Kansas City Area Teachers of Mathematics
2011 KCATM Math Competition

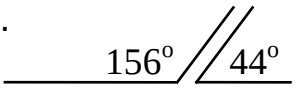
GEOMETRY AND MEASUREMENT TEST
GRADE 6

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.

- Time limit: **20 minutes**
- You **may use calculators**.
- Mark your answer on the Scantron sheet by **FILLING in the oval**.
- You **may not use rulers, protractors, or other measurement devices** on this test.
- Letter **"E" is "None of the above"**. It is a correct answer for some of the problems.
- Use the π key or 3.14159 on your calculator.
- The pictures in the figures are **"not-to-scale."**

1. Which angle values shown in **Figure 1** show congruent angles?

A. 

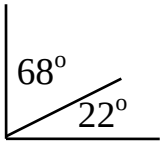
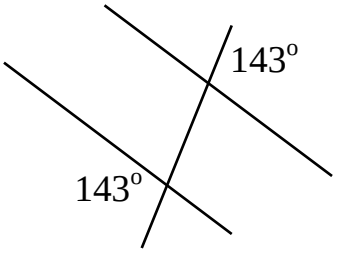
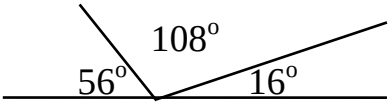
B. 

Figure 1

C. 

D. 

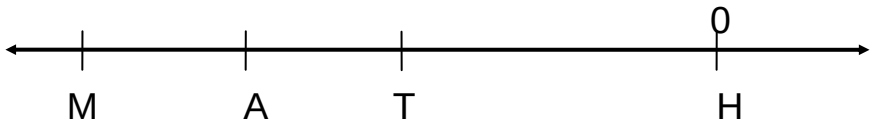
E. None of the above

2. If you continue to add sides to a convex polygon, what figure does the polygon get closer to looking like?

A. a dodecagon B. an octagon
C. a hexagon D. a circle
E. None of the above

3. Point T is the midpoint of $\overline{MH}$, and A is the midpoint of $\overline{MT}$ in **Figure 2**. What is the coordinate of pt. M when AT = 3 and H is "0"?

Figure 2



A. -3 B. -6 C. -9 D. -12 E. None of the above

4. Which name correctly describes the information shown in **Figure 3**?

A. Acute ∠JAM B. ∠*AMJ*
C. Right ∠ MAJ D. Obtuse ∠JMA
E. None of the above

Figure 3

5. Which statement is NOT necessarily true about **Figure 4**?

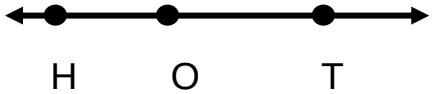


Figure 4

A. Opposite rays $\overrightarrow{OH}$ and $\overrightarrow{OT}$
B. O is between points H and T
C. O is the midpoint of $\overrightarrow{HT}$
D. ∠HOT is a straight angle
E. None of the above

6. Name the geometric shape in **Figure 5**.
   A. tetrahedron B. cone
   C cylinder D. pyramid
   E. None of the above

Figure 5

For questions #7-9, refer to the coordinate plane shown in **Figure 6**.

7. Name the coordinates of point has the coordinates of point M.
   A. (1, -3) B. (3, -1)
   C. (-3, 1) D. (-1, 3)
   E. None of the above

8. If triangle MKL is reflected over the x axis, what would be the point of reflection for point K?
   A. (-2, -5) B. (2, 5)
   C. (-2, 5) D. (2, -5)
   E. None of the above

9. What is the area of ΔMKL?
   A. 6 sq. units B. 7 sq. units
   C. 8 sq. units D. 9 sq. units
   E. None of the above

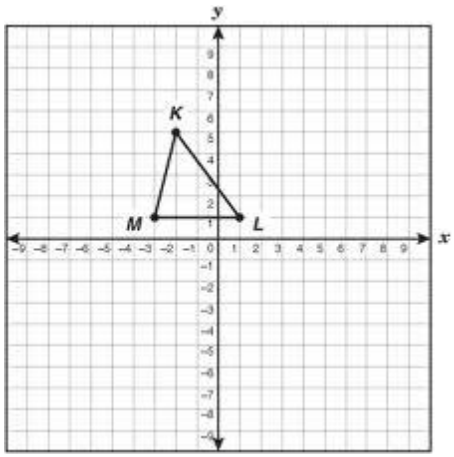


Figure 6

For questions #10.-11., refer to the **Figure 7**. $\overline{AB}$ is 13 cm long. Point B is the center of the circle.

10. What is the length DE?
    A. 10 cm B. 20 cm
    C. 27 cm D. 50 cm
    E. None of the above

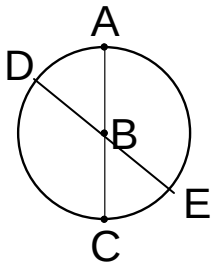


Figure 7

11. To the nearest one-tenth of a cm, what is the circumference of circle B?
    A. 530.9 cm B. 81.7 cm
    C. 35.3 cm D. 20.4 cm
    E. None of the above

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12. A Kindle book reader has dimensions of 4.75" by 7.5". If the viewing screen is 3" by 5", what is the area that is does not show printed material? **(Figure 8)** Round to the nearest hundredth.

