius r: $V = \frac{4}{3}\pi r^3$

Surface area of a sphere with radius r: $S = 4\pi r^2$

Volume of a pyramid with base area B and height h:

$$V = \frac{1}{3}Bh$$

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1. If $9a - ab = 108$ and $9 - b = 4$, what is the value of a ?

   (A) 5
   (B) 12
   (C) 27
   (D) 36
   (E) 104

USE THIS SPACE FOR SCRATCHWORK.

2. Two distinct integers, a and b, are divided and the quotient $\frac{a}{b}$ is an even integer. Which of the following must be true?

   (A) Both integers are odd.
   (B) a is odd, b is even.
   (C) One of the integers is 2.
   (D) At least one of the integers is even.
   (E) Both integers are even.

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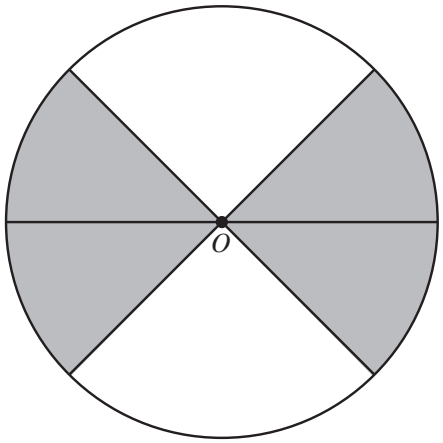
MATHEMATICS LEVEL 1—*Continued*

3. If $x + y = 6$ and $2xy = 16$, then $x^2 + y^2 =$

   (A) 12
   (B) 20
   (C) 22
   (D) 36
   (E) 64

USE THIS SPACE FOR SCRATCHWORK.



Note: Figure not drawn to scale.

4. In the figure above, the four shaded sectors of the circle with center O each have a central angle of 60 degrees. What fraction of the circle remains unshaded?

   (A) $\frac{1}{6}$
   (B) $\frac{1}{4}$
   (C) $\frac{1}{3}$
   (D) $\frac{2}{5}$
   (E) $\frac{2}{3}$

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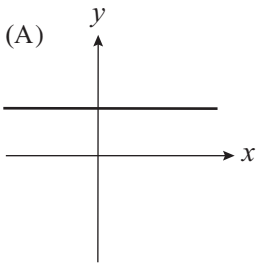
MATHEMATICS LEVEL 1—*Continued*

5. Which of the following graphs shows a line with both a positive slope and a positive x-intercept?

USE THIS SPACE FOR SCRATCHWORK.

(A)



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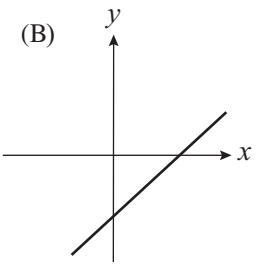

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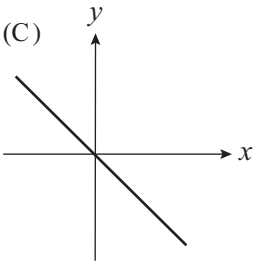

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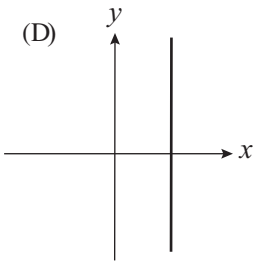
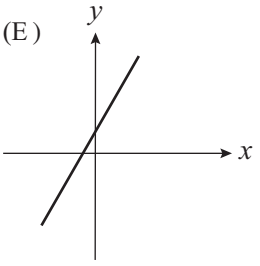


(E)



6. If $2y^2 + 16 = 25 + y^2$, what are all possible values of y?

(A) 1 only
(B) 3 only
(C) –3 only
(D) –3 and 3 only
(E) 1, 3, and –3

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MATHEMATICS LEVEL 1—*Continued*

7. If $k^{7x-6} = k^{9x+2}$ for all values of k where $k \neq 0$, what is the value of x ?

USE THIS SPACE FOR SCRATCHWORK.

