

1992 National Mu Alpha Theta Convention

Algebra I Topic Test Answers:

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

1992 National Mu Alpha theta — Algebra I Solutions.

1. EQ of line: $y = \frac{3}{-1}x + b$

D
4

$y = -3x + b$

$4 = -3(-2) + b$

$b = -2$

$y = -3x - 2$

Cross x-axis where $y = 0$

$0 = -3x - 2$

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

2. $\frac{48}{99} = \frac{16}{33}$

B The sum = $16 + 33 = 49$

3. $g(a+b) = 3(a+b) + 4$
 $= 3a + 3b + 4$

C
4 $\frac{1}{8y}(8x = 5y)$

B $\frac{x}{y} = \frac{5}{8}$

5. $x^3 - 2x^2 + x - 2$
 $= x^2(x-2) + 1(x-2)$
E $= (x^2 + 1)(x-2)$

6. $16^{-\frac{3}{4}} = (16^{-3})^{\frac{1}{4}}$

C $(\frac{1}{4096})^{\frac{1}{4}} = \frac{1}{8}$

7. Fibonacci sequence:

B Add the two preceding terms to get the next term.

$8 + 13 = 21$

8. $g(3) = 3 + 2 = 5$

E $3^5 = 25 - 9 = 16$

9. $\frac{3(x^2 + 3x + 10)}{2} = 2^{2(x^2 - x)}$

C $3x^2 + 9x + 30 = 2x^2 - 2x$

$x^2 + 11x + 30 = 0$

$(x+5)(x+6) = 0$

$x = -5, -6$

Sum = $-5 - 6 = -11$

10. Degree of y cannot exceed 1.

11. $8x^3 - 27$ (Difference of cubes)
E $= (2x-3)(4x^2 + 6x + 9)$

12. $\left(\left(\frac{-1}{125}\right)^{-2}\right)^{\frac{1}{3}} = \left((-125)^2\right)^{\frac{1}{3}}$
C $= (5^6)^{\frac{1}{3}} = 25$

13. $3x^3 - 9x^2 + kx - 12$
 $3(3)^3 - 9(3)^2 + k(3) - 12 = 0$
C $k = 4$
 $\frac{3x^3 - 9x^2 + 4x - 12}{x-3} = 3x^2 + 4$

14. $\frac{1^{4y-1}}{\frac{1}{5} - \frac{1}{3}} = \frac{1}{\frac{8}{15}}$

$= \frac{15}{8}$

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

16. $n = 2 - (-2)^{(2 - (-2))}$
 $= -14$

17. $3x^5 - 5x^3 + 1$
 $3(2)^5 - 5(2)^3 + 1$
 $= 57$

18. $SA = 2\pi r(r + h)$
 $h = \frac{SA}{2\pi r} - r$

19. $(0.6)60 = 36$ L acid
 $60 - 36 = 24$ L water
 $\frac{36}{x} = \frac{45}{100}$ $x = 80$
 $80 - 36 = 44$ L water
 $44 - 24 = 20$ L

20. x : Tens digit
 y : Units digit
 $2x = y$
 $10y + x = 2(10x + y) - 6$
 $x = 2, y = 4$

21. $51x^2z^3, 34xz^5$
 $17 \cdot 3 \cdot 2 \cdot x^2 \cdot z^5$
 $= 102x^2z^5$

22. $1 - \frac{1}{1-x} = \frac{1}{1-x}$
 $x = -1$

23. $(x^2 + 1)^4 \cdot (x^3 + 1)^3$
 $(x^8)(x^9) = x^{17}$

24. Eq of line: $y = 3x + b$
 $-6 = 3(0) + b$
 $b = -6$

$3(3) - 6 = y = 3$

25.

1	4	4	1	64
2	3	4	6	
3	2	5	5	

 $\frac{7}{36}$

26.

r	t	d	
40	$\frac{x}{40}$	x	UP
60	$\frac{x}{60}$	x	DOWN

$r_{total} = \frac{2x}{\frac{x}{40} + \frac{x}{60}} = 48$ mp

27. Factor: $2^3 \cdot 3^1 \cdot 83^1$
 Total factors: $2(4)(2)(2) = 32$

28. $x + y = \frac{5}{4}, x = 2y$
 $x = \frac{5}{6}, y = \frac{5}{12}$
 $xy = \frac{25}{72}$

29. $2(12x + 12(x + 4))$
 $= 48x + 96$

30. $x + y = 7$
 $(x + y)(x - y) = 21$
 $x - y = 3$
 $x = 5, y = 2$

$2(5) + 3(2) = 16$