Bryn Mawr College
Department of Physics
Mathematics Readiness Examination for Introductory Physics

There are 71 questions and you should do this exam in two and a half hours. Do not use any books, calculators, or computers.

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1. If $x - 1 = 2$, then $x + 1 =$

(A) 1 (B) 2 (C) 3 (D) 4 (E) –2

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2. A cylinder has a circular cross section of diameter 4 cm (centimeters) and length 5 cm. The volume is approximately

(A) 600 cm^3 (B) 60 cm^3 (C) 6,000 cm^3 (D) 0.6 cm^3 (E) 6 cm^3

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3. If $x = 3$, then $x^2 + 3 =$

(A) 6 (B) 9 (C) 12 (D) 27 (E) 3

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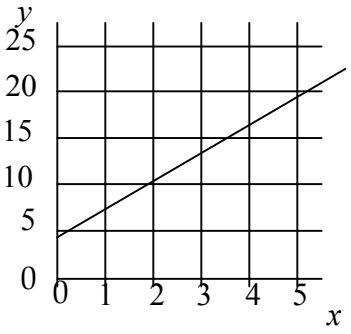
4. The area under this line between x = 1 and x = 5 is about

(A) 15
(B) 5
(C) 55
(D) 25
(E) 155



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5. $\dfrac{(-2)(-6)}{-4} =$

(A) -3 (B) -2 (C) 2 (D) 3 (E) -12

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6. $(2xy^3)^3 =$

(A) $6x^3y^9$ (B) $8x^4y^6$ (C) $8x^4y^6$ (D) $8x^3y^9$ (E) $6x^3y^9$

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7. $(2x-1)(4x+1) =$

(A) $8x^2-2x-1$ (B) $8x^2-6x-1$ (C) $8x^2-1$ (D) $6x$ (E) $-6x$

---

8. C3. $\dfrac{4\times10^{-15}}{8\times10^{-12}} =$

(A) 5×10^{-4} (B) 2×10^{-4} (C) 5×10^{-28} (D) 5×10^{4} (E) 2×10^{-27}

---

9. A13. $\left(\dfrac{x^2}{y}\right)+\left(\dfrac{x}{y^2}\right) =$

(A) $\dfrac{x}{y}$ (B) $\dfrac{y}{x}$ (C) xy (D) $\dfrac{x^2y+x}{y^2}$ (E) $\dfrac{x^2y^2+xy^2}{x^2y^2}$

---

10. $x^2-100 =$

(A) $(x+10)^2$ (B) $(x-10)^2$ (C) $(x+10)(x-10)$
(D) $(x-50)(x-50)$ (E) $(x-2)(x-50)$

---

11. $\left(5\times10^{8}\right)\left(6\times10^{-12}\right) =$

(A) 3×10^{-3} (B) 3×10^{-19} (C) 3×10^{-4} (D) 3×10^{4} (E) 2×10^{-27}

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12. $(2x + 3) - (x - 2) =$

(A) $x + 5$ (B) $x + 1$ (C) 3 (D) 7 (E) $3x + 5$

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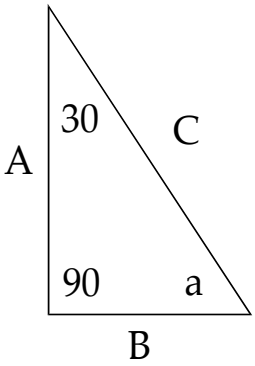
13. If A = $\sqrt{3}$ and B = 1 in the following triangle, then C =



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

---

14. If $\frac{1}{3}$ of a number is 8, then what is $\frac{1}{4}$ of the number?

(A) $\frac{1}{12}$ (B) $\frac{1}{6}$ (C) 6 (D) 12 (E) 24

---

15. If $x = -2$ and $y = 5$, then $x^3 y =$

(A) –40 (B) –30 (C) 30 (D) 40 (E) 12

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16. If there are about three feet in a meter, 25 meters is about