(A) –4

(B) –2

(C) $\frac{1}{2}$

(D) 2

(E) 4

8. Orders for coffee at the Foggy London Cafe have been dropping by 80 cups per week, and orders for tea have been rising by 120 cups per week. This week's receipts show 4,800 coffee orders and 1,200 tea orders. Which of the following equations could be used to calculate the number of weeks w until tea orders are equal to coffee orders at the Foggy London Cafe?

(A) $1{,}200 - 80w = 4{,}800 + 120w$
(B) $1{,}200 + 120w = 4{,}800 - 80w$
(C) $4{,}800 - 120w = 1{,}200 - 80w$
(D) $120\ (w - 1{,}200) = 80\ (w - 4{,}800)$
(E) $12w + 8 = 48w - 12$

9. If $y = 10.2 - \sqrt[3]{x}$, for what value of x does $y = 9$?

(A) –0.69
(B) 1.06
(C) 1.73
(D) 2.08
(E) 2.17

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MATHEMATICS LEVEL 1—*Continued*

10. A rectangular flower bed has an area of 81 square feet, and is 9 times as wide as it is long. What is the perimeter of the flower bed?

    (A) 27 ft
    (B) 30 ft
    (C) 36 ft
    (D) 60 ft
    (E) 108 ft

11. The function S, where $S(t) = 63.158t + 200$, represents the correlation between likely test score $S(t)$ and the number of hours t that Astrid sleeps the night before her test. Based on this function, approximately how many hours did Astrid sleep the night before she scored a 720 ?

    (A) 1.1
    (B) 4.6
    (C) 8.2
    (D) 9.5
    (E) 14.6

12. Which of the following is equivalent to $x^3 - 3x^2 - 2x + 9 = -2x^3 + 3x^2 - 1$?

    (A) $-x^3 - 2x + 8 = 0$
    (B) $3x^3 - 6x^2 - 2x + 10 = 0$
    (C) $3x^3 - 2x + 10 = 0$
    (D) $3x^6 - 6x^4 - 2x + 10 = 0$
    (E) $-x^6 - 2x + 8 = 0$

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MATHEMATICS LEVEL 1—*Continued*

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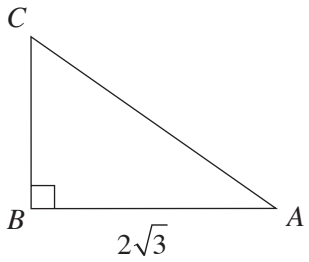

13. In right triangle ABC shown above, side $AB = 2\sqrt{3}$ and $\cos A = \frac{\sqrt{3}}{2}$. What is the length of side AC ?

(A) 1
(B) $\sqrt{3}$
(C) 2
(D) 4
(E) $4\sqrt{3}$

14. Which of the following numbers serves to DISPROVE the statement "Every number which is a factor of a prime number is itself a prime number" ?

(A) 1
(B) 2
(C) 4
(D) 7
(E) 25

15. If $f(x) = \frac{x^2}{4 - 3x}$, what is the value of $f(-\frac{1}{2})$?

(A) $-\frac{2}{11}$
(B) $-\frac{1}{10}$
(C) $-\frac{1}{22}$
(D) $\frac{1}{22}$
(E) $\frac{1}{10}$

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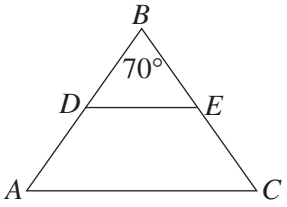
MATHEMATICS LEVEL 1—*Continued*

16. Oakland is located 8.36 miles from San Francisco. On a scale map of the Bay Area, this distance is represented as 5.73 inches. If, on the same map, the distance from Menlo Park to Berkeley is represented as 20.07 inches, what is the actual distance in miles between Menlo Park and Berkeley?

(A) 2.39
(B) 13.76
(C) 22.70
(D) 27.83
(E) 29.28

USE THIS SPACE FOR SCRATCHWORK.



17. In triangle ABC shown above, $m\angle ABC = 70$, $AB \cong BC$, and points D and E are the midpoints of sides AB and BC, respectively. What is the sum of the degree measures of $\angle ADE$ and $\angle DEC$?

