Name: __*Solutions*_____ Date: _____ Score: _____

MATHEMATICS TEST
8 Minutes—8 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note:Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word line indicates a straight line.
4. The word average indicates arithmetic mean.

Pre-Algebra 23% ~ about 14 out of 60

1. Which of the following is true for all consecutive integers *m* and *n* such that *m* < *n* ?
F. *m* is odd
G. *n* is odd
H. *n* – *m* is even
J. $n^2 - m^2$ is odd
K. $m^2 + n^2$ is even

If the numbers are consecutive, then one must be even and the other odd - if the first one is add, the second is even or if the first is even, the second is odd.
F. false (you don't know which one is odd or even).
G. false (you don't know which one is odd or even)
H. false(the numbers are consecutive so n-m = 1)
J. true (an even number squared is still even, and an odd number squared is still odd, therefore the difference is odd)
K. false (for the same reason J is true)

2. $|7-3| - |3-7|$?
A. -8
B. -6
C. -4
D. 0
E. 8

Simplify the expression, using the correct order of operations:
$|7-3| - |3-7| = |4| - |-4| = 4 - 4 = 0$

3. Vehicle A averages 14 miles per gallon of gasoline, and Vehicle B averages 36 miles per gallon of gasoline. At these rates, how many more gallons of gasoline does Vehicle A need than Vehicle B to make a 1,008-mile trip?
A. 25
B. 28
C. 44
D. 50
E. 72

Vehicle A: At 14 mpg a 1008 mile trip will require $1008\,miles \div 14\,mpg = 72\,gallons$
Vehicle B: At 36 mpg a 1008 mile trip will require $1008\,miles \div 36\,mpg = 28\,gallons$
Vehicle A requires 72-28 or 44 more gallons than Vehicle B

Elementary Algebra 17% ~ about 10 out of 60

4. Which of the following is a factored form of the expression $5x^2 - 13x - 6$?

A. $(x - 3)(5x + 2)$ $\quad$ $Use\ FOIL\ to\ verify: (x-3)(5x+2) = 5x^2 + 2x - 15x - 6 = 5x^2 - 13x - 6$

B. $(x - 2)(5x - 3)$
C. $(x - 2)(5x + 3)$
D. $(x + 2)(5x - 3)$
E. $(x + 3)(5x - 2)$

Intermediate Algebra 15% ~ about 9 out of 60

5. What are the real solutions to the equation $|x|^2 + 2|x| - 3 = 0$?

F. ± 1
G. ± 3
H. 1 and 3
J. –1 and –3
K. $\pm 1 and \pm 3$

$Factor\ the\ original\ equation: |x|^2 + 2|x| - 3 = (|x| + 3)(|x| - 1)$

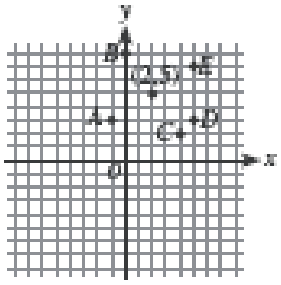
$so\ the\ solutions\ are: |x| = -3\ and\ |x| = 1$

$There\ are\ no\ values\ of\ x\ which\ make\ the\ first\ statement\ true$

$The\ 2nd\ statement\ is\ equivalent\ to\ x = \pm 1$

Coordinate Geometry 15% ~ about 9 out of 60

6. The point (2,5) is shown in the standard (x,y) coordinate plane below. Which of the following is another point on the line through the point (2,5) with a slope of $-\frac{2}{3}$?



A. $A(-1,3)$
B. $B(0,8)$
C. $(4, 2)$
D. $(5, 3)$
E. $E(5,7)$

Draw a line on the graph starting at (2,5) using the given slope:
1) Put a point at (2,5)
2) Move down 2 units and to the right 3 units and plot the next point.
3) Repeat step #2 as needed

Only point D is on the line

-or-

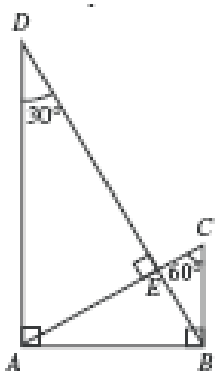
Write an equation for the line in point-slope form: $y - 5 = -\frac{2}{3}(x - 2)$

Plug in the coordinates for each answer choice. Only answer D works in the equation.

Plane Geometry 23% ~ about 14 out of 60

7. For the triangles in the figure below, which of the following ratios of side lengths is equivalent to the ratio of the perimeter of **triangle** *ABC* to the perimeter of **triangle** *DAB* ?

F. *AB*:*AD*
G. *AB*:*BD*
H. *AD*:*BD*
J. *BC*:*AD*
K. *BC*:*BD*



Both of the triangles are 30-60-90 triangles, so the ratio of their side lengths is $1:\sqrt{3}:2$ *(small side: medium side: long side).*

AB is the medium side in triangle ABC, while it is the small side in triangle DAB, so the lengths of the sides are:

Triangle ABC: $\frac{AB}{\sqrt{3}},\ AB,\ \frac{2AB}{\sqrt{3}}$

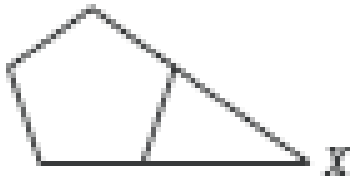
Triangle DEF: $AB,\ \sqrt{3}AB,\ 2AB$

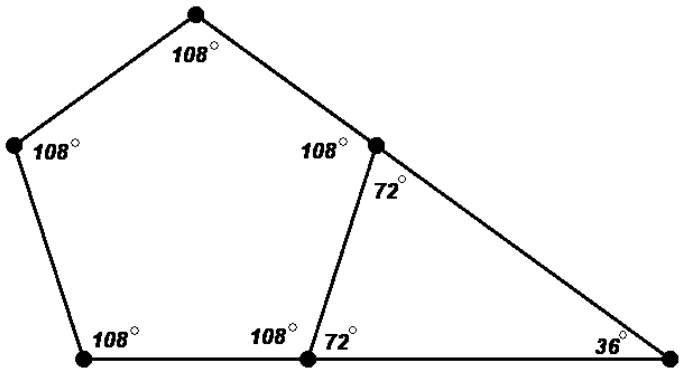
Each side in triangle DEF is $\sqrt{3}$ *times as big as the corresponding side in triangle ABC, so the ratio of the perimeters of ABC to DAB is* $1:\sqrt{3}$

The answer with the same ratio is AB:AD (a short to a medium side ratio)

8. In the figure below, 2 nonadjacent sides of a regular pentagon (5 congruent sides and 5 congruent interior angles) are extended until they meet at point *X*. What is the measure of $\angle X$?

A. 18°
B. 30°
C. 36°
D. 45°
E. 72°





The sum of the interior angles of the regular pentagon is 540°*,*
Therefore each interior angle measures $540^\circ / 5 = 108^\circ$

The sum of the exterior angles of the regular pentagon is 360°
therefore each exterior angle measures $360^\circ / 5 = 72^\circ$

The angles of the new triangle must add up to 180°*,*
so angle X measures 36°