SAT Math Level 2 Practice Test 7

Parametric Equations

1. In the graph of the parametric equations $\begin{cases} x = t^2 + t \\ y = t^2 - t \end{cases}$

A. $x \geq 0$

B. $x \geq -\frac{1}{4}$

C. x is any real number

D. $x \geq -1$

E. $x \leq 1$

2. The graph of $\begin{cases} x = \sin^2 t \\ y = 2\cos t \end{cases}$ is a

A. straight line

B. line segment

C. parabola

D. portion of a parabola

E. semicircle

3. Which of the following is (are) a pair of parametric equations that represent a circle?

I. $\begin{cases} x = \sin\theta \\ y = \cos\theta \end{cases}$

II. $\begin{cases} x = t \\ y = \sqrt{1 - t^2} \end{cases}$

III. $\begin{cases} x = \sqrt{s} \\ y = \sqrt{1 - s} \end{cases}$

A. only I

B. only II

C. only III

D. only II and III

E. I, II, and III

Piecewise Functions

1. $|2x - 1| = 4x + 5$ has how many numbers in its solution set?

A. 0

B. 1

C. 2

D. an infinite number

E. none of the above

2. Which of the following is equivalent to $1 \leq |x - 2| \leq 4$?

A. $3 \leq x \leq 6$

B. $x \leq 1$ or $x \geq 3$

C. $1 \leq x \leq 3$

D. $x \leq -2$ or $x \geq 6$

E. $-2 \leq x \leq 1$ or $3 \leq x \leq 6$

3. The area bound by the relation $|x| + |y| = 2$ is

A. 8

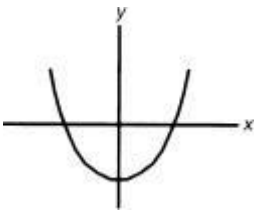
B. 1

C. 2

D. 4

E. There is no finite area.

4. Given a function, $f(x)$, such that $f(x) = f(|x|)$. Which one of the following could be the graph of $f(x)$?

A. 

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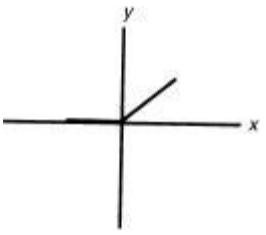

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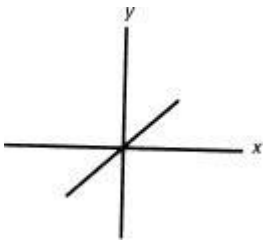

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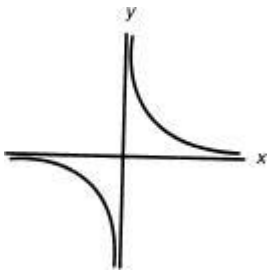

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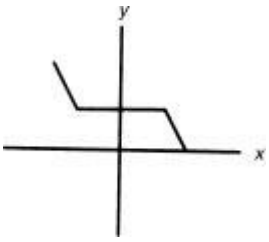
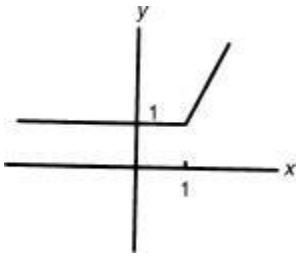


5. The figure shows the graph of which one of the following?



A. $y = 2x - |x|$

B. $y = |x - 1| + x$

C. $y = |2x - 1|$

D. $y = |x + 1| - x$

E. $y = 2|x| - |x|$

6. The postal rate for first-class mail is 44 cents for the first ounce or portion thereof and 17 cents for each additional ounce or portion thereof up to 3.5 ounces. The cost of a 3.5-ounce letter is 95 ¢. A formula for the cost in cents of first-class postage for a letter weighing N ounces ($N \leq 3.5$) is

