

Nassau County Interscholastic Mathematics League

Contest #2 Answers must be in simplest exact form, unless otherwise noted.

2003-2004

Calculators

Problems 7-8 Time limit: 10 minutes.

- 7) For how many integers x will it be true that $2x^2 \leq 7x + 15$?
- 8) Find the area of a square inscribed in a circle with equation $x^2 + y^2 = 64$.
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Problems 9-10 Time limit: 10 minutes.

- 9) A function f is called even if $f(-x) = f(x)$ for all real x . How many of the ten functions listed below are even?
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|------------------------|-----------------|--------------------|----------------|------------|
| (i) $\sin(x)$ | (ii) $\cos(x)$ | (iii) 5 | (iv) $x^2 + 3$ | (v) $3x^3$ |
| (vi) $4x^3 + 2x^2 - x$ | (vii) $\tan(x)$ | (viii) $\log_2(x)$ | (ix) $ x $ | (x) 2^x |
- 10) Find the number base for which $(257)(9) = 1643$ (Note: all three numbers are written in a base other than base ten. Find that base).
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Problems 11-12 Time limit: 10 minutes.

11. Each box of the candy Cracker-Jill contains one of six prizes, all of which are equally likely to be found in any given box. Jack buys six boxes. Find the probability that he gets one of each prize. Express your answer either as a fraction in simplest form or as a decimal to the nearest **ten-thousandth**.
12. Find the length of the shortest altitude of the triangle with sides of length 18, 80, and 82. Express your answer either as a fraction in simplest form or as a decimal to the nearest **thousandth**.
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- Answers:
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|-----|---------------------------|-----|----------------------------|
| 7) | 7 | 8) | 128 |
| 9) | 4 | 10) | 15 |
| 11) | $\frac{5}{324}$ or 0.0154 | 12) | $\frac{720}{41}$ or 17.561 |
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