Franklin Math Bowl 2008

Algebra I Test

1. The product of the first eighteen positive integers divided by the product of the first fifteen positive integers is:

    a) 4896   b) 6   c)   2730   d)   380   e) 342

2. Solve $\dfrac{5}{7}x + 4 = 3x$

    a) $\dfrac{-7}{4}$ b) $\dfrac{-4}{7}$ c) $\dfrac{4}{7}$ d) $\dfrac{7}{4}$ e) None of the above

3. Assuming that $x^2 - 6x + 9 \neq 0$, simplify $\dfrac{x^2 - 9}{x^2 - 6x + 9}$.

    a) $\dfrac{-1}{6x}$ b) $\dfrac{3}{x-3}$ c) $\dfrac{3}{x+3}$ d) $\dfrac{x+3}{x-3}$ e) $\dfrac{x-3}{x+3}$

4. Bill drives three hours at forty miles an hour and then 3 hours at 60 miles an hour. What is his average speed?

    a) 42 mph   b) 48.3 mph   c) 50 mph   d) 52 mph   e)   58.7mph

5. Solve $x^2 - x = 2$.

    a) $x = 0, 1$ b) $x = 2, 3$ c) $x = \dfrac{1 \pm \sqrt{13}}{2}$ d) $\dfrac{1 \pm \sqrt{3}}{2}$ e) $x = -1, 2$

6. The perimeter of a rectangle is p units and its area is a square units. In order to calculate its length and width, you would need to find roots of what equation (x denotes the length)?

    a) $2x^2 + px - 2a = 0$ b) $2x^2 - px + 2a = 0$ c) $x^2 + px + a = 0$

    d) $x^2 - px + a = 0$ e) None of the above.

7. Standard retail markup is 30%. What is the wholesale price for an item that sells for $61.75 (rounded to nearest cent)?

    a) $20.59   b) $43.23   c) $47.50   d) $88.22   e) None of the above

8. A telephone pole is supported by a wire that is attached from the top of the pole diagonally to the ground. The obtuse angle formed by the wire and the ground is supplementary to the acute angle the wire makes with the ground. The obtuse angle is four times the measure of the acute angle. Find the measure of both angles.

    a) Ob=72, Ac=18   b) Ob=144, Ac=36   c) Ob=60, Ac=15   d) Ob=135, Ac=45

9. Assuming that $x \neq 0$, simplify $\dfrac{\frac{1}{x}+3}{\frac{1}{3x}-3}$.

a) $(x+3)(9x+1)$ b) $\dfrac{3x^2}{(9x+3)(9x+1)}$ c) $\dfrac{9x+1}{9x+3}$ d) $\dfrac{9x+3}{9x+1}$ e) $\dfrac{1}{3}$

10. A water silo is in the shape of a right circular cylinder with radius r and height h. How much paint is required to paint the outside of the silo (i.e., the outer wall and the top and the bottom)?

a) $2\pi r^2 + 2\pi rh$ b) $\pi r^2 + \pi rh$ c) $\pi r^2 h + 2\pi rh$ d) $2\pi r^2 h + \pi rh$ e) $2\pi r^2$

11. Last week, gas cost $4 a gallon. This week, the cost goes up 5%. In a month, the cost will decrease by 5%. How much will gas cost in a month?

a) $3.95/gallon b) $3.99/gallon c) $4/gallon d) $4.01/gallon e)$4.05/gallon

12. Bill drives 130 miles in 2 hours and then 200 miles in 4 hours. What is his average speed?

a) 33.3 mph b) 40 mph c) 41.25 mph d) 50 mph e) 55 mph

13. Suppose that $|x - 4| < 8$. Which of the following says the same thing?

a) x is between 4 and 8. b) x is smaller than 4 or larger than 8.
c) x is between −4 and 4. d) x is between −4 and 12.
e) x is smaller than −4 and larger than 10.

14. What is the equation of the line passing through the points (−4,3) and (1,2)?

a) $5y + x = 11$ b) $y + 5x = 7$ c) $y + 5x = 11$ d) $5y - x = 11$ e) $5y + x = 1$

15. A number such as $4\dfrac{11}{17}$ is called a (an)

a) proper fraction b) improper fraction c) mixed number
d) irrational number e) imaginary number

16. You and a friend go to a Mexican restaurant. You order 3 tacos and 2 enchiladas. Your friend orders 2 tacos and 3 enchiladas. Your bill was $5 and your friend's bill was $4.50. What did each item cost?

a) t=$.70, e=$1.20 b) t=$1.20, e=$.70 c) t=$.60, e=$1.40 d) t=$1.40, e=$.60

17. Suppose that Ann made a 64 on her first test. What score does she need to get on the second test to have an average of 72?

a) 78   b) 80   c) 82   d) 84   e) 86

18. Expand $[(x-y)^2]^2$ and collect terms to obtain. . .

a) $x^4 - y^4$ b) $x^4 + y^4$ c) $x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$
d) $x^4 - 4x^3y + 6x^2y^2 + 4xy^3 + y^4$ e) None of the above

19. Which of the following is equivalent to $x^3 - 3x^2 + 10x - 30$?

a) $(x-3)(x+10)$ b) $(x-3)(x-10)$ c) $(x-3)(x^2+10)$ d) $(x-3)(x^2-10)$

20. Simplify $\dfrac{x-2}{x^2-4}$.

a) $\dfrac{1}{x+2}$ b) $\dfrac{1}{x-2}$ c) $\dfrac{1}{x+4}$ d) $\dfrac{1}{x-4}$ e) $\dfrac{x}{x+1}$

21. Ann can assemble a kite in 2 hours and Bill can assemble the same kite in 3 hours. How long would it take them to assemble this kite if they were to work together?

a) ⅖ hours   b) $\dfrac{3}{2}$ hr   c) $\dfrac{5}{6}$ hr   d) $1\dfrac{1}{5}$ hr   e) 1 hr

22. Solve $4^{x^2-4x+3} = 1$.

a) $x = -1, -3$ b) $x = -1, 3$ c) $x = 1, -3$ d) $x = 1, 3$ e) $x = 1, 4$

23. Chad needs to drive from his home to the airport. If he travels at 45 mph, he will arrive 15 minutes late. If he drives at 60 mph, he will arrive 5 minutes early. How far does he live from the airport?

a) 48.15 miles b) 60 miles   c) 78 miles   d) 900 miles   e) 3600 miles

24. The sum of two numbers is 120. Their difference is 50. One of the numbers is:

a) 30   b) 35   c) 40   d) 50   e) 70

25. A triangle has a base that is ¾ that of a rectangle. A square has sides half as long as the base of the triangle and area one-sixth that of the rectangle. If the square has area 1 square unit, find the perimeter of the rectangle rounded to the nearest thousandth.

a) 4.917   b) 8.189   c) 9.833   d) 16.375   e) 12

Answers

1.A	2. D
3.D	4.C
5. E	6. B
7. C	8. B
9. D	10. A
11. B	12. E
13. D	14. A
15. C	16. B
17. B	18. D
19. C	20. A
21. D	22. D
23. B	24. B
25. C	