A. $44 + [N - 1] \cdot 17$

B. $[N - 44] \cdot 17$

C. $44 + [N] \cdot 17$

D. $1 + [N] \cdot 17$

E. none of the above

7. If $f(x) = i$, where i is an integer such that $i \leq x < i + 1$, the range of $f(x)$ is

A. the set of all real numbers

B. the set of all positive integers

C. the set of all integers

D. the set of all negative integers

E. the set of all nonnegative real numbers

8. If $f(x) = [2x] - 4x$ with domain $0 \leq x \leq 2$, then $f(x)$ can also be written as

A. $2x$

B. $-x$

C. $-2x$

D. $x^2 - 4x$

E. none of the above

Transformations and Symmetry

1. Which of the following functions transforms $y = f(x)$ by moving it 5 units to the right?

A. $y = f(x + 5)$

B. $y = f(x - 5)$

C. $y = f(x) + 5$

D. $y = f(x) - 5$

E. $y = 5f(x)$

2. Which of the following functions stretches $y = \cos(x)$ vertically by a factor of 3?

A. $y = \cos(x + 3)$

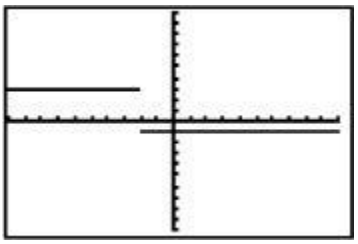
B. $y = \cos(3x)$

C. $y = \cos\left(\frac{1}{3}x\right)$

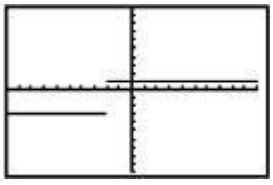
D. $y = 3\cos x$

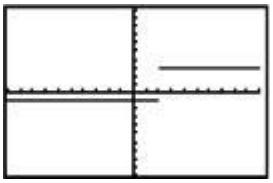
E. $y = \frac{1}{3}\cos x$

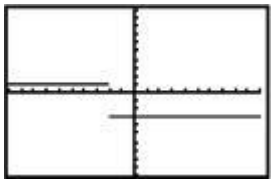
3. The graph of $y = f(x)$ is shown.

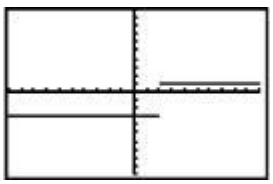


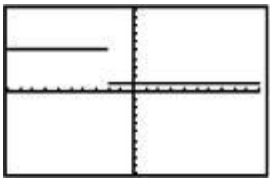
Which of the following is the graph of $y = f(-x) - 2$?

A. 

B. 

C. 

D. 

E. 

4. Which of the following is a transformation of $y = f(x)$ that translates this function down 3, shrinks it horizontally by a factor of 2, and reflects it about the x -axis.

A. $y = -2f(x - 3)$

B. $y = f(-2x) - 3$

C. $y = -f\left(\frac{1}{2}x\right) - 3$

D. $y = -f(2x) - 3$

E. $y = 2f\left(-\frac{1}{2}x\right) - 3$

Conic Sections

1. Which of the following is a focus of $\frac{(x-2)^2}{4} + \frac{(y+1)^2}{5} = 1$?

A. (1, -1)

B. (2, -1)

C. (3, -1)

D. (2, -2)

E. (-2, 1)

2. Which of the following is an asymptote of $3x^2 - 4y^2 - 12 = 0$?

A. $y = \frac{4}{3}x$

B. $y = -\frac{2}{\sqrt{3}}x$

C. $y = -\frac{3}{4}x$

D. $y = \frac{\sqrt{3}}{2}x$

E. $y = \frac{2}{3}x$

3. The standard equation of a parabola with focus (2, -3) and directrix $x = 6$ is

A. $x - 2 = 8(y + 3)^2$

B. $x - 4 = -8(y + 3)^2$

C. $y + 3 = 8(x - 2)^2$

D. $y - 3 = -8(x + 2)^2$

E. $y - 3 = -8(x + 4)^2$

4. The standard equation of an ellipse with vertices (-5, 2) and (3, 2) and minor axis of length 6 is

A. $\frac{(x+1)^2}{16} + \frac{(y-2)^2}{9} = 1$

B. $\frac{(x-1)^2}{9} + \frac{(y+2)^2}{16} = 1$

C. $\frac{(x+1)^2}{9} + \frac{(y-2)^2}{16} = 1$

D. $\frac{(x-1)^2}{16} + \frac{(y-2)^2}{9} = 1$

E. $\frac{(x-1)^2}{7} + \frac{(y+2)^2}{16} = 1$

5. Which of the following is a vertex of $16x^2 - y^2 - 32x - 6y - 57 = 0$?

A. (1, -1)

B. (1, 3)

C. (1, 5)

D. (1, -3)

E. (-1, 3)

6. The graph of $x^2 = (2y + 3)^2$ is

A. an ellipse

B. a parabola

C. a hyperbola

D. a circle

E. none of these

Polar Coordinates

1. A point has a polar coordinate (2,60°). The same point can be represented by

A. (-2,240°)

B. (2,240°)

C. (-2,60°)

D. (2,-60°)

E. (2,-240°)

2. The polar coordinates of a point *P* are (2,200°). The rectangular coordinates of *P* are

A. (-1.88,-0.68)

B. (-0.68,-1.88)

C. (-0.34,-0.94)

D. (-0.94,-0.34)

E. (-0.47,-0.17)

3. Describe the graph of $r = \frac{3}{\cos\theta}$.

A. a parabola

B. an ellipse

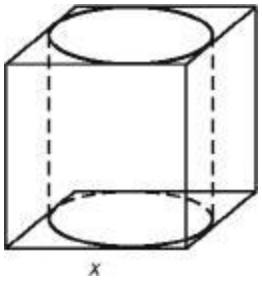
C. a circle

D. a vertical line

E. the x-axis

Surface Area and Volume

1. The figure below shows a right circular cylinder inscribed in a cube with an edge of length *x*. What is the ratio of the volume of the cylinder to the volume of the cube?