(A) 8 feet (B) 75 feet (C) 450 feet (D) 4.5 feet (E) 0.45 feet

---

17. $(x^2 - 3x + 2) - (3x^2 - 5x - 1) =$

(A) $4x^2 - 8x + 1$ (B) $2x^2 + 2x + 3$ (C) $-2x^2 + 2x + 3$
(D) $-2x^2 - 2x + 1$ (E) $2x^2 + 2x + 3$

---

18. $\frac{2x}{3y} \bullet \frac{9y}{4x^2} =$

(A) $6xy$ (B) $\frac{3y}{2x}$ (C) $\frac{8x^3}{9y^2}$ (D) $\frac{3}{2x}$ (E) $\frac{8x^3}{9y^2}$

---

19. $2x^2 + 5x - 3 =$

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

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20. $ln(ab) =$

(A) 10^{ab} (B) e^{ab} (C) $e^{(a+b)}$ (D) $ln(a)+ln(b)$ (E) $a\,ln(b)$

---

21. $|3-8| =$

(A) -11 (B) -5 (C) 5 (D) 11 (E) 12

---

22. $\frac{2}{x} + \frac{5}{y} =$

(A) $\frac{2y+5x}{xy}$ (B) $\frac{2x+5y}{xy}$ (C) $\frac{-7}{x+y}$ (D) $\frac{7}{xy}$ (E) $\frac{-7}{x+y}$

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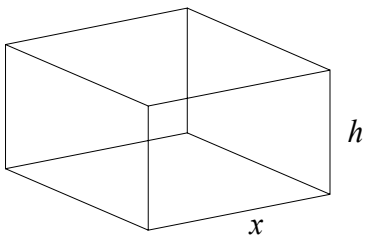
23. The box pictured below has a square base and a closed top. Express its surface area in terms of x and h.



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

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24. If $x = -4$ and $y = -7$, then $x - y =$

(A) -11 (B) -3 (C) 3 (D) 11 (E) 28

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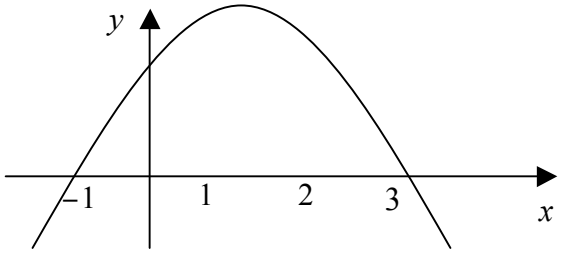
25. If $f(x)$ is a function whose graph is the parabola sketched below, then $f(x) < 0$ whenever



(A) $x < 0$
(B) $x < 3$
(C) $x > 1$
(D) $x < -1$ or $x > 3$
(E) $-1 < x < 3$

---

26. If money in a bank doubles every 5 years, then by what factor does it increase over a 20 year period?

(A) 4 (B) 8 (C) 12 (D) 16 (E) 20

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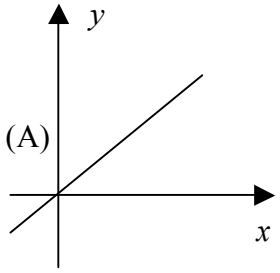
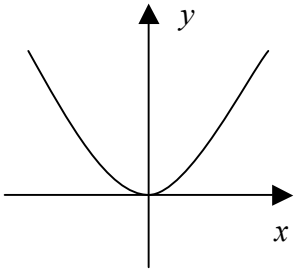
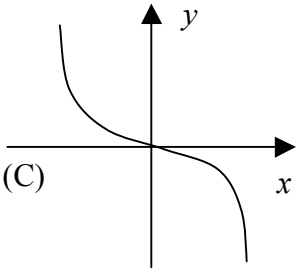
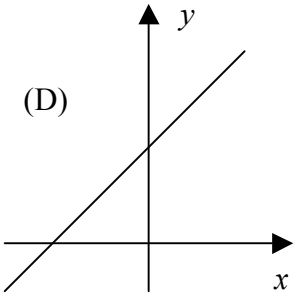
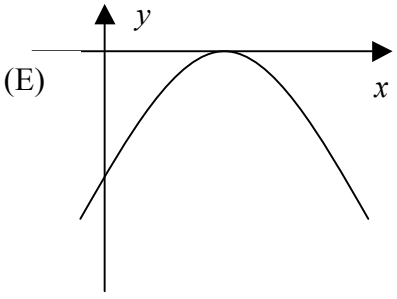
27. Definition: A function is *even* if $f(-x) = f(x)$ for each x in the domain of f. Which of the functions whose graphs are shown is even?

