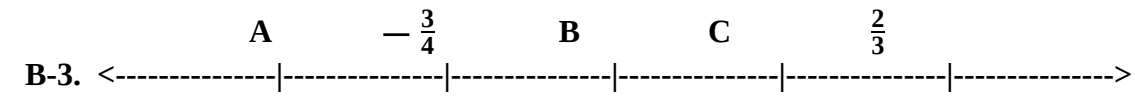
B-1. Evaluate: $(2 + 4 \times 3 - 4) \div 2 \times 3 + 2^4 - 3!$

(A) 0 **(B)** 17 **(C)** 23 **(D)** 25 **(E)** 31

B-2. Les Cash buys 4 DVDs at the regular price of $9.95 each. He has a coupon giving him 25% off of the regular price. He has to pay 8% sales tax on the total sale price. How much change should Les receive if he gives the cashier two $20.00 bills?

(A) $7.24 **(B)** $7.76 **(C)** $9.95 **(D)** $10.15 **(E)** $10.75

B-3.



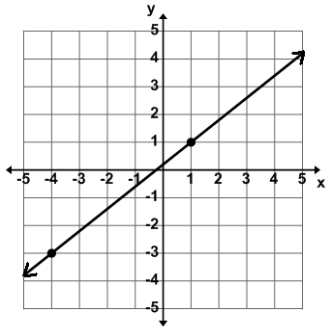
The distances between the hash marks (|) are equal. Find the length of segment AB.

(A) $\frac{17}{6}$ **(B)** $\frac{17}{12}$ **(C)** $\frac{17}{18}$ **(D)** $\frac{17}{24}$ **(E)** $\frac{17}{36}$

A1-4. If $x - y = 6$ **and** $xy = 4$, **then** $x^2 + y^2 = ?$

(A) 16 **(B)** 24 **(C)** 32 **(D)** 36 **(E)** 44

A1-5. Which of the following is an equation of the line shown?



(A) $4x - 5y = -1$ **(B)** $5x + 4y = 1$ **(C)** $4x + 5y = -1$

(D) $-4x - 3y = 1$ **(E)** $4x - 3y = -1$

A1-6. The *Ye Olde Sweet Tooth Shoppe* mixed some peppermint candy worth $1.50 a pound with some sour balls worth 75¢ a pound. How many pounds of sour balls did they mix with the peppermint candy to make a 2 pound bag that sells for $1.25 a pound?

(A) $\frac{1}{3}$ lb **(B)** $\frac{1}{2}$ lb **(C)** $\frac{2}{3}$ lb **(D)** 1 lb **(E)** $1\frac{1}{3}$ lbs

G-7. The range of the relation $(x + 4)^2 + (y - 3)^2 = 16$ **is:**

(A) $[-8, 0]$ **(B)** $(-1, 7]$ **(C)** $[-8, 0)$ **(D)** $[-1, 7]$ **(E)** $(-8, 7)$

G-8. Horace Troff has a rectangular water tank that is 2 feet deep, 10 feet long, and 3 feet wide. How many gallons of water does it hold when it is full? (nearest gallon)

(A) 460 gal (B) 449 gal (C) 345 gal (D) 240 gal (E) 60 gal

G-9. The ratio of a rectangle's width to its length is 1:2 and the measure of its diagonal is 5 inches. The area of the rectangle is:

(A) 10 in^2 (B) 12.5 in^2 (C) 15 in^2 (D) 20 in^2 (E) 25 in^2

A2-10. If $\frac{A}{x+6} + \frac{B}{2x+1} = \frac{13x+23}{2x^2+13x+6}$, where A and B are constants, then B equals:

(A) 1 (B) 3 (C) 5 (D) 7 (E) 9

A2-11. If $\frac{3x+1}{x+3} + \frac{2x-1}{x-2} = \frac{Ax^2+Bx+C}{Px^2+Qx+R}$, then $\frac{A+B+C}{P+Q+R}$ equals:

(A) -5 (B) -2.5 (C) 0 (D) $1\frac{2}{3}$ (E) 5

A2-12. Lotta Scents has a bag of nickels, dimes, and quarters. The number of quarters is twice the number of nickels and there are eight more dimes than nickels. How many nickels does Lotta have if the total value is $6.65?

(A) 18 (B) 17 (C) 13 (D) 11 (E) 9

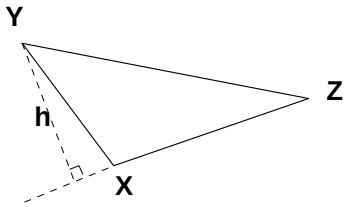
T-13. Let y = sin(kπx), where $0 \le x \le \frac{2}{k}$ and $k > 0$. The maximum value of y on the graph occurs when x equals:

(A) k (B) $\frac{2}{k}$ (C) $\frac{1}{2k}$ (D) $\frac{k}{2}$ (E) $\frac{1}{k}$

T-14. The expression $\frac{\cos\theta}{\sec\theta} - \frac{\sin\theta}{\csc\theta}$ is equivalent to:

(A) -1 (B) 0 (C) 1 (D) sin 2θ (E) cos 2θ

T-15. A triangle is drawn as shown. Find h if XZ = 8", XY = 6", and YZ = 12" . (nearest tenth)



(A) 4.7" (B) 4.9" (C) 5.1" (D) 5.3" (E) 5.8"

An-16. The conic $x^2 + 12xy + 6y^2 + 2y - 16 = 0$ is a(n) _____.

