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# SAT Subject Test Math Level 1

- practice tests
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# Second Edition

# **DIAGNOSTIC TEST**

# **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then, fill in the appropriate oval on the answer sheet.

Notes:

- 1. A calculator will be needed to answer some of the questions on the test. Scientific, programmable, and graphing calculators are permitted. It is up to you to determine when and when not to use your calculator.
- 2. All angles on the Level 1 test are measured in degrees, not radians. Make sure your calculator is set to degree mode.
- 3. Figures are drawn as accurately as possible and are intended to help solve some of the test problems. If a figure is not drawn to scale, this will be stated in the problem. All figures lie in a plane unless the problem indicates otherwise.
- 4. Unless otherwise stated, the domain of a function *f* is assumed to be the set of real numbers *x* for which the value of the function, *f*(*x*), is a real number.
- 5. Reference information that may be useful in answering some of the test questions can be found below.

Reference Information	
Right circular cone with radius $r$ and height $h$ :	Volume = $\frac{1}{3}\pi r^2h$
Right circular cone with circumference of base $c$ and slant height $\ell$ :	Lateral Area = $\frac{1}{2}c\ell$
Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$ Surface Area = $4\pi r^2$
Pyramid with base area $B$ and height $h$ :	Volume = $\frac{1}{3}Bh$



- 1. (x+y+3)(x+y-3) =
  - (A)  $x^2 + y^2 3^2$
  - (B)  $(x+y)^2 + 6(x+y) + 9$
  - (C)  $(x+y)^2 + 6(x+y)$
  - (D)  $(x+y)^2 9$
  - (E)  $x^2 + 2xy + y^2 + 3^2$
- 2. In square *ABCD* in Figure 1, what are the coordinates of vertex *B*?
  - (A) (4, −2)
  - (B) (5, -2)
  - (C) (-2, 5)
  - (D) (-2, 1)
  - (E) (1, 2)





# Figure 1

3. If a = -3, then (a + 6)(a - 3) =

- (A) –18
- (B) 18
- (C) 0
- (D) 27
- (E) -54

4. Assuming 
$$x \neq 0$$
,  $\frac{1}{(x/3)^2} =$ 



$$(D) = \frac{1}{x}$$

(E)  $\frac{y}{x^2}$ 

5. If 
$$\frac{1}{2}x - 2x = 3x - 9$$
, then  $x =$ 

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

If  $\sqrt[3]{\sqrt[2]{x}} = 3$ , then x =6.

- (A) 9
- (B) 27
- (C) 81
- (D) 243
- (E) 729

7. If 2n + m = 10 and 3n - m = -5, then m =

- (A) 6
- (B) 1
- (C) 8
- (D) 4
- (E) 2
- 8. In Figure 2, if  $\ell_1 || \ell_2$  and both lines are intersected by line *t*, then y =
  - (A) 55°
  - (B) 45°
  - (C) 135°
  - (D) 90°
  - (E) 180°
- What is the *y*-intercept of the graph of 3x + 4y = 24? 9.
  - (A) (0, 24)
  - (B) (0, 6)
  - (C) (0, 8)
  - (D) (0,4)
  - (E) (0, 2)

10. If  $2n^2 = 5$ , then  $5(2n^2) =$ 

- (A) <u>25</u> 4
- $\frac{5}{2}$ (B)
- (C) 5
- (D) 25 Г

(E) 
$$\frac{5\sqrt{5}}{2}$$







- 11. A cone and a cylinder both have a height *h* and a radius *r*. If the volume of the cone is  $12\pi$  cm<sup>3</sup>, what is the volume of the cylinder?
  - (A)  $4\pi \text{ cm}^3$
  - (B)  $12\pi \text{ cm}^3$
  - (C)  $24\pi \text{ cm}^3$
  - (D)  $36\pi \, cm^3$
  - (E)  $48\pi \text{ cm}^3$
- 12. In Figure 3, XY = YZ in  $\Delta XYZ$ . If the measure of  $\angle Y$  is 50°, what is the measure of  $\angle Z$ ?
  - (A) 50°
  - (B) 130°
  - (C) 65°
  - (D) 75°
  - (E) 25°
- 13. In terms of x, what is the average (arithmetic mean) of 2x + 1, 3x 4, 2x + 7, and 5x?
  - (A) 3x + 1
  - (B) 3x + 4
  - (C) 12x + 1
  - (D) 4x + 4
  - (E) 12x + 4
- 14. What is the measure of the angle formed by the hands of a clock at 5 o'clock?
  - (A) 120°
  - (B) 140°
  - (C) 150°
  - (D) 160°
  - (E) 170°

15. If 
$$f(x) = \frac{1}{2x^2 + 1}$$
, then  $f\left(-\frac{1}{2}\right) =$   
(A)  $\frac{1}{3}$   
(B) 2  
(C)  $\frac{1}{2}$   
(D)  $\frac{3}{2}$ 

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

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# Figure 3

- (A) 2
- (B) 12
- (C) 9
- (D) 6
- (E) 3
- 17. If three coins are tossed, what is the probability that exactly two are heads?

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

- 18. A circle has a circumference of  $16\pi$  cm. What is its area?
  - (A)  $8\pi \, \text{cm}^2$
  - (B)  $16\pi \text{ cm}^2$
  - (C)  $332\pi$  cm<sup>2</sup>
  - (D)  $64\pi \, cm^2$
  - (E)  $256\pi \text{ cm}^2$
- 19. If |x+4|>2, what values of x satisfy the inequality?
  - (A) x < -6 or x > -2
  - (B) -6 < x < -2
  - (C) x > -2
  - (D) x < 2 or x > 6
  - (E) -6 < x < 2
- 20. In Figure 4,  $\overline{PQ}$  and  $\overline{PR}$  are tangent segments to circle *O*. If the  $m \angle P = \frac{4}{5} m \angle O$ , then  $m \angle O =$ 
  - (A) 40°
  - (B) 50°
  - (C) 80°
  - (D) 100°
  - (E) 120°



Figure 4



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- 21. In Table 1, f(x) is a linear function. What is the value of n?
  - (A) 9
  - (A) = (B) = -7
  - (B) -7(C) -11
  - (C) -11(D) -15
  - (D) -13
  - (E) –5

Table 1

x	<i>f</i> ( <i>x</i> )
-2	13
0	5
1	1
2	-3
4	п

- 22. The slope of  $\leftrightarrow AB$  is  $\frac{1}{4}$ . If *A* has coordinates (10,
  - -8) and *B* has coordinates (6, *y*), then *y* =
  - (A) –24
  - (B) –9
  - (C) –7
  - (D) –2
  - (E) 7
- 23. Mark wears a uniform to school. According to the school's dress code, he can wear one of 2 types of pants, one of 4 shirts, and one of 2 pairs of shoes. How many pants-shirt-shoes combinations are possible?
  - (A) 2
  - (B) 6
  - (C) 8
  - (D) 16
  - (E) 32
- 24. A bike has wheels with radii of 8 inches. How far does the bike travel in two complete revolutions of its wheels?
  - (A)  $8\pi$  inches
  - (B)  $16\pi$  inches
  - (C)  $32\pi$  inches
  - (D)  $64\pi$  inches
  - (E)  $128\pi$  inches

- 25. In Figure 5, a circle is inscribed in a square whose sides have a length of 6 inches. What is the area of the shaded region?
  - (A)  $36 \text{ in}^2$
  - (B)  $27\pi in^2$
  - (C)  $36 9\pi \text{ in}^2$
  - (D)  $36 36\pi \text{ in}^2$
  - (E)  $9\pi in^2$
- 26. Two circles have diameters in the ratio of 2:1. If the circumference of the larger circle is  $9\pi$  centimeters more than the circumference of the smaller circle, what is the radius of the smaller circle?
  - (A) 4.5 cm
  - (B) 9 cm
  - (C) 18 cm
  - (D)  $\sqrt{3}$  cm
  - (E) 12 cm
- 27. What is the equation of the line containing the point (1, -2) and perpendicular to the line y = -3x + 7?
  - (A) y = -3x 2
  - (B) y = -3x + 1
  - (C)  $y = -\frac{1}{3}x$
  - (D)  $y = \frac{1}{3}x + 7$
  - (E)  $y = \frac{3}{3x} \frac{7}{3}$
- 28. In Figure 6, if  $x = 37^{\circ}$ , what is the value of *a*?
  - (A) 6.03
  - (B) 6.39
  - (C) 10.02
  - (D) 10.62
  - (E) 13.29
- 29. The product of the roots of a quadratic equation is -15 and their sum is -2. Which of the following could be the quadratic equation?
  - (A)  $x^2 2x 15 = 0$
  - (B)  $x^2 + 2x 15 = 0$ (C)  $x^2 - 2x + 15 = 0$
  - (C)  $x^2 + 15x 2 = 0$ (D)  $x^2 + 15x - 2 = 0$
  - (E)  $x^2 15x 2 = 0$









- 30. The line with the equation x + y = 3 is graphed on the same *xy*-plane as the parabola with vertex (0, 0) and focus (0, -3). What is the point of intersection of the two graphs?
  - (A) (0, 3)
  - (B) (0, -3)
  - $(C) \quad (0.46, 2.54)$
  - (D) (-0.5, 3.5)
  - (E) (6, -3)
- 31. What is the measure of each interior angle of a regular hexagon?
  - (A) 180°
  - (B) 720°
  - (C) 60°
  - (D) 120°
  - (E) 90°
- 32. In Mr. Taylor's first-period geometry class, the mean score of 30 students on a test is 76 percent. In his second-period class, the mean score of 22 students is 82 percent. What is the mean score of the 52 students?
  - (A) 77%
  - (B) 78%
  - (C) 78.5%
  - (D) 79%
  - (E) 79.5%
- 33. The sum of two numbers is 27, and the difference of their squares is also 27. What are the two numbers?
  - (A) {13, 14}
  - (B) {12, 15}
  - (C)  $\{16, 11\}$
  - (D) {10, 17}
  - (E) {9, 18}
- 34. If 8 percent of an 18-gallon solution is chlorine, how many gallons of water must be added to make a new solution that is 6 percent chlorine?
  - (A) 6 gallons
  - (B) 8 gallons
  - (C) 10 gallons
  - (D) 12 gallons
  - (E) 18 gallons

35. Which of the following equations does NOT represent the line containing the points (15, 14) and (10, 10)?

(A) 
$$y = \frac{4}{5}x + 2$$
  
(B)  $y - 10 = \frac{4}{5}(x - 10)$   
(C)  $y - 14 = \frac{4}{5}(x - 15)$   
(D)  $4x - 5y + 10 = 0$ 

- (E) 4x + 5y = -10
- 36. What is the maximum value of the function f(x) = $-x^2 + 8x - 20?$ 
  - (A) 4
  - (B) 28
  - (C) 3
  - (D) -4
  - (E) -36
- 37. What is the *n*th term of the geometric sequence 3,  $3\sqrt{3}$ , 9,  $9\sqrt{3}$ , 27, ...?
  - (A)  $2n\sqrt{3}$
  - (B)  $n\sqrt{3}$
  - (C)  $(\sqrt{3})^n$
  - (D)  $(\sqrt{3})^{n-1}$
  - (E)  $(\sqrt{3})^{n+1}$
- 38. If  $4^{-1} 8^{-1} = x^{-1}$ , then x =
  - (A) –4
  - (B) -8
  - $\frac{1}{2}$ (C)

  - (D) 8
  - (E) 4

- 39. The cube in Figure 7 has edges of length 5. What is the distance from vertex *H* to vertex *K*?
  - (A)  $5\sqrt{2}$
  - (B)  $5\sqrt{3}$
  - (C) 5
  - (D)  $10\sqrt{2}$
  - (E)  $5\sqrt{5}$





- 40. At the end of 2000, the number of students attending a certain high school was 850. If the number of students increases at a constant rate of 2.25 percent each year, how many students will attend the high school at the end of 2012?
  - (A) 1062
  - (B) 1086
  - (C) 1110
  - (D) 1135
  - (E) 1161
- 41. If  $f(x) = \frac{x+3}{2}$  and  $f^{-1}$  is the inverse function of *f*, what is  $f^{-1}(-5)$ ?
  - (A) 1
  - (B) 4 (C) -13
  - (C) -13(D) 7
  - (E) –7
- 42. The area of the rhombus *TUVW* in Figure 8 is
  - (A) 64
  - (B) 32
  - (C) 5.7
  - (D) 45.3
  - (E)  $64\sqrt{2}$





- (A)  $\sin \theta$
- (B)  $\cos \theta$
- (C)  $\sec \theta$
- (C)  $\sec \theta$ (D)  $\csc \theta$
- (E)  $\cot \theta$

