

Franklin Math Bowl

Algebra I

2003

- Suppose $x^2 + \sqrt{x} = 84$. Then $x =$
a) 4 b) 9 c) 16 d) 32 e) cannot be determined from the given information
- Simplify $\frac{x^2 - 4}{x^2 - 4x + 4}$.
a) $\frac{1}{-2x}$ b) $\frac{2}{x-2}$ c) $\frac{2}{x+2}$ d) $\frac{x-2}{x+2}$ e) $\frac{x+2}{x-2}$
- A person drives for 2 hours at 50 miles per hour and then drives for 2 hours at 70 miles per hour. What is the average speed for the entire trip?
a) 60 mph b) $58\frac{1}{3}$ mph c) $62\frac{2}{3}$ mph d) 52 mph e) 58 mph
- Solve for x : $3x + 2 = 2x - 3$.
a) $x = -1$ b) $x = 1$ c) $x = \frac{2}{3}$ d) $x = \frac{3}{2}$ e) $x = -5$
- Solve for x : $x^2 - x - 1 = 0$
a) $x = \frac{1 \pm \sqrt{5}}{2}$ b) $x = \frac{-1 \pm \sqrt{5}}{2}$ c) $x = \frac{1 \pm \sqrt{3}}{2}$ d) $x = \frac{-1 \pm \sqrt{3}}{2}$ e) no real solution
- A person drives 100 miles at 50 miles per hour and then drives 100 miles at 70 miles per hour. What is the average speed for the entire trip?
a) 60 mph b) $58\frac{1}{3}$ mph c) $62\frac{2}{3}$ mph d) 52 mph e) 58 mph

7. Given three graphs, $y = ax - b$, $y = x^2 + c$, and $y = cx + a$, so the values of the parameters a , b , and c cause all three graphs to pass through the point $(2, 3)$. What is the sum $a + b + c$?
- a) 6 b) 4 c) 9 d) 11 e) 1
8. Simplify $\frac{1/x + 1/x}{1/x}$.
- a) x b) $1/x$ c) $2x$ d) $2/x$ e) 2
9. A person drives 100 miles at 60 miles per hour and then drives 200 miles at 60 miles per hour. What is the average speed for the entire trip?
- a) 60 mph b) $58\frac{1}{3}$ mph c) $62\frac{2}{3}$ mph d) 52 mph e) 58 mph
10. The word "per" in mathematics is a synonym for which of the following operations
- a) addition b) subtraction c) multiplication d) division e) all of these
11. Suppose $|x - 3| < 7$. Which of the following says the same thing.
- a) x is between 3 and 7 b) x is larger than 3 and smaller than 7
c) x is between -4 and $+4$ c) x is between -4 and 10
e) x is smaller than -4 and larger than 10
12. A person drives 100 miles in 2 hours and then drives 200 miles in 3 hours. What is the average speed for the entire trip?
- a) 60 mph b) $58\frac{1}{3}$ mph c) $62\frac{2}{3}$ mph d) 52 mph e) 58 mph
13. $1 + 2 - 3 * 4 / 5^2 =$
- a) $4/25$ b) $16/25$ c) $3\frac{12}{25}$ d) $2\frac{13}{25}$ e) $9/25$
14. A number such as $3\frac{12}{25}$ is called a (an)
- a) proper fraction b) improper fraction c) mixed number
d) irrational number e) imaginary number

15. You are working a problem involving a scalene triangle (not a right triangle), a square, and a non-square rectangle, all the same height. How many different letters should you use to represent the lengths of the unknown sides?

- a) 3 b) 4 c) 5 d) 6
e) Not enough information is given to give a definite answer to the question.

16. In the expression xy , what is the understood coefficient, the two understood exponents, and the understood operation?

- a) 1, 0, 0, multiplication b) 1, 1, 1, multiplication c) 0, 1, 1, multiplication
d) 1, 0, 0, exponentiation e) 0, 1, 1, exponentiation

17. Give the reasons for each of the following three identities:

- 1) $x(y - z) = xy - xz$ 2) $xy = yx$ 3) $x + 0 = x$

- a) commutative, associative, distributive b) distributive, commutative, associative
c) distributive, associative, commutative d) distributive, commutative, identity
e) associative, commutative, identity

18. You are working a problem involving three triangles: a scalene triangle, an isosceles triangle, and an equilateral triangle. If the two equal sides of the isosceles triangle are 5 meters, how many different letters should you use to represent the lengths of the unknown sides of the triangles?

- a) 4 b) 5 c) 6 d) 7
e) Not enough information is given to give a definite answer to the question.

19. Simplify $\frac{x\sqrt{x} + \sqrt{x}}{x\sqrt{x} - \sqrt{x}} - \frac{x^2 + 1}{x^2 - 1}$.

- a) $\frac{2}{x-1}$ b) $\frac{2x}{x^2-1}$ c) $\frac{\sqrt{x}}{x^2-1}$ d) $\frac{2\sqrt{x}}{x^2-1}$ e) 0

20. An office has two scanners. Model 2000 can scan four sheets a minute. Model 9000 can scan ten sheets a minute. How many sheets per minute can the two scanners scan working together.

- a) $\frac{1}{4} + \frac{1}{10}$ b) $\frac{1}{\frac{1}{4} + \frac{1}{10}}$ c) $\frac{40}{14}$ d) $\frac{4}{40} + \frac{10}{40}$ e) 14

21. An isosceles triangle has a side of length 5 meters and another side of length x meters. The perimeter of the triangle is

- a) $10 + x$ b) $5 + 2x$ c) $\frac{1}{2}(5x)$ d) $\frac{1}{2}(5x^2)$
e) Not enough information is given to give a definite answer to the question.

22. The sum of two numbers is the same as their difference, and their product is the same as the second number raised to the first number power. What is the first number raised to the second number power?

- a) 0 b) 1 c) -1 d) e) undefined

23. Consider the following equations:

$$\begin{cases} 2x + 3y \\ 5x - 4y \end{cases} \quad \text{equation 1 and equation 2}$$

$$\begin{aligned} x^2 - 1 &= 0 \\ x = 1, x &= -1 \end{aligned} \quad \text{equation 3, equation 4, and equation 5.}$$

This notation indicates that

- a) Equation 1 and equation 2 cannot be true simultaneously, equation 4 and equation 5 may be true simultaneously.
b) Equation 1 and equation 2 may be true simultaneously, equation 4 and equation 5 may be true simultaneously.
c) Equation 1 and equation 2 cannot be true simultaneously, equation 4 and equation 5 cannot be true simultaneously.
d) Equation 1 and equation 2 may be true simultaneously, equation 4 and equation 5 cannot be true simultaneously.
e) Equation 1 implies equation 2, equation 3 implies both equation 4 and equation 5.

24. A square and an equilateral triangle are the same height. What is the ratio of the area of the square to the area of the triangle?

- a) 3 b) $\sqrt{3}$ c) $\sqrt{3}/2$ d) $\sqrt{3}/3$
e) There is not enough information to find the answer.

25. This equation has a solution that is a two digit number. What is the sum of the digits? $x^3 - 17x^2 + 2x - 34$

- a) 5 b) 7 c) 8 d) 9 e) 11