(A) 55
(B) 110
(C) 140
(D) 220
(E) 250

18. For what value of x, if any, is $\dfrac{(3+2x)(x-3)}{(3+2x)}$ undefined?

(A) $-\dfrac{3}{2}$
(B) $\dfrac{2}{3}$
(C) $\dfrac{3}{2}$
(D) 3
(E) The expression is defined for all values of x.

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MATHEMATICS LEVEL 1—*Continued*

19. A conservation team wishes to plant 600 new trees this year in local parks. With 6 months remaining in the year, the team is planning to raise the average number of trees planted per month to 72. After reviewing the plan, it is discovered that, even with the increase, the team will still fall short of its goal by 6 trees. What was the team's average number of trees planted per month during the first 6 months of the year?

    (A) 22
    (B) 27
    (C) 28
    (D) 162
    (E) 432

USE THIS SPACE FOR SCRATCHWORK.

20. At what value of x does the graph of the linear equation $7y - 6x = -5$ cross the x-axis ?

    (A) -5
    (B) $-\frac{5}{6}$
    (C) $-\frac{5}{7}$
    (D) $\frac{5}{6}$
    (E) $\frac{6}{7}$

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MATHEMATICS LEVEL 1—*Continued*

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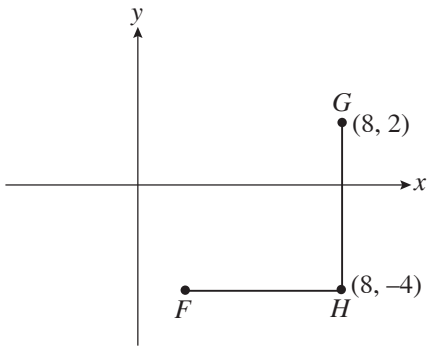

21. In the figure above, line segment GH is perpendicular to line segment FH. If points F and G are equidistant from point H, what is the approximate distance from point F to point G ?

(A) 4.24
(B) 6
(C) 7.21
(D) 8.49
(E) 12

22. Six friends are playing a board game in which they each select one of six pieces: a rabbit, a clock, a dragon, a horse, a telephone, or a train. If Casey ALWAYS picks the dragon, in how many different arrangements can the pieces be selected by the six friends?

(A) 5
(B) 25
(C) 36
(D) 120
(E) 720

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MATHEMATICS LEVEL 1—*Continued*

23. In triangles ABC and RST, the measure of $\angle B$ is equal to the measure of $\angle S$, and the measure of $\angle C$ is equal to the measure of $\angle T$. If side $AC = 5.7$ and side $RT = 17.1$, what is the ratio of the perimeter of triangle ABC to the perimeter of triangle RST ?

(A) 1:27
(B) 1:9
(C) 1:3
(D) 1:2
(E) 3:1

USE THIS SPACE FOR SCRATCHWORK.

24. The graph of $3x - 5y = 15$ will be perpendicular to the graph of which of the following?

(A) $y = -\frac{5}{3}x + 10$

(B) $y = -\frac{3}{5}x - 3$

(C) $y = 3x - 5$

(D) $y = \frac{5}{3}x - 3$

(E) $y = \frac{3}{5}x + 15$

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MATHEMATICS LEVEL 1—*Continued*

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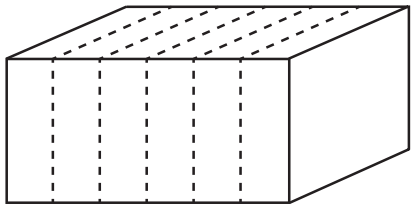

25. The rectangular prism shown above has all of its faces painted green, and is then cut vertically along the dotted lines into six congruent rectangular prisms. The new faces created by the cuts remain unpainted. What fraction of the faces of the six rectangular prisms are NOT painted green?