44. If  $i^2 = -1$ , then  $i^8 =$ 

- (A) *i*
- (B) −*i*
- (C) 1
- (D) -1
- (E) –4
- 45. The statement, "If a triangle is equilateral, then it is *not* scalene," is logically equivalent to which of the following?
  - I. If a triangle is not scalene, then it is equilateral.
  - II. If a triangle is not equilateral, then it is scalene.
  - III. If a triangle is scalene, then it is not equilateral.
    - (A) I only
    - (B) II only
    - (C) III only
    - (D) I and II only
    - (E) I and III only
- 46.  $(2\sin x)(9\sin x) (6\cos x)(-3\cos x) =$ 
  - (A) 18
  - (B)  $18\sin^2 x 18\cos^2 x$
  - (C)  $18\sin x + 18\cos x$
  - (D) 36
  - (E) 1
- 47. If the sides of a right triangle have lengths x 3, x + 1, and x + 5, then x =
  - (A) -1
  - (B) 15
  - (C) 4
  - (D) 5
  - (E) 12

48. If  $x^2 - y^2 = x + y$  and  $x \neq -y$ , then x - y = x + y

- (A) -1
- (B) 1
- (C) 0
- (D) –2
- (E) Cannot be determined

# USE THIS SPACE AS SCRATCH PAPER

49. 
$$\frac{\sqrt{6}}{\sqrt{3} + \sqrt{2}} =$$
(A) 
$$\frac{\sqrt{6}}{\sqrt{5}}$$
(B) 
$$\sqrt{2} + \sqrt{3}$$
(C) 
$$\frac{3\sqrt{2} - 2\sqrt{3}}{5}$$
(D) 
$$2\sqrt{3} - 3\sqrt{2}$$
(E) 
$$3\sqrt{2} - 2\sqrt{3}$$

- 50. A rectangular swimming pool has dimensions 15 feet, 12 feet, and 5 feet. The pool is to be filled using a right cylindrical bucket with a base radius of 6 inches and a height of 2 feet. Approximately, how many buckets of water will it take to fill the swimming pool?
  - (A) 75
  - (B) 3,438
  - (C) 24
  - (D) 143
  - (E) 573

# S T O P

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

# ANSWER KEY

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

# **PRACTICE TEST 1**

# **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then fill in the appropriate oval on the answer sheet.

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Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$
	Surface Area = $4\pi r^2$
Pyramid with base area <i>B</i> and height <i>h</i> :	Volume = $\frac{1}{3}Bh$



- 1. If a = 2b 10 and b = 3a 5, then a =
  - (A) 3

  - (B) 4
  - (C) 7
  - (D) -4
  - (E) -3

2.  $\sqrt{\sin^2 9\theta + \cos^2 9\theta} =$ 

- (A) -1
- (B)  $\sin 3\theta + \cos 3\theta$
- (C)  $\sin 9\theta + \cos 9\theta$
- (D) 1
- (E) sec  $3\theta$
- 3. A fax machine sends *n* pages per minute. In terms of n, how many minutes will it take to fax a 25-page document?
  - (A) <u>n</u>
  - 25
  - (B) 25 n
  - (C) <u>25</u>
  - п (D) 25n
  - (E) *n*
- 4. It is possible to have a triangle with all of the following sets of sides EXCEPT
  - (A) 1, 1, 1
  - (B) 1, 2, 2
  - (C) 3, 4, 5
  - (D) 9, 9, 18
  - (E) 7, 10, 16

5. If x > 0, then  $\frac{x^{\frac{2}{4}}}{x^{-\frac{1}{4}}} =$ 

- (A)  $x^{\overline{2}}$
- (B) 1
- (C) *x*
- (D) –*x*
- (E) x<sup>-1</sup>

- 6. In Figure 1,  $\overline{XY} \parallel \overline{WZ}$ . What is *c* in terms of *a* and *b*?
  - (A) a+b
  - (B) a b
  - (C) b a
  - (D) 180 a b
  - (E) 180 a + b
- 7. What is the slope of the line parallel to the line segment with endpoints (0, -4) and (2, 4)?
  - (A) 4
  - (B) <u>1</u>

  - (C) -4
  - (D) -4
  - (E) 0
- 8. In Figure 2,  $m \angle ABC = 29^{\circ}$  and  $\overline{AB} = 12$ . What is the length of AC?
  - (A) 10.5
  - (B) 6.7
  - (C) 24.8
  - (D) 5.8
  - (E) 0.49

9. If 
$$g(f(x)) = 2x + 1$$
 and  $f(x) = \frac{1}{4}x - 1$ , then  $g(x) = \frac{1}{4}x - 1$ 

- (A)  $-\frac{8}{7}$
- (B) 8x + 9
- (C)  $\frac{1}{4}(2x+1)$
- (D) 8x 8
- (E) 8*x*
- 10. If  $i^2 = -1$  and 7 xi = x + y + 2i, then y = -1(A) 9 - 2i(B) 2+2*i* (C) 7

  - (D) 5
  - (E) 9

11. If |x-8| < 5, then

- (A) 0 < x < 14
- (B) x > 3
- (C) 0 < x < 13
- (D) *x* < 13
- (E) 3 < x < 13

# USE THIS SPACE AS SCRATCH PAPER







# Figure 2

- 12. What is the area of the base of a triangular pyramid with a volume of 88 cm<sup>3</sup> and a height of 16 cm?
  - (A)  $5.5 \text{ cm}^2$
  - (B) 11 cm<sup>2</sup>
  - (C)  $8 \text{ cm}^2$
  - (D)  $16.5 \text{ cm}^2$
  - (E)  $22 \text{ cm}^2$
- 13. Which of the following is the *y*-intercept of the line determined by the equation 6x + 7y 15 = 0?

(A) 
$$\frac{15}{7}$$
  
(B)  $\frac{5}{2}$   
(C)  $-\frac{15}{7}$   
(D)  $-\frac{5}{2}$   
(E) 15

- 14. In which of the following quadrants could the point (a, |b|) lie?
  - (A) I only
  - (B) I or II
  - (C) II only
  - (D) II or III
  - (E) III or IV

15. 
$$\frac{\sqrt{a+b}}{\sqrt{a-b}} =$$
(A) 1
(B) 
$$\frac{\sqrt{a^2+b^2}}{a-b}$$
(C) 
$$\frac{\sqrt{a^2-b^2}}{a-b}$$
(D) 
$$\sqrt{a-b}$$
(E) -1

16. |-7.5|+|-8.6|-|5.2|=(A) 10.9

- (B) -21.3
- (C) 16.1
- (D) 21.3
- (E) -6.3

# USE THIS SPACE AS SCRATCH PAPER

- 17. The cost of 2 candy bars and 4 sodas is \$6.00. If the cost of 3 sodas is \$3.30, then what is the cost of 1 candy bar?
  - (A) \$1.10
  - (B) \$2.70
  - (C) \$1.35
  - (D) \$0.80
  - (E) \$1.60
- If each exterior angle of a regular polygon measures 40°, how many sides does it have?
  - (A) 1,260
  - (B) 10
  - (C) 18
  - (D) 9
  - (E) 8
- 19. John spends 25 percent of his monthly salary on rent and puts 25 percent of the remaining amount into a savings account. If he puts \$420 a month into his savings account, how much is his monthly salary?
  - (A) \$6,720
  - (B) \$2,240
  - (C) \$840
  - (D) \$560
  - (E) \$2,420
- 20. The cube root of twice a number, *n*, is  $\frac{3}{4}$ . *n* =
  - (A) 0.422
  - (B) 0.211
  - (C) 0.909
  - (D) 0.454
  - (E) 0.563
- 21. A cube with an edge of 3 cm has the same volume as a sphere with a radius of what length?
  - (A) 1.86 cm
  - (B) 6.45 cm
  - (C) 2.25 cm
  - (D) 1.29 cm
  - (E) 11.46 cm
- 22. The perimeter of a rectangle is 48 cm. If the ratio of its width to length is 1:3, then what is its length?
  - (A) 6
  - (B) 16
  - (C) 8
  - (D) 18
  - (E) 12

- 23. If  $\log_x y = n$ , then which of the following is true?
  - (A)  $x^n = y$
  - (B)  $y^x = n$
  - (C)  $n^x = y$
  - (D)  $y^x = n$
  - (E)  $x^y = n$
- 24. If a circle has a radius of 5 and is tangent to both the *x* and *y*-axis, then which of the following is a possible equation for the circle?
  - (A)  $x^2 + y^2 = 25$
  - (B)  $x^2 + y^2 = 5$
  - (C)  $x^2 + (y-5)^2 = 5$
  - (D)  $(x+5)^2 + y^2 = 25$
  - (E)  $(x-5)^2 + (y-5)^2 = 25$
- 25. What is the axis of symmetry of the graph of  $y = -5(x+1)^2 + 9$ ?
  - (A) y = -1
  - (B) x = -1
  - (C) y = 9
  - (D) x = 9
  - (E) x = 1
- 26. Which of the following is the solution set of  $8x^3 + 8x^2 16x = 0$ ?
  - (A)  $\{-2, 1\}$
  - (B)  $\{-2, 0, 1\}$
  - (C)  $\{-2, 0, -1\}$
  - (D)  $\{8, 1\}$
  - (E)  $\{-2, 1, 8\}$
- 27. What is the measure of  $\angle ABC$  in Figure 3?
  - (A) 30°
  - (B) 85°
  - (C) 65°
  - (D) 75°
  - (E) 80°
- 28. What is the area, in square units, of a triangle with vertices (-1, 1), (5, 1), and (8, 8)?
  - (A) 42
  - (B) 21
  - (C) 48
  - (D) 24
  - (E) 14









29. If the distance from A(1, 6) to B(x, -2) is 10, then what is a possible value for *x*?

- (A) 11
- (B) -5
- (C) –7
- (D) 8
- (E) 6
- 30. In Figure 4,  $\overline{WX} = \overline{WZ}$  and  $\overline{XY} = \overline{ZY}$ . n =
  - (A) 50°
  - (B) 142°
  - (C) 25°
  - (D) 26°
  - (E) 168°
- 31. What is the maximum value of  $f(x) = -x^2 + 3x 11$ ?
  - (A)  $\frac{3}{2}$ (B) -11 (C)  $-\frac{35}{4}$ (D)  $-\frac{3}{2}$ (E)  $-\frac{53}{4}$
- 32. The diagonal of a square is 12. What is the length of a side?
  - $\frac{12}{\sqrt{3}}$ (A)
  - (B) 14.1
  - (C) 8.5
  - (D) 6.9
  - (E) 17
- 33. In Figure 5, what is the length of  $\overline{OQ}$ ?
  - (A) 3
  - (B) 5
  - (C) 4
  - (D) 9
  - (E) 8



34. When f(x) is divided by 2x + 1, the quotient is  $x^2 - x + 4$  and the remainder is 6. What is f(x)?

(A)  $2x^3 - x^2 + 9x + 6$ 

(B)  $2x^3 - 2x^2 + 8x + 6$ (C)  $x^2 - x + 10$ 

- (C)  $x^{-}x^{+}10^{-}$ (D)  $2x^{3}-x^{2}+7x+4$
- (E)  $2x^3 x^2 + 7x + 10$
- 35. If  $f(x) = x^2 + 1$ , then f(f(x)) =
  - (A)  $x^4 + 1$
  - (B)  $x^4 + 2x^2 + 1$
  - (C)  $x^4 + 2x^2 + 2$
  - (D)  $x^4 + x^2 + 1$
  - (E)  $x^4 + 2$

36. If  $\frac{4^n}{4^3} = 2^{10}$ , then n =

- (A) 13
- (B) 8
- (C) 7
- (D) 5
- (E) 2
- 37. If xy = 7, then which of the following must be true statements?
  - I. *x* and *y* cannot both be integers.
  - II. x and y have the same sign.
  - III.  $y \neq 0$
  - (A) II only
  - (B) III only
  - (C) I and III only
  - (D) II and III only
  - $(E) \quad I, II, and \, III$
- 38. In Figure 6, *FGHIJK* is a regular hexagon with a perimeter of 36. What is the length of  $\overline{KG}$ ?
  - (A) 10.4
  - (B) 8.5
  - (C) 6
  - (D) 5.2
  - (E) 7.1



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39. Which of the following is NOT a true statement?

