

# Algebra I Individual Test Solutions - Match Regional 3/11/95

## of Team

D.1. D

C 2.  $-(3x+5y) - (6x-3y)$   
 $-3x-5y-6x+3y$   
 $-9x-2y$

B 3.  $\frac{3}{y}$

C 4.  $g = b + 90$      $\frac{b+90}{b} = \frac{5}{3}$   
 $g = b$   
 $3b + 270 = 5b$

A 5.  $\begin{cases} 3x + y = 42 \\ y = x + 2 \end{cases}$   
 Substitute for y  
 $3x + x + 2 = 42$   
 $x = 10$

D 6.  $y = \frac{2}{3}(-4)x - 4$   
 $\frac{2}{3}y = -\frac{8}{3}x - 4$  or  $8x + 3y = -12$

D 7.  $7|x-5| < 5|x-5| + 14$   
 $\frac{-5|x-5| - 5|x-5|}{2|x-5|} < \frac{14}{2}$   
 $2|x-5| < 14$   
 $|x-5| < 7$   
 $-7 < x-5 < 7$   
 $-2 < x < 12$

C 8.  $y = 3x^2 - 2x + 1$   
 vertex  $-\frac{b}{2a} = \frac{2}{6}$   
 $(\frac{1}{3}, \frac{2}{3})$   $3 \cdot \frac{1}{9} - 2 \cdot \frac{1}{3} + 1$   
 $\frac{1}{3} - \frac{2}{3} + 1 = \frac{2}{3}$

C 9.  $ax + b = cx + d$   
 $ax - cx = d - b$   
 $x(a-c) = d - b$   
 $x = \frac{d-b}{a-c}$

B 10.  $(x+2)^2 + 5(x+2) + 6 = 0$   
 $(x+2+2)(x+2+3)$   
 $(x+4)(x+5) = 0$   
 $x = -4, -5$   
 $|-4 - (-5)| = 1$

B 11.  $(3x+1)(4x-2) - (2x-3)(4x+5)$   
 $(12x^2 - 2x - 2) - (8x^2 - 2x - 15)$   
 $12x^2 - 2x - 2 - 8x^2 + 2x + 15$   
 $4x^2 + 13$

E 12.  $\frac{10}{(5-\sqrt{3})} \cdot \frac{(5+\sqrt{3})}{(5+\sqrt{3})} = \frac{50+10\sqrt{3}}{25-3}$   
 $\frac{50+10\sqrt{3}}{22} = \frac{25+5\sqrt{3}}{11}$

B 13. 

	R	t	d
R	$10+x$	$\frac{210}{10+x}$	210
L	$x$	$\frac{180}{x}$	180

  
 $\frac{210}{10+x} = \frac{180}{x}$   
 $210x = 1800 + 180x$   
 $30x = 1800$   
 $x = 60$  Leo  
 Roger = 70 mph

D 14. L to  $2x - 3y = 6$  passing through  
 is  $3x + 2y = -26$   $(-4, -7)$

B 15.  $2x + 5y = 8$   
 $5x + 2y = 6$   
 $\frac{7x + 7y = 14}{x + y = 2}$   
 $14(x+y) = 28$

C 16.  $.64^{\frac{1}{2}} = .8$   
 $.064^{\frac{1}{3}} = .4$   
 $\frac{.8}{.4} = 1.2$

	liters	alcohol
40%	x	.4x
20%	8	1.6
25%	8+x	.25(8+x)

$.4x + 1.6 = .25(8+x)$   
 $.4x + 1.6 = 2 + .25x$   
 $.15x = .4$   
 $x = 2\frac{2}{3}$  or  $\frac{8}{3}$

C 18.  $16^{-3/4} \Rightarrow \frac{1}{16^{3/4}}$   
 $\Rightarrow \frac{1}{\sqrt[4]{16^3}} \Rightarrow \frac{1}{8}$

D 19.  $3x^2 - 2x = 5$   
 $a=3, b=-2, c=-5$   
 $b^2 - 4ac$   
 $4 - 4 \cdot 3 \cdot (-5) = 4 + 60$   
 $= 64$

A 20. slope =  $\frac{12-6}{6-0}$  or 3

A  $m = \frac{12-3}{6-3}$  or 3

B.  $m = \frac{12-1}{6-2}$  or  $\frac{11}{4}$

C.  $m = \frac{12-16}{6-7}$  or  $\frac{-4}{-1}$

D.  $m = \frac{12-4}{6-1}$  or  $\frac{8}{5}$

B 21.  $\frac{20\sqrt{2} - 21\sqrt{2} + 6\sqrt{2}}{4\sqrt{50} - 3\sqrt{98} + 2\sqrt{18}}$   
 $= \frac{-5\sqrt{2}}{-11\sqrt{2}}$   
 $= \frac{5}{11}$

