22. Since (1/3 + 1/x) ÷ 2 = 1/4, we can solve to get x = 6.
A) 5 B) 6 C) $\frac{1}{5}$ D) $\frac{1}{6}$
Answer: 22. B

23. There are 10 different letters in the phrase, so each of the 10 digits is used once. The sum is 0+1+2+3+4+5+6+7+8+9 = 45.
A) 9 B) 10 C) 45 D) 55
Answer: 23. C

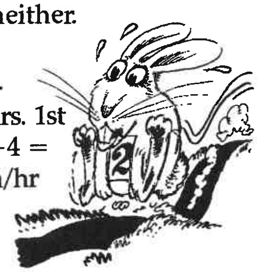
24. Try x = 100 or 121 or 144; A is correct.
A) $\sqrt{x}$ and $\sqrt{x}+1$ B) $\sqrt{x}+1$ and $\sqrt{x}+2$
C) $\sqrt{x}+2$ and $\sqrt{x}+3$ D) $\sqrt{x}+3$ and $\sqrt{x}+4$
Answer: 24. A

25. $1-\frac{1}{2}+\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+\ldots+\frac{1}{2001}-\frac{1}{2002}=1-\frac{1}{2002}=\frac{2001}{2002}$.
A) $\frac{1}{2002}$ B) $\frac{1999}{2002}$ C) $\frac{2001}{2002}$ D) 1
Answer: 25. C

26. The sum of the roots is (−1+2)+(−3+4)+ . . . +(−99+100) = 50.
A) 100 B) 50 C) −50 D) −100
Answer: 26. B

27. If $|x| = -y$, then $y < 0$; so $|y| = -y$. (Try $y = -2$, $x = 2,-2$.)
A) x B) $-x$ C) y D) $-y$
Answer: 27. D

28. $a^2-b^2 = (a+b)(a-b)$ = (even)(even) or (odd)(odd), so a^2-b^2 must be either a multiple of 4 *OR* odd, and 2002 is neither.
A) 2002 B) 2003 C) 2004 D) 2005
Answer: 28. A



29. To run two 60 km laps at 12 km/hr takes 10 hrs. 1st lap at 15 km/hr takes 4 hrs. 2nd lap takes 10−4 = 6 hrs, so 2nd lap rate is 10 km/hr. That's 2 km/hr slower = 16⅔% slower than 12 km/hr.
A) $\frac{50}{3}$ B) 20 C) 25 D) $\frac{250}{3}$
Answer: 29. A

30. You can use just the last 2 digits of each year. Look for a number you can write as a product of digits in the greatest # of ways: 6 = 1×6 = 2×3 = 3×2 = 6×1 (1916, 1923, 1932, 1961). Similarly, 8, 12, 24 can also be written as digit-products in 4 different ways.
A) 2 B) 3 C) 4 D) 6
Answer: 30. C

The end of the contest **A**

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Information & Solutions

Spring, 2002

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 30 points (75% correct). Students with half that, 15 points, *deserve commendation!*
- **Answers & Rating Scale** Turn to page 148 for the letter answers to each question and the rating scale for this contest.

1. If $x+2002 = 2001$, then $x = 2001-2002 = -1$.
A) -1 B) 1 C) -2003 D) 2003 — **1. A**

2. x + (50% of x) = $x + (0.5x) = 1.5x$.
A) $0.5x$ B) $\frac{x}{2}$ C) $1.5x$ D) $150x$ — **2. C**

3. (1000 ants) × (5 hrs) = 5000 ant-hrs = (2500 ants) × (h hrs). Solving, $h = 2$. It took the 2500 ants 2 hours.
A) 1 B) 2 C) 3 D) 4 — **3. B**

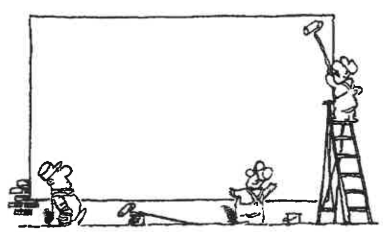
4. There are two primes between 50 and 60: 53 and 59. Thus, the number of primes less than 60 is $n+2$.
A) $n+1$ B) $n+2$ C) $n+3$ D) $n+4$ — **4. B**