- (A)  $3^2(3^3) = 3^5$
- (B)  $2^3(3^3) = 6^3$
- (C)  $(64)^{\frac{1}{2}} = 8$
- (D)  $2^2 + 2^3 = 2^5$
- (E)  $2^2(2^{-3}) = \frac{1}{2}$
- 40. A jar contains 4 red, 1 green, and 3 yellow marbles. If 2 marbles are drawn from the jar without replacement, what is the probability that both will be yellow?
  - (A)  $\frac{3}{8}$ (B)  $\frac{3}{28}$ (C)  $\frac{1}{4}$ (D)  $\frac{3}{56}$ (E)  $\frac{5}{56}$
- 41. If  $f(x) = \sqrt{4x^2 9}$ , then what is the domain of the function?
  - (A) All x such that  $x \ge 0$
  - (B) All x such that  $x \ge \frac{3}{2}$
  - (C) All x such that  $-\frac{3}{2} \le x \le \frac{3}{2}$ (D) All x such that  $x \le -\frac{3}{2}$  or  $x \ge \frac{3}{2}$
  - (E) All real numbers
- 42. The width of a rectangular prism is doubled, its length is tripled, and its height is cut in half. If the volume of the original prism was *V*, what is its new volume?
  - (A) 2V
  - (B) 4V
  - (C) 16V
  - (D) 6V
  - (E) 3V

43. If  $\cos x^\circ = 0.788$ , then  $\cos (x + 0.5)^\circ =$ 

- (A) 0.623
- (B) 1.29
- (C) 0.793
- (D) 38
- (E) 0.783

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- 44. The probability that Claire passes chemistry is 0.75, and the probability that she passes history is 0.88. If passing one course is independent of passing the other, what is the probability that she does not pass chemistry and passes history?
  - (A) 0.22
  - (B) 0.66
  - (C) 0.13
  - (D) 0.25
  - (E) 0.03
- 45. A comedian has rehearsed 10 different jokes. During a given act, he performs any 5 of these jokes. How many different acts can he perform assuming the order of the jokes in an act is not important?
  - (A) 10
  - (B) 252
  - (C) 42
  - (D) 84
  - (E) 126
- 46. What is the maximum value of the function y = 3 + 1 $2(\sin \pi x)?$ 
  - (A) 3
  - (B) 2
  - (C) 5
  - (D) 1
  - (E) 6
- 47. If  $f(x) = \frac{|x|}{x}$ , then what is the range of the function?
  - (A) y > 0
  - (B) All real numbers except y = 0
  - (C) y = -1 or y = 1
  - (D) y = 1
  - (E) All real numbers
- 48. Assuming each factor has only real coefficients, which of the following is the completely factored form of  $2x^4 - 18$ ?
  - (A)  $2(x^4 9)$
  - (B)  $2(x^2+3)(x^2-3)$
  - (C)  $(2x+6)(x-\sqrt{3})(x+\sqrt{3})$ (D)  $2(x^2+3)(x-3)(x+3)$ (E)  $2(x^2+3)(x-\sqrt{3})(x+\sqrt{3})$

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

49. If n = the number of the term, the *n*th term of the sequence 1, 0, 1, 4, 9, ... is which of the following?

- (A) n 1
- (B)  $n^2$
- (C)  $(n-1)^2$
- (D)  $(n-2)^2$
- (E)  $n^2 1$

50. 
$$\frac{\left(\frac{-6+2x}{x-3}\right)}{\left(\frac{x^2+6x+9}{x^2-9}\right)} =$$
(A)  $\frac{2(x-3)}{x+3}$ 
(B)  $\frac{2x}{x+3}$ 
(C)  $-\frac{2(x-3)}{x+3}$ 
(D) 2
(E)  $\frac{-6+2x}{x-3}$ 

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# S T O P

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

# **PRACTICE TEST 2**

# **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then fill in the appropriate oval on the answer sheet.

Notes:

- (1) A calculator will be needed to answer some of the questions on the test. Scientific, programmable, and graphing calculators are permitted. It is up to you to determine when and when not to use your calculator.
- (2) All angles on the Level 1 test are measured in degrees, not radians. Make sure your calculator is set to degree mode.
- (3) Figures are drawn as accurately as possible and are intended to help solve some of the test problems. If a figure is not drawn to scale, this will be stated in the problem. All figures lie in a plane unless the problem indicates otherwise.
- (4) Unless otherwise stated, the domain of a function *f* is assumed to be the set of real numbers *x* for which the value of the function, *f*(*x*), is a real number.
- (5) Reference information that may be useful in answering some of the test questions can be found below.

Reference Information	
Right circular cone with radius $r$ and height $h$ :	Volume = $\frac{1}{3}\pi r^2 h$
Right circular cone with circumference of base $c$ and slant height $\ell$ :	Lateral Area = $\frac{1}{2}c\ell$
Sphere with radius r:	Volume = $\frac{4}{3}\pi r^3$ Surface Area = $4\pi r^2$
Pyramid with base area <i>B</i> and height <i>h</i> :	Volume = $\frac{1}{3}Bh$



1. The cost to rent a DVD is \$4.50 for the first five days, with a \$2.50 late fee for each succeeding day. Which of the following represents the cost of renting the DVD for *d* days if *d* is greater than 5?

(A) 
$$4.50d + 2.50d$$

- (B) 4.50 + 2.50(d-5)
- (C) 7*d*
- (D) 4.50 + 2.50d
- (E) 4.50 + (2.50d 5)

2. If 
$$x \neq 0$$
, then  $\frac{1}{2x^{-\frac{3}{2}}} =$   
(A)  $-\frac{1}{2x^{\frac{3}{2}}}$   
(B)  $2x^{\frac{3}{2}}$   
(C)  $\frac{x^{\frac{2}{3}}}{2}$   
(D)  $\frac{x^{\frac{3}{2}}}{2}$ 

- 3. What are all values of *x* for which  $x 3 > 9 x^2$ ?
  - (A) x > 3
  - (B) x < -3
  - (C) x < -4 or x > 3
  - (D) x < -4
  - (E) -4 < x < 3
- 4. What is the distance between the points (5, 6) and (-3, 0)?
  - (A) 9
  - (B) 100
  - (C) 10
  - (D) 6
  - (E) 8
- 5. At what point does the graph of 4x 6y = -1 intersect the *x*-axis?
  - (A) 4
  - (B) 6

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

(D) 
$$\frac{1}{6}$$
  
(E)  $-\frac{1}{4}$ 

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- 6. If  $4x^3 = -64$ , then x =
  - (A) –1
  - (B) 1
  - (C)  $-2\sqrt[3]{2}$
  - (D)  $2\sqrt[3]{2}$
  - (E) 4
- 7. If the fourth root of the square of a number is 2, then what is the number?
  - (A) 2
  - (B) 4
  - (C) 8
  - (D) 16
  - (E) 32
- 8. If a line is perpendicular to the line 2x + 6y = 18, what is its slope?
  - (A)  $-\frac{1}{3}$
  - (B)  $\frac{1}{3}$
  - (C) -3
  - (D) 3
  - (E)  $\frac{1}{2}$
- 9. If x y = 8 and 2x + 3y = 16, then x =
  - (A) 8
  - (B) 0
  - (C) 10
  - (D) 4
  - (E) -8

10. If  $f(x) = \frac{x^2 - 16}{x - 4}$  and h(x) = x + 4, which of the following is true about their graphs?

- (A) They are the same.
- (B) They are the line x y = 4.
- (C) They are the same except when x = 4.
- (D) They are the same except when x = -4.
- (E) They do not share any points.
- 11.  $(2^2 \times 2^3)^4 =$ 
  - (A) 2<sup>5</sup>
  - (B) 2<sup>9</sup>
  - (C) 2<sup>20</sup>
  - (D) 2<sup>24</sup>
  - (E) 2<sup>96</sup>

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- 12. If the lines  $\ell_1$  and  $\ell_2$  are parallel and are intersected by a transversal *t*, then what is the sum of the exterior angles on the same side of *t*?
  - (A) 45°
  - (B) 90°
  - (C) 180°
  - (D) 360°
  - (E) Cannot be determined
- 13. Of the following, which has the greater value?
  - (A)  $2^8$
  - (B)  $2^5 \times 2^2$
  - (C)  $\frac{2^{10}}{10}$
  - $\frac{(C)}{2^2}$
  - (D)  $(2^5)^2$
  - (E)  $2^8 + 2^4$
- 14. In Figure 1, if  $\theta = 48^\circ$ , then what is the value of *a*?
  - (A) 14.4
  - (B) 17.5
  - (C) 19.4
  - (D) 9.7
  - (E) 11.7

- 15. Line  $\ell_1$  has a negative slope and a positive *y*-intercept. If  $\ell_2$  is perpendicular to  $\ell_1$  and has a positive *y*-intercept, then which of the following must be true of the *x*-intercepts of the two lines?
  - (A) Both are negative.
  - (B) Both are positive.
  - (C) They are equal.
  - (D) The *x*-intercept of  $\ell_1$  is greater than the *x*-intercept of  $\ell_2$ .
  - (E) The *x*-intercept of  $\ell_1$  is less than the *x*-intercept of  $\ell_2$ .
- 16. In a given high school, 60 percent of the teachers reported an annual salary greater than or equal to \$50,000 a year. Which of the following must be greater than or equal to \$50,000?
  - (A) The mean salary
  - (B) The median salary
  - (C) The mode of their salaries
  - (D) The mean and the median of their salaries
  - (E) Neither the mean, median, nor mode



#### **Figure 1**

17. If  $2x^2 + 15x + k = 0$  has  $\frac{1}{2}$  as one of its solutions, what is the value of *k*?

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

- 18. Assuming you are factoring over the real numbers, which of the following is the completely factored form of  $x^4 16$ ?
  - (A)  $(x^2 4)(x^2 + 4)$

(B) 
$$(x-2)(x+2)(x^2+4)$$

- (C)  $(x^2 4)^2$
- (D)  $(x-2)^2(x^2+4)$
- (E)  $(x^2 8)(x^2 + 2)$
- 19. In Figure 2,  $\triangle ABE$  is similar to  $\triangle ACD$ . What is the value of *x*?
  - (A) 3
  - (B) 3.5
  - (C) 3.75
  - (D) 4
  - (E) 13.75
- 20. If the supplement of an angle is four times the measure of its complement, then the measure of the angle's complement is
  - (A) 30°
  - (B) 60°
  - (C) 20°
  - (D) 120°
  - (E) 150°

21. If 
$$f(x) = \frac{4x - 1}{2}$$
, then  $f^{-1}(x) =$   
(A)  $\frac{4x - 1}{2}$   
(B)  $\frac{2}{4x - 1}$   
(C)  $2x + 1$   
(D)  $\frac{2x + 1}{4}$   
(E)  $2\left(\frac{1}{4x + 1}\right)$ 

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Figure 2

- 22. If the triangle in Figure 3 is reflected across the *x*-axis, what will be the coordinates of the reflection of vertex *A*?
  - (A) (-1, 1)
  - (B) (1, 1)
  - (C) (-1, -1)
  - (D) (1,0)
  - (E) (0, -1)



# Figure 3

- 23. What is the measure of each exterior angle of a regular pentagon?
  - (A) 90°
  - (B) 60°
  - (C) 120°
  - (D) 108°
  - (E) 72°
- 24. The triangle in Figure 4 has sides measuring 3, 4, and 5 units. What is the measure of  $\theta$ ?
  - (A) 45°
  - (B) 30°
  - (C) 60°
  - (D) 36.9°
  - (E) 53.1°
- 25. How many lines of symmetry does a rhombus have?
  - (A) 0
  - (B) 1
  - (C) 2
  - (D) 3
  - (E) 4

# 26. $\sin 30^\circ =$

- (A) cos 60°
- (B)  $\sin 60^{\circ}$
- (C)  $\cos 30^{\circ}$
- (D)  $\tan 60^{\circ}$
- (E)  $\csc 30^{\circ}$



# Figure 4

27.  $(\cos^2 \theta + \sin^2 \theta - 2)^3 =$ 

- (A) 1
- (A) I
- (B) -1
- (C) 0
- (D) 2
- (E) -8
- 28. If the equation of a circle is  $x^2 + y^2 = 12$ , then which of the following is a *y*-intercept?
  - (A) 12
  - (B) -12
  - (C)  $-2\sqrt{3}$
  - (D) 0
  - (E) Cannot be determined

29. If f(x) = 5x + 3 and  $g(x) = \frac{x+1}{2}$ , then what is g(f(4))?

- (A) 12
- (B) 11
- (C) 23
- (D) 15.5
- (E) 23.5
- 30. Figure 5 is a right hexagonal prism whose bases are regular polygons. Which of the following points lies in the plane determined by points *E*, *K*, and *B*?
  - (A) *H*
  - (B) *A*
  - (C) *G*
  - (D) *C*
  - (E) *D*
- 31. If  $f(x) = \frac{1}{x}$  and -1 < x < 0, then what is the range of the function?
  - (A) All real numbers
  - (B) y > -1
  - (C) y < -1
  - (D) -1 < y < 0
  - (E) y < 0





Figure 5



- 32. Assuming both *a* and *b* are positive, if ab = 16 and  $\frac{a}{b} = 4$ , then what is the average of *a* and *b*?
  - (A) 10
  - (B) 6

  - (C) 5
  - (D) 4
  - (E) 3

33. If  $i = \sqrt{-1}$ , then (4 - i)(4 + i) =(A) 17 (B) 15 (C) 16+8*i* 

- (D) 16 *i*
- (E) 16

34. What is the equation of the graph in Figure 6?

(A) f(x) = |x - 4|

- (B) f(x) = -|x-4|
- (C) f(x) = |x+4|
- (D) f(x) = -|x+4|(E) f(x) = -|x|-4



(A)	$-2 \le y \le 2$
(B)	$2 \le y \le 2$
(C)	$-1 \le y \le 1$
(D)	$-\frac{1}{2} \le y \le \frac{1}{2}$
(E)	$-\frac{1}{2} \leq y \leq 0$

