

**ALGEBRA I INDIVIDUAL ANSWERS**

**MARCH 20, 1993**

- |       |       |
|-------|-------|
| 1) C  | 16) D |
| 2) A  | 17) A |
| 3) B  | 18) D |
| 4) A  | 19) A |
| 5) C  | 20) D |
| 6) B  | 21) E |
| 7) D  | 22) C |
| 8) B  | 23) D |
| 9) C  | 24) D |
| 10) A | 25) C |
| 11) B | 26) C |
| 12) C | 27) B |
| 13) E | 28) C |
| 14) B | 29) B |
| 15) B | 30) D |

MU ALPHA THETA REGIONAL COMPETITION  
MARCH 20, 1993

ALGEBRA I INDIVIDUAL TEST

<p>① <math>1993 = 1993 \times 1</math> sum of prime factors is 1993. The number 1 is <u>not</u> prime</p> <p style="text-align: right;">[c]</p>	<p>② <math>6x^2 - x - 7 = 0</math> <math>(6x - 7)(x + 1) = 0</math> <math>x = \frac{7}{6} = 1\frac{1}{6}</math> <math>x = -1</math></p> <p style="text-align: right;">[a]</p>	<p>③ <math>6 - 2x &lt; 9</math>      <math>-6 + 2x &lt; 9</math> <math>-2x &lt; 3</math>              <math>2x &lt; 15</math> <math>x &gt; -\frac{3}{2}</math>                <math>x &lt; 7\frac{1}{2}</math></p> <p><math>-1 + 0 + 1 + 2 + 3 + 4 + 5</math> <math>+ 6 + 7 = 27</math></p> <p style="text-align: right;">[b]</p>
<p>④ <math>\overline{AB} = \sqrt{18} = 3\sqrt{2}</math> <math>\overline{AC} = \sqrt{50} = 5\sqrt{2}</math> <math>\overline{BC} = \sqrt{32} = 4\sqrt{2}</math> Perimeter = <math>12\sqrt{2}</math></p> <p style="text-align: right;">[a]</p>	<p>⑤ <math>(x - 8)(x - 2) = 0</math> <math>x = 8</math> } sum = <math>[10 = A]</math> <math>x = 2</math> }</p> <p><math>(x + 12)(x - 2) = 0</math> <math>x = -12</math> } product = <math>[24 = B]</math> <math>x = 2</math> }</p> <p><math>3(10) - 10(-24) = 270</math></p> <p style="text-align: right;">[c]</p>	<p>⑥ <math>0^8 = 0</math> <math>3^0 = 1</math> <math>2^1 = 2</math> <math>(-5)^2 = 25</math></p> <p style="text-align: right;">[b]</p>
<p>⑦ <math>7^{2x(x-7)} = 7^0</math> <math>2x(x-7) = 0</math> <math>x = 0</math> <math>x = 7</math></p> <p style="text-align: right;">[d]</p>	<p>⑧ <math>\left(\frac{3^{12}}{x^4 y^{36}}\right) \left(\frac{x^5}{3^8 y^2}\right) =</math> <math>\frac{x^3 3^4}{y^{38}}</math> <math>1 + 4 + 38 = 43</math></p> <p style="text-align: right;">[b]</p>	<p>⑨ <math>F = \frac{9}{5}(0) + 32</math> <math>F = 32^\circ</math> <math>F = \frac{9}{5}(50) + 32</math> <math>F = 122^\circ</math> <math>122^\circ - 32^\circ = 90^\circ</math></p> <p style="text-align: right;">[c]</p>
<p>⑩ <math>g\sqrt{3} = 5</math> <math>f(5) = 25 + 20 - 5 = 40</math></p> <p style="text-align: right;">[a]</p>	<p>⑪ <math>\sqrt[3]{2^{12} 2^{18} 2^{18}}</math> <math>\sqrt[3]{2^{48}} = 2^{16}</math></p> <p style="text-align: right;">[b]</p>	<p>⑫ <math>x^2 - 16x + 60 = 0</math> <math>(x - 6)(x - 10) = 0</math> <math>x = 6</math> } sum = 16 <math>x = 10</math> }</p> <p><math>\frac{6}{10} = \frac{3}{5}</math> ratio [c]</p>