(A) $\frac{1}{6}$

(B) $\frac{5}{18}$

(C) $\frac{1}{3}$

(D) $\frac{2}{3}$

(E) $\frac{13}{18}$

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MATHEMATICS LEVEL 1—*Continued*

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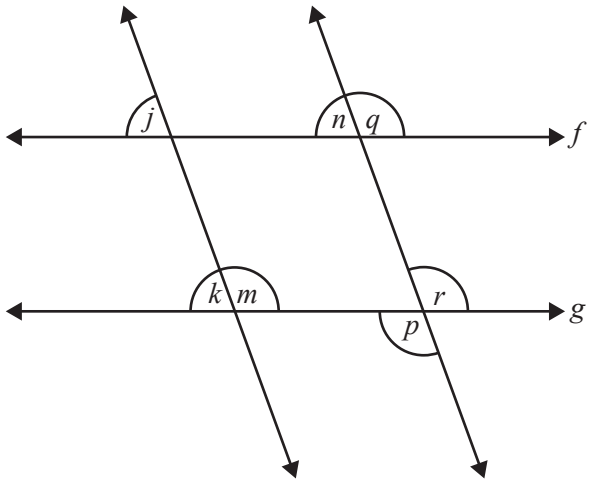

Note: Figure not drawn to scale

26. In the figure above, line f is parallel to line g. Which of the following must be true?

(A) $\angle n \cong \angle k$
(B) $m\angle n + m\angle r = 180$
(C) $\angle j \cong \angle m$
(D) $\angle m \cong \angle r$
(E) $m\angle p + m\angle q = 180$

27. Maria is building a 45 foot long fence and has been completing approximately 4 feet of the fence every 12 hours. If Maria is able to increase her rate by 25 percent, approximately how many hours will it take her to build the remaining 29 feet of the fence?

(A) 108
(B) 69.6
(C) 65.3
(D) 49.7
(E) 12.1

28. If $|m| - |n| < 0$, which of the following must be true?

(A) $n^2 > m^2$
(B) n is positive.
(C) Both m and n are negative.
(D) $n^3 > m^3$
(E) $|m - n| < 0$

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MATHEMATICS LEVEL 1—*Continued*

29. In triangle RST, the measures of $\angle R$ and $\angle S$ sum to 90 degrees. Which of the following is equal to $\tan R$?

(A) $\frac{RT}{RS}$
(B) $\frac{RT}{ST}$
(C) $\frac{ST}{RS}$
(D) $\frac{ST}{RT}$
(E) $\frac{RS}{ST}$

USE THIS SPACE FOR SCRATCHWORK.

30. A magazine publisher has a fixed amount of monthly production costs. If, each month, he sells 600 copies of the magazine, his monthly profit is \$4,800, and if he sells 450 copies, his monthly profit is \$2,550. What are the publisher's monthly production costs?

(A) \$2.33
(B) \$15
(C) \$2,250
(D) \$4,200
(E) \$9,000

31. A line segment in the xy-plane with endpoints $(x, 4)$ and $(2x, 10)$ has a midpoint located at $(12, x - 1)$. What is the value of $2x$?

(A) 4
(B) 7
(C) 8
(D) 14
(E) 16

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MATHEMATICS LEVEL 1—*Continued*

USE THIS SPACE FOR SCRATCHWORK.

32. If $\frac{1}{2}$ of $\frac{1}{5}$ of a certain number is $\frac{2}{3}$ of $\frac{3}{5}$, what is the number?

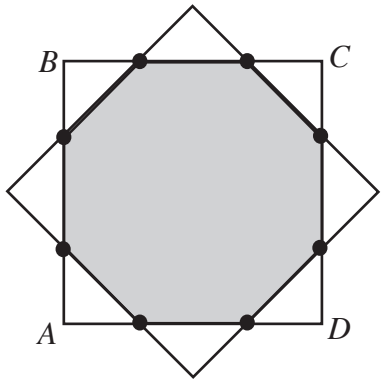
(A) $\frac{1}{25}$

(B) $\frac{1}{15}$

(C) 1

(D) $\frac{9}{4}$

(E) 4



33. In the figure above, the sides of square *ABCD* are intersected by the sides of a second square, such that the intersection points divide the sides of square *ABCD* into equal thirds. What is the ratio of the shaded area to the area of square *ABCD* ?

(A) 2:9
(B) 7:9
(C) 9:7
(D) 7:4
(E) 7:2

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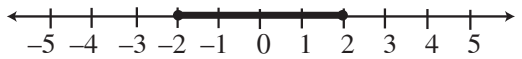
MATHEMATICS LEVEL 1—*Continued*

34. Which of the following represents the domain of the function $f(x) = \dfrac{\sqrt{x+4}}{x-12}$?

(A) $x > -4, x \neq 12$
(B) $x < -4, x = 12$
(C) $x > 12, x \neq 4$
(D) $x > 0, x \neq 12$
(E) $x > 4, x = -12$

USE THIS SPACE FOR SCRATCHWORK.

