

**Directions:**

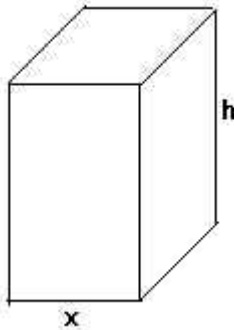
Each question is followed by five suggested answers, labeled (a) through (e). Select the one best answer to each question. Do not spend too much time on any one question.

(This is NOT in an interactive form, so you will need to write your answers down on paper. At the end of the exam, you can follow a link to the answer key and score your test.

Recommendations will be given based on your score.)

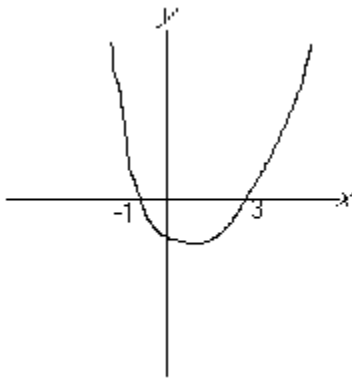
Suggested time: 30 minutes

1. The box pictured has a square base and a closed top. Express its surface area in terms of  $x$  and  $h$ .



- (A)  $2x^2 + 4xh$
- (B)  $x^2h$
- (C)  $4x + h$
- (D)  $x^2 + 4xh$
- (E)  $8x + 4h$

- 
2. If  $f$  is a function whose graph is the parabola sketched below, then  $f(x) < 0$  whenever:



- (A)  $x < 0$
  - (B)  $x < -1$
  - (C)  $x > 3$
  - (D)  $-1 < x < 3$
  - (E)  $x < -1$  or  $x > 3$
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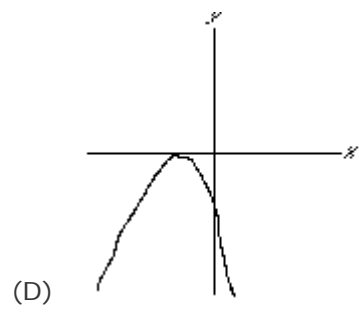
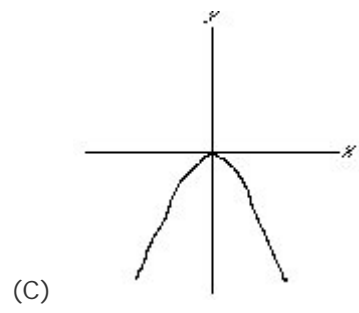
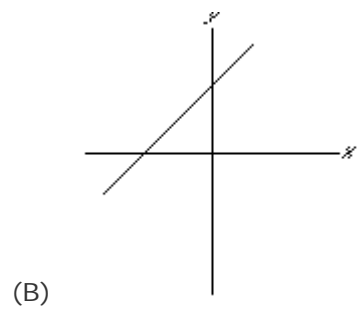
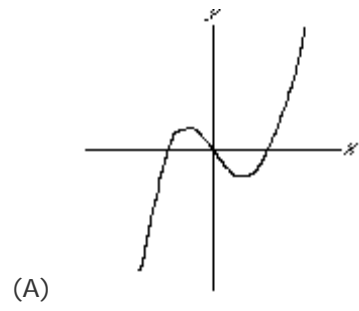
3. Money in a bank triples every 9 years. If \$100 is deposited today, what will its value be after 36 years?

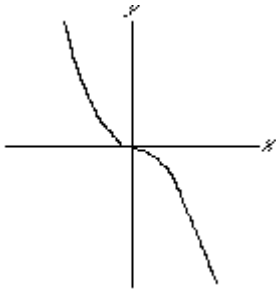
- (A) \$8,500      (B) \$8,100      (C) \$1,600      (D) \$1,200      (E) \$40
- 

4. The y-coordinate of the point of intersection of the graphs of  $-x + 3y = -36$  and  $x + y = -12$  is

- (A) 12      (B) 0      (C) -6      (D) -9      (E) -12
- 

5. Definition: A function  $f$  is even if  $f(-x) = f(x)$  for each  $x$  in the domain of  $f$ . Of the following, which best represents the graph of an even function?





(E)

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6.  $(81)^{1/4} (8)^{-1/3} =$

(A) 6

(B)  $3/2$

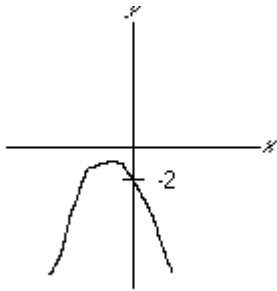
(C)  $2/3$

(D)  $(648)^{-1/12}$

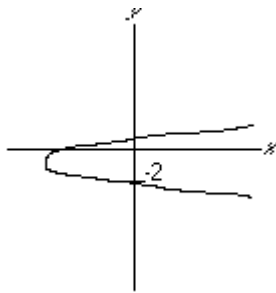
(E) -6

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7. Of the following, which best represents the graph of  $y = x^2 + 2x - 2$ ?