36. If  $f(x) = x^3 + 2x$ , then f(-2) + 2f(-1) =

- (A) -6
- (B) 10
- (C) -15
- (D) 9
- (E) -18

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**Figure 6** 



- (A) 16
- (B) 24
- (C) 120
- (D) 720
- (E) 5,040
- 38. The operation  $\widehat{\square}$  is defined as:  $n \widehat{\square} m = \frac{2n}{m}$ . If *n* and *m* do not equal zero, then for all of the following values  $n \widehat{\square} m = m \widehat{\square} n$  EXCEPT
  - (A) n = m
  - (B) n = -m
  - (C) m = -n
  - (D) n = 1 and m = 1
  - (E) n = 2 and  $m = \frac{1}{2}$
- 39. The top face of a rectangular prism has an area of 32 cm<sup>2</sup>. The front face has an area of 16 cm<sup>2</sup> and the side face has an area of 8 cm<sup>2</sup>. What is the volume of the prism?
  - (A) 32 cm<sup>3</sup>
  - (B)  $64 \text{ cm}^3$
  - (C) 128 cm<sup>3</sup>
  - (D) 256 cm<sup>3</sup>
  - (E) 4,096 cm<sup>3</sup>
- 40. If x 4, x, and x + 4 are the first three terms of an arithmetic sequence, then what is the fifth term of the sequence?
  - (A) *x*
  - (B) x 4
  - (C) *x*+8
  - (D) x + 12
  - (E) 4
- 41. Claire can complete spring-cleaning in a house in 5 hours. Ruth can complete spring-cleaning in the same house in 7 hours. If Claire works for 1 hour alone and then Ruth joins her to finish the cleaning, what is the total time it takes to complete spring-cleaning?
  - (A) 2 hours, 30 minutes
  - (B) 2 hours, 20 minutes
  - (C) 3 hours, 20 minutes
  - (D) 3 hours
  - (E) 2 hours, 33 minutes

42. What is the area of the quadrilateral in Figure 7?

- (A) 80
- (B) 70
- (C) 140
- (D) 60
- (E) 105



- 44. What is the lateral surface area of a right circular cone whose radius is 3 cm and whose slant height is 12 cm?
  - (A) 36 cm<sup>2</sup>
  - (B)  $18 \text{ cm}^2$
  - (C)  $18\pi \text{ cm}^2$
  - (D)  $36\pi \text{ cm}^2$
  - (E)  $72\pi \text{ cm}^2$
- 45. If the measure of one angle of a rhombus is  $120^{\circ}$  and its perimeter is 16 cm, then what is the length of its longer diagonal?
  - (A) 4
  - (B)  $2\sqrt{3}$
  - (C)  $2\sqrt{2}$
  - (D)  $4\sqrt{2}$
  - (E)  $4\sqrt{3}$
- 46. *a* and *b* are positive. *a* is even and *b* is odd. Which of the following must also be odd?
  - (A) ab
  - $\frac{a}{b}$ (B)

  - (C) a + 2b
  - (D) *b*<sup>*a*</sup>
  - (E)  $(ab)^{a}$

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- 47. In Figure 8,  $\overline{RS} = \overline{RT} = \overline{TU}$ . If  $m \angle RTS = 50^\circ$ , then what is the measure of  $\angle TRU$ ?
  - (A) 25°
  - (B) 50°
  - (C) 10°
  - (D) 80°
  - (E) 40°
- 48. All of the following statements are true EXCEPT
  - (A) All circles are similar.
  - (B) All squares are similar.
  - (C) All cubes are similar.
  - (D) All spheres are similar.
  - (E) All cones are similar.
- 49. Given the parallelogram *ABCD* in Figure 9, what is the measure of  $\angle DCB$ ?
  - (A) 34°
  - (B) 44°
  - (C) 102°
  - (D) 30°
  - (E) 40°
- 50. An equilateral triangle with sides of length 12 is inscribed in the circle shown in Figure 10. What is the area of the shaded region?
  - (A)  $36\sqrt{3}$
  - (B)  $144\pi 36$
  - (C)  $108\pi 36\sqrt{3}$
  - (D)  $192\pi 144\sqrt{3}$
  - (E)  $48\pi 36\sqrt{3}$







Figure 9



Figure 10

# S T O P

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

**ANSWER KEY** 

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

# **PRACTICE TEST 3**

### **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then fill in the appropriate oval on the answer sheet.

NOTES:

- (1) A calculator will be needed to answer some of the questions on the test. Scientific, programmable, and graphing calculators are permitted. It is up to you to determine when and when not to use your calculator.
- (2) All angles on the Level 1 test are measured in degrees, not radians. Make sure your calculator is set to degree mode.
- (3) Figures are drawn as accurately as possible and are intended to help solve some of the test problems. If a figure is not drawn to scale, this will be stated in the problem. All figures lie in a plane unless the problem indicates otherwise.
- (4) Unless otherwise stated, the domain of a function *f* is assumed to be the set of real numbers *x* for which the value of the function, *f*(*x*), is a real number.
- (5) Reference information that may be useful in answering some of the test questions can be found below.

Reference Information		
Right circular cone with radius $r$ and height $h$ :	Volume = $\frac{1}{3}\pi r^2 h$	
Right circular cone with circumference of base $c$ and slant height $\ell$ :	Lateral Area = $\frac{1}{2}c\ell$	
Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$	
	Surface Area = $4\pi r^2$	
Pyramid with base area <i>B</i> and height <i>h</i> :	Volume = $\frac{1}{3}Bh$	

- 1. If a car travels 300 miles in 6 hours, then assuming the car travels at the same rate, how long will it take to travel 360 miles?
  - (A) 5 hours
  - (B) 6 hours
  - (C) 7 hours
  - (D) 7 hours, 12 minutes
  - (E) 7 hours, 20 minutes
- 2. A number *n* is decreased by 4. The square root of the result equals 0.8. n =
  - (A) 23.04
  - (B) 0.8
  - (C) 0.64
  - (D) 4.64
  - (E) -3.36
- 3. If  $f(x) = x^4 2x^3 + 6x 1$ , then f(-2) =
  - (A) –13
  - (B) 19
  - (C) 32
  - (D) 11
  - (E) 43
- 4. What is the midpoint of the segment with endpoints A(-3, -8) and B(4, 6)?

(A) 
$$\left(\frac{1}{2}, -1\right)$$
  
(B)  $\left(-1, \frac{1}{2}\right)$   
(C)  $\left(-\frac{1}{2}, 1\right)$   
(D)  $(-7, -14)$   
(E)  $\left(-\frac{7}{2}, -7\right)$ 

- 5. What is  $\frac{1}{2}$  percent of 6?
  - (A) 3
  - (B) 0.06
  - (C) 0.03
  - (D) 12
  - (E) 0.003

- 6. What are the *x*-intercept(s) of the graph of  $f(x) = x^2 9$ ?
  - (A) (3,0)
  - (B) (0, 3)
  - (C) (0, -9)
  - (D) (-3, 0)
  - (E) (±3, 0)
- 7. All of the following are equivalent to the equation of the line containing points (0, 1) and (4, 3) EXCEPT

(A) 
$$y = \frac{1}{2}x + 1$$
  
(B)  $x - 2y = -2$   
(C)  $(y - 3) = \frac{1}{2}(x - 4)$   
(D)  $2x - y + 1 = 0$ 

(D) 
$$2x - y + 1 = 0$$
  
(E)  $(y - 1) = \frac{1}{2}x$ 

- (E)  $(y-1) = -\frac{1}{2}x$
- 8. What are all the values of *x* for which  $x^2 + 5x 14 \le 0$ ?
  - (A)  $x \le -7$  or  $x \ge 2$
  - (B)  $-7 \le x \le 2$
  - (C)  $x \ge 2$
  - (D)  $x \ge -7$
  - (E)  $x \leq 2$
- 9. If  $f(x) = x^3$  and  $f^{-1}$  is the inverse function of *f*, then  $f^{-1}(27) =$ 
  - (A) 27<sup>3</sup>
  - (B) 3
  - (C) -3
  - (D) 9
  - (E) 5.2
- 10. What is the slope of the line containing the points (6, 0) and (6, 7)?
  - (A) 7
  - (B) 0
  - (C) Undefined
  - $\frac{1}{6}$ (D)

  - (E) -7



- 11. The triangle in Figure 1 has sides measuring 6, 8, and 10 units. What is the measure of  $\theta$ ?
  - (A) 53.1°
  - (B) 36.9°
  - (C) 60°
  - (D) 30°
  - (E) 45°



12. How many total diagonals can be drawn from all of the vertices of a 15-gon?

- (A) 13
- (B) 12
- (C) 180
- (D) 90
- (E) 77

13. 
$$\frac{2 - \sqrt{3}}{2 + \sqrt{3}} =$$
(A) 0
(B) -1
(C)  $\frac{1}{7 + 4\sqrt{3}}$ 

(D) 
$$7 - 4\sqrt{3}$$

(E)  $1 - 4\sqrt{3}$ 

14.  $(a^2 - 1)(a^2 - 4) =$ 

- (A) (a-1)(a+1)(a-2)(a+2)
- (B)  $a^2 + 4$
- (C)  $a^4 + 5a^2 + 4$
- (D)  $a^4 5a^2 4$
- (E) (a-1)(a-4)

15. In Figure 2,  $\ell_1 \parallel \ell_2$ . What is the value of *x*?

- (A) 140°
- (B) 70°
- (C) 110°
- (D) 40°
- (E) 35°





Figure 1



- 16. If  $\triangle ABC$  is congruent to  $\triangle JKL$ , then all of the following parts are congruent by CPCTC EXCEPT
  - (A)  $\overline{AB} \cong \overline{JK}$
  - (B)  $\overline{CA} \cong \overline{JL}$
  - (C)  $\angle B \cong \angle K$
  - (D)  $\overline{CB} \cong \overline{LJ}$
  - (E)  $\angle C \cong \angle L$
- 17. What is the measure of *y* in Figure 3?
  - (A) 18°
  - (B) 72°
  - (C) 90°
  - (D) 108°
  - (E) 162°

- 18. If the sides of a cube are doubled, then its volume is increased by what factor?
  - (A) 2
  - (B) 3
  - (C) 4
  - (D) 8
  - (E) 16
- 19. In Figure 4, the length of  $\overline{XZ}$  is 16 and  $\overline{XY}$  is one-third the length of  $\overline{YZ}$ . What is the length of  $\overline{XY}$ ?
  - (A) 3
  - (B) 4
  - (C) 5.3
  - (D) 12
  - (E) 21.3
- 20. What is the length of the altitude of  $\triangle ABC$  in Figure 5 given that the measure of  $\angle ABC$  is 35°?
  - (A) 5.6
  - (B) 10
  - (C) 4.6
  - (D) 6
  - (E) 6.6





- 21. All of the following statements are true regarding the graph of  $y = x^2$  EXCEPT
  - (A) It is concave up.
  - (B) Its vertex is the origin.
  - (C) Its directrix is the line  $y = -\frac{1}{4}$ .
  - (D) It does not represent a function.
  - (E) It is symmetric with respect to the y-axis.
- 22. What is the domain of the function  $f(x) = \sqrt{x^2 10}$ ?

(A) 
$$x \ge 0$$
  
(B)  $x \le -\sqrt{10} \text{ or } x \ge \sqrt{10}$   
(C)  $-\sqrt{10} \quad x \le \sqrt{10}$   
(D)  $-10 \le x \le 10$   
(E)  $x \ge \sqrt{10}$ 

- 23. Which of the following shapes has exactly four lines of symmetry?
  - (A) Square
  - (B) Rhombus
  - (C) Parallelogram
  - (D) Rectangle
  - (E) Circle
- 24. Sarah wants to purchase a new car. At the car dealership, there are 4 different models to choose from in her price range. For each model, there are 5 different colors (black, silver, green, navy, and red) and 2 different engine types (4-cylinder or 6-cylinder). How many combinations of model-color-engine type are there?
  - (A) 11
  - (B) 20
  - (C) 40
  - (D) 8
  - (E) 10

25. If  $\log_n 18 - \log_n x = \log_n 6$ , then x =

- (A) 3
- (B) 0.48
- (C) 12
- (D) 6
- (E) 108

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- 26. If the sum of two numbers is 40, then what is their greatest possible product?
  - (A) 391
  - (B) 396
  - (C) 400
  - (D) 399
  - (E) 420

27. If 
$$i = \sqrt{-1}$$
, then  $\frac{5-i}{5+i} =$   
(A) -1  
(B)  $\frac{13}{12} - \frac{5}{12}i$   
(C)  $\frac{12}{13} - \frac{5}{13}i$   
(D) 24 - 10i  
(E)  $\frac{3}{2}$ 

- 28. Mark received a 92 percent and a 78 percent on the first two math tests. What grade must he receive on the third test to have an average of 84 percent?
  - (A) 80%
  - (B) 82%
  - (C) 84%
  - (D) 85%
  - (E) 86%
- 29. All of the following triplets could be the lengths of the sides of a right triangle EXCEPT
  - (A) 6, 8, 10
  - (B) 15, 20, 25
  - (C) 7, 24, 25
  - (D)  $\sqrt{3}, \sqrt{4}, \sqrt{5}$
  - (E) 1, 2,  $\sqrt{5}$
- 30. A cone-shaped cup has a height of 10 units and a radius of 3 units. The cup is filled with water and the height of the water is 6 units. What is radius of the surface of the water?
  - (A) 1.5 units
  - (B) 1.8 units
  - (C) 2 units
  - (D) 3 units
  - (E) 5 units

