Alpha Equations and Inequalities Topic Test

Note: For each problem, where there is no choice (e), assume (e) none of the above.

1. Solve for k: $\quad 4k - 2(k-1) = 12$ $\qquad$ a) $\dfrac{5}{3}$ $\quad$ b) $\dfrac{7}{3}$ $\quad$ c) 3 $\quad$ d) 5

2. If $x:y = 2:1$, find the value of $\dfrac{x^2 - y^2}{x^2 + y^2}$

    a) $\dfrac{3}{5}$ $\quad$ b) 2 $\quad$ c) $\dfrac{1}{3}$ $\quad$ d) cannot be determined

3. Find the solution set for: $\quad 7p - 2(p-3) \le 5(2-p)$

   a) ϕ $\qquad$ b) $\left(-\infty, 0.4\right]$ $\qquad$ c) $\left(-\infty,\ 1\right]$ $\quad$ d) $\left(-\infty, \dfrac{8}{7}\right]$

4. Express the solution in interval form for $\quad 5 \le 2x - 3 \le 7$.

   a) $[1,2]$ $\qquad$ b) $\left(-\infty, 1\right] \cup [2, \infty)$ $\qquad$ c) $\left(-\infty, 4\right] \cup [5, \infty)$ $\qquad$ d) $[4,5]$

5. Solve for r: $\dfrac{5}{3r} - 10 = \dfrac{3}{2r}$. $\qquad$ a) $-\dfrac{1}{12}$ $\quad$ b) $-\dfrac{9}{50}$ $\quad$ c) 60 $\quad$ d) $\dfrac{1}{60}$

6. A baseball player threw a ball that traveled according to the equation $h(t) = 9.8t + 1.1 - 4.9t^2$ where h = height in meters and t = time in seconds. What is the maximum height reached by the ball?
    a) 1 m $\qquad$ b) 3.8 m $\qquad$ c) 6m $\qquad$ d) 15.8m

7. For what values of x and y is the following true? $\quad (2-i) + 4x + yi = 6 + 3i$

    a) (1,4) $\quad$ b(- 1, - 4) $\qquad$ c) $\left(\dfrac{3}{2}, -1\right)$ $\qquad$ d) $\left(-\dfrac{3}{2}, 1\right)$

8. Solve for the only positive solution to $\left(x^{\frac{1}{2}}\right)\left(x^{\frac{3}{2}}\right) = 16$

   a) $32\sqrt[3]{2}$ $\qquad$ b) 16 $\qquad$ c) 8 $\qquad$ d) 4

9. Find the solution set for: $x^2 + 3x - 4 \le 0$
    a) $[-4, 1]$ $\qquad$ b) $[-1, 4]$ $\qquad$ c) $\left(-\infty, -4\right] \cup [1, \infty)$ $\quad$ d) $\left(-\infty, -1\right] \cup [4, \infty)$

10. Solve for the solution set: $-3x + \dfrac{-6+3}{-3} > -8x \div \dfrac{4 \div 2}{-6 \div 3}$

   a) $x < \dfrac{1}{11}$ b) $x > \dfrac{1}{11}$ c) $x < -\dfrac{1}{6}$ d) $x > -\dfrac{1}{6}$

11. Using only one solution, round to the nearest degree to solve for θ given:
$\sin^2 \theta - 0.3 \sin \theta - 0.4 = 0$ where $0 \le \theta < 360$.   a) -1   b) 1   c) 30   d) 53

12. Solve for f: $A = \dfrac{24f}{B(p+1)}$.

   a) $\dfrac{24}{A} - Bp - 1$ b) $\dfrac{AB(p+1)}{24}$ c) $\dfrac{ABp-1}{24}$ d) $ABp + \dfrac{1}{24}$

13. Find the length of a line segment defined as part of the line $2x - y = 12$ between the x and
   y axes.   a) 12   b) 12.490   c) 13.416   d) 18

14. Find the value for n if $3 + 3^2 + 3^3 + ... + 3^n = 9840$ and $S_n = \dfrac{a(1-r^n)}{1-r}$.

   a) 8   b) 9   c) 10   d) 11

15. The value, in dollars, of a diamond is directly proportional to the square of its mass. If a
   diamond, worth $6300 is 200 mg, what is the mass of a diamond worth $25,200?
   a) 450 mg   b) 600 mg   c) 725 mg   d) 800mg

16. Given the system: $\begin{aligned} 0.25x + 0.4y + 0.2z &= 22 \\ 0.4x + 0.2y + 0.3z &= 28 \\ 0.3x + 0.2y + 0.1z &= 18 \end{aligned}$, find the values for x, y and z.

   a) (30, 20, 35)   b) (30, 20, 40)   c) (40, 15, 30)   d) (40, 20, 20)