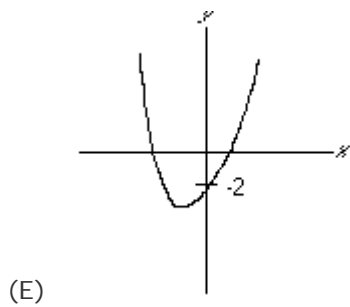
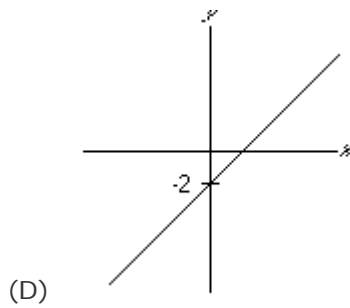
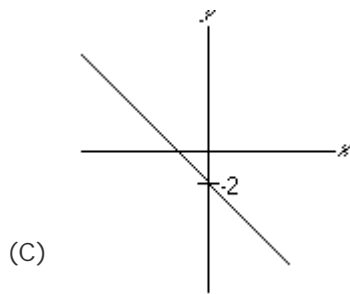


(A)



(B)

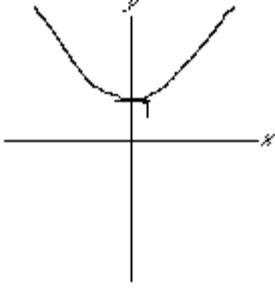
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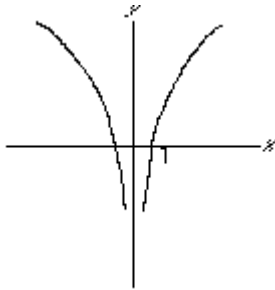
8. If  $\log_2(x + 7) = 5$ , then  $x =$

- (A) 25      (B) 17      (C) 10      (D) 3      (E)  $5/\log_2 25 - 7$
- 

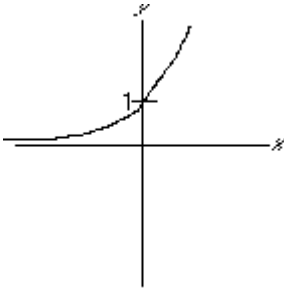
9. Of the following, which best represents the graph of  $y = 4^x$



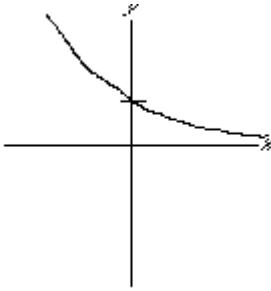
(A)



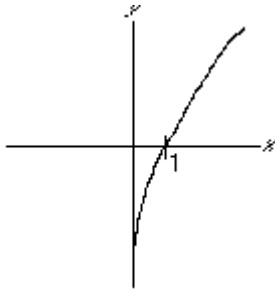
(B)



(C)



(D)



(E)

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10. If  $\frac{(4x-1)(x+3)}{(x-2)} = 0$  then  $x =$

(A) 3, -2, or  $-1/4$

(B) 3 or  $-1/4$

(C) -3, 2, or  $1/4$

(D) -3 or  $1/4$

(E) -3 or 2

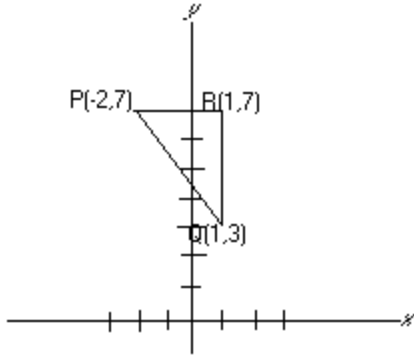
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11. If  $2^{13}$  is approximately equal to 8000, then, of the following, which best approximates  $2^{26}$ ?

(A) 640,000    (B) 6,400,000    (C) 64,000,000    (D) 800013    (E) 16,000

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12. In the figure shown below, what is the distance between the points P and Q?



- (A) 11      (B) 7      (C) 6      (D) 5      (E) 3
- 

13. If  $f(x) = \frac{3x+5}{x+3}$  then  $f(n+1) =$

(A) 2

(B)  $\frac{3n+5}{n+4}$

(C)  $\frac{3n+6}{n+4}$

(D)  $\frac{3n+5}{n+3}$

(E)  $\frac{3n+8}{n+4}$

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14. In a standard coordinate system, the graph of the equation  $y = -5x + 8$  is

(A) a line falling to the right

(B) a line rising to the right

(C) a vertical line

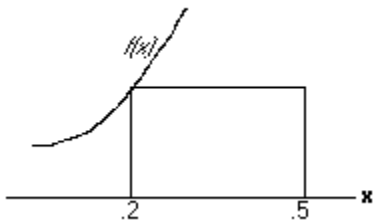


(D) a horizontal line

(E) not a line

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15. What is the area of the rectangle shown in the figure below? (note: the figure is not drawn to scale)



$$f(x) = x^2 + 3x + 1$$

(A) 1.64

(B) 0.492

(C) 0.3

(D) 0.1

(E) 0.0492

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16. The quantity  $a + b$  is a factor of how many of the following?