35. Which of the following is the graph of the solutions to the inequality $|m| + 3 \geq 5$?

(A)


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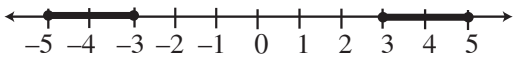

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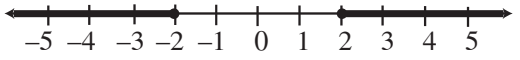
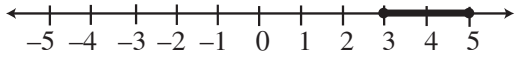


(D)


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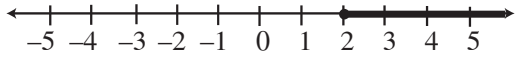

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MATHEMATICS LEVEL 1—*Continued*

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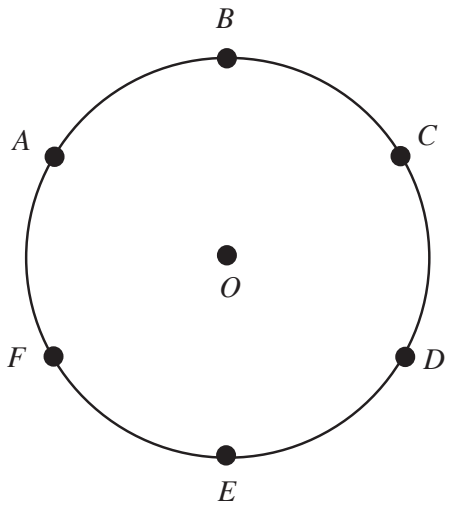
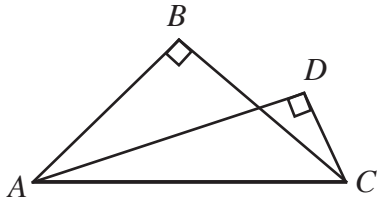


36. In the figure above, points A, B, C, D, E, and F are placed on Circle O such that the arcs between adjacent points are each equal to one-sixth of the circumference, and point O is the center of the circle. How many line segments can be drawn connecting any two labeled points such that the length of the segment is equal to the radius?

(A) 3
(B) 6
(C) 7
(D) 12
(E) 14



37. In the figure above, right triangle ABC has legs measuring 15 and x , and right triangle ADC has legs measuring 7 and $x + 4$. What is the length of segment AC ?

(A) 20
(B) 22
(C) 24
(D) 25
(E) 30

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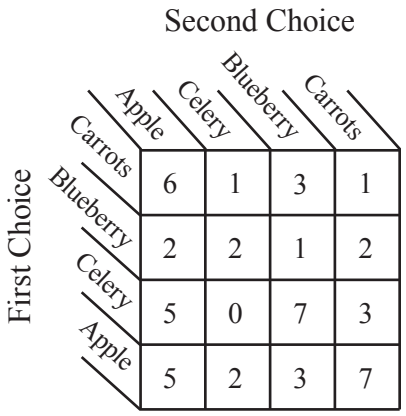
MATHEMATICS LEVEL 1—*Continued*

USE THIS SPACE FOR SCRATCHWORK.



38. At snack time, students in a school can choose any 2 of 4 options: an apple, carrots, celery sticks, or blueberries. They may also choose the same item twice. The table above shows the results of 50 first grader's choices. If one of these students were selected at random, what is the probability that the student's second choice was fruit?