D 22.  $x = 40, y = 10$   
 $x + y = 50$

A 23.  $\frac{1}{20} + \frac{1}{30} = x$   
 $\frac{50}{600} = x, x = \frac{1}{12}$

C 24.  $m = -\frac{2}{3}$  y-int = 2  
 $y = -\frac{2}{3}x + 2$   
 $3y = -2x + 6$   
 $2x + 3y = 6$

B 25.  $10x + 25x + 50x = 935$   
 $85x = 935$   
 $x = 11$   
 11 dimes, 11 quarters,  
 11 half-dollars  
 33 coins

D 26.  $3x - y = -8$   
 $-y = -3x - 8$   
 $y = 3x + 8$   
 $m = 3, y\text{-int} = 8$

D 27.  $\frac{q}{1} = \frac{2p+1-p}{2-2}$   
 $\frac{q}{1} = \frac{p+1}{4}$   
 $36 = p+1$   
 $35 = p$

B 28.  $AB = 17, BC = 23$   
 $AC = 40$

C 29.

$$\frac{(2x-1)(x+3)}{2x^2+5x-3} \cdot \frac{(x+2)(x-2)}{x^2-4}$$

$$\frac{x^2-5x+6}{(x-2)(x-3)} \cdot \frac{x^2+5x+6}{(x+3)(x+2)}$$

$$\frac{2x-1}{x-3}$$

C 30

$$\begin{array}{r} \boxed{3x^2+4} \\ x-3 \overline{) 3x^3-9x^2+Kx-12} \\ \underline{-3x^3+9x^2} \phantom{-12} \\ Kx-12 \\ \underline{-4x+12} \\ -K=4 \end{array}$$

Team Solutions

(-20/7) 1. Must have same slope  
 $m = \frac{11}{-7}$       $\frac{11}{-7} = \frac{n-5}{5}$

$$55 = -7n + 35$$

$$20 = -7n$$

$$\frac{-20}{7} = n$$

(5) 2.  $x^9 - x = x(x^8 - 1)$   
 $= x(x^4 + 1)(x^4 - 1)$   
 $= x(x^4 + 1)(x^2 + 1)(x^2 - 1)$   
 $= x(x^4 + 1)(x^2 + 1)(x + 1)(x - 1)$   
 5 factors

(0) 3.  $(x^3 - 3x^2 - 3x + 1) \div (x - 2)$   
 Remainder is: -9  
 $(2x^3 + 6x^2 + 6x + 2) \div (x - 4)$   
 Remainder is: 250  
 $(x^3 - 3x^2 - 3x + 1) \div (x + 1)$   
 Remainder is: 0  
 $(2x^3 + 6x^2 + 6x + 2) \div (x - 2)$   
 Remainder is: 54

3. continued  
 Product is:  $(-9)(250)(0)(54) = 0$

(-5 ± √21) / 2

$$\left( \frac{5}{x} + \frac{x}{x+3} = \frac{14}{x^2+3x} \right) x^2+3x$$

$$5x+15+x^2=14$$

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

$$x = \frac{-5 \pm \sqrt{25-4}}{2}$$

$$= \frac{-5 \pm \sqrt{21}}{2}$$

(-25) 5.  $|2x+5| \leq 10$   
 $2x+5 \leq 10$  AND  $2x+5 \geq -10$   
 $2x \leq 5$                        $2x \geq -15$   
 $x \leq 5/2$  AND                 $x \geq -15/2$   
 Integers in solution are  
 $\{-7, -6, -5, -4, -3, -2, -1, 0, 1, 2\}$   
 Sum is -25

(40) 6.  $x =$  what she's paid back  
 $\frac{2}{3}x = \frac{3}{4}(85-x)$   
 $x = 45$   
 She owes  $85 - 45$  or \$40

(-3a+b) or b-3a

$$7. \quad xb - a(x - 4b) = 3a^2 + b^2$$

$$xb - ax + 4ab = 3a^2 + b^2$$

$$\frac{x(b-a)}{(b-a)} = \frac{3a^2 + b^2 - 4ab}{(b-a)}$$

$$x = \frac{3a^2 - 4ab + b^2}{b-a}$$

$$= \frac{(3a-b)(a-b)}{b-a}$$

$$= -3a+b \text{ or } b-3a$$