

# SOUTH PLAINS MATH & SCIENCE COMPETITION

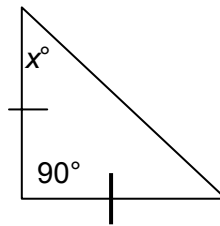
## GEOMETRY

### General Information:

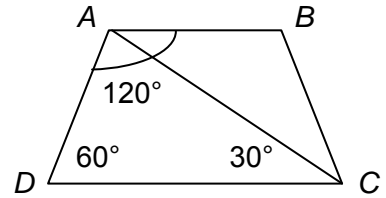
- Check to see that you have written your name on the label and that the test name on the label matches the name on this booklet.
- **DO NOT** open the test booklet and **DO NOT** start until the proctor says "begin."
- Each individual exam period will be 45 minutes and each exam contains 40 multiple 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.**

## GEOMETRY

1. A triangle and a parallelogram having the same base are equal in area. The length of the altitude of the triangle is:
  - a. four times the length of the altitude of the parallelogram
  - b. two times the length of the altitude of the parallelogram
  - c. one-half the length of the altitude of the parallelogram
  - d. one-fourth the length of the altitude of the parallelogram
2. Three points are non-co-linear. How many planes contain these three points?
  - a. exactly one
  - b. exactly four
  - c. exactly two
  - d. exactly three
3. In a decagon, the sum of the interior angles is \_\_\_\_\_?
  - a.  $360^\circ$
  - b.  $720^\circ$
  - c.  $1440^\circ$
  - d.  $2160^\circ$
4. Which of the following equations is not linear ?
  - a.  $6x + 7 = 5y$
  - b.  $x = 0$
  - c.  $2xy = 3$
  - d.  $3x = 5y$
5. The slope of the line containing the points (3, 4) and (-5, - 7) is \_\_\_\_?
  - a.  $-2/3$
  - b. 0
  - c.  $2/3$
  - d.  $3/2$
6. Each angle of a polygon is  $160^\circ$ . How many sides does the polygon have?
  - a. 12
  - b. 18
  - c. 6
  - d. 10
7. Find the value of  $x$  for the figure at the right.
  - a. 36
  - b. 45
  - c. 48
  - d. 42
8. The slope of the line  $y - 6 = \frac{2}{3}(x+4)$  is:
  - a.  $2/3$
  - b.  $3/2$
  - c.  $5/6$
  - d.  $-5/6$



9. Name two perpendicular segments in the figure at the right -
- $AB$  &  $AC$
  - $CD$  &  $CA$
  - $AD$  &  $AC$
  - $BC$  &  $AD$



10. Name two angles complementary to  $\angle BAC$
- $\angle BAD$  &  $\angle DCB$
  - $\angle DCA$  &  $\angle ACB$
  - $\angle CDA$  &  $\angle DAB$
  - $\angle CBA$  &  $\angle ADC$

11. The sides of a triangle measure 6, 8, and 10. The side of length 8 is separated into 2 segments by the bisector of the opposite angle. One of these segments has length

- $2\frac{3}{4}$
- $3\frac{1}{4}$
- 3
- 4

12. Find the volume of a spherical aquarium if the diameter is 2 feet in length.

- $\frac{8}{3} \pi \text{ ft}^3$
- $\frac{32}{3} \pi \text{ ft}^3$
- $\frac{4}{3} \pi \text{ ft}^3$
- $\frac{2}{3} \pi \text{ ft}^3$
- $9 \pi \text{ ft}^3$

13. The interior of a regular polygon is divided into 3 triangular regions by the diagonals drawn from one vertex. How many sides must the polygon have?

- 3
- 4
- 5
- 6

14. The consecutive vertices of a parallelogram are  $(M,5)$ ,  $(0,0)$ , and  $(5,0)$ . Which of the following may be the coordinates of the fourth vertex?

- $(5-M, 5)$
- $(5, M)$
- $(5+M, 5)$
- $(5,5)$

15. In a regular polygon of 20 sides, the measure of an interior angle is \_\_\_?

- $162^\circ$
- $155^\circ$
- $3240^\circ$
- $165^\circ$

16. If a triangle and a circle intersect what is the greatest possible number of points of intersection?

- 7
- 3
- 6
- 9

17. The diameter of the base of a right circular cylinder is 6 and its height is 12. Its lateral area is?

- 90
- 37
- 108
- 72

18. A regular pyramid has a square base of 10 cm on a side. Its slant height is 12 cm. Its lateral area is \_\_\_\_?

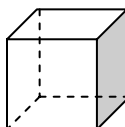
- a.  $480 \text{ cm}^2$
- b.  $400 \text{ cm}^2$
- c.  $340 \text{ cm}^2$
- d.  $240 \text{ cm}^2$

19. A cube is inscribed in a sphere. If the radius of the sphere is 6 in., what is the volume of the cube?

- a.  $48 \text{ in.}^3$
- b.  $612 \text{ in.}^3$
- c.  $243 \text{ in.}^3$
- d.  $216 \text{ in.}^3$

20. If the following cube were thrown up and allowed to fall flat on *one* face, what surface area is not covered by the ground?

Edge = 6 in.



- a.  $80 \text{ in}^2$
- b.  $180 \text{ in}^2$
- c.  $36 \text{ in}^2$
- d.  $252 \text{ in}^2$
- e.  $96 \text{ in}^2$

21. A dilation does not preserve \_\_\_\_?

- a. distance between points
- b. betweenness of points
- c. angle measure
- d. collinearity of points

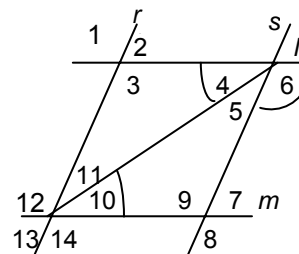
Refer to the diagram at right for the next three questions.

22.  $\angle 4$  and  $\angle 10$  are alternate interior angles.

- a. true
- b. false

23. If  $r \parallel s$  and  $l \parallel m$  and  $\angle 6 = 122^\circ$ , then  $\angle 12 = 122^\circ$

- a. true
- b. false



24. If  $\angle 6$  and  $\angle 7$  are supplementary, then  $l \parallel m$ .

- a. true
- b. false

25. Through how many degrees must you rotate an equilateral triangle ABC so that C is the image of A?

- a.  $180^\circ$
- b.  $90^\circ$
- c.  $60^\circ$
- d.  $30^\circ$