(A)


(B)


(C)


(D)


(E)


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28. If $7y - 4 = 16 + 3y$, then $y =$

(A) $6/5$ (B) 2 (C) 3 (D) 5 (E) –5

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29. $(10)(-1/5)(-2)(3) =$

(A) –12 (B) –3 (C) 10 (D) 12 (E) –10

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30. The y-coordinate of the intersection of the graphs of $x - 2y = 6$ and $x + y = -3$ is

(A) –3 (B) –2 (C) –1 (D) 1 (E) 3

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31. $8^{-1/3}9^{1/2} =$

(A) 6 (B) –6 (C) $(72)^{-\frac{1}{6}}$ (D) $\frac{2}{3}$ (E) $\frac{3}{2}$

---

32. $\sqrt[3]{-27} =$

(A) –9 (B) –3 (C) 3 (D) 9 (E) 54

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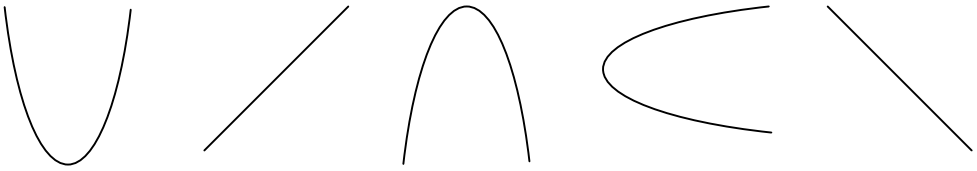
33. Which of the following best resembles the graph of $y = \frac{1}{2}x^2 - 3x + 1$?

(A) (B) (C) (D) (E)



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34. If $\log_3(x+1) = 2$, then $x =$

(A) 5 (B) 6 (C) 7 (D) 8 (E) $\frac{2}{\log_3} - 1$

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35. $(-2x^2)(3x^2y)(-y) =$

(A) $-6x^2y$ (B) $-x^2$ (C) $6x^4y$ (D) $6x^4y^2$ (E) $-x^2$

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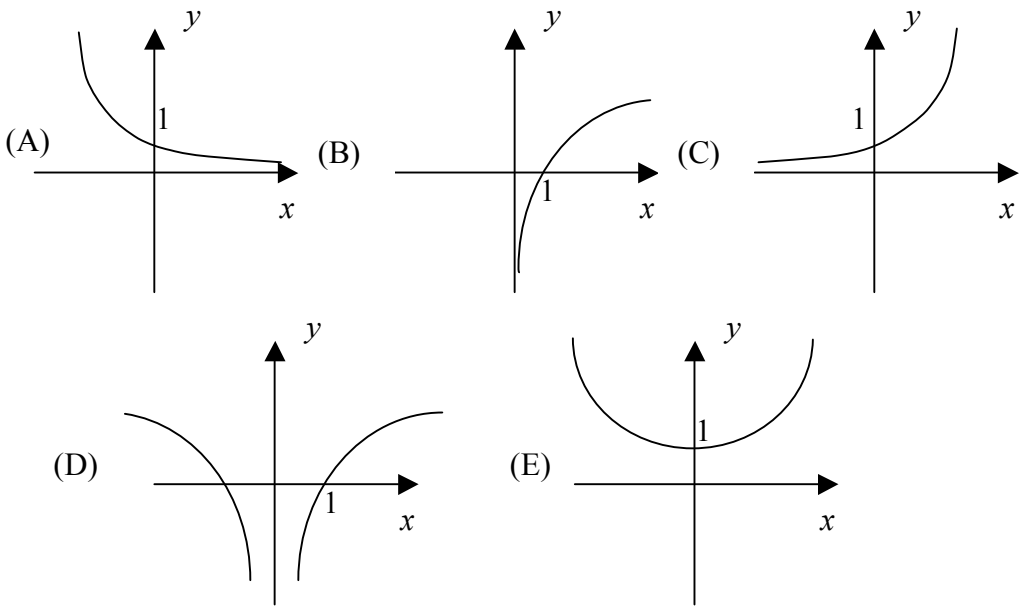
36. Which of the following curves best resembles the graph of $f(x) = 3^x$?