- 31. How many degrees does the hour hand of a clock rotate in 20 minutes?
  - (A) 30°
  - (B) 10°
  - (C) 6°
  - (D) 15°
  - (E) 7.5°
- 32.  $(6\sin x)(3\sin x) (9\cos x)(-2\cos x) =$ 
  - (A) 1
  - (B) -18
  - (C) 18
  - (D) -1
  - (E)  $18\sin^2 x 18\cos^2 x$
- 33. Figure 6 is the graph of which of the following?
  - (A)  $y \ge |x+6|$
  - (B)  $y \le |x+6|$
  - (C)  $y \ge |x-6|$
  - (D) y < |x 6|
  - (E) y = |x 6|



- (A) 0
- (B) 1
- (C) -1
- (D) 2
- (E) 4
- 35. In  $\triangle ABC$  in Figure 7,  $m \angle CAB = 60^\circ$  and  $\overline{AB} = 4\sqrt{3}$ . What is the length of  $\overline{BC}$ ?
  - (A)  $2\sqrt{3}$
  - (B)  $8\sqrt{3}$
  - (C) 24
  - (D) 12
  - (E) 8





36. If f(x) = x + 1 and  $g(x) = x^2 - 1$ , then what is g(f(x))? (A)  $x^2 + 1$ (B)  $x^2 - 1$ (C)  $x^2 + 2x - 1$ (D)  $x^2 + 2x + 1$ 

- (E)  $x^2 + 2x$
- 37. In rectangle *ABCD*,  $\overline{AB} = 3$  cm and  $\overline{AD} = 3\sqrt{3}$ . If a square has the same area as the area of *ABCD*, what is the length of a side of the square?
  - (A) 3
  - (B)  $3\sqrt{3}$
  - (C) 5.2
  - (D) 3.9
  - (E) 7.8

38. Solve  $(x-3)^{\frac{3}{5}} = 8$ .

- (A) 32
- (B) 35
- (C) 19
- (D) 67
- (E) 29
- 39. Assuming each dimension must be an integer, how many different rectangular prisms with a volume of 18 cm<sup>3</sup> are there?
  - (A) 2
  - (B) 3
  - (C) 4
  - (D) 5
  - (E) 6
- 40. What is the range of the function  $f(x) = 6^x$ ?
  - (A) All real numbers
  - (B)  $y \ge 1$
  - (C)  $y \ge 0$
  - (D) y > 0
  - (E) All real numbers except y = 0
- 41. How many points may be contained in the intersection of two distinct circles?
  - I. 0 points
  - II. 1 point
  - III. 2 points
  - IV. 3 points
  - (A) III only
  - (B) II or III only
  - (C) III or IV only
  - (D) I, II, or III only
  - (E) I, II, III, or IV

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- 42. How many different chords can be drawn from 8 distinct points on a circle?
  - (A) 48
  - (B) 7
  - (C) 8
  - (D) 16
  - (E) 28
- 43. Assuming a > 1, which of the following expressions represents the greatest value?

(A) 
$$\frac{a+1}{a+1}$$
  
(B) 
$$\frac{a}{a+1}$$
  
(C) 
$$\frac{a}{a-1}$$
  
(D) 
$$\frac{a-1}{a-2}$$
  
(E) 
$$\frac{a+1}{a-1}$$

- 44. If 4n + 1, 6n, and 7n + 2 are the first three terms of an arithmetic sequence, what is the value of *n*?
  - (A)
  - $\frac{3}{2}$
  - (B) 2
  - (C) 3
  - (D) 1 (E) 6
- 45. All of the following are equivalent to the expression (4x-8)(x+1) EXCEPT
  - (A) 4(x-2)(x+1)
  - (B) -4(2-x)(x+1)
  - (C)  $4(x^2 x 2)$
  - (D) (1+x)(8-4x)
  - (E)  $4x^2 4x 8$

46. 
$$\sqrt{4 + 4x^2} + \sqrt{9x^2 + 9} =$$
  
(A)  $\sqrt{13x^2 + 13}$   
(B)  $5x + 5$   
(C)  $5\sqrt{x^2 + 1}$ 

(D) 
$$\sqrt{13(x^2+1)}$$

(E) 6x + 6

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47. A ball is dropped from a height of 8 feet. If it always rebounds  $\frac{2}{3}$  the distance it has fallen, how high will it reach after it hits the ground for the third time?

- (A) 5.33
- (B) 3.56
- (C) 2.37
- (D) 1.58(E) 2.73
- 48. The solution set of  $8x^2 16x 24 = 0$  is which of the following?
  - (A)  $\{-1, 3\}$
  - (B) {-3, 1}
  - (C)  $\{-1, 3, 8\}$
  - (D)  $\{-1, -3\}$
  - (E) {1,3}
- 49. If  $x^2 5x + 1 = (x a)^2 + c$ , then what is the value of c?

(A) 
$$-\frac{29}{4}$$
  
(B)  $-\frac{21}{4}$   
(C)  $-\frac{5}{2}$   
(D)  $-\frac{25}{4}$   
(E) 1

50. Solve 
$$3x - 5\sqrt{x} - 2 = 0$$

(A) 
$$\left\{ \frac{1}{9}, 4 \right\}$$
  
(B)  $\left\{ \frac{1}{9} \right\}$   
(C)  $\{4\}$   
(D)  $\left\{ -\frac{1}{9}, -4 \right\}$   
(E)  $\{-4\}$ 

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# S T O P

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

### **ANSWER KEY**

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

### **ANSWERS AND SOLUTIONS**

#### 1. **D**

$$\frac{300}{6} = \frac{360}{t}$$
$$t = \frac{6(360)}{300} = 7.2 \text{ hours}$$

7.2 hours is equivalent to 7 hours and 12 minutes.

#### 2. **D**

 $\sqrt{n-4} = 0.8$ n-4 = 0.64n = 4.64

#### 3. **B**

$$f(-2) = (-2)^4 - 2(-2)^3 + 6(-2) - 1$$
$$= 16 + 16 - 12 - 1$$
$$= 19$$

### 4. **A**

The midpoint is given by  $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ The *x*-coordinate is  $\left(\frac{-3 + 4}{2}\right) = \frac{1}{2}$ . The *y*-coordinate is  $\frac{(-8 + 6)}{2} = -1$ .

### 5. **C**

$$a = \frac{1}{2}\%$$
 of 6  
 $a = 0.005(6)$   
 $a = 0.03$ 

6. **E** Set 
$$y = 0$$
 and solve for *x*.

$$0 = x^2 - 9$$
$$9 = x^2$$
$$x = \pm 3$$

The *x*-intercepts are the two points (3, 0) and (-3, 0).

7. **D** The slope of the line containing (0, 1) and (4, 3) equals  $\frac{2}{4}$  or  $\frac{1}{2}$ . Answer D cannot be correct because the slope of the line is 2.

#### 8. **B**

$$x^{2} + 5x - 14 \le 0$$
$$(x + 7)(x - 2) \le 0$$

The critical points of the graph are x = -7 and x = 2. Test the inequality when x = 0 to see that  $0^2 + 5(0) - 14 \le 0$  is a true statement. The interval between -7 and 2, inclusive, satisfies the inequality.

# **PRACTICE TEST 4**

### **Time: 60 Minutes**

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Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$	
	Surface Area = $4\pi r^2$	
Pyramid with base area $B$ and height $h$ :	Volume = $\frac{1}{3}Bh$	

- (A)  $\frac{7}{3}$
- (B) 18
- (C) 14
- (D) 21
- (E) 63

2. If  $\frac{3}{10} = \frac{5}{x}$ , then x =(A)  $\frac{50}{3}$ (B)  $\frac{3}{50}$ (C) 16

- (D) 12
- (E) 17

3.  $9\sin^2 x + 9\cos^2 x =$ 

- (A) 1
- (B) -1
- (C) 9
- (D) –9
- (E) 0
- 4. If the supplement of twice an angle is 124°, then what is the measure of the angle?
  - (A) 60°
  - (B) 30°
  - (C) 56°
  - (D) 28°
  - (E) 27°
- 5. Two times a number k is decreased by 1. If the cube root of that result is -2, then k =
  - (A) –7
  - (B) -3.5
  - (C) -8
  - (D) -3
  - (E) -4.5
- 6. All of the following triplets could be the lengths of the sides of a triangle EXCEPT
  - (A) 3, 4, 5
  - (B) 3, 3, 5
  - (C) 1, 1, 2
  - (D) 6, 8, 10
  - (E) 7, 5, 11

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- 7. Valerie drives 10 miles due east, then drives 20 miles due north, and finally drives 5 miles due west. Which of the following represents the straight-line distance Valerie is from her starting point?
  - (A) 24 miles
  - (B) 22.4 miles
  - (C) 25 miles
  - (D) 35 miles
  - (E) 20.6 miles
- 8. The measures of the angles of a quadrilateral are x, 2x + 7, 3x, and 5x + 1. What is the measure of the largest angle?
  - (A) 33°
  - (B) 32°
  - (C) 161°
  - (D) 166°
  - (E) 168°
- 9. How many sides does a regular polygon have if each interior angle measures 140°?
  - (A) 6
  - (B) 7
  - (C) 8
  - (D) 9
  - (E) 10
- 10. What is the solution to the system below?

$$\begin{cases} 2x + y = \frac{5}{2} \\ x - 2y = 5 \end{cases}$$
(A)  $\left(2, \frac{3}{2}\right)$ 
(B)  $\left(2, -\frac{3}{2}\right)$ 
(C)  $\left(0, -\frac{5}{2}\right)$ 
(D)  $\left(\frac{10}{3}, -\frac{5}{6}\right)$ 
(E)  $\left(0, \frac{5}{2}\right)$ 

11. Which of the following is NOT an irrational number?

- (A) π
- (B)  $\sqrt{2}$
- (C)  $e^{(D)}$
- (D) 1.666 . . .
- (E)  $\frac{\sqrt{3}}{2}$
- 12. What is the distance between the points with coordinates (-2, 6) and (2, -3)?
  - (A) 9.85
  - (B) 97
  - (C) 65
  - (D) 8.06
  - (E) 3
- 13. Which of the following best describes the figure with vertices P(-2, 3), Q(3, 3), R(3, -1), and S(-2, -1)?
  - (A) Square
  - (B) Rectangle
  - (C) Parallelogram
  - (D) Trapezoid
  - (E) Rhombus
- 14. Which of the following are solutions to the equation  $30x^2 + 49x 11 = 0$ ?

(A) 
$$\left\{-\frac{1}{5}, \frac{11}{6}\right\}$$
  
(B)  $\left\{-\frac{1}{30}, -11\right\}$   
(C)  $\left\{\frac{1}{5}, -\frac{11}{6}\right\}$   
(D)  $\left\{\frac{1}{30}, 11\right\}$   
(E)  $\left\{-\frac{11}{15}, -\frac{1}{2}\right\}$ 

- 15. The points (4, -2) and (x, y) are symmetric to each other with respect to the origin. (x, y) =
  - (A) (-2, 4)
  - (B) (2, -4)
  - (C) (4, 2)
  - (D) (-4, -2)
  - (E) (-4, 2)

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16. Each of the following is equivalent to  $4\sqrt{2}$  EXCEPT

(A) 
$$2\sqrt{2} + 2\sqrt{2}$$
  
(B)  $\sqrt{32}$   
(C)  $\sqrt{8}(\sqrt{4})$   
(D)  $\frac{\sqrt{64}}{\sqrt{2}}$   
(E)  $\sqrt{20} + \sqrt{12}$ 

- 17. In  $\triangle ABC$  in Figure 1,  $\overline{AB} = 4$  and  $\overline{AC} = 4$ . What is the length of  $\overline{AC}$ ?
  - (A) 4
  - (B)  $4\sqrt{2}$
  - (C)  $4\sqrt{3}$
  - (D) 8
  - (E) 5
- 18. A local newspaper company prints 520 pages of the newspaper every 30 minutes. How many pages will it print in 5 hours?
  - (A) 2,600 pages
  - (B) 86.7 pages
  - (C) 5,200 pages
  - (D) 10,400 pages
  - (E) 1,300 pages
- 19. When *n* is divided by 3, the remainder is 1, and when *m* is divided by 3, the remainder is 2. What is the remainder when the product *nm* is divided by 3?
  - (A) 0
  - (B) 1
  - (C) 2
  - (D) 3
  - (E) Cannot be determined
- 20. If *a* is positive and  $\log_{3a} 36 = 2$ , then a =
  - (A) 2
  - (B) 3
  - (C) 6
  - (D)  $2\sqrt{3}$
  - (E) 9

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Figure 1

21. What is the radius of the circle represented by the equation  $x^2 - 2x + y^2 + 6y + 6 = 0$ ?

- (A) 2
- (B) 4
- (C) 1
- (D) 3
- (E) 16
- 22. What is the perimeter of  $\Delta DEF$  in Figure 2?
  - (A) 48
  - (B) 6
  - (C) 8
  - (D) 12
  - (E) 24