$a^2 - b^2$

$a^2 + b^2$

$a^3 - b^3$

$a^3 + b^3$

(A) none

(B) one only

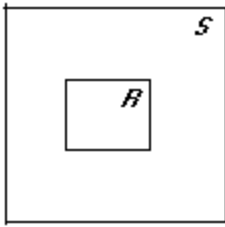
(C) two only

(D) three only

(E) four

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17. A rectangle R has width  $x$  and length  $y$ . A rectangle S is formed from R by multiplying each of the sides of the rectangle R by 6 as shown in the figure below. (note: the figure is not drawn to scale) What is the area of the portion of S lying outside R?



- (A)  $36xy$       (B)  $35xy$       (C)  $6xy$       (D)  $xy$       (E)  $x^6y^6$
- 

18. The inequality  $|x - 3| < 6$  is equivalent to

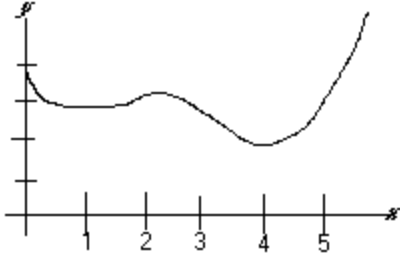
- (A)  $-3 < x < 9$   
 (B)  $-9 < x < 3$   
 (C)  $-9 < x < 9$   
 (D)  $x > 9$   
 (E)  $x < -3$
- 

19. The length of a certain rectangle is 6 meters more than twice its width. What is the width of the rectangle if the perimeter of the rectangle is 192 meters?

- (A) 9 m      (B) 18 m      (C) 30 m      (D) 34 m      (E) 62 m
- 

20. Definition: a function  $f$  has a minimum value at  $c$  if  $f(c) \leq f(x)$  for every  $x$  in the domain of  $f$ .

The domain of the function whose graph is shown below is  $[0, 5]$ . At which of the following numbers does the function appear to have a minimum value?

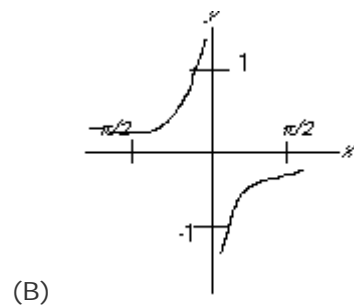
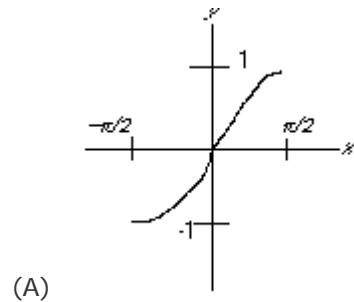


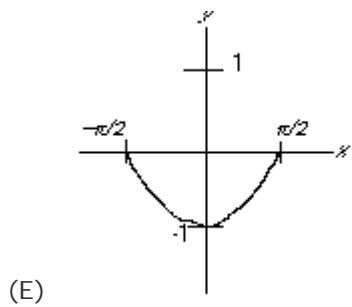
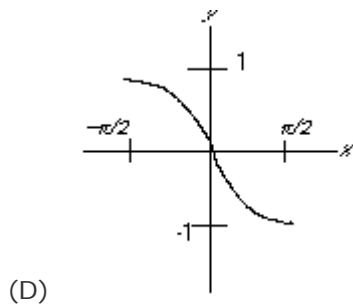
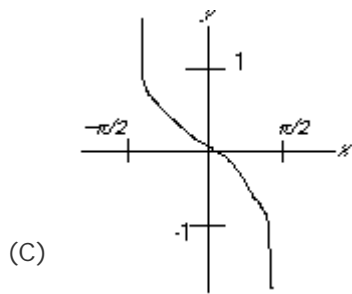
- (A) 0                      (B) 1                      (C) 2                      (D) 3                      (E) 4
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PART II

(Assume radian measure in all trigonometric expressions)

21. Of the following, which best represents the graph of  $y = -\sin x$  for  $x$  between  $-\pi/2$  and  $\pi/2$ ?





22.  $1 - \cos^2 q =$

- (A)  $\sin q$       (B)  $\sin^2 q$       (C)  $-\cos 2q$       (D)  $\sec^2 q$       (E)  $-\sin^2 q$

23. If  $f(x) = \sin(3x)$ , then  $f(\pi/6) =$

- (A) 1      (B)  $\frac{\sqrt{3}}{2}$       (C)  $\frac{1}{\sqrt{2}}$       (D)  $\frac{1}{2}$       (E) 0

24. For which of the following values of  $x$  is  $\cot x$  not defined?

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

25.  $\sin q \tan q \csc^2 q =$

- (A)  $\tan q$       (B)  $\sin q$       (C)  $\sec q$       (D)  $\csc q$       (E)  $\cos q$