(A) $\frac{1}{10}$

(B) $\frac{11}{50}$

(C) $\frac{21}{50}$

(D) $\frac{12}{25}$

(E) $\frac{16}{25}$

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MATHEMATICS LEVEL 1—*Continued*

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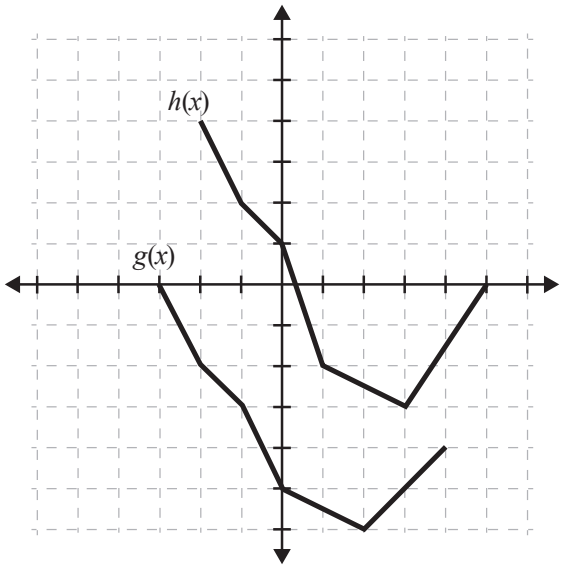
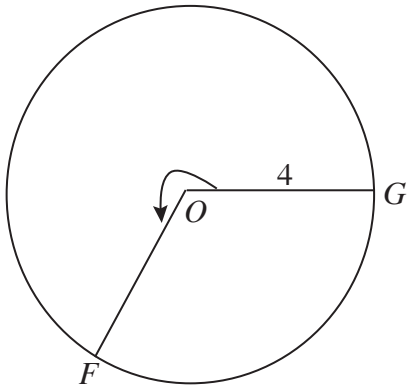


39. According to the graph above, for which of the following values of x does $g(h(x)) = 0$?

(A) –2
(B) –1
(C) 0
(D) 1
(E) 3



40. In Circle O shown above, major arc FG has length 16.76. What is the measure, in degrees, of the indicated angle?

(A) 120
(B) 135
(C) 240
(D) 270
(E) 300

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MATHEMATICS LEVEL 1—*Continued*

$(x + 3)^2 + (y + 1)^2 = 9$
$(x - 3)^2 + (y + 1)^2 = 9$
$(x)^2 + (y + 4)^2 = 9$

41. The system of equations above, when graphed in the *xy*-coordinate plane, yields three congruent circles. Which of the following is the solution set to this system of equations?

(A) (–3, –1), (3, 1), (0, –4)
(B) (0, –1) only
(C) (0, –1), (–3, –4), (3, –4)
(D) (3, 1), (–3, 1), (0, 1)
(E) (0, 1), (3, 4), (–3, 4)

42. A cube-shaped fish tank has a volume of m. If the tank is placed on a table, which of the following is an expression for the area of the table surface that the tank will occupy?

(A) $\sqrt[3]{m^2}$
(B) $2\sqrt[3]{m}$
(C) $\frac{m^2}{9}$
(D) $\frac{2m}{3}$
(E) $4\sqrt{m}$

43. If a and b are integers, for how many values of a could the equation $y = (x + a)(x + b)$ have a y-intercept of 24 ?

(A) 1
(B) 4
(C) 8
(D) 16
(E) 24

USE THIS SPACE FOR SCRATCHWORK.

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MATHEMATICS LEVEL 1—*Continued*

44. What is the sum of the hundreds, tens, and units digits of 5^{57} ?

(A) 7
(B) 8
(C) 10
(D) 13
(E) 17

USE THIS SPACE FOR SCRATCHWORK.

45. Which of the following is an interval on which $f(x) = x^3 - 2x^2 - 5x + 2$ is decreasing?

(A) $-1.68 < x < 0.36$
(B) $-0.79 < x < 2.12$
(C) $0.36 < x < 3.32$
(D) $-1.68 < x < 3.32$
(E) $2.12 < x < 3.32$

46. How many sides does a regular convex polygon have if the sum of any two of its exterior angles is 72 degrees?

(A) 5
(B) 8
(C) 10
(D) 12
(E) 14

47. If the graph of $y = mx^2 + mx$ is shifted upward 2 units, it will yield a graph whose equation has exactly one real double root. What is the value of m ?

