SOUTH PLAINS MATH & SCIENCE COMPETITION

ALGEBRA 1

General Information:

- Check to see that you have written your name on the label and that the test name on the label matches the name on this booklet.
- **DO NOT** open the test booklet and **DO NOT** start until the proctor says "begin."
- Each individual exam period will be 45 minutes and each exam contains 40 multiple choice questions.
- Students are allowed to use a non-programmable battery operated calculator during the individual and team exams.
- Students are encouraged to write on the exam booklet. Scratch paper and pencils will also be provided.
- Students will not be permitted to leave the test room while the test is in progress. If a student finishes early, he/she must remain in the test room until the exam period is completed.
- If you need to ask a question during the test, raise your hand and the proctor will come to you.
- There is no penalty for skipping a problem. The exam scores will be determined by the number of correct answers. All ties will be broken by awarding the place to the contestant who has the most consecutive correct answers before a problem is missed.
- **Students may NOT keep the test booklet.**

ALGEBRA 1

1. The vertex angle of an isosceles triangle has a degree measure of d. Find in the degree measure for a base angle of the triangle.

a. $\frac{180-d}{2}$ b. $\frac{90-d}{2}$ c. $\frac{180+d}{2}$ d. $\frac{90+d}{2}$

2. Find the reciprocal of $\frac{3}{x+1}+\frac{2}{x}$

a. $\frac{x+1}{5}$ b. $\frac{x^2+x}{5}$ c. $\frac{5x+2}{x^2+x}$ d. $\frac{x+x}{5x+2}$

3. What does y equal in the solution of the system at the right?

a. $^{2}/_{11}$ b. $^{42}/_{19}$ c. $^{18}/_{11}$ d. $^{2}/_{19}$

$x/2 + y/3 = 1$
$x/5 + y/2 = 1$

4. Find the value of c that makes this trinomial a perfect square. $n^2 - 20n + c$

a. 20 b. 1600 c. 100 d. 800

5. Simplify $32^{\sqrt{3}} * 4^{\sqrt{5}}$.

a. $2^{5^{\sqrt{3}}+2^{\sqrt{5}}}$ 5+2 b. 12815 c. $2^{10^{\sqrt{15}}}$ d. $128^{\sqrt{3}+\sqrt{5}}$

6. What is S_n for the arithmetic series for which $a_1 = 3$, $d = 0.5$, and $a_n = 7.5$

a. 52.5 b. 22.5 c. 47.25 d. 57.75

7. If two fractions have denominators of $x^2 + 6x + 9$ and $x^2 - 9$, what is the least common denominator?

a. $x^2 - 9$ b. $x^2 + 6x + 9$ c. $2x^2 + 6x$ d. $(x = 3)^2 (x - 3)$

8. Solve $\log_5 y = -3$

a. -15 b. -125 c. $^{1}/_{125}$ d. $^{3}/_{5}$

9. If it takes 4 hours for 2 person to clean a house, how many hours will it take 2 people, working at the same rate, to clean another house that is the same size?

a. 2/3 b. 1 ½ c. 2 d. 3

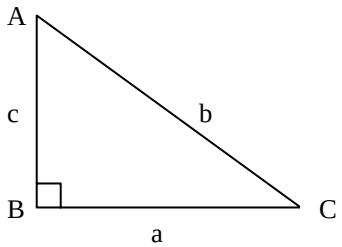
10. Three less than three times a number is $^{5}/_{6}$. What is one more than twice the number?

a. $2\,^{2}/_{3}$ b. $3\,^{4}/_{9}$ c. $3\,^{5}/_{9}$ d. 2 ½

11. Which of the following is true?

a. $a^2 > b^2 - c^2$ c. $a^2 = b^2 - c^2$

b. $a^2 < b^2 - c^2$ d. cannot say



12. Simplify: $\sqrt{9x^2 - 24x + 16}$

a. 3x - 4 b. $|3x - 2\sqrt{6 + 4}|$ c. |3x - 4| d. $3x - 2\sqrt{6x + 4}$

13. Rich was traveling by plane from El Paso to Texarkana. After one third of the trip, the movie started. When the movie was over, the amount of the trip left was one third of the trip completed during the movie. What fraction of the trip did the movie take?

a. ½ b. $^1/_3$ c. $^2/_3$ d. $^1/_4$

14. What is the simplest polynomial equation with integral coefficients that has roots 3 and 4 - I?

a. -1 b. -2 c - 1.4 d. -1.5

15. What is the equation of the axis of symmetry of the parabola defined by $y = ½(x + 7)^2 - 4$?

a. x = 7 b. x = -4 c. x = -7 d. y = 7

16. Find the solution of 6(n - 11) = 12 + 4(2n - 3)

a. -11 b. 11. c. -33 d. 33

17. Find the center of the ellipse with the equation $3x^2 + 4y^2 + 18x - 32y - 5 = 0$.

a. (3, -4) b. (-3, 4) c. (4, -3) d. (-4, 3)