A. $\frac{2}{3}$

B. $\frac{3}{4}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{2}$

E. $\frac{4}{5}$

2. The volume of a right circular cylinder is the same numerical value as its total surface area. Find the smallest integral value for the radius of the cylinder.

A. 1

B. 2

C. 3

D. 4

E. This value cannot be determined.

3. The length, width, and height of a rectangular solid are 5 cm, 3 cm, and 7 cm, respectively. What is the length of the longest segment whose endpoints are vertices of the rectangular solid?

A. 5.8 cm

B. 7.6 cm

C. 8.6 cm

D. 9.1 cm

E. 15 cm

Coordinates in Three Dimensions

1. The distance between two points in space, P (x,-1,-1) and Q (3,-3,1), is 3. Find the possible values of x.

A. 1 or 2

B. 2 or 3

C. -2 or -3

D. 2 or 4

E. -2 or -4

2. The point (-4,0,7) lies on the

A. y-axis

B. xy plane

C. yz plane

D. xz plane

E. z -axis

3. The region in the first quadrant bounded by the line $3x + 2y = 7$ and the coordinate axes is rotated about the x-axis. What is the volume of the resulting solid?

A. 8 units^3

B. 20 units^3

C. 30 units^3

D. 90 units^3

E. 120 units^3

Venn Diagrams

1. There are 50 people in a room. Twenty-eight are male, and 32 are under the age of 30. Twelve are males under the age of 30. How many women over the age of 30 are in the group?

A. 2

B. 3

C. 4

D. 5

E. 6

Multiplication Rule

1. M & M plain candies come in six colors: brown, green, orange, red, tan, and yellow. Assume there are at least 3 of each color. If you pick three candies from a bag, how many color possibilities are there?

A. 18

B. 20

C. 120

D. 216

E. 729

2. A code consists of two letters of the alphabet followed by 5 digits. How many such codes are possible?

A. 7

B. 10

C. 128

D. 20,000

E. 67,600,000

3. A salad bar has 7 ingredients, excluding the dressing. How many different salads are possible where two salads are different if they don't include identical ingredients?

A. 7

B. 14

C. 128

D. 5,040

E. 823,543

Factorial, Permutations, Combinations

1. How many 3-person committees can be selected from a fraternity with 25 members?

A. 15,625

B. 13,800

C. 2,300

D. 75

E. 8

2. A basketball team has 5 centers, 9 guards, and 13 forwards. Of these, 1 center, 2 guards, and 2 forwards start a game. How many possible starting teams can a coach put on the floor?

A. 56,160

B. 14,040

C. 585

D. 197

E. 27

3. Five boys and 6 girls would like to serve on the homecoming court, which will consist of 2 boys and 2 girls. How many different homecoming courts are possible?

