

PRACTICE TEST QUESTIONS

For the multiple-choice questions, select the best answer. For the grid-in questions, fill in your answer on the grid provided.



1. If x and y are real numbers, and $2\sqrt{x-4} - 2 = 1$, and |y-5| < 2, what is the smallest possible integer value of x + y?

- (A) 9
- (B) 10
- (C) 11
- (D) 12
- (E) 13

2. The length of a rectangle is 4 less than double the width. If the area of the rectangle is 70, what is the perimeter of the rectangle?

- (A) 13
- (B) 17
- (C) 22
- (D) 30
- (E) 34

3. For all values of x and y, let x * y be defined as $x * y = \frac{4xy}{3}$. If 6 * a = 2, then a =(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{5}$

 $\frac{1}{6}$

(E)

2400 Club Grand Mixture 339

4. In a contest, each contestant could receive a score of 6, 7, 8, 9, or 10. The following bar graph shows how many contestants received each score.



The score of 8 is described by which of the following measures?

- I. The average (arithmetic mean)
- II. The median
- III. The mode
- (A) I only
- (B) II only
- (C) III only
- (D) II and III only
- (E) I, II, and III
- 5. Let $A = \{2, 3, 4, 7, 9, 10\}$ and $B = \{3, 6, 9, 12\}$.

If a number is chosen at random from set *A*, what is the probability that the number is in $A \cap B$?

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

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

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

- 6. Let $f(x) = x^2 x + 3$ and g(x) = f(x + 3). What is the range of g(x)?
 - (A) All real numbers
 - (B) $y \ge 2.75$
 - (C) $y \le 2.75$
 - (D) $y \ge 8.75$
 - (E) $y \ge 3$
- **7.** The coordinates of the vertices of $\triangle ABC$ are A(4, 5), B(2, 1), and C(6, 3). If *P* is a point such that *APBC* is a parallelogram, what are the coordinates of *P*?
 - (A) $\left(\frac{9}{2}, 3\right)$
 - (B) (1, 4)
 - (C) (8, 7)
 - (D) (1, 3)
 - (E) (0, 3)

x	f(x)	g(x)
-1	-2	4
0	0	3
1	2	2
2	4	1
3	6	0
4	8	-1

- **8.** According to the table above, for what value of *x* does g(f(x)) = -1?
 - (A) 8
 - (B) 4
 - (C) 3
 - (D) 2
 - (E) 1



9. If $\frac{a}{bc} = \frac{d}{ef}$, which of the following is *not*

equivalent to each of the other expressions?

(A) dbc = aef

(B)
$$\frac{ae}{db} = \frac{c}{f}$$

(C) $\frac{af}{d} = \frac{bc}{e}$
(D) $\frac{a}{d} = \frac{bc}{ef}$
(E) $\frac{ae}{f} = \frac{db}{c}$

10. If 12 + 6*n* is 20 percent larger than *k*, what is *k*?

(A)
$$\frac{12+6n}{5}$$

(B) $10+5n$
(C) $2+n$
(D) $\frac{6(12+6n)}{5}$

(E)
$$20 + 10n$$

11. What is the domain of $f(x) = \frac{x}{\sqrt{1-x}}$?

- (A) x < 1
- (B) $x \le 1$
- (C) x > 1
- (D) $x \le 0$
- (E) x < 0



Note: Figure not drawn to scale.

- **12.** The figure above shows two circles, each with center *O*. Line segment \overline{AB} is tangent to the smaller circle. If OA = 5 and AB = 12, what is the ratio of the area of the smaller circle to the area of the larger circle?
 - (A) 5:13
 - (B) 5:12
 - (C) 25:169
 - (D) 25:144
 - (E) 144:169



- **13.** The pyramid in the figure above has square base *FGHI*, and all triangular faces are congruent. The base *BCDE* of the small pyramid is also square, and is parallel to *FGHI*. If the ratio of the area of square *BCDE* to the area of square *FGHI* is 1 : 4, what is the ratio of the volume of the small pyramid to the volume of the large pyramid?
 - (A) 1:2
 - (B) 1:3
 - (C) 1:4
 - (D) 1:8
 - (E) 1:32

14. The original price of a shirt is *x* dollars. During a sale, the original price is marked down *y* percent. On the last day of the sale, an additional discount of *z* percent off the sale price is offered. Which of the following represents the price of the shirt, in dollars, after the additional discount?