(A) –8
(B) –4
(C) 4
(D) 6
(E) 8

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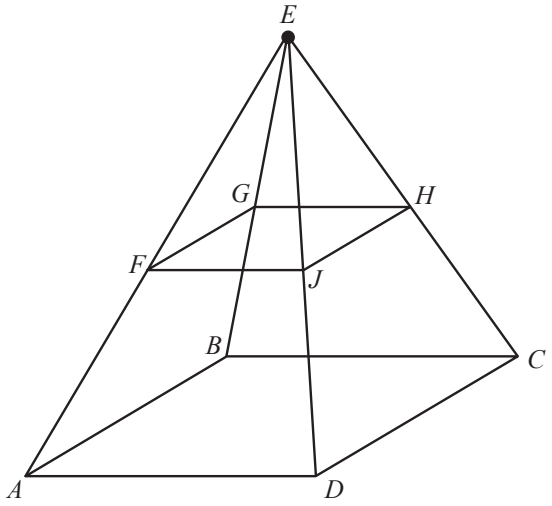
MATHEMATICS LEVEL 1—*Continued*

48. If $1 - \cos^2 B = \sin B$, which of the following could be the value of $\sin B$?

(A) –1
(B) 0.707
(C) 0.866
(D) 1
(E) 2

USE THIS SPACE FOR SCRATCHWORK.



49. In the figure above, square pyramid *ABCDE* has a volume of 256 and a height of 12, and is similar to square pyramid *EFGHJ,* which has a volume of 32 and a height of 6. What is the approximate distance between the midpoint of *AF* and the midpoint of *CH* ?

(A) 4.90
(B) 6.00
(C) 6.29
(D) 8.49
(E) 10.39

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MATHEMATICS LEVEL 1—*Continued*

50. If $f(x) = 2x^2 - 6x + 5$ and $g(x) = -x - 2$, which of the following is equal to $-f(-g(-x))$?

(A) $2x^2 - 2x + 1$
(B) $-2x^2 - 14x - 25$
(C) $-2x^2 + 2x - 1$
(D) $2x^2 + 14x + 25$
(E) $2x^2 + 6x + 25$

USE THIS SPACE FOR SCRATCHWORK.

STOP

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS TEST ONLY.
DO NOT WORK ON ANY OTHER TEST IN THIS BOOK.

PRACTICE TEST 1 ANSWER KEY

Question Number	Correct Answer	Right	Wrong	Question Number	Correct Answer	Right	Wrong
1	C	____	____	26	B	____	____
2	D	____	____	27	B	____	____
3	B	____	____	28	A	____	____
4	C	____	____	29	D	____	____
5	B	____	____	30	D	____	____
6	D	____	____	31	E	____	____
7	A	____	____	32	E	____	____
8	B	____	____	33	B	____	____
9	C	____	____	34	A	____	____
10	D	____	____	35	C	____	____
11	C	____	____	36	D	____	____
12	B	____	____	37	D	____	____
13	D	____	____	38	E	____	____
14	A	____	____	39	E	____	____
15	D	____	____	40	C	____	____
16	E	____	____	41	B	____	____
17	E	____	____	42	A	____	____
18	A	____	____	43	D	____	____
19	B	____	____	44	B	____	____
20	D	____	____	45	B	____	____
21	D	____	____	46	C	____	____
22	D	____	____	47	E	____	____
23	C	____	____	48	D	____	____
24	A	____	____	49	D	____	____
25	B	____	____	50	C	____	____

HOW TO SCORE PRACTICE TEST 1

When you take the real exam, the proctors will collect your test booklet and bubble sheet and send your bubble sheet to a processing center where a computer looks at the pattern of filled-in ovals on your bubble sheet and gives you a score. We couldn't include even a small computer with this book, so we are providing this more primitive way of scoring your exam. (For a printable bubble sheet, check your online student tools.)

Determining Your Score

STEP 1 Using the answer key, determine how many questions you got right and how many you got wrong on the test. Remember: Questions that you do not answer don't count as either right answers or wrong answers.

STEP 2 List the number of right answers here. (A) _____

STEP 3 List the number of wrong answers here. Now divide that number by 4. (Use a calculator if you're feeling particularly lazy.) (B) _____ ÷ 4 = (C) _____

STEP 4 Subtract the number of wrong answers divided by 4 from the number of correct answers. Round this score to the nearest whole number. This is your raw score. (A) _____ – (C) _____ = _____

STEP 5 To determine your real score, take the number from Step 4 and look it up in the left column of the Score Conversion Table on the next page; the corresponding score on the right is your score on the exam.