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37. If $\frac{(2x+1)(x-1)}{(x+1)} = 0$, then $x =$

(A) –1 or 1 (B) $-\frac{1}{2}$ or 1 (C) $-\frac{1}{2}$, 1, or –1 (D) $\frac{1}{2}$ or –1 (E) $\frac{1}{2}$, 1, or –1

---

38. $13a - 15b - a + 2b =$

(A) $13 - 13b$ (B) $12a - 13b$ (C) $14a - 17b$ (D) $12a^2 - 13b^2$ (E) $13a + 13b$

---

39. The symbol "≅" means "is approximately equal to." Given that $3^7 \cong 2000$, then $3^{14} \cong$

(A) 4,000 (B) 40,000 (C) 400,000 (D) 4,000,000 (E) $2{,}000^8$

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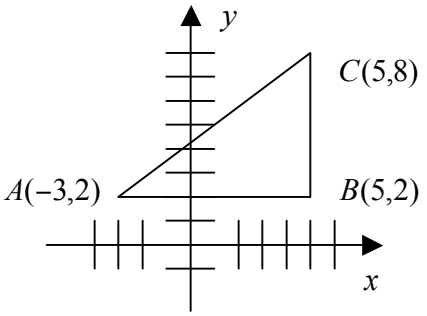
40. In the given figure, the distance between points A and C is

(A) 8
(B) 10
(C) 12
(D) 14
(E) 16



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41. If $f(x) = \dfrac{2x+6}{x+2}$, then $f(a+2) =$

(A) $\dfrac{5}{2}$ (B) $\dfrac{2a+8}{a+4}$ (C) $\dfrac{2a+10}{a+4}$ (D) $\dfrac{2a+6}{a+2}$ (E) $\dfrac{2a+6}{a+4}$

---

42. The graph of the equation $y = -5x + 3$ is

(A) a horizontal line
(B) a line rising to the right
(C) a vertical line
(D) a line falling to the right
(E) not a line

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43. If $ax + b = 3$ and $a \neq 0$, then $x =$

(A) $\dfrac{b+3}{a}$ (B) $\dfrac{3-b}{a}$ (C) $\dfrac{b-3}{a}$ (D) $b-3$ (E) $3-b$

---

44. 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) 0 (B) 1 (C) 2 (D) 3 (E) 4

---

45. $3p > p + 12$ is equivalent to

(A) $p > 1$ (B) $p > 3$ (C) $p > 4$ (D) $p > 6$ (E) $p > 15$

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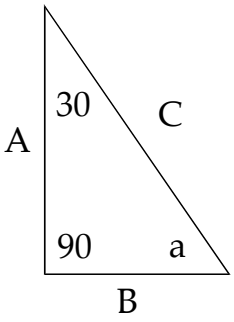
46. In the triangle shown, $tan(a)$ =



(A) A/B
(B) B/A
(C) B/C
(D) A/C
(E) C/A

---

47. A^{ab} =

(A) A^{a+b} (B) bA^{a} (C) $\frac{A^{a}}{A^{b}}$ (D) $\left(A^{a}\right)^{b}$ (E) $A^{a}A^{b}$

