

Franklin Math Bowl
Algebra I Test
2004

1. A student in an algebra course has test scores of 75, 82, 71, and 84. What score on the next test will raise the student's average to 80?
(A) 92 (B) 82 (C) 88 (D) 90

2. Solve for t: $55t - \frac{55}{2} = 40t$
(A) 11/6 (B) 22 (C) 13/5 (D) 7/3

3. Simplify the expression: $\frac{2 - x - 3x^2}{6x^2 - x - 2}$
(A) $\frac{x + 1}{2x + 1}$ (B) $\frac{-(x + 1)}{2x + 1}$ (C) $\frac{x + 1}{3x - 2}$ (D) x

4. Eliminate negative exponents and simplify: $\frac{8x^3y^{-5}}{4x^{-1}y^2}$
(A) $\frac{2x^2}{y^3}$ (B) $\frac{2x^4}{y^7}$ (C) $\frac{4x^4}{y^7}$ (D) $\frac{2y^7}{x^4}$

5. Find the value of $|| -4| - |-9||$.
(A) -5 (B) 13 (C) -13 (D) 5

6. What quantity has to be added to $x^2 + 3x$ to convert it into a perfect square?
(A) 9/4 (B) 3/2 (C) 1/2 (D) 2/3

7. Express the product as a polynomial: $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$
(A) $a - b$ (B) $a + b$ (C) $a - 2ab - b$ (D) $a + 2ab + b$

8. Solve the equation.
$$\frac{3}{2x - 4} - \frac{5}{x + 3} = \frac{2}{x - 2}$$

(A) 11/17 (B) 17/11 (C) 1 (D) 16/3

9. For what values of c is -3 a solution of the equation $3x + 1 - 5c = 2c + x - 10$?
- (A) 16 (B) $7/5$ (C) -16 (D) $5/7$
10. A chemist has 10ml of a solution that contains 30% concentration of acid. How many ml of pure acid must be added in order to increase the concentration to 50%?
- (A) 4ml (B) 10ml (C) 3ml (D) 6ml
11. Given the equation $4x^2 - 4xy + 1 - y^2 = 0$, use the Quadratic Formula to solve for x in terms of y .
- (A) $\frac{y \pm y\sqrt{2}}{2}$ (B) $\frac{4y \pm \sqrt{32y}}{8}$ (C) $\frac{y \pm \sqrt{2y^2 - 1}}{2}$ (D) $4y \pm \sqrt{2y^2 - 1}$
12. Solve $|2x + 3| > 9$.
- (A) $(-6, 3)$ (B) $(-3, 6)$ (C) $(-\infty, -6) \cup (3, \infty)$ (D) $(-\infty, -3) \cup (6, \infty)$
13. A boy shoots a toy rocket upward with an initial velocity of 72 feet per second. Its altitude s (in feet) after t seconds is given by $s = -16t^2 + 72t$. During what time interval will the rocket be at least 32 feet above the ground?
- (A) $[1, 4]$ (B) $[2, 4]$ (C) $[1/2, 4]$ (D) $[3, 5]$
14. When all possible numbers are put in place of y , the expression $y^2 - 16y + 64$ will .
- (A) always be positive (B) sometimes be negative (C) never be negative (D) never be positive
15. Find an equation of the line that passes through the point $(5, -7)$ and is parallel to the line $6x + 3y - 4 = 0$.
- (A) $2x + y - 3 = 0$ (B) $2x + y + 3 = 0$ (C) $-2x - y + 3 = 0$ (D) $-2x - y - 3 = 0$
16. In the sequence $\dots, a, b, c, d, 0, 1, 1, 2, 3, 5, 8, \dots$, each term is the sum of the two terms to the left . Find a .
- (A) -1 (B) -3 (C) 1 (D) 3
17. Suppose that $f(x) = x^2 + 3x - 2$. If a and h are real numbers, and $h \neq 0$, find and simplify $\frac{f(a+h) - f(a)}{h}$.
- (A) $a + h + 3$ (B) $2a^2 + h^2 + 3$ (C) $2a + h + 3$ (D) $2a + h$

18. Solve the equation. $\sqrt{11 + 8x} + 1 = \sqrt{9 + 4x}$
(A) $7/4$ (B) $-5/4$ (C) $5/4$ (D) $7/4$ and $-5/4$
19. What is the range of the function $f(x) = -\sqrt{x + 2}$.
(A) $(-\infty, -2]$ (B) $[-2, \infty)$ (C) $[0, \infty)$ (D) $(-\infty, 0]$
20. A man has \$15,000 to invest. He plans to deposit part of it in a savings account paying 5% simple interest and the remainder in an investment fund yielding 8% simple interest. How much should he invest in each to obtain a 7% return on his money after one year?
(A) \$5,000 in the savings account, \$10,000 in the investment fund
(B) \$10,000 in the savings account, \$5,000 in the investment fund
(C) \$7,500 in the savings account, \$7,500 in the investment fund
(D) \$6,000 in the savings account, \$9,000 in the investment fund
21. Simplify $\sqrt{3a^2b^3}\sqrt{6a^5b}$ where a and b denote positive real numbers.
(A) $2ab\sqrt{a^3b^2}$ (B) $3ab\sqrt{2a}$ (C) $3a^3b^2\sqrt{2a}$ (D) $3a^3b^2\sqrt{2ab}$
22. Simplify the expression: $x(1 - 2x)^{-\frac{3}{2}} + (1 - 2x)^{-\frac{1}{2}}$
(A) $\frac{x}{1 - 2x}$ (B) $\frac{1 - x}{(1 - 2x)^{\frac{1}{2}}}$ (C) $\frac{1 - x}{(1 - 2x)^{\frac{3}{2}}}$ (D) $\frac{1 - 2x}{1 - x}$
23. Find two consecutive integers whose product is 5 less than the square of the smaller number.
(A) 5 and 6 (B) -6 and -5 (C) 4 and 5 (D) -5 and -4
24. Solve the inequality $2\sqrt{x} < 1 - 3x$
(A) $[0, 1/9)$ (B) $[-1, 2)$ (C) $(0, 1)$ (D) $[0, 0.1)$
25. Find all values of B and C such that the roots of $x^2 + Bx + C = 0$ are B and C .
(A) $B = 1, C = -2$ (B) $B = -2, C = 1$ (C) $B = C = 0$ (D) $B = 1, C = -2$ or $B = C = 0$