	Answers
22. We're told that $10d+5n = 25(n-d)$, so $10d+5n = 25n-25d$, from which $35d = 20n$. Dividing by $35n$, $d{:}n = 20{:}35 = 4{:}7$. A) 4:7 B) 7:4 C) 1:2 D) 2:1	22. A
23. From the 99 integers $\{1, \ldots, 99\}$, choose n different integers. Since $100 = 1\times2\times5\times10$, the greatest possible value of n is 4. A) 2 B) 3 C) 4 D) 5	23. C
24. Undefined $\Leftrightarrow x+2006 = 0$ or $x+\frac{2005}{x+2006} = 0$. In the latter case, $x^2+2006x+2005 = (x+2005)(x+1) = 0$; so $x = -2006, -2005, -1$. A) 1 B) 2 C) 3 D) 4	24. C
25. The smallest such number is the square root of 4^{144}, which is 4^{72}. A) 4^{12} B) 4^{72} C) 4^{144} D) 4^{288}	25. B
26. $x-y+\frac{1}{x+y} = \frac{(x-y)(x+y)+1}{x+y} = \frac{x^2-y^2+1}{x+y}$, so $\text{☼} = -y^2$. A) $-y^2$ B) xy C) y^2 D) $-xy$	26. A
27. The roots of $x^2 = a^2$ are roots of $(x^2)^2 = (a^2)^2 \Leftrightarrow x^4-a^4 = 0$. A) $x-a = 0$ B) $x+a = 0$ C) $x^2+a^2 = 0$ D) $x^4-a^4 = 0$	27. D
28. Try (-2,1) in QII. Change both signs to get (2,-1) in QIV. A) I B) II C) III D) IV	28. D
29. The whole-number factors of 64 are $1, 2^1, 2^2, 2^3, 2^4, 2^5, 2^6$. The product of these is $1\times2^1\times2^2\times2^3\times2^4\times2^5\times2^6 = 2^{1+2+3+4+5+6} = 2^{21}$. A) 2^{36} B) 2^{21} C) 2^{12} D) 2^{11}	29. B
30. Given $\Leftrightarrow 1 < \lvert x+1\rvert \Leftrightarrow x+1 < -1$ or $x+1 > 1 \Leftrightarrow x < -2$ or $x > 0$. A) $x < -2$ B) $x > -1$ C) $x < 0$ D) $x < 1$	30. A

The end of the contest **A**

MATH

ALGEBRA COURSE 1 CONTEST

Math League Press, P.O. Box 17, Tenafly, New Jersey 07670-0017

Information & Solutions

Spring, 2006

A

Contest Information

- **Solutions** Turn the page for detailed contest solutions (written in the question boxes) and letter answers (written in the *Answers* column to the right of each question).
- **Scores** Please remember that *this is a contest, not a test*—and there is no "passing" or "failing" score. Few students score as high as 24 points (80% correct). Students with half that, 12 points, *deserve commendation!*
- **Answers & Rating Scale** Turn to page 152 for the letter answers to each question and the rating scale for this contest.

Answers

1. $(2+0+0+6)^{(2\times0\times0\times6)} = 8^0 = 1$.
   A) 1 B) 8 C) 0 D) 8^8

   Answer: A

2. Given $= (-2)(1)(-2)(2)(-2)(3)(-2)(4)(-2)(5) = (1)(2)(3)(4)(5)(-32)$.
   A) 2 B) -2 C) 32 D) -32

   Answer: D

3. Since $(x+1)+(2x+2) = 3x+3 = 3(x+1)$, $(x+1)+(2x+2)$ scoops cost $3\times\$3 = \$9$.
   A) \$18 B) \$15
   C) \$12 D) \$9

   Answer: D

4. $8 = \dfrac{x^2-4}{x+2} = \dfrac{(x+2)(x-2)}{x+2} = x-2$.
   A) 10 B) 8 C) 6 D) 4

   Answer: B

5. $(10x)^{100} = 10^{100}x^{100} = (10x^{100})(10^{99})$.
   A) 1 B) 10 C) 10^{99} D) 10^{100}