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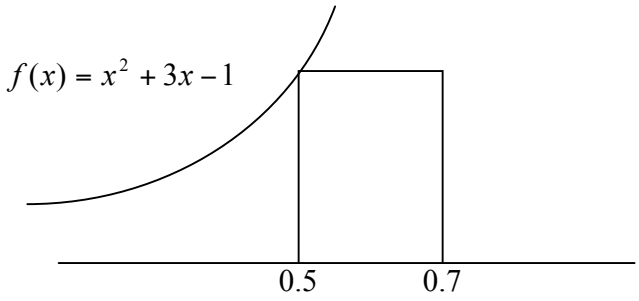
48. The area of the rectangle pictured below is

(A) 0.015
(B) 0.15
(C) 0.2
(D) 0.35
(E) 0.75



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49. Suppose the sides of a rectangle with length x and width y are each doubled. The increase in the area of the rectangle is

(A) xy (B) $2xy$ (C) $3xy$ (D) $4xy$ (E) x^2y^2

---

50. 4^0 (4 raised to the zeroth power) =

(A) 2 (B) 0 (C) 4 (D) 1 (E) 0.25

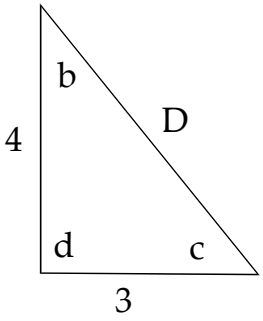
---

51. $4 - (-2 + 5)$ =

(A) 11 (B) 7 (C) 1 (D) –3 (E) –1

---

52. In the triangle shown, $sin(b)$ =



(A) 1.2
(B) 1.33
(C) 0.75
(D) 0.8
(E) 0.6

---

53. $|x-2| \le 1$ is equivalent to

(A) $x \ge 3$ (B) $x \le 1$ (C) $-3 \le x \le -1$ (D) $1 \le x \le 3$ (E) $-3 \le x \le 3$

---

54. $\dfrac{3/2}{2/3}$ =

(A) 0 (B) 4/9 (C) 9/4 (D) 1 (E) 6

---

55. The length of a certain rectangle is 3 meters more than twice its width. If the perimeter of the rectangle is 90 meters, then the width of the rectangle is

(A) 6 m (B) 12 m (C) 14 m (D) 16 m (E) 29 m

---

56. $4(s+2)$ =

(A) $4s+8$ (B) $4s+6$ (C) $4s+2$ (D) $s+8$ (E) $\dfrac{1}{4}(s+2)$

---

57. $3/4 - 1/7$ =

(A) 17/28 (B) 25/28 (C) 1/14 (D) 2/47 (E) 3/14

---

58. If $1-5x < 3$, then

(A) $x < -\dfrac{2}{5}$ (B) $x > -\dfrac{2}{5}$ (C) $x < \dfrac{2}{5}$ (D) $x > \dfrac{5}{2}$ (E) $x > \dfrac{5}{2}$

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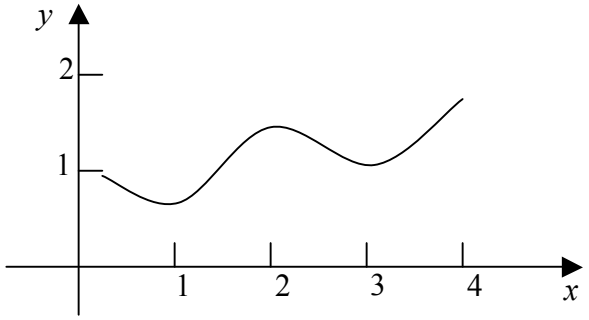
59. Definition: A function $f(x)$ has a *minimum value at the number c* if $f(c) \le f(x)$ for every x in the domain of $f(x)$. If the domain of the function whose graph appears on the right is $[0,4]$, at which number does the function have a minimum value?