(73)  $3x + 2y = 9$   
 $y = -\frac{3}{2}x + \frac{9}{2}$

⊥ means  $m_1 = \frac{2}{3}$   
 $b = -3$

$y = \frac{2}{3}x - 3$

$2x - 3y = 9$

**C**

	Rate	Time	Distance
up	$r - c$	$\frac{7}{2}$	15
down	$r + c$	$\frac{5}{4}$	10

$r - c = \frac{30}{7}$        $-2c = -\frac{26}{7}$

$r + c = \frac{56}{7}$        $c = \frac{13}{7} = 1\frac{6}{7}$  mph

**b**

(5)  $10x = 2.4666$   
 $x = 0.2466$

$9x = 2.22$

$x = \frac{222}{900} = \frac{37}{150}$

$37 + 150 = 187$

**b**

(16)  $\frac{(48)(3)}{(2)(2\sqrt{3})} = \frac{36 \cdot \sqrt{3}}{\sqrt{3} \sqrt{3}}$

$\frac{36\sqrt{3}}{3} = 12\sqrt{3}$

**d**

(17)  $\frac{x}{20} - \frac{x}{28} = 1$

$28x - 20x = 560$

$8x = 560$

$x = 70$  min.

$x = 1\frac{1}{6}$  hr.

**a**

add:  
 $8x + y + 3z = 10$   
 $-2x + 4y - z = -14$   
 $\hline = 5x - 6y - 2z = 8$

$x - y = 4$

**d**

(19)  $5a - 2b = -24$   
 $-5a - 20b = -75$   
 $\hline -22b = -99$

$b = \frac{9}{2}$

$a = -3$

$\frac{a}{b} = -\frac{3}{1} \cdot \frac{2}{9} = -\frac{2}{3}$

**a**

(20)  $(85 - 83)(85 + 83) = (2)(168)$   
 $= 336$

$(28 - 30)(28 + 30) = (-2)(58)$   
 $= -116$

$A - B = 336 - (-116)$   
 $= 452$

**d**

(21)  $\sqrt{(5x - 8)^2}$   
 $= 5x - 8 = \text{side of square}$

$4(5x - 8) = \text{perimeter}$   
 $= 20x - 32$

**C**

(22)  $(3x - 5)(3x + 5)(x + 5)$   
 $(-2)(8)(5) = -80$   
 (let  $x = 1$ )

sum = -80

**C**

(3)  $x + 5x + 10x + 25x + 50x = 2184$   
 $91x = 2184$

$x = 24$  of each type

$5(24) = 120$  total coins

**d**

(24)  $3^{1.5} = 5$   
 $(3^{1.5})^4 = 5^4$   
 $3^6 = 625$

**d**

(25)  $x - y = 2$   
 $-x - 3y = -18$   
 $-4y = -16$   
 $y = 4$   
 $x = 6$

$\frac{6!}{4!} = 6 \cdot 5 = 30$

**c**

(26)  $\frac{\sqrt{6} \cdot (2 - \sqrt{6})}{2 + \sqrt{6} \cdot (2 - \sqrt{6})}$   
 $\frac{2\sqrt{6} - 6}{-2} = -\sqrt{6} + 3$

**c**

(27)  $2^1 = 2$     $2^{37} = 2$     $2^{41} = 2$   
 $2^2 = 4$     $2^{38} = 4$     $2^{42} = 4$   
 $2^3 = 8$     $2^{39} = 8$   
 $2^4 = 6$     $2^{40} = 6$

Pattern repeats in groups of four.

**b**

(28)  $x^2 - 4 = 2x + 4$   
 $x^2 - 2x - 8 = 0$   
 $(x - 4)(x + 2) = 0$   
 $x = 4$   
 $x = -2$

solution is 4

factors of denominator  
 $x(x + 2)$   
 $x \neq 0, -2$

**c**

(29)  $2x^2 + 6x - 8 = 0$   
 $2(x^2 + 3x - 4) = 0$   
 $2(x + 4)(x - 1) = 0$   
 $x = -4$   
 $x = 1$

$\left(-\frac{8}{2} + \frac{3}{2}\right)^2 = \left(-\frac{5}{2}\right)^2 = \frac{25}{4}$   
 $\left(\frac{8}{2} + \frac{3}{2}\right)^2 = \left(\frac{5}{2}\right)^2 = \frac{25}{4}$

**b**

(30)  $x^2 - 3x - 9 = x + 1$   
 $x^2 - 4x - 10 = 0$   
 use quadratic formula  
 $x = \frac{4 \pm 2\sqrt{14}}{2} = 2 \pm \sqrt{14}$

**d**