

2009 Quadratic Topic Test

**E is none of these**

- Which of the following is not in the solutions set of  $5x^2 + 13x + 6 < 0$ 
  - 1
  - 4/5
  - 7/5
  - 22/15
- The points of intersections of the graphs of  $x^2 + y^2 = 4$  and  $4x^2 + 9y^2 = 36$  are  $(a, b)$  and  $(c, d)$ . Find  $ab + cd$ .
  - 4
  - 0
  - 2
  - 4
- Which of the following is a solution to:  $x^2 + \sqrt{3}x = -\frac{x}{4}$ .
  - $1 + \sqrt{3}$
  - $\frac{1 + \sqrt{3}}{4}$
  - $\frac{-1 - \sqrt{3}}{4}$
  - $1 - \sqrt{3}$
- Find  $2a + b$  if  $\frac{y^2 + ay + 6}{y + 3} = y - b + \frac{1}{y + 3}$ 
  - $19/3$
  - 4
  - $7/3$
  - $4/3$
- Solve for  $x$ :  $\frac{5}{2x} + \frac{2}{x - 1} = \frac{3x + 2}{2x^2 - 2x}$ .
  - 3
  - $7/6$
  - $3/5$
  - 2
- If the length of a side of a square is decreased by 2cm., the area is decreased by 24 cm<sup>2</sup>. Find the perimeter of the square.
  - $8\sqrt{3}$
  - $16\sqrt{6}$
  - 28
  - 16
- When  $3x^2 - 4ax - 4x - 3$  is divided by  $x - 1$  the remainder is 4. Find the value of  $a$ .
  - 2
  - 0
  - $1/2$
  - 2
- A  $\nabla$  operation is defined as  $x \nabla y = xy - y^2$ . Find  $2 \nabla (3 \nabla 1)$ .
  - 8
  - 2
  - 0
  - 4
- Find the  $x$ - value solution(s) to:  $3^{x^2 - 10} = 9^{2y}$ , and  $2^{x + y} = \sqrt{2}$ .
  - 2, 5
  - 2, -6
  - 1, 5
  - 6

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10. Which of the following is not in the solution set of:  $-x^2 - x + 2 > 0$ .
- a) 1                                  b) 0                                  c) -1                                  d) -2
11. A rectangular swimming pool whose length is twice its width is to be surrounded by a cement walk 4 feet wide. The total area (including the pool and walk) is to be  $2880 \text{ ft}^2$ . Find the length of the pool.
- a) 68                                  b) 72                                  c) 64                                  d) 48
12. Find the sum of all the y-values in the solution set of:  $x^2 - y^2 = 9$  and  $4y = x^2 - 9$
- a) 0                                  b) 4                                  c) 6                                  d) 8
13. Find the x - value of the vertex of the parabola:  $y = 3x^2 - 5x - 2$
- a)  $\frac{5}{3}$                                   b)  $\frac{4}{3}$                                   c)  $\frac{5}{6}$                                   d)  $-\frac{2}{3}$
14. The two legs of a right triangle have the lengths of 4 and  $2\sqrt{5}$ . Find the length of the median drawn to the hypotenuse of the triangle.
- a) 3                                  b)  $8\sqrt{5}$                                   c)  $\frac{5}{3}$                                   d)  $\frac{\sqrt{119}}{3}$
15. Find the sum of the value(s) of x in  $x^2 + 3x - \sqrt{x^2 + 3x} - 6 = 0$ .
- a)  $-3 + \sqrt{5}$                                   b)  $\sqrt{5}$                                   c) 2                                  d) -3
16. A sequence of numbers is defined:  $2n - 3$  for  $n \geq 1$ . Find the sum of the first 100 numbers.
- a) 9900                                  b) 9800                                  c) 9600                                  d) 9400
17. If  $|x - 5| + (y + 3)^2 = 0$ , then  $x^2 - 3y = ?$
- a) 26                                  b) 43                                  c) 16                                  d) 34
18. Simplify:  $\frac{x^2 - y^2}{(x - y)^2} \cdot \frac{x^2 - xy + y^2}{x^2 - 2xy + y^2} \div \frac{x^3 + y^3}{(x - y)^4}$ .
- a)  $\frac{1}{xy}$                                   b)  $(x - y)$                                   c)  $\frac{x^2 - xy + y^2}{x^2 + 2xy + y^2}$  d)  $(x + y)$
19. What is the smallest integral value of k such that  $2x(kx - 4) - x^2 + 6 = 0$  has no real roots?
- a) 4                                  b) 3                                  c) 2                                  d) -1