5. If $(x + y + z)\div 3 = 18$, then $x + y + z = 3\times 18 = 54$.
A) 6 B) 18 C) 36 D) 54 — **5. D**

6. If $n + n = n\times n$, then $2n = n^2$. This can be rewritten as $n^2 - 2n = 0$ or $n(n - 2) = 0$. The only solutions are 0 and 2.
A) none B) one C) two D) four — **6. C**

7. $(x+1)^2 - (x-1)^2 = x^2+2x+1 - (x^2-2x+1) = 4x$.
A) 2 B) -2 C) $4x$ D) $-4x$ — **7. C**

8. Since $2+2 = 4$, $\sqrt{4}+\sqrt{4} = \sqrt{16}$ and $x = 4$.
A) 2 B) 4 C) 8 D) 12 — **8. B**

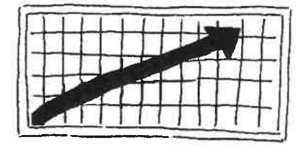


9. Since Q's perimeter is 8014, $n+(n-1)+(n-2)+(n-3) = 8014$. Thus, $4n-6 = 8014$ and $n = 2005$.
A) 2002 B) 2003 C) 2004 D) 2005 — **9. D**

10. Add together the equations $\sqrt{P} + \sqrt{L} = 7$ and $\sqrt{P} - \sqrt{L} = 1$ to obtain $2\sqrt{P} = 8$, $\sqrt{P} = 4$, and $P = 16$.
A) 3 B) 4 C) 9 D) 16 — **10. D**

Go on to the next page ➡ A

11. $(1-x)(2-x) = (-1)(x-1)(-1)(x-2) = (x-1)(x-2) = 6$.
A) -6 B) -36 C) 6 D) 36 — **11. C**



12. The slope between (0,0) and (a,b) = b/a = slope between (0,0) and $(-a,-b)$.
A) $(-a,b)$ B) $(a,-b)$ C) $(-a,-b)$ D) (a^2,b^2) — **12. C**

13. Since 0 is an even number that is both greater than −10 and less than +10, the product is 0.
A) $38\,400^2$ B) 384^2 C) 384 D) 0 — **13. D**

14. The slope of the line joining $(a,0)$ and $(0,a)$, $a \neq 0$, is $-a/a = -1$, so the correct answer is C.
A) 0 B) 1 C) -1 D) undefined — **14. C**

15. Since x^4 is a factor of x^6, the LCM of $4x^4$ and $6x^6$ is $12x^6$.
A) $2x^4$ B) $12x^6$ C) $12x^{12}$ D) $24x^{24}$ — **15. B**

16. $\pi(\pi^2+\pi) + \pi(\pi^2-\pi) = \pi^3 + \pi^2 + \pi^3 - \pi^2 = 2\pi^3$.
A) 0 B) π^3 C) $2\pi^3$ D) $2\pi^3+2\pi^2$ — **16. C**

17. Divide both sides of the equation $3ax^2+3bx+3c = 0$ by 3 to get the equivalent equation $ax^2+bx+c = 0$ with the same roots.
A) 2 and 3 B) 6 and 9 C) 18 and 27 D) -2 and -3 — **17. B**

18. $p\div 0.5p = p\div(p/2) = p\times(2/p) = 2 = 200\%$.
A) (1/2)% B) 20% C) 50% D) 200% — **18. D**

19. $(\pm5,0)$, $(0,\pm5)$, $(\pm3,4)$, $(\pm3,-4)$, $(\pm4,3)$, and $(\pm4,-3)$ all satisfy $x^2+y^2 = 25$.
A) twelve B) eight C) six D) four — **19. A**

20. $10^3\times(1.76x)^3 = 7883$, so $(1.76x)^3 = 7.883$.
A) 788.3 B) 78.83 C) 7.883 D) 0.7883 — **20. C**

21. If $n = 3$, then n, $n+2$, and $n+4 = 3, 5$, and 7. If $n > 3$, then n, or $n+2$, or $n+4$ is divisible by 3.
A) none B) one C) two D) three — **21. B**

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