(A)
$$\frac{xyz}{(100)(100)}$$

(B) $\frac{x(1-y)(1-z)}{100}$
(C) $x\left(1-\frac{y}{100}\right)\left(1-\frac{z}{100}\right)$
(D) $x\left(1-\frac{y+z}{100}\right)$
(E) $x\left(1-\frac{yz}{100}\right)$

- 15. An electronics store charges \$24 for a set of stereo headphones and has been selling about 1,000 of them a week. The store manager estimates that for every \$1 price reduction, 100 more headphones can be sold per week. For example, he could sell 1,100 headphones at \$23 each and 1,200 headphones at \$22 each. Let 24 *x* be the reduced price, in dollars, per set of headphones. Which function best represents the total expected revenue in a week for these headphones?
 - (A) f(x) = (24 x)(1,000 + 100x)
 - (B) f(x) = (x-1)(1,000 + 24x)
 - (C) f(x) = 100(24 x) + 1,000
 - (D) f(x) = (24)(1,000 + 100x) x
 - (E) f(x) = (24 x)(1,000 100x)



- **16.** The above graph shows f(x), which is defined for all real numbers. If f(x + 5) = f(x) for all x, for how many x-values in the interval $0 \le x \le 17$ is f(x) = 0?
 - (A) 10
 - (B) 11
 - (C) 12
 - (D) 13
 - (E) 14



17. In the figure above, *ABCDEF* is a regular hexagon. What is the slope of line \overrightarrow{FE} ?

(A)
$$-\frac{1}{2}$$

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



18. A set of real numbers is represented graphically as follows:



If *x* is a value in the set, which of the following inequalities represents all possible values of *x*?

- (A) $|x-3| \leq 4$
- (B) $|x-3| \ge 4$
- (C) $|x-1| \le 2$
- (D) $|x-1| \ge 2$
- (E) $|x-3| \le 1$
- **19.** The management of a large sportsequipment store conducts a survey of its 15 treadmill salespeople. The average number of minutes spent with each potential customer and the number of treadmills sold in a week are recorded for each salesperson. The results are shown in the scatterplot below.



Which could be the line of best fit for these data?

- (A) y = 0.54x + 1.2
- (B) y = 0.54x + 5
- (C) y = -0.54x + 5
- (D) y = -0.54x 3.7
- (E) y = 0.54x 3.7



20. A particle moves at a constant speed. The graph above shows the distance traveled as a function of time, starting at distance *d* at time = 0. If the constant speed of the particle had been lower during the given time frame, which of the following could be the graph?



21. If $|x^2 + 4x - 21| > 0$, which must be true?

- (A) x < -7 or x > 3
- (B) -7 < x < 3
- (C) $x \neq -7$ or $x \neq 3$
- (D) $x \neq -3$ or $x \neq 7$
- (E) x is any real number.
- **22.** Which is equivalent to $x^{-\frac{2}{3}} = 4$?

(A)
$$x^{\frac{2}{3}} = \frac{1}{4}$$

(B) $x^{\frac{2}{3}} = -4$
(C) $x^{-\frac{2}{3}} = -\frac{1}{4}$
(D) $x^{\frac{3}{2}} = \frac{1}{4}$
(E) $x^{-\frac{3}{2}} = \frac{1}{4}$

23. Consider this repeating decimal:

0.102003000400005...80000000 9000000001020030004...

What will be the 118th digit of this number?

- (A) 0
- (B) 2
- (C) 4
- (D) 6
- (E) 8



24. The graph shown above represents f(x + 3). Which graph represents f(x-3)?







25. In the figure above, *D* is the midpoint of \overline{AB} and *E* is the midpoint of \overline{AC} . A point is picked at random in $\triangle ABC$. If all points in $\triangle ABC$ are equally likely to be picked, what is the probability that the point lies in trapezoid *BDEC*?

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

- **26.** Set *A* has *a* members, and set *B* has *b* members. Set *C* consists of all members that are either in *A* or in *B*. Suppose that there are *p* members common to *A* and *B*, p > 0. Which of the following represents the number of members in set *C*?
 - (A) a + b(B) a + b - p(C) a + b - 2p(D) a + b + p(E) a + b + 2p



27. A hollow right circular cone made of cardboard is shown above. Point *A* is the vertex, and *B* is any point on the circular edge of the base. The cone is cut along line segment \overline{AB} , then opened up and flattened out. Which of the following could represent the plane figure obtained?



