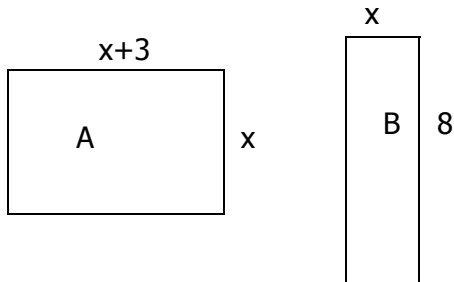


National MAθ Convention 2002  
Hustle.....Algebra II

# 1 If the area of the 2 rectangles is the same, find the dimensions of each.



Ans. 5 by 8 for each rectangle

# 2 If  $f(x) = 7x - 26$ , find  $f(f^{-1}(4))$ .

Ans. 4

# 3 Simplify with positive exponents

only:  $\left(\frac{y^{-1} - x^{-1}}{y^{-2} - x^{-2}}\right)\left(\frac{1}{x}\right)^0$ .

Ans.  $\frac{xy}{x+y}$

# 4 What is the minimum value that the expression  $|x-4|-5$  can attain?

Ans. -5

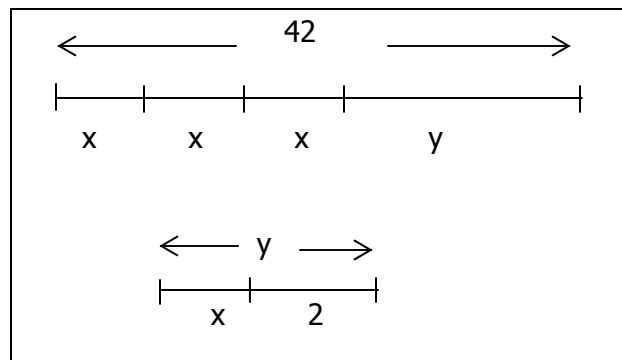
# 5 Find the sum of the roots for  $x(x+1) - 5(x+1) = 0$ .

Ans. 4

# 6 Define  $a \odot b = a^2 + b^2$ , find  $2.4 \odot 7.6$ .

Ans. 63.52

# 7 Use the diagrams to solve for  $x$ .



Ans.  $x = 10$

# 8 Simplify and solve for  $x$ :

$$5|x-5| + 6|x-5| - 3|x-5| = 40$$

Ans.  $x = 0$  or  $x = 10$

# 9 Solve for  $x$ :

$$(x^2 - x)^2 - 26(x^2 - x) + 120 = 0$$

Ans.  $\{-4, -2, 3, 5\}$

# 10 Simplify:

$$16x - 3[2x - (7 - 2x) - 5(x + 1) + 7]$$

Ans.  $19x + 15$

# 11 Give the exact roots for  $x$ :

$$2x^2 - 5x + 1 = 0.$$

Ans.  $\frac{5 \pm \sqrt{17}}{4}$

# 12 Multiply:

$$(x + 6y)(x^2 - 6xy + 36y^2)$$

Ans.  $x^3 + 216y^3$

# 13 Two forestry stations are located at  $F_1(-5, -2)$  and  $F_2(9, 5)$ . Which station is closest to a fire located at  $(-3, 9)$ ?

Ans.  $F_1$

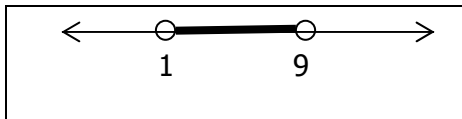
# 14 The lines  $\frac{4x-2y}{3} = 3$  and  $3x + y = 2 + kx$  are parallel. Find the value of  $k$ .

Ans.  $k = 5$

# 15 Simplify:  $(12+i)^2 - (i-12)^2$

Ans.  $48i$

# 16 Write an absolute value inequality



for the graph.

Ans.  $|x - 5| < 4$

# 17 Simplify completely:  $\frac{(6^{2x+y})(6^y)}{6^{2y}}$

Ans.  $6^{2x}$

# 18 Which of the following has the smallest value?

$$27^{-\frac{2}{3}}, 216^{\frac{2}{3}}, 16^{-\frac{5}{4}}, 64^{-\frac{1}{6}}$$

Ans.  $16^{-\frac{5}{4}}$

# 19 If  $p^2 + q^2 = 5$  and  $pq = -2$ , find the positive value of  $p - q$ .

Ans. 3

# 20 Three sides of a triangle have sides  $7x^2 + 6x - 10$ ,  $15x^2 - 8x + 9$  and  $4x^2 + 12x - 6$ . Find the perimeter of the triangle.

Ans.  $26x^2 + 10x - 7$

# 21 Solve for  $x$ :  $5(3c - x) - (2c - x) = 7x + 2c$ .

Ans.  $x = c$

# 22 Write an equation in standard form of the line that passes through the points  $(-6, 6)$  and  $(9, 1)$ .

Ans.  $x + 3y = 12$

# 23 The slope of the line perpendicular to the line represented by  $6x - 14y = 28$  is ?

Ans.  $-\frac{7}{3}$

# 24 Solve for  $x$ :  $6 - (3 + x) < 8 - 2x$

Ans.  $x < 5$

# 25 If  $f(x) = -3x + 1$  and  $g(x) = 2x^2$ , find  $(f \circ g)(x)$ .

Ans.  $-6x^2 + 1$