17. Solve for y: $\dfrac{y}{y-2} = \dfrac{y^2+3y}{y^2-4} - \dfrac{3}{y+2}$

   a) $-\dfrac{3}{2}$ b) - 2   c) 3   d) no real solution

18. Which points are NOT on the circle defined by the equation $x^2 + y^2 = 25$?
   I (0,25)   II (-5,0)   III (12.5,12.5)   IV (3,-4)   V $\left(-2\sqrt{2}, 4\right)$
   a) I & III   b) III & V   c) II & IV   d) I, III & V

19. Given: $\begin{cases} y \geq 5 \\ 2 \leq x \leq 7 \\ y - x \leq 40 \end{cases}$ and a profit equation of P = 3x + y, find the coordinates that will

maximize the profit.   a) (2,42)   b) (7,47)   c) (2,45)   d) (7,49)

20. Solve for x: $5^{(\log_5 x - \log_5 2)} = 4$.   a) 2   b) 4   c) 6   d) 8

21. The period of the graph of $y = \tan\left(\frac{1}{3}\theta\right)$ is:

a) $\frac{\pi}{3}$ b) 3π c) $\frac{2\pi}{3}$ d) 6π

22. Express the solution in interval notation: $\frac{3}{x+2} > \frac{2}{x-4}$

a) $(16, \infty)$ b) $(-2, 4) \cup (16, \infty)$ c) $\left(-\infty, -\frac{8}{5}\right); x \neq -2$ d) $(-\infty, -2) \cup (4, \infty)$

23. Find the values for which $f(x) = g(x)$ given $f(x) = \sqrt{3x} + 1$ and $g(x) = x + 1$.
a) -1   b) 0   c) 3   d) $\{0, 3\}$

24. How much money, A, does Sasha need to invest today at 9% compounded annually in
order to have $5000 in 8 years if the situation is modeled by: $8\log 1.09 + \log A = \log 5000$?
a) $2500   b) $2510   c) $2550   d) $3700

25. Find the sum of the roots given $x^3 - 7x + 6 = 0$.   a) - 6   b) 0   c) 6   d) 7

26. Solve for x over the Reals: $x^4 + 6x^2 - 40 = 0$
a) ± 2 b) $\pm 2, \pm \sqrt{10}$ c) -10, 4   d) ϕ

27. A calculator manufacturer predicts that the number, N, of calculators sold when x thousand
of dollars are spent on advertising is given by $N = 2275 + 10000 \ln(x+1)$. How much
advertising money must be spent to sell 62,583 calculators?
a) $ 9.99 X 10^{499} b) $ 7803.75   c) $ 415.05   d) $ 7.97

28. Find the solution set for $-3|x| + 6 \leq 12$.
a) $(-\infty, -2] \cup [2, \infty)$ b) [- 2, 2]   c) no solution   d) all real numbers

29. Find the solution set: $2^{x^2} = 32\left(2^{4x}\right)$.   a) 0, 20   b) - 1   c) 5   d) - 1, 5

30. Find the solution for $x^3 + 6x^2 - x - 5 < 1$. a) $(-6,0] \cup (1,5)$

    b) $(-\infty, -6) \cup (0,5)$ c) $(-6, -1) \cup (1, \infty)$ d) $(-\infty, -6) \cup (-1,1)$

31. The equations of the sides of quadrilateral ABCD are: AB: x+6y=15   BC: 4x - y=10
       DC: 3x+7y= - 8   AD: x - y= - 6. Which vertex(ices) would give a sum of zero if you
       added its x and y coordinates?
       a) A & B   b) B & C   c) C & A   d) D & A

32. For what value(s) of p does the equation have real and unequal roots?
$$5x^2 - (p-1)x + 1 = 0$$
    a) $p > 1 + 2\sqrt{5}$ b) $p > 1 + 2\sqrt{5} \text{ or } p < 1 - 2\sqrt{5}$ c) $p > 3$ d) $p > 1 \pm 2\sqrt{5}$

33. Given $\displaystyle\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$, find the value of $\displaystyle\sum_{i=1}^{50} 5i$. a) 255 b) 1275 c) 3275 d) 6375

34. Solve for a, given $(a+6)(_{10}C_8) - 3(5!) = (a-2)(_5P_2)$
  a) 2   b) 5.2   c) 7   d) 14.08

35. Determine the exact real root, r, given $r\sqrt[3]{32} - \sqrt[3]{2} = \sqrt[3]{250} - \sqrt[3]{4r^3}$
      a) $\sqrt[3]{4}$ b) $\sqrt[3]{7}$ c) $2\sqrt[3]{2}$ d) $7\sqrt[3]{4}$

TIEBREAKER: Solve for x: $\dfrac{11^x \left(7^{2x+3}\right)}{3^{1-x}\left(2^{4x-1}\right)} = 5^x$

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Answer Key

1. d
2. a
3. b
4. d
5. d
6. c
7. a
8. d
9. a
10. a
11. d
12. b
13. c
14. a
15. d
16. c
17. c
18. d
19. b
20. d
21. b
22. b
23. d
24. b
25. b
26. a
27. c
28. d
29. d
30. d
31. c
32. b
33. d
34. a
35. a

TIEBREAKER: -1.807