- 28. The consecutive multiples of 7 from -84 to 7k, k > 0, are added together. If the total is 189, what is k?
- **29.** The following table shows the results of a survey of 40 high school students:

Favorite Subject					
	Math	English	History		
Girls	6	11	5		
Boys	8	2	8		

What percent of students surveyed preferred English or history to math?

<u>A B C D E</u>

- Note: Figure not drawn to scale.
- **30.** In the figure above, *D* is the midpoint of \overline{CE} , and the ratio AB : BC is 2 : 1. If the length of \overline{BD} is 14 and the length of \overline{AE} is 34, find the length of \overline{AB} .



31. In the diagram above, *ABCD* is a square. The circles, whose centers lie on \overline{BD} , are congruent to each other. The sides of the square are tangent to the outer circles at *P*, *Q*, *R*, and *S*, and the circles are tangent to each other at *K* and *L*. If the radius of each circle is 1 inch, what is the area, to the nearest square inch, of the square?

32. The following table shows how the price of a certain computer has fallen since the year 2000:

Year	Price
2000	\$2,020
2001	\$1,500
2002	\$1,250
2003	\$1,100
2004	\$1,000

According to this table, by what percent did the price decrease from 2000 to 2004?



Note: Figure not drawn to scale.

33. In the *xy*-coordinate system shown above, the lines ℓ and *k* are parallel, and distance *OP* is 6. If point (5, 3) is on line *k*, and point (3, *n*) is on line ℓ , what is the value of *n*?



34. Suppose that, to get from point *K* to point *L*, shown in the figure above, a traveler must either go north or east (up or right). For example, one possible path is to go 3 steps east then 3 steps north. How many possible paths are there from *K* to *L* that *don't* include point *A*?



- **35.** The weight of an object on or beneath the surface of the Moon varies directly as the distance of the object from the center of the Moon. The radius of the Moon is approximately 1,080 miles. If an object weighs 60 pounds on the surface of the Moon, how far beneath the surface, in miles, would it have to be to weigh 50 pounds?
- **36.** One-third of the air in a tank is removed with each stroke of a pump. What percent of the original amount of air remains in the tank after five strokes?
- **37.** In a theater, the front row has 30 seats. Each row behind the first row has 4 more seats than the row in front of it. If there are 26 rows, what is the total number of seats in the theater?

38. A hardware store owner finds that she can expect to sell *n* sets of wrenches per month if the price per set, in dollars, is

$$p(n) = \frac{3,000}{a+n}$$

where *a* is constant. If, according to this function, 25 sets of wrenches are sold in a month at \$100 per set, how many sets can the owner expect to sell in a month if she raises the price to \$200 per set?

Questions 28–38 are grid-in questions.

28.		29.	30.	31.
	0 0			
32.	(a) (b) (c) (33.	34. 0	35. 000000000000000000000000000000000000
36.	0 0	37. 000000000000000000000000000000000000	38. Image: Original system Image: O	



ANSWERS AND EXPLANATIONS

The difficulty level for each question is specified in parentheses.

1. B (M)	9. E (M)	17. B (M)	25. D (M)	33. 39/5 or 7.8 or
2. E (M)	10. B (M)	18. C (M)	26. B (M)	7.80 (H)
3. C (M)	11. A (M)	19. E (M)	27. A (M)	34. 11 (H)
4. D (M)	12. C (M)	20. C (M)	28. 14 (H)	35. 180 (H)
5. B (M)	13. D (H)	21. C (H)	29. 65 (M)	36. 13.2 or 13.1 (H)
6. B (M)	14. C (H)	22. A (M)	30. 12 (H)	37. 2080 (H)
7. E (H)	15. A (H)	23. C (H)	31. 23 (H)	38. 10 (H)
8. D (H)	16. E (H)	24. E (H)	32. 50.5 or 50.4 (M)	

28 .		29.		30.		31.	
	$ \begin{array}{c} 7 & 4 \\ \hline & \bigcirc & \bigcirc & \bigcirc \\ & \bigcirc & \bigcirc & \bigcirc & \bigcirc & \bigcirc \\ & \bigcirc \\ & \bigcirc & $		0 3 0 0 0		7 2 • • • • • • • • • • • • • • • • • • •		2 3 000000000000000000000000000000000000
32.	5 0 . 5 • • • • • <	33.	3 9 / 5 • • • • • <	34.	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	35.	1 8 0 • • • • • •
36.	1 3 . 2 <th>37.</th> <th>2 0 8 0 </th> <th>38.</th> <th>1 0 1 0 0</th> <th></th> <th></th>	37.	2 0 8 0	38.	1 0 1 0 0		