18. What is the simplest form of $\frac{(4x^2y)^3}{16x\ y^4}$?

a. $\frac{2y^5}{3x^2}$ b. $\frac{y^4}{3x^3}$ c. $\frac{x^2}{y^5}$ d. $\frac{4x^5}{y}$

19. The price of an item was reduced by 5% then later reduced by 15%. The two reductions were equivalent to the single reduction of _____.

a. 19 ¼% b. 20% c. 80% d. 80 ¾%

20. An equation of a circle with center (3, -2) and radius 2 is

a. $(x + 3)^2 + (y - 2)^2 = 4$ b. $(x - 3)^2 + (y + 2)^2 = 4$

c. $(x + 3)^2 + (y - 2)^2 = 2$ d. $(x - 3)^2 + (y + 2)^2 = 2$

21. Solve $5w - (w - 8) > 9 + 3(2w - 3)$

a. $w < {}^{11}/_5$ b. $w < -{}^{11}/_5$ c. w < - 4 d. w < 4

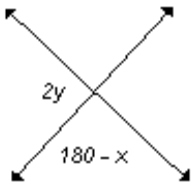
22. Find p in terms of m if m/p = q, q = p, p > 0, and m ≠ 0.

a. $\sqrt{m}$ b. mq c. m d. p

23. Which of the following is true?

a. x > y c. x = y

b. x < y d. cannot say



24. If a is $^{5}/_{7}$ of b and b is $^{2}/_{3}$ of c, then $^{a}/_{c}$ =

a. $^{10}/_{21}$ b. $^{14}/_{15}$ c. $^{7}/_{10}$ d. $^{9}/_{8}$

25. Which of the following is the greatest?
a. the number of which 12 is 30% b. the number of which 12 is 5%
c. the number of which 12 is 40% d. the number of which 12 is 100%

26. What are the dimensions of [1 2 0 3]?
a. 4 x 4 b. 1 x 4 c. 1 x 1 d. 4 x 1

27. Find the value of k so $\frac{x^3 - 2x^2 + kx + 6}{x + 2}$ has remainder 8.

a. -9 b. 9 c. 0 d. 1

28. What are the next three numbers in this sequence? 1, 7, 17, 31, 49, …
a. 71, 97, 127 b. 64, 81, 100 c. 67, 85, 103 d. 61, 67,71, 99

29. Simplify: $(9c^{4}d^{5})(-6c^{4}d^{5})$

a. $3c^{7}d^{9}$ b. 3cd c. $-54c^{7}d^{9}$ d. $-54c^{12}d^{20}$

30. If $(2m - 1)(6m + 2) = 12m^{2} - 2m - 2$, then $(2m + 1)(6m - 2)$ =

a. $12m^{2} - 2m + 2$ b. $12m^{2} + 2m - 2$ c. $12m^{2} + 2m + 2$ d. $12m^{2} + 10m + 2$

31. If $y = {}^{1}/_{2}\cos 4x$, find all values of x so that y is a maximum.

a. $45n^{o}$ b. $90n^{o}$ c. $180n^{o}$ d. $1440n^{o}$

32. What is the prime factorization of 342?
a. 2 • 3 • 57 b. 1 • 2 •3 •57 c. 2 •3 •3 •19 d. none of these

33. Find an equation of the line through (6, -3) with slope $^{2}/_{3}$.

a. -2x + 3y = 24 b. -2x +3y = -21 c. 3x - 2y = 24 d. 3x - 2y = -21

34. If the system $^{1}/_{2}x + {}^{1}/_{3}y = 2$ is graphed, in which quadrant will the solution not be in?
a. I b. II c. III d. IV

35. What is the period of $y = -3\sin 4\theta$?

a. -3 b. 4 c. 4π d. $^{\pi}/_{2}$

36. Find the equation of the axis of symmetry for the graph of $y = -2x^{2} + x + 17$, and state whether the axis of symmetry contains the minimum or maximum point of the graph.
a. x = ¼; maximum b. x = -¼; maximum
c. x = ¼; minimum d. x = -¼; minimum

37. What is 100^{o} expressed in radians?

a. $5/9$ b. $5\pi/9$ c. $10/9$ d. $10\pi/9$

38. Find the length of the longest side of a triangle with $A = 40^{o}$, $B = 60^{o}$, and $a = 5$.

a. 6.43 b. 5 c. 6.74 d. 7.66

39. If City B has 1500 households, how many of them have a TV set?

Appliance	City A	City B	City C
Clothes Washer	83%	73%	91%
Freezer	37%	33%	53%
TV Set	88%	56%	69%

a. 1. 69 b. 840 c. 2070 d. 2106

40. There are 142 carats in one ounce. In 1905, a rough diamond weighing 2106 carats was discovered. To the nearest ounce, how much did the diamond weigh?

a. 12 oz. b. 22 oz. c. 15 oz. d. 36 oz.

End of Test