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



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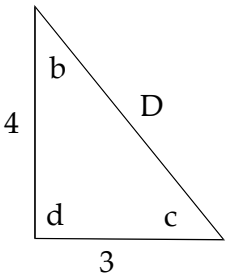
60. The side D in this triangle is



(A) 5
(B) 25
(C) $\sqrt{12}$
(D) $\sqrt{5}$
(E) $\sqrt{7}$

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61. $\left(2\sqrt{3}\right)\left(3\sqrt{6}\right) =$

(A) 18 (B) $18\sqrt{2}$ (C) 108 (D) $\sqrt{108}$ (E) $6\sqrt{108}$

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62. $1 - \sin^2\theta =$

(A) $-\cos^2\theta$ (B) $\cos^2\theta$ (C) $\cos\theta$ (D) $\csc^2\theta$ (E) $-\cos(2\theta)$

---

63. If $f(x) = \cos(3x)$, then $f(\pi/6) =$

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

---

64. The circumference of a circle of radius R is

(A) $2\pi R$ (B) R^2 (C) $\pi^2 R$ (D) $\pi^2 R^2$ (E) πR^2

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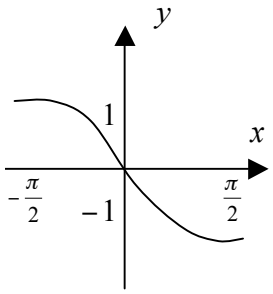
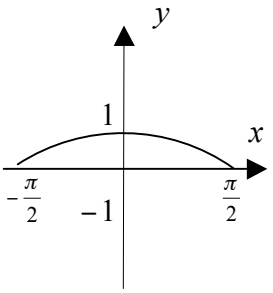
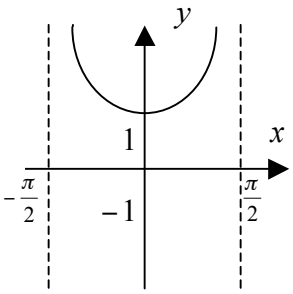
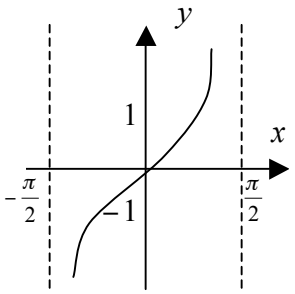
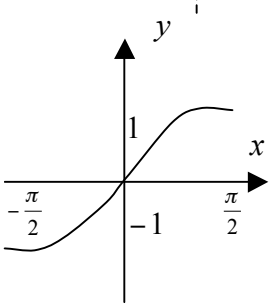
65. Which of the following best represents the graph of $y = \sin x$ for x between $-\frac{\pi}{2}$ and $\frac{\pi}{2}$

(A) 

(B) 

(C) 

(D) 

(E) 

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66. $\sin\theta \tan\theta \csc^2\theta =$

(A) $\tan\theta \sin^2\theta$ (B) $\cos\theta$ (C) $\sin\theta$ (D) $\tan\theta$ (E) $\sec\theta$

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67. For which value of x is $\tan x$ *not* defined?

(A) $-\pi$ (B) $-\frac{\pi}{2}$ (C) 0 (D) $\frac{\pi}{4}$ (E) $\frac{\pi}{3}$

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68. The area of a circle of radius R is

(A) $2\pi R$ (B) R^2 (C) $\pi^2 R$ (D) $\pi^2 R^2$ (E) πR^2

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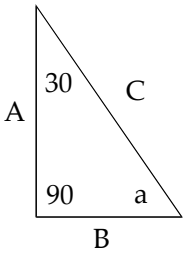
69. The angle *a* in this triangle is



(A) 45
(B) 60
(C) 120
(D) 30
(E) 90

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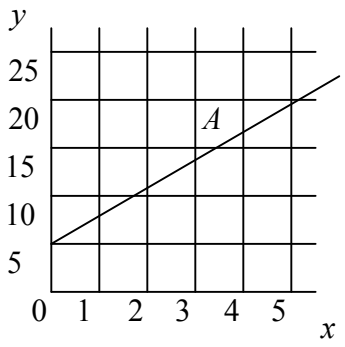
70. The slope of line A is

(A) 4.0
(B) 3.3
(C) 3.0
(D) 0.25



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71. If there are (5/8) mile per km (kilometer) and 60 seconds in a minute, then 100 km/minute is about

(A) 3 miles/second (B) 4,000 miles/second (C) 6 miles/second
(D) 0.1 miles/second (E) 1 mile/second