(A) circle (B) degenerate (C) ellipse (D) hyperbola (E) parabola

An-17. Use the Fibonacci characteristic sequence ..., —2, p, q, 4, 5, r, ... to find $p + q + r$.

(A) 13 (B) 7 (C) 20 (D) 9 (E) 24

An-18. Let $6x^4 + 5x^3 — 14x^2 + x + 2 = 0$. According to Descartes' Rule of Signs how many possible negative real roots are there?

(A) 0 or 2 (B) 0 or 4 (C) 0, 2, or 4 (D) 1 or 3 (E) 1, 3, or 5

C-19. Let $f(x) = 2x^2 — 3x — 4$ and $g(x) = x + 1$. Find $g(f'(x — 1))$.

(A) $4x — 3$ (B) $2x^2 — 3x — 4$ (C) $4x — 7$ (D) 1 (E) $4x — 6$

C-20. The graph of $x — 3y + 3xy = 0$ has how many asymptotes?

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

P-21. Dee Deeler shuffles a standard deck of 52 cards. Then she deals the top 3 cards face up. What is the probability that they are all red cards (diamonds or hearts)? (nearest tenth)

(A) 19.2% (B) 15.0% (C) 14.7% (D) 12.9% (E) 11.8%

P-22. Dr. Skow has 10 students in his probability and statistics class. The names of his top two students are Don and Larry. How many 5-member committees can Dr. Skow form if each committee contains Don or Larry but not both?

(A) 252 (B) 140 (C) 126 (D) 120 (E) 28

M-23. Given that the set of natural numbers continue in the triangular pattern shown below, find the sum of the numbers in the 7th row.

			1				(row 1)
		2	3	4			(row 2)
	5	6	7	8	9		(row 3)
10	11	12	13	14	15	16	(row 4)
			...				(...)

(A) 409 (B) 453 (C) 523 (D) 559 (E) 609

M-24. The repeating decimal 0.464646... in base 8 can be written as which of the following fractions in base 8?

(A) $\frac{46}{77}_8$ (B) $\frac{23}{40}_8$ (C) $\frac{46}{72}_8$ (D) $\frac{23}{32}_8$ (E) $\frac{23}{36}_8$

NT-25. How many positive integers less than or equal to 50 contain at least one 4 but do not contain any 1's?

(A) 4 (B) 12 (C) 13 (D) 17 (E) 22

NT-26. How many integers k, where $1 \leq k \leq 2015$, are divisible by 10 or 5?

(A) 201 (B) 202 (C) 363 (D) 403 (E) 604

NS-27. The first term of an arithmetic sequence is 4 and the common difference is 3. How many terms are in the sequence if the sum of the terms is 116.

(A) 6 (B) 7 (C) 8 (D) 10 (E) 12

NS-28. A, B, and C are the real roots of $x^3 + 2x^2 - 9x - 18 = 0$. Find $(A + B + C) - (AB + BC + AC)$.

(A) 6 (B) 7 (C) 11 (D) 14 (E) 16

SP-29. Find the value of $A + 2B + 3C$, where A, B, and C are positive integers such that

$$\frac{24}{5} = A + \left(\frac{1}{B + \left(\frac{1}{C+1}\right)}\right).$$

(A) 9 (B) 12 (C) 15 (D) 16 (E) 20

SP-30. Let $f_0 = 0$, $f_1 = 1$, $f_2 = 1$, $f_3 = 2$, $f_4 = 3$, ... be the terms of the Fibonacci sequence. Find GCD(f_{12}, f_6).

(A) 1 (B) 2 (C) 3 (D) 4 (E) 8

Mathematicians (No new mathematicians this year)

Agnesi	Archimedes	Boole, George	Byron, Ada (Lady Lovelace)
Cantor, Georg	Descartes, Rene	Diophantus	Erastosthenes
Euclid	Euler, Leonard	Germain, Sophie	Goldbach, Christian
Hypatia	Kovalevsky, Sonya	Leibniz, Gottfried	Mandelbrot, Benoit
Napier, John	Noether, Emmy	Porter, Freda	Ptolemy, Claudius
Smith, Karen E.	Stott, Alicia	Theano	Venn, John
Williams, Grace	Zeno of Elea		

Types of Numbers (No new numbers this year)

Complex	Real	Imaginary	Rational	Irrational
Transcendental	Integer	Whole	Natural	Even
Odd	Prime	Composite	Unit	Deficient
Frugal	Economical	Perfect	Equidigital	Abundant
Extravagant	Wasteful	Fibonacci	Lucas	Happy
Unhappy	Lucky	Unlucky	Evil	Odious
Polite	Primeval	Harmonic		

Special Emphasis Concepts: (No special emphasis concepts this year.)

This year's tests will revisit special problems from the past several years.

The numbering system used on this year's SAC test was designed to show the students/coaches how the test is constructed, e.g. B-basic math, A1-Algebra1, G-Geometry, A2-Algebra2, etc.