   Answer: C

6. If $x = 0.5$, then $x^2-x = (0.5)^2-0.5 = 0.25-0.5 = -0.25 < 0$.
   A) 2 B) 1 C) 0.5 D) -0.5

   Answer: C

7. Clearing fractions, $\frac{x}{3} < 3 \Leftrightarrow x < 9$. Since $x > 0$, $x = 1, 2, \ldots, 8$.
   A) 9 B) 8 C) 6 D) 3

   Answer: B

8. Since area $= lw$, $l:w = 48:1$ or $24:2$, or $16:3$, or $12:4$, or $8:6$. Choice B is not included among these possibilities.
   A) 3:1 B) 6:1 C) 12:1 D) 48:1

   Answer: B

9. The ratio of the number of teams that wear red jerseys to the number that wear blue is 7:13. Of 20 teams, 7 wear red jerseys, so the percent that wear red jerseys is $7/20 = 35/100 = 35\%$.
   A) 70% B) 49% C) 35% D) 20%

   Answer: C

10. The first multiple of x^2 that's divisible by $2x$ is $2x^2$.
    A) $2x$ B) $2x^2$ C) $2x^3$ D) $2x^4$

    Answer: B

11. $x^{18}+2x^{17}+x^{16} = x^{16}(x^2+2x+1) = x^{16}(x+1)^2$.
    A) x^4 B) x^8 C) x^{12} D) x^{16}

    Answer: D

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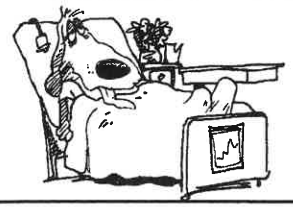
Answers

12. I was in the hospital for $|2x|+|-x|$ days $= 2|x|+|x|$ days $= 3|x|$ days.
    A) $3x$ B) x
    C) $|x|$ D) $3|x|$



    Answer: D

13. Rewrite each choice as shown below. Choice A is largest if $x > 1$.
    A) x^{50} B) x^{20} C) $x^{10}x^5 = x^{15}$ D) $x^2x^{25} = x^{27}$

    Answer: A

14. $x = \pm\sqrt{2006}$. The product is $-\sqrt{2006}\times\sqrt{2006} = -2006$.
    A) 2006 B) 5002 C) $2\sqrt{2006}$ D) -2006

    Answer: D

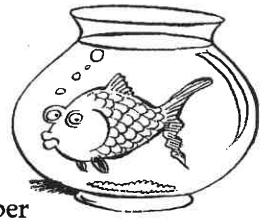
15. Each side has length $(x+1)^2$. Perimeter $= 4s = 4(x+1)^2$.
    A) $4(x+1)^2$ B) $(x+1)^2$ C) $4(x+1)$ D) $(4x+1)$

    Answer: A

16. $\dfrac{w^2w^4w^6\times\ldots\times w^{48}w^{50}}{w^1w^3w^5\times\ldots\times w^{47}w^{49}} = \dfrac{w^2}{w^1}\times\dfrac{w^4}{w^3}\times\ldots\times\dfrac{w^{50}}{w^{49}} = w^{25}$.
    A) w^{24} B) w^{25} C) w^{49} D) w^{50}

    Answer: B

17. Any positive integer that's both a perfect square and a perfect cube is of the form n^6, where n is an integer. The only such integers less than 100 are $1^6 = 1$ and $2^6 = 64$.
    A) 1 B) 2 C) 3 D) 64



    Answer: B

18. Parallel lines have equal slopes. The number 2 cannot be written as a product of three identical integers.
    A) $-1\times-1\times-1$ B) $0\times0\times0$ C) $1\times1\times1$ D) 2

    Answer: D

19. If $y = 2x+5$, then $3y = 6x+15$; so $a = 6$, $b = 15$, and $a+b = 21$.
    A) 7 B) 13 C) 21 D) 30

    Answer: C

20. My age in years is a two-digit number. Reversing the digits of my age results in my age 18 years ago. So, $10u+t = 10t+u-18$. Thus, $9t-9u = 18$ or $t-u = 2$.
    A) 1 B) 2 C) 3 D) 4

    Answer: B

21. $\sqrt{M\times A\times T\times M\times A\times T} = M\times A\times T$, so H must be $M\times A\times T$.
    A) $M\times A\times T$ B) $\sqrt{M\times A\times T}$ C) $M^2\times A^2\times T^2$ D) 1

    Answer: A

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