23. If  $f(x) = x^2 + 3x$ , then f(3x) =

- (A)  $3(x^2 + 3x)$
- (B) 9(x+1)
- (C)  $9x^2 + 9x$
- (D)  $3x^2 + 9x$
- (E)  $9x^2 + 6x$
- 24. If the graph of  $\frac{x^2}{a} + \frac{y^2}{b} = 1$  contains the point (0, 1), then which of the following must be a true statement?
  - (A) a = b
  - (B) b = 0
  - (C) b = 1
  - (D) b = -1
  - (E) a = 1

25. If  $f(x) = x^2 + 5$  and  $g(x) = -\sqrt{x}$ , then f(g(7)) =(A) 7.6

- (B) –2
- (C) 54
- (D) 9
- (E) 12
- 26. If 20 percent of a given number is 11, then what is 55 percent of the same number?
  - (A) 55
  - (B) 30.25
  - (C) 100
  - (D) 36
  - (E) 27.5

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Figure 2

- 27. All of the following are properties of a parallelogram EXCEPT
  - (A) The diagonals are perpendicular.
  - (B) Opposite sides are congruent.
  - (C) Consecutive angles are supplementary.
  - (D) A diagonal forms two congruent triangles.
  - (E) The diagonals bisect each other.
- 28. Standing 20 feet away from a flagpole, the angle of elevation of the top of the pole is 42°. Assuming the flagpole is perpendicular to the ground, what is its height?
  - (A) 18
  - (B) 22
  - (C) 13
  - (D) 15
  - (E) 16
- 29. Which equation describes the graph in Figure 3?
  - (A)  $y = (x+2)^2$
  - (B)  $x^2 + y^2 = 4$
  - (C) |x| = 4
  - (D)  $x^2 = 4$
  - (E)  $y = \frac{2}{x}$

- 30. What is the volume of the right triangular prism in Figure 4?
  - (A)  $650 \text{ cm}^3$
  - (B) 600 cm<sup>3</sup>
  - (C) 300 cm<sup>3</sup>
  - (D)  $325 \text{ cm}^3$
  - (E) 780 cm<sup>3</sup>







31. What is the maximum value of  $f(x) = 4 - (x + 1)^2$ ?

- (A) -1
- (B) 4
- $(\mathbf{D})$  4
- (C) 1
- (D) -4
- (E) –5
- 32. In circle *R* in Figure 5, the measure of arc *UT* is 100°. What is the measure of  $\angle STU$ ?
  - (A) 50°
  - (B) 40°
  - (C) 100°
  - (D) 30°
  - (E) 45°



- (A) 1:9
- (B) 3:1
- (C) 9:1
- (D) 27:1
- (E) 81:1
- 34. If  $f(x) = x^2 + 3$  for  $-1 \le x \le 3$ , then what is the range of *f*?
  - (A)  $y \ge 0$
  - (B)  $y \ge 3$
  - (C)  $-1 \le y \le 3$
  - (D)  $4 \le y \le 12$
  - (E)  $3 \le y \le 12$

35. What is the domain of the function  $f(x) = \frac{x}{x+6}$ ?

- (A) All real numbers.
- (B) All real numbers except 0.
- (C) All real numbers except 6.
- (D) All real numbers except -6.
- (E) All real numbers greater than or equal to -6.
- 36. If three numbers *x*, *y*, and *z* are added in pairs, their sums are 3, 9, and 28. What is the smallest of the three numbers?
  - (A) 3
  - (B) 17
  - (C) –3
  - (D) -8
  - (E) 9

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### Figure 5

37. Given the three points A(1, 2), B(6, 2), and C(6, 5), what is the tangent of  $\angle CAB$ ?

(A) 
$$\frac{3}{5}$$
  
(B)  $\frac{5}{3}$   
(C)  $\frac{3}{4}$   
(D)  $\frac{3\sqrt{34}}{34}$   
(E)  $\frac{1}{2}$ 

- 38. In Figure 6,  $\overline{VW}$  and  $\overline{XY}$  are parallel. The measure of  $\angle ZXY$  is 75° and the measure of  $\angle ZYX$  is 25°. What is the measure of  $\angle VZY$ ?
  - (A) 75°
  - (B) 80°
  - (C) 155°
  - (D) 165°
  - (E) 105°
- 39. In Figure 7,  $\overline{AB}$  is congruent to  $\overline{DC}$ ,  $\overline{DB} = 10$  units, and  $m \angle DBC = 40^{\circ}$ . What is the perimeter of quadrilateral *ABCD*?
  - (A) 40
  - (B) 28.2
  - (C) 20
  - (D) 26
  - (E) 21.6
- 40. What real values of *a* and *b* satisfy the equation a + b + 9i = 6 + (2a b)i?
  - (A) a = 5, b = -1
  - (B) a = 5, b = 1
  - (C) a = 6, b = 0
  - (D) a = 4, b = 2
  - (E) a = 1, b = 5













- 41. What is the length of the edge of a cube having the same total surface area as a rectangular prism measuring 3 cm by 4 cm by 8 cm?
  - (A) 22.7 cm
  - (B) 4.8 cm
  - (C) 136 cm
  - (D) 5.8 cm
  - (E) 11.7 cm
- 42. What are the x-intercepts of the graph  $f(x) = -25 5x^2$ ?
  - (A)  $\pm \sqrt{5}$
  - (B) ±5
  - (C) 0
  - (D) -25
  - (E) None
- 43. The number of tails showing when a pair of coins was tossed 10 times was {0, 1, 2, 2, 1, 1, 0, 2, 0, 1}. What is the mean of the data?
  - (A) 0
  - (B) 0.5
  - (C) 1
  - (D) 1.5
  - (E) 2
- 44. Christine's average score on the first three math tests of the term is 89 percent. If she earns an 81 percent on the fourth test, what will her new average be?
  - (A) 87%
  - (B) 85%
  - (C) 86.8%
  - (D) 88%
  - (E) 85.5%
- 45. The diagonals of a rhombus measure 24 and 10 inches. What is the measure of the larger angle of the rhombus?
  - (A) 45.2°
  - (B) 150°
  - (C) 145°
  - (D) 120°
  - (E) 134.8°

- 46. Eighteen students took an 8-question quiz. The graph in Figure 8 shows the number of students who earned each possible score from 0 to 8. What is the median for the quiz scores?
  - (A) 5.3
  - (B) 5
  - (C) 4
  - (D) 6
  - (E) 5.5



**Figure 8** 

47. If f(x) = 3x + 1 and  $g(x) = x^2 - 2x + 1$ , then (f+g)(2) =

- (A) 7
- (B) 1
- (C) 8
- (D) 6
- (E) 15

### 48. $(2x-3)^3 =$

- (A)  $8x^3 27$
- (B)  $8x^3 36x^2 + 54x 27$
- (C)  $(2x-3)(4x^2+12x+9)$ (D)  $2x^3-10x^2+54x+9$
- (D)  $8x^3 18x^2 + 54x 27$ (E)  $2x^3 - 26x^2 - 54x - 27$
- (E)  $2x^3 36x^2 54x 27$
- 49. If (x, y) is a point on the graph of a function, then which of the following must be a point on the graph of the inverse of the function?
  - (A) (y, x)
  - (B) (-x, -y)
  - (C) (-y, -x)
  - (D) (x, -y)
  - (E) (-x, y)
- 50. If the length of a rectangle is 7 feet more than its width and if its area is 18 square feet, then what are the dimensions of the rectangle?
  - (A)  $-9 \times -2$  feet
  - (B)  $1 \times 18$  feet
  - (C)  $3 \times 6$  feet
  - (D)  $2 \times 9$  feet
  - (E)  $1 \times 8$  feet

# **S T O P**

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

ANSWER KEY

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

# **PRACTICE TEST 5**

### **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then fill in the appropriate oval on the answer sheet.

### NOTES:

- (1) A calculator will be needed to answer some of the questions on the test. Scientific, programmable, and graphing calculators are permitted. It is up to you to determine when and when not to use your calculator.
- (2) All angles on the Level 1 test are measured in degrees, not radians. Make sure your calculator is set to degree mode.
- (3) Figures are drawn as accurately as possible and are intended to help solve some of the test problems. If a figure is not drawn to scale, this will be stated in the problem. All figures lie in a plane unless the problem indicates otherwise.
- (4) Unless otherwise stated, the domain of a function *f* is assumed to be the set of real numbers *x* for which the value of the function, *f*(*x*), is a real number.
- (5) Reference information that may be useful in answering some of the test questions can be found below.

Reference Information		
Right circular cone with radius $r$ and height $h$ :	Volume = $\frac{1}{3}\pi r^2 h$	
Right circular cone with circumference of base $c$ and slant height $\ell$ :	Lateral Area = $\frac{1}{2}c\ell$	
Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$	
	Surface Area = $4\pi r^2$	
Pyramid with base area <i>B</i> and height <i>h</i> :	Volume = $\frac{1}{3}Bh$	



### 1. If $a = b^3$ and b = 4k, then what is the value of *a* when

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

2. If 
$$\frac{3}{8} = \frac{1}{4x - 1}$$
, then  $x =$   
(A)  $\frac{3}{4}$   
(B)  $\frac{9}{4}$   
(C) 11  
(D)  $\frac{11}{12}$ 

(E) 
$$\frac{5}{12}$$

3. If 4 - 3(5 - x) = 2(x + 5) - 1, then x =

- (A) –2
- (B) 20
- (C) -15
- (D) 4
- (E) 21

4.  $\frac{1}{2}$  percent of 50 percent of 1,000 is

- (A)  $\frac{5}{2}$
- (B) 5
- (C) 0.25
- (D) 25
- (E) 250
- 5. What is the least positive integer divisible by 2, 6, and 27?
  - (A) 108
  - (B) 54
  - (C) 18
  - (D) 324
  - (E) 162

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- 6. If the area of a square is  $100 \text{ cm}^2$ , then its perimeter is
  - (A) 10 cm
  - (B) 20 cm
  - (C) 40 cm
  - (D) 200 cm
  - (E) 100 cm
- 7. The sides of pentagon *ABCDE* in Figure 1 are extended. What is the sum of the measures of the five marked angles?
  - (A) 180°
  - (B) 270°
  - (C) 360°
  - (D) 540°
  - (E) 720°







- 8. What is the *y*-intercept of the line  $y 1 = -\frac{1}{2}(x + 8)$ ?
  - (A) 8
  - (B) −4
  - (C) -5 (D) -3
  - (D) J
  - (E)  $-\frac{1}{2}$

9. If 4x - y = 6z + w, then what does the expression 12 - 4x + y equal in terms of z and w?

- (A) 12 w
- (B) 12 6z
- (C) 12 + 6z + w
- (D) 12 6z + w
- (E) 12 6z w

10. For all x except x = 9,  $\frac{3x^2 - 28x + 9}{9 - x} =$ 

- (A) -2x + 28
- (B) 3x 1
- (C) -3x + 1
- (D) 3x + 3
- (E)  $3x^2 28$

11. In Figure 2, if the length of  $\overline{DF} = 4x + 2$  and the length of  $\overline{EF}$  is  $\frac{3}{4}x + 1$ , what is the length of  $\overline{DE}$ ?

(A) 
$$\frac{13}{4}x + 3$$
  
(B)  $\frac{13}{4}x + 1$   
(C)  $x + 1$   
(D)  $\frac{19}{4}x + 3$   
(E)  $3x + 1$ 

- 12. What are three consecutive even integers whose sum is 48?
  - (A) 12, 14, 16
  - (B) 16, 18, 20
  - (C) 13, 15, 17
  - (D) 15, 16, 17(E) 14, 16, 18
- 13.  $||-4| |(-2)^3|| =$ 
  - (A) 4
  - (B) -4
  - (C) 8
  - (D) 0
  - (E) 2

14. If 
$$x + y = -1$$
 and  $x - y = 6$ , then  $\frac{x}{y} =$ 

(A) 
$$\frac{5}{2}$$
  
(B)  $-\frac{7}{2}$   
(C)  $-\frac{5}{7}$   
(D)  $-\frac{7}{9}$   
(E)  $-\frac{7}{5}$   
15. If  $f(x) = \frac{16}{x^5}$  and  $x \neq 0$ , then  $f(-2) =$   
(A)  $-\frac{1}{2}$   
(B)  $\frac{1}{2}$   
(C)  $\frac{1}{4}$   
(D) 1  
(E)  $-1$ 

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Figure 2

- 16. How many diagonals can be drawn from one vertex of a 20-gon?
  - (A) 15
  - (B) 16
  - (C) 17
  - (D) 18
  - (E) 170
- 17. Which of the following lines is perpendicular to the line y = -3x + 1?
  - (A) y = -3x + 4
  - (B) y = 3x
  - (C)  $y = \frac{1}{3}x + 1$
  - (D)  $y = -\frac{1}{3}x 1$
  - (E) y = -3x 1
- 18. If the point (-1, 2) is on a graph that is symmetric with respect to the *y*-axis, then which of the following points must also be on the graph?
  - (A) (1, 2)
  - (B) (−1, −2)
  - (C) (1,−2)
  - (D) (-2, 1)
  - (E) (2, −1)
- 19.  $-9\cos^2\theta 9\sin^2\theta =$ 
  - (A) 0
  - (B) 1
  - (C) –1
  - (D) 9
  - (E) –9
- 20. The midpoint of  $\overline{AB}$  is (5, -6) and the coordinates of endpoint *A* are (-1, 2). What are the coordinates of *B*?
  - (A) (-7, 10)
  - (B) (11, -14)
  - (C) (2, -2)
  - (D) (-2, 2)
  - (E) (-1, 4)
- 21. What is the volume of the rectangular pyramid in Figure 3?