20. For which equation is the product of its solutions not a negative number?

- a)  $x^2 - 10x - 24 = 0$       b)  $x^2 - 25$       c)  $2x^2 = 12 - 5x$       d)  $x^4 - 37x^2 = -36$

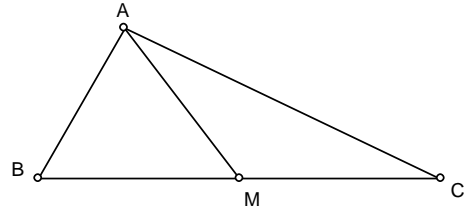
21. If  $g(x) = 1 - x^2$  and  $f(g(x)) = \frac{1-x^2}{x^2}$  when  $x \neq 0$ , then  $f(1/2) = ?$

- a)  $3/4$       b) 1      c) 3      d)  $\sqrt{2}/2$

22. The sum of two numbers is 10 and their product is 20. Find the sum of their reciprocals.

- a)  $1/10$       b)  $1/2$       c) 1      d) 2

23. In the figure  $\triangle ABC$  is such that  $AB = 4$ ,  $AC = 8$ . If  $M$  is the midpoint of  $\overline{BC}$  and  $AM = 3$ , what is the length of  $\overline{BC}$ ?



- a)  $2\sqrt{26}$       b)  $2\sqrt{31}$   
c) 9      d)  $4 + 2\sqrt{13}$

24. What are the value(s) of  $k$  will the equation  $2kx^2 - 4x + 3 = 0$  have 2 distinct roots?

- a)  $k < 2/3$       b)  $k < 3/2$       c)  $k = 3/2$       d)  $k > 2/3$

25. If  $y \geq 7$ , solve  $4x + 11 \geq 3y$  for  $x$ .

- a)  $x \geq -7/8$       b)  $x \geq 5/6$       c)  $x \leq 5/3$       d)  $x \geq 5/2$

26. If  $\frac{ax^2 + 2ax + a}{x^2 + 2x + 1} = 6$ , find the value of  $a$ .

- a)  $x^2 + 2x + 1$       b)  $x + 1$       c) 6      d)  $1/6$

27. If  $f(x) = 3x^2 - 2x + 5$  and  $f(x + a) = 3x^2 + 28x + 70 = 0$ , find the value of  $a$ .

- a) 3      b) 4      c) 5      d) 6

28. If  $\sqrt{10 + \sqrt{10 + \sqrt{10 + \dots}}} = \frac{a + \sqrt{b}}{c}$ , find  $a + b + c$ .

- a) 18      b) 19      c) 20      d) 21

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29. If the larger of two integers, whose sum is 88 is divided by the smaller the quotient is 5 and the remainder is 10. Find the product of the two numbers.

- a) 975                                      b) 845                                      c) 1005                                      d) 925

30. John is standing at the edge of a 3000- foot- canyon. He kicks a ball into the air with an initial upward velocity of 32 feet per second. What is the greatest height above the canyon's edge the ball will reach?

- a) 32ft                                      b) 16ft                                      c) 12ft                                      d) 8ft

Tie-Breakers:

1. Express  $x^3 + x + 2x^4 + 4x^2 + 2$  as the product of two quadratics.
2. Factor  $x^4 + 64$  into 2 polynomials of degree 2.
3. Find the quadratic equation with roots that are twice the roots of  $x^2 + 4x - 5 = 0$ .