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FRANKLIN MATH BOWL   ALGEBRA EXAM-2007

1) What is equivalent to $2^3 4^2$?
   a) 8^5 b) 2^{12} c) 85   d) 2^7

2) You pay a clerk $17 for a shirt. The shirt was marked down 25% from its original price and tax was assessed at 8.5%. Which of the following equations, when solved for x, will find the original cost?
   a) 17 = .25*x + 0.085*0.75*x c) 17 = .75*x + 0.085*0.75*x
   b) 17 = .75*x + 0.085*x d) 17 = .75*x + 0.085*x

3) Evaluate $2x - 3(4 - 2[x - 7])$.
   a) $54 - 2x$ b) $-4x - 54$ c) $8x - 54$ d) $8x + 30$

4) Evaluate $-x^2 - xy$ if x = -2 and y = -3.
   a) 2   b) -2   c) 10   d) -10

5) If $\dfrac{x-y}{a+2b} = \dfrac{3}{4}$, find $\dfrac{2x-2y}{3a+6b}$.
   a) $\dfrac{1}{4}$ b) $\dfrac{1}{2}$ c) $\dfrac{3}{2}$ d) $\dfrac{2}{3}$

6) If $S = 1 + 2 + \cdots + n$, then S can also be written as $S = n + (n - 1) + \cdots + 1$. Adding the two equations and solving for S, we obtain
   a) $S = \dfrac{n}{2}$ c) $S = \dfrac{n^2 + 1}{2}$
   b) $S = \dfrac{n(n+1)}{2}$ d) $S = \dfrac{n^2(n+1)}{2}$

7) Solve for x if $\dfrac{2}{x} = x - 1$.
   a) $x = -2, x = -1$ c) $x = -2, x = 1$
   b) $x = 2, x = 1$ d) $x = 2, x = -1$

8) Simplify $\dfrac{\dfrac{1}{x}+2}{\dfrac{1}{2x}+2}$

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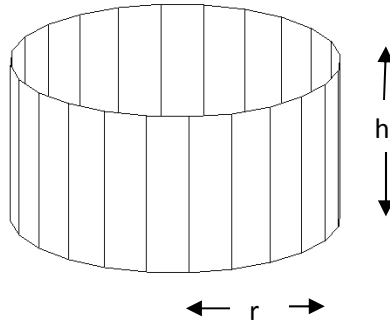d) $\dfrac{4x+1}{2x+1}$

9) $\sqrt{x-3}=1-\sqrt{x}$ has

a) A solution $x = 4$
c) A solution $x = -4$

b) No solution
d) A solution $x = 3$

10) A can in the shape of a right circular cylinder has no top. Let r = radius and h = height. How much paint is required to paint the base and outside wall of the can?

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

11) $\dfrac{x^2+x-2}{x^2-1} \bullet \dfrac{x^3-1}{x^2+x+1} \bullet \dfrac{1}{x+2}$ simplifies to

a) $\dfrac{x+1}{x-1}$
c) $\dfrac{x-1}{(x+1)(x^2+x+1)}$

b) $\dfrac{x-1}{x+1}$
d) $x-2$

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12) A 10' pole has a 12' guy wire that reaches the ground. Find the distance x from the base of the pole to the base of the guy wire.

12'

10'

x

a) 4

b) $\sqrt{11}$

c) $2\sqrt{11}$

d) 44

13) If $A = \frac{h}{2}(b_1 + b_2)$, b_1 in terms of the other variables is

a) $\frac{2A}{h} - b_2$

b) $-\frac{2A}{h} + b_2$

c) $\frac{2A}{h} + b_2$

d) $2A - \frac{b_2}{2}$

14) A line with slope = 2 passes through (-2,-3). Suppose the point (4,k) lies on the line. Find k.

a) 5

b) 15

c) -7

d) 9

15) Find the mean and median of the data set {6, 1, 9, 2, 2}.

a) 4 and 2

b) 4 and 9

c) 5 and 9

d) 5 and 2

16) Suppose Ralph made 76 on his first test. What should his score on the second test be to have an average which is 84?

a) 90

b) 92

c) 94

d) 96

17) Expand $((a - b)^2)^2$ and collect terms to obtain

a) $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

c) $a^4 - b^4$

b) $a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4$

d) $a^4 + b^4$

18) Simplify $\left(\dfrac{x^{-2}y^{3}}{xy^{-1}}\right)^{-2}$

a) $\dfrac{x^{5}}{y^{6}}$

b) $\dfrac{y^{8}}{x^{6}}$

c) $\dfrac{x^{6}}{y^{8}}$

d) $\dfrac{y^{6}}{x^{5}}$

19) Find the width of a rectangle with perimeter 120 ft if its length is twice its width.

a) 40   b) 20   c) 30   d) 25

20) Al bought 3 hamburgers and 1 drink, and Bill bought 2 hamburgers and 2 drinks. Suppose Al's bill was $8.75 and Ralph's bill was $7.50. What is the price of a hamburger?

a) $1.25   b) $2.00   c) $2.50   d) $3.00

21) Solve $3^{x^{2}-x-2}=1$ for all x's.

a) x = 2, x = 1   b) x = 2, x = -1   c) x = -2, x = 1   d) x = -2, x = -1

22) If the sum of two numbers is 100 and their difference is 20, then one of the numbers is

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

23) Let f(x) $= 4-\sqrt{x-2}$. The domain and range of f(x) is

a) $x \geq 2$ and $y \geq 4$ c) $x \leq 2$ and $y \geq 4$

b) $x \geq 2$ and $y \leq 4$ d) $x \leq 2$ and $y \leq 4$

24) Consider the consecutive positive odd integers 1, 3, 5, 7,… Find the result with the product of the first 7 consecutive positive odd integers is divided by the first 5 consecutive positive odd integers.
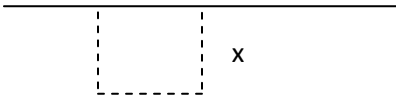
   a) 134   b) 143   c) 131   d) 143

25) A rectangular pen is attached to a wall of barn where the wall forms one side of the rectangle.

The length of the fence (indicated by a dotted line) is 100 ft. The area of the enclosed pen in terms of x is

a) $x(50 - x)$

b) $x(100 - x)$

c) $x(100 - 2x)$

d) $2x(50 - 2x)$