(A) 
$$\frac{3n^2}{2}$$
  
(B)  $\frac{3n^3}{4}$ 

(C) 
$$\frac{3n^3}{2}$$
  
(D)  $\frac{n^3}{2}$ 

(E)  $n^3$ 





Figure 3



- 22.  $2x^3 + 9x^2 + 3x 4$  divided by (x + 1) =
  - (A)  $2x^2 + 11x + 14$
  - (B) (2x-1)(x-4)
  - (C)  $2x^2 + 7x + 10$
  - (D)  $2x^2 + 7x 4$
  - (E)  $2x^3 + 7x^2 4x$
- 23. In the triangle shown in Figure 4, what is the value of c?
  - (A)  $\sqrt{3}$
  - (B)  $3\sqrt{3}$
  - (C)  $6\sqrt{3}$
  - (D)  $9\sqrt{3}$
  - (E)  $9\sqrt{2}$
- 24. Which one of the following is a counterexample to the statement "If two angles are supplementary, then they are right angles?"
  - (A) If two angles are complementary, then they are not right angles.
  - (B) If two angles are right angles, then they are supplementary.
  - (C) If two angles are not supplementary, then they are not right angles.
  - (D) If two angles are supplementary, then one could measure 100° and one could measure 80°.
  - (E) If two angles are not right angles, then they are not supplementary.

25. What is the domain of the function  $f(x) = \sqrt{36 - x^2}$ 

- (A)  $x \le -6$  or  $x \ge 6$
- (B)  $x \ge \pm 6$
- (C)  $x \neq \pm 6$
- (D)  $x \le 6$
- (E)  $-6 \le x \le 6$
- 26. What is the maximum value of the function  $f(x) = \frac{1}{x}$

over the interval  $\frac{1}{2} \le x \le \frac{3}{2}$ ? (A)  $\frac{1}{2}$ (B)  $\frac{3}{2}$ (C) 2 (D)  $\frac{2}{3}$ (E) Infinity

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Figure 4

### GO ON TO TH<u>e next page</u>

27. If 
$$a = \frac{n+1}{n^4}$$
 and  $b = \frac{1-n}{n^4}$ , then, for  $n \neq 0, a-b =$   
(A)  $\frac{2}{n^4}$   
(B)  $\frac{2}{n^3}$   
(C) 0  
(D)  $2n$   
(E)  $\frac{2n-2}{n^4}$ 

- 28. What is the volume of a sphere whose surface area is  $100\pi$  square units?
  - (A)  $\frac{100}{3}\pi$  cubic units or units<sup>3</sup> (B)  $\frac{500}{3}\pi$  units<sup>3</sup> (C)  $160\pi$  units<sup>3</sup>
  - (D)  $\frac{375}{4}\pi$  units<sup>3</sup>

 $n^4$ 

- (E)  $520 \text{ units}^3$
- 29. What is the circumference of a circle whose area is  $64\pi$  cm<sup>2</sup>?
  - (A) 16
  - (B) 8π
  - (C) 8
  - (D) 128π
  - (E) 16π

30. Which of the following is the solution of |2x-4| < 1?

(A) 
$$\frac{3}{2} < x < \frac{5}{2}$$
  
(B)  $x < \frac{5}{2}$   
(C)  $x < \frac{3}{2}$  or  $x > \frac{5}{2}$   
(D)  $x > 0$   
(E)  $x \le \frac{3}{2}$  or  $x \ge \frac{5}{2}$ 

- 31. Which of the following is the equation of a circle with center (-1, 7) and a radius of length 3?
  - (A)  $(x+1)^2 (y+7)^2 = 9$
  - (B)  $(x+1)^2 + (y-7)^2 = 3$
  - (C)  $(x-1)^2 + (y+7)^2 = 3$
  - (D)  $(x+1)^2 + (y-7)^2 = 9$
  - (E)  $(x-1)^2 + (y+7)^2 = 9$

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32. An equation of the line parallel to 8x - 2y = 5 and containing the point (-2, 2) is

(A) 
$$y-2=4(x-2)$$
  
(B)  $y = 4x + \frac{5}{2}$   
(C)  $y = 4x - \frac{5}{2}$   
(D)  $y+2=4(x-2)$   
(E)  $y = 4x + 10$ 

33. If the letters of the word PROBLEMS are written on cards and put in a hat, what is the probability of randomly drawing either "E" or "S"?

(A) 
$$\frac{1}{8}$$
  
(B)  $\frac{1}{56}$   
(C)  $\frac{1}{4}$   
(D)  $\frac{1}{64}$   
(E)  $\frac{1}{16}$ 

34. If  $\tan 10^\circ = \cot \theta$ , then  $\theta =$ 

- (A) 10°
- (B) 80°
- (C) 70°
- (D) -10°
- (E) 90°
- 35. In circle *O* in Figure 5,  $\overline{OE} = 3$ ,  $\overline{OF} = 2$ , and  $\overline{OG} = 4$ . Which of the following lists the three chords in order from longest to shortest?
  - (A) OG, OE, OF
  - (B) *DF*, *CG*, *BE*
  - (C) *BC*, *AB*, *DC*
  - (D) *DC*, *AB*, *BC*
  - (E) *DC*, *BC*, *AB*

36. If  $\cos (45 + 2x)^\circ = \sin (3x)^\circ$ , then x =

- (A) 18°
- (B) 27°
- (C) 45°
- (D) 22.5°
- (E) 9°

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### Figure 5

37. If 
$$2^{3}(2^{3n})(2) = \frac{1}{4}$$
, then *n*  
(A)  $-\frac{5}{3}$   
(B)  $-2$   
(C)  $-\frac{2}{9}$   
(D)  $-\frac{2}{3}$   
(E)  $-\frac{1}{3}$ 

38. If 
$$f(x) = \frac{3}{2}x + \sqrt{x}$$
, then  $f(f(4)) = \frac{1}{2}x + \sqrt{x}$ 

- (A)  $12 + 2\sqrt{2}$
- (B) 20
- (C)  $14\sqrt{2}$
- (D) 8
- (E) 16
- 39. The operation  $\bigstar$  is defined for all real numbers *a* and *b* as  $a \triangleq b = b^{2a}$ . If  $n \triangleq 5 = 125$ , then n =

=

- (A) 1
- (B) 2
- (C) 3
- (D)  $\frac{3}{2}$
- (E)  $\frac{1}{2}$
- 40. How many common tangents can be drawn to the two circles in Figure 6?
  - (A) 0
  - (B) 1
  - (C) 2
  - (D) 3
  - (E) 4





- 41. The boys' basketball team scored an average of 54 points per game in their first 5 games of the season. The girls' basketball team scored an average of 59 points per game in their first 6 games. What was the average of points scored in all 11 games?
  - (A) 56.5
  - (B) 56.7
  - (C) 56.0
  - (D) 57.1
  - (E) 62.4
- 42. The rectangle in Figure 7 is rotated about side  $\overline{WZ}$ . What is the volume of the resulting solid?
  - (A) 432
  - (B) 108π
  - (C) 432π
  - (D) 72π
  - (E) 330
- 43. If  $i = \sqrt{-1}$ , then all of the following expressions are equivalent EXCEPT
  - (A) *i*<sup>4</sup>
  - (B)  $(i^4)^4$
  - (C)  $i^8$
  - (D) *i*<sup>20</sup>
  - (E)  $i^4 + i^4$

44. For  $x \neq -1$  and  $x \neq \frac{1}{3}$ , if f(x) = 1 - 3x and  $g(x) = 3x^2 + 2x - 1$ , then  $\left(\frac{f}{g}\right)(x) =$ (A)  $\frac{1}{3}x^2 - \frac{3}{2}x$ (B)  $\frac{-1}{x+1}$ (C)  $\frac{1}{x+1}$ (D)  $\frac{-1}{x-1}$ (E)  $3x^2 + 5x - 2$ 45. If  $\sin x = \frac{7}{25}$ , then  $\tan x =$ (A)  $\frac{7}{20}$ (B)  $\frac{24}{25}$ (C)  $\frac{7}{24}$ (D)  $\frac{24}{7}$ (E)  $\frac{8}{24}$  USE THIS SPACE AS SCRATCH PAPER



**Figure 7**
46. Kate needs to complete 5 more courses—calculus, English, French, computer science, and history—in order to graduate from high school. She plans to schedule the courses during the first 5 periods of the school day, and all 5 courses are offered during each of the 5 periods. How many different schedules are possible?

(A) 25

- (B) 24
- (C) 240
- (D) 120
- (E) 60
- 47. If the pattern of the terms  $3\sqrt{3}$ , 27,  $81\sqrt{3}$ , ... continues, which of the following would be the sixth term of the sequence?
  - (A)  $(3\sqrt{3})^{6}$ (B)  $(\sqrt{3})^{6}$ (C)  $3^{6}$
  - (D)  $\left(3\sqrt{3}\right)^{3}$
  - (E) 3<sup>7</sup>
- 48. The quotient from dividing the sum of the measures of the interior angles of a regular polygon by the number of its sides is 157.5°. How many sides does the polygon have?
  - (A) 14
  - (B) 15
  - (C) 16
  - (D) 17
  - (E) 18

49. What is the value of k if

$$\frac{1}{(x-2)(x+4)} = \frac{n}{(x-2)} + \frac{\kappa}{(x+1)}$$
(A) 2  
(B) -4  
(C)  $-\frac{1}{6}$   
(D)  $\frac{1}{6}$   
(E) -2

50. What is the perimeter of the regular hexagon shown in Figure 8 if the apothem, *XO*, measures  $2\sqrt{3}$  units?

- (A) 12
- (B)  $12\sqrt{3}$
- (C) 24
- (D) 24√3
- (E) 36

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S T O P

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

**ANSWER KEY** 

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

## **PRACTICE TEST 6**

### **Time: 60 Minutes**

<u>Directions:</u> Select the BEST answer for each of the 50 multiple-choice questions. If the exact solution is not one of the five choices, select the answer that is the best approximation. Then fill in the appropriate oval on the answer sheet.

NOTES:

- (1) A calculator will be needed to answer some of the questions on the test. Scientific, programmable, and graphing calculators are permitted. It is up to you to determine when and when not to use your calculator.
- (2) All angles on the Level 1 test are measured in degrees, not radians. Make sure your calculator is set to degree mode.
- (3) Figures are drawn as accurately as possible and are intended to help solve some of the test problems. If a figure is not drawn to scale, this will be stated in the problem. All figures lie in a plane unless the problem indicates otherwise.
- (4) Unless otherwise stated, the domain of a function *f* is assumed to be the set of real numbers *x* for which the value of the function, *f*(*x*), is a real number.
- (5) Reference information that may be useful in answering some of the test questions can be found below.