A. 30

B. 61

C. 150

D. 900

E. 2048

4. In a plane there are 8 points, no three of which are collinear. How many lines do the points determine?

A. 7

B. 16

C. 28

D. 36

E. 64

5. If $\binom{6}{x} = \binom{4}{x}$, then x =

A. 0

B. 1

C. 4

D. 5

E. 10

Imaginary Numbers

1. i^{29} =

A. 1

B. i

C. $-i$

D. -1

E. none of these

Complex Number Arithmetic

1. Write the product of $(2 + 3i)(4 - 5i)$ in standard form.

A. $-7 - 23i$

B. $-7 + 2i$

C. $23 - 7i$

D. $23 + 2i$

E. $23 - 2i$

2. Write $\frac{i}{2-i}$ in standard form.

A. $-1 + \frac{1}{2}i$

B. $\frac{1}{5} - \frac{2}{5}i$

C. $-\frac{1}{5} + \frac{2}{5}i$

D. $-1 + 2i$

E. $-1-2i$

3. If $z = 8 - 2i$, z^2 =

A. $60 - 32i$

B. $64 + 4i$

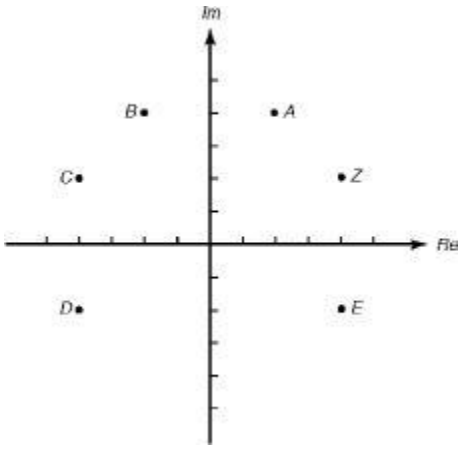
C. 64-4*i*

D. 60

E. 68

Graphing Complex Numbers

1. If *z* is the complex number shown in the figure, which of the following points could be *iz*?



A. *A*

B. *B*

C. *C*

D. *D*

E. *E*

2. Which of the following is the modulus of 2 + *i*?

A. $\sqrt{2}$

B. 2

C. $\sqrt{3}$

D. $\sqrt{5}$

E. 5

Addition, Subtraction, and Scalar Multiplication

1. $\begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} + \begin{bmatrix} 11 & 5 \\ -6 & 12 \end{bmatrix} = K \begin{bmatrix} 3 & 2 \\ J & M \end{bmatrix}$. Find the value of $K + J + M$.

A. 2

B. 4

C. 6

D. 7

E. 8

2. Evaluate x and y if $\begin{bmatrix} x & 2 \\ -3 & y \end{bmatrix} = 2 \begin{bmatrix} x^2 & 1 \\ -\frac{3}{2} & 3y-5 \end{bmatrix}$.

A. $x = 0$; $y = 2$

B. $x = 1$; $y = 2$

C. $x = -1, 1$; $y = \frac{5}{3}$

D. $x = -\frac{1}{2}, \frac{1}{2}; y = \frac{5}{6}$

E. $x = 0, \frac{1}{2}$; $y = 2$

3. Solve for x: $\begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & 3 \end{bmatrix} - X = \begin{bmatrix} 5 & 1 & 8 \\ -6 & 0 & 5 \end{bmatrix}$.

A. $\begin{bmatrix} 4 & 1 & -11 \\ -8 & 1 & -2 \end{bmatrix}$

B. $\begin{bmatrix} -4 & 1 & -11 \\ 8 & 1 & -2 \end{bmatrix}$

C. $\begin{bmatrix} -5 & -2 & 24 \\ 12 & 0 & -15 \end{bmatrix}$

D. $\begin{bmatrix} 5 & 2 & -24 \\ -12 & 0 & 15 \end{bmatrix}$

E. $\begin{bmatrix} 6 & 3 & 5 \\ -4 & 1 & 8 \end{bmatrix}$

Matrix Multiplication

1. The product AB =

A. $\begin{bmatrix} 0 & 10 \\ -3 & 2 \\ 20 & 0 \\ -54 & 9 \end{bmatrix}$

B. [-37 21]

C. $\begin{bmatrix} 10 \\ -2 \\ 20 \\ -45 \end{bmatrix}$

D. $\begin{bmatrix} 0 \\ 6 \\ 0 \\ -54 \end{bmatrix}$

E. product is not defined

2. The first row, second column of the product $\begin{bmatrix} x & 1 \\ 2 & -3 \end{bmatrix}\begin{bmatrix} 5 & -x \\ 2 & 1 \end{bmatrix}$ is

A. $-5x - 3$

B. $-x - 3$

C. $1 - x^2$

D. $4x$

E. $2x + 2$

3. If $A = \begin{bmatrix} -3 & 1 & 6 \\ 2 & -5 & 0 \\ 1 & -3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 7 \\ -4 & 2 \\ -1 & -5 \end{bmatrix}$, and $AX = B$, then the size of X is

A. 3 rows, 3 columns

B. 3 rows, 2 columns

C. 2 rows, 2 columns

D. 2 rows, 3 columns

E. cannot be determined

4. The chart below shows the number of small and large packages of a certain brand of cereal that were bought over a three-day period. The price of a small box of this brand is $2.99, and the price of a large box is $3.99. Which of the following matrix expressions represents the income, in dollars, received from the sale of cereal each of the three days?

	Day 1	Day 2	Day 3
Large	75	82	57
Small	43	36	50

A. $\begin{bmatrix} 75 & 82 & 57 \\ 43 & 36 & 50 \end{bmatrix} (2.99 \quad 3.99)$

B. $\begin{bmatrix} 75 & 43 \\ 82 & 36 \\ 57 & 50 \end{bmatrix} \begin{bmatrix} 3.99 \\ 2.99 \end{bmatrix}$

C. $\begin{bmatrix} 75 & 82 & 57 \\ 43 & 36 & 50 \end{bmatrix} \begin{bmatrix} 2.99 \\ 3.99 \end{bmatrix}$

D. $\begin{bmatrix} 2.99 \\ 3.99 \end{bmatrix} \begin{bmatrix} 75 & 43 \\ 82 & 36 \\ 57 & 50 \end{bmatrix}$

E. $2.99 \begin{bmatrix} 75 & 82 & 57 \\ 43 & 36 & 50 \end{bmatrix} + 3.99 \begin{bmatrix} 75 & 82 & 57 \\ 43 & 36 & 50 \end{bmatrix}$