Reference Information					
Right circular cone with radius $r$ and height $h$ :	Volume = $\frac{1}{3}\pi r^2 h$				
Right circular cone with circumference of base $c$ and slant height $\ell$ :	Lateral Area = $\frac{1}{2}c\ell$				
Sphere with radius <i>r</i> :	Volume = $\frac{4}{3}\pi r^3$ Surface Area = $4\pi r^2$				
	Surface Area – 4M				
Pyramid with base area $B$ and height $h$ :	Volume = $\frac{1}{3}Bh$				

1. If 
$$\frac{7^2 - x}{7 + x} = 6$$
, then  $x =$   
(A)  $\frac{6}{7}$   
(B) 1  
(C)  $\frac{7}{5}$   
(D) -1  
(E)  $\frac{7}{6}$   
2. If  $\frac{2}{4x^2 + 1} = \frac{2}{5}$ , then  $x =$   
(A) 4  
(B) 1  
(C)  $\pm 1$   
(D)  $\pm \sqrt{\frac{6}{4}}$   
(E)  $\pm \sqrt{\frac{6}{2}}$ 

- 3. Which of the following equations has the same solution(s) as |x-5| = 2?
  - (A)  $\frac{x}{2} = \frac{3}{2}$

  - (B) 3x = 21
  - (C)  $x^2 10x + 21 = 0$ (D)  $x^2 - 4x - 21 = 0$
  - (E)  $x^2 = 49$
- 4.  $x^3 + 8x^2 1$  subtracted from  $5x^3 x^2 + 2x + 1$  equals which of the following?
  - (A)  $4x^3 8x^2 + 2x 2$
  - (B)  $-4x^3 + 9x^2 2x 2$
  - (C)  $4x^3 + 7x^2 + 2x$
  - (D)  $4x^3 9x^2 + 2x$
  - (E)  $4x^3 9x^2 + 2x + 2$
- 5. A cell phone company charges \$30 a month for a phone plan plus an additional 40 cents for each minute over the allotted 300 minutes that come with the plan. Assuming the phone is used for m minutes and m > 300, which of the following is an expression for the monthly cost?
  - (A) 30 + 0.40m
  - (B) 30 + 0.40(m 300)
  - (C) 30 + 0.40(m + 300)
  - (D) 30 + 40(m 300)
  - (E) 30.40m

6. If  $\sqrt[3]{8-7x} = -3$ , then x =

- (A)  $-\frac{19}{7}$ (B) 5 (C)  $\frac{19}{7}$ (D) -5(E)  $-\frac{1}{7}$
- 7. If two similar octagons have a scale factor of 3:5, then the ratio of their areas is
  - (A) 3:5
  - (B)  $\sqrt{3}:\sqrt{5}$
  - (C) 9:25
  - (D) 27:125
  - (E) 6:10
- 8. What is the ratio of the circumference of a circle to its area?
  - (A) 2:*r*
  - (B) r:2
  - (C) 1:*r*
  - (D) 2*r*:1
  - (E)  $2:r^2$
- 9. Kelli has taken a job with a starting salary of \$35,000. If she receives annual raises of \$2,800, what will her salary be during her fourth year on the job?
  - (A) \$11,900
  - (B) \$37,800
  - (C) \$40,600
  - (D) \$43,400
  - (E) \$46,200
- 10. If  $x = \sqrt[3]{y}$  and y = 2n, then what is the value of x when n = -4?
  - (A) 2
  - (B) –2
  - (C) 8
  - (D) -8
  - (E)  $2\sqrt{2}$

- (A) 8
- (B) 14
- (C) 11
- (D) 10
- (E) 12
- 12. If the measure of each exterior angle of a regular polygon is 20°, how many sides does the polygon have?
  - (A) 18
  - (B) 9
  - (C) 27
  - (D) 22
  - (E) 36
- 13. The ratio of the measures of the angles of a quadrilateral is 1:2:4:5. What is the measure of the largest angle?
  - (A) 30°
  - (B) 150°
  - (C) 154°
  - (D) 120°
  - (E) 144°
- 14. If -2x + y = -17 and x + y = 16, then x y =
  - (A) 5
  - (B) 11
  - (C) 6 (D) 4
  - (E) 10
- 15. Which of the following is the graph of  $2x y \ge -1$ ?







## 16. If the point (-2, *a*) is on the graph of the equation $y = x^2 - 7$ , then a =

- (A) 4 (B) 3 (C)  $\pm \sqrt{5}$
- (D) -11 (E) -3
- (E) -3
- 17. (x+y+5)(x+y-5) =
  - (A)  $(x+y)^2 25$ (B)  $(x+y)^2 + 10(x+y) + 25$ (C)  $(x+y)^2 + 10(x+y)$
  - (D)  $x^2 + y^2 5^2$
  - (E)  $x^2 + 2xy + y^2 + 5^2$

18. In Figure 1, 
$$\frac{ST}{TR} = \frac{11}{14} \cdot \sin \theta =$$

- $\begin{array}{rrrr} (A) & \frac{11}{317} \\ (B) & 0.618 \\ (C) & 0.786 \\ (D) & 0.222 \\ (E) & 0.733 \end{array}$
- 19. If points (0, 0), (3, 7), and (11, 0) are the vertices of an isosceles trapezoid, then which of the following points is the remaining vertex?
  - (A) (8, -7)
  - (B) (14, 7)
  - (C) (7,8)
  - (D) (3, -7)
  - (E) (8,7)
- 20. A point Q is in the second quadrant at a distance of  $\sqrt{41}$  from the origin. Which of the following could be the coordinates of Q?
  - (A) (-1, 41)
  - (B) (-4, 5)
  - (C)  $(-8, \sqrt{23})$
  - (D) (5, -4)
  - (E) (-6, 5)

21. If 
$$\sqrt[5]{\sqrt{x}} = 2$$
, then  $x =$ 

- (A) 20
- (B) 1,024
- (C) 64
- (D) 128
- (E) 512



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Figure 1

22. What is the area of the triangle in Figure 2?

- (A)  $64\sqrt{3}$
- (B)  $64\sqrt{2}$
- (D) 0412
- (C)  $32\sqrt{3}$
- (D) 64(E) 32

23. If  $4^x = 36^3 \div 9^3$ , then x =

- (A) 2
- (B) 3
- (C) 4
- (D) 5
- (E) 16

24. For  $x \neq 0$ , if  $3^{-2} - 6^{-2} = x^{-2}$ , then x = 1

- (A)  $3\sqrt{3}$
- (B)  $2\sqrt{3}$
- (C)  $\pm 12$
- (D)  $\pm 2\sqrt{3}$
- (E)  $\pm 2\sqrt{2}$ (E)  $\pm 6$
- 25. Which of the following is the equation of a line that will never intersect the line 5x 9y = -1?
  - $(A) \quad -5x 9y = -1$
  - (B)  $y = x + \frac{1}{9}$
  - (C)  $y = \frac{5}{9}x 2$
  - (D) 5x + 9y = 0
  - $(E) \quad y = \frac{9}{5}x + 1$
- 26. If 2 percent of a 12-gallon solution is sodium, how many gallons of pure sodium must be added to make a new solution that is 6 percent sodium?
  - (A) 1.79
  - (B) 1.02
  - (C) 8
  - (D) 5
  - (E) 0.51
- 27. The product of the roots of a quadratic equation is -5 and their sum is -4. Which of the following could be the quadratic equation?
  - (A)  $x^2 4x + 5 = 0$
  - (B)  $x^2 4x 5 = 0$
  - (C)  $x^2 + 4x 5 = 0$
  - (D)  $x^2 + 5x 4 = 0$
  - (E)  $x^2 5x 4 = 0$

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Figure 2

28. If  $f(x) = x^2 + 4$  and  $g(x) = 1 - x^3$ , then f(g(-1)) =(A) 6 (B) 5 (C) 16 (D) 4 (E) 8 29.  $(1 + \sin \theta)(1 - \sin \theta) =$ (A)  $1 - \sin \theta$ 

- (B)  $\cos^2 \theta$
- (C)  $1 2\sin\theta + \sin^2\theta$
- (D)  $\cos \theta$
- (E) 1

30. If  $25x^2 - 20x + k = 0$  has  $\frac{2}{5}$  as a double root, k =(A) 4 (B)  $\frac{4}{25}$ 

- (C) 5
- (D) -5
- (E) 1
- 31. If *a* is an even integer and *b* is an odd integer, then which of the following must be odd?
  - (A) *ab*
  - (B) *a<sup>b</sup>*
  - (C) a+b+1
  - (D) 2b + 1
  - (E) a-2b
- 32. Which of the following equations has roots of 4 and
  - $-\frac{1}{2}?$

(A) 
$$2x^3 + x^2 - 32x - 16 = 0$$

- (B)  $2x^2 + 7x 4 = 0$
- (C)  $2x^2 9x 4 = 0$
- (D)  $2x^2 7x 4 = 0$
- (E) 4(2x+1) = 0
- 33. What is the area of the quadrilateral in Figure 3?

(A) 
$$2\sqrt{2}$$
 units<sup>2</sup>

(B)  $8\sqrt{2}$  units<sup>2</sup>

(C) 
$$\frac{16}{2}$$
 units<sup>2</sup>

- 2 (D) 16 units<sup>2</sup>
- (E)  $8 \text{ units}^2$

# 4



### Figure 3



# 34. The volume of a cube is *V*. If the sides of the cube are cut if half, the volume of the resulting solid is

- (A) 2V
- (B)  $\frac{1}{2}V$ (C)  $\frac{1}{4}V$ (D)  $\frac{1}{8}V$ (E)  $\frac{1}{16}V$
- 35. y = f(x) is graphed in Figure 4. Which of the following is the graph of y = |f(x)|?







Figure 4



36. In Figure 5, which of the following must be true?



- II.  $\cos x = \sin y$
- III.  $\tan x = \tan y$
- (A) I only
- (B) II only
- (C) II and III only
- (D) I and II only
- (E) I, II, and III
- 37. What is the lateral area of the right circular cone shown in Figure 6?
  - (A)  $50\pi$

(B) 
$$75\pi$$

(C) 
$$\frac{125\sqrt{3}}{2}\pi$$

- (D)  $25\sqrt{3}\pi$
- (E) 100π



### Figure 5



### Figure 6



38. If  $f(x) = -4(x + 2)^2 - 1$  for  $-4 \le x \le 0$ , then which of the following is the range of *f*?

(A)  $y \le -1$ (B)  $-4 \le y \le 0$ (C)  $y \le 0$ 

- $(D) \quad -17 \le y \le -1$
- (E)  $y \leq -17$

39. If  $f(x) = \sqrt{x}$  and  $f(g(x)) = 2\sqrt{x}$ , then g(x) =(A) 4x(B) 2x(C)  $2x^{2}$ (D)  $\frac{x}{2}$ (E)  $x^{3}$ 

40. If  $i = \sqrt{-1}$ , then (6 - i)(6 + i) =(A) 35 (B) 36 - *i* (C) 37

- (D) 35 + 12i
- (E) 36
- 41. What is the volume of the right triangular prism in Figure 7?
  - (A)  $200 \text{ cm}^3$
  - (B)  $100\sqrt{2}$  cm<sup>3</sup>
  - (C)  $100 \text{ cm}^3$

(D) 
$$\frac{100}{3}$$
 cm<sup>3</sup>  
(E)  $\frac{100\sqrt{2}}{3}$  cm<sup>3</sup>

42.  $\tan \theta(\sin \theta) + \cos \theta =$ 

- (A)  $2\cos\theta$
- (B)  $\cos \theta + \sec \theta$
- (C)  $\csc \theta$
- (D) sec  $\theta$
- (E) 1
- 43. The French Club consists of 10 members and is holding officer elections to select a president, secretary, and treasurer for the club. A member can only be selected for one position. How many possibilities are there for selecting the three officers?
  - (A) 30
  - (B) 27
  - (C) 72
  - (D) 720
  - (E) 90

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Figure 7



- 44. Which of the following is symmetric with respect to the origin?
  - (A)  $y = x^2 1$
  - (B)  $y = x^3 2x$
  - (C)  $y^2 = x + 8$
  - (D) y = -|x+1|
  - (E)  $y = (x+3)^2$
- 45. In parallelogram *JKLM* shown in Figure 8,  $\overline{JK}$ = 18,  $\overline{KL}$  = 12, and  $m \angle JKL$  = 120°. What is the area of *JKLM*?
  - (A)  $108\sqrt{3}$
  - (B)  $72\sqrt{3}$
  - (C)  $54\sqrt{3}$
  - (D)  $36\sqrt{3}$
  - (E)  $90\sqrt{3}$
- 46. Thirteen students receive the following grades on a math test:

60, 78, 90, 67, 88, 92, 81, 100, 95, 83, 83, 86, 74

What is the interquartile range of the test scores?

- (A) 14
- (B) 83
- (C) 15
- (D) 16(E) 40
- 47.  $p \Box q$  is defined as  $\frac{p^q}{pq}$  for all positive real numbers.

Which of the following is equivalent to  $\frac{p}{2}$ ?

- (A)  $p \square 1$
- (B)  $p \square p$
- (C)  $p \Box \frac{1}{2}$
- (D)  $1 \Box q$
- (E)  $p \Box 2$

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Figure 8

### GO ON TO THE NEXT PAGE

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### **PRACTICE TEST 6**

48. Matt and Alysia are going to get their driver's licenses. The probability that Matt passes his driving

test is  $\frac{9}{10}$ . The probability that Alysia passes her

driving test is  $\frac{7}{9}$ . Assuming that their result is not

dependent on how the other does, what is the probability that Matt passes and Alysia fails?

(A) 
$$\frac{101}{90}$$
  
(B)  $\frac{1}{5}$   
(C)  $\frac{7}{10}$   
(D)  $\frac{11}{90}$   
(E)  $\frac{27}{100}$ 

- 49. The circle shown in Figure 9 has an area of  $36\pi$  cm<sup>2</sup>. What is the area of the shaded segment?
  - (A)  $9\pi \, cm^2$
  - (B)  $9\pi 36 \text{ cm}^2$
  - (C) 18 cm<sup>2</sup>
  - (D)  $9\pi 18 \text{ cm}^2$
  - (E)  $18\pi 18 \text{ cm}^2$

50. If 
$$f(n) = 9^{-n}$$
, then  $f\left(-\frac{1}{4}\right) =$ 

- (A)  $9^{-\frac{1}{4}}$
- (B) 3
- (C)  $\sqrt{3}$
- (D)  $\frac{1}{9}$
- (E) 9



Figure 9

## S T O P

IF YOU FINISH BEFORE TIME IS CALLED, GO BACK AND CHECK YOUR WORK.

**ANSWER KEY** 

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