A. 35.63 in^2 B. 20.63 in^2
C. 15.00 in^2 D. 20.35 in^2
E. None of the above

Figure 8

13. What is the degree of rotational symmetry in **Figure 9**?

A. 30^o B. 45^o
C. 60^o D. 90^o
E. None of the above

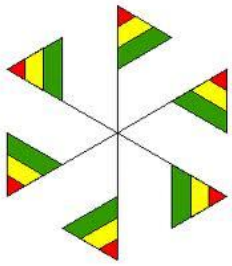


Figure 9

14. The lama tessellation in **Figure 10** shows what type of transformation?

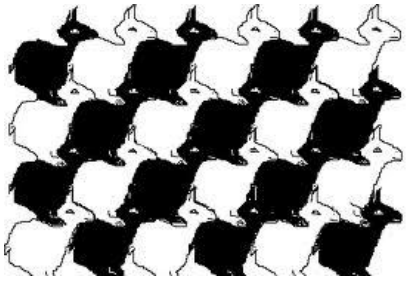


Figure 10

A. reflection B. translation
C. dilation D. rotation
E. None of the above

15. Which triangle has the largest area in **Figure 11**?

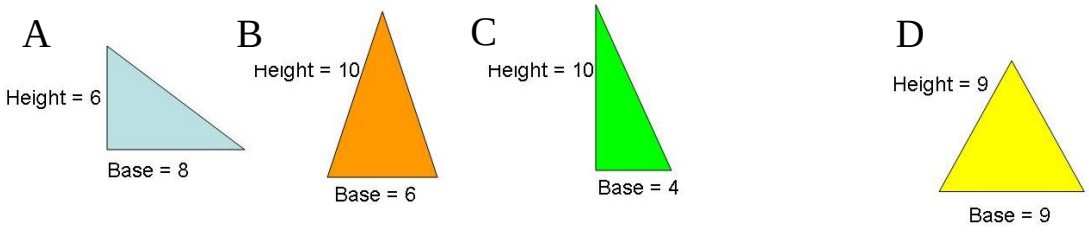


Figure 11

E. None of the above

16. Which statement is **ALWAYS** true?
    A. A polygon is always a quadrilateral.
    B. A square is always a parallelogram.
    C. A rhombus is always a square.
    D. A trapezoid is always a parallelogram.
    E. All statements are always true.

17. According to the highway sign in **Figure 12**, 10 miles is equal to 16 kilometers. If the sign would have said Bowling Green: 30 miles, how many kilometers would the sign say?

Figure 12

A. 32 km B.48 km

C. 64 km D. 16 km

E. None of the above

18. How many centimeters are in 2.8 meters?
    A. 2.8 cm B.28 cm C. 28 cm D. 280 E. None of the above

19. Seventy-five kilometers is how many meters?
    A. 75 m B. 750 m C. 7,500
    D. 75,000 km E. None of the above

20. You have invited your friends to come over to play games on your new Kinect for the Xbox 360. When you get home from school at 3:52, your mom asks you to do chores. Your friends are coming over at 5:10. How much time do you have to help your mom before they arrive?
    A. 1hr. 18 min. B. 1 hr. 8 min. C. 2 hr. 18 min.
    D. 2 hr. 8 min. E. None of the above

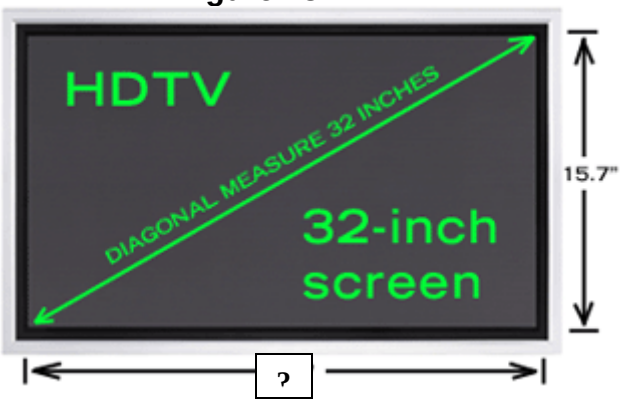
21. You have a cell phone plan that lets you talk for 400 minutes per month free during the prime rate time. If you talk to your friends for the following amounts during the prime rate time, how many minutes do you still have left for the month?

    30 min.; 1 hr.; 45 min.; 1 ½ hour

    A. 55 min. B. 175 min.
    C. 255 min. D. 120 min.
    E. None of the above

22. HDTVs are longer horizontally that old TVs. Find the width of the 32" TV in **Figure 13 (Round your answer to the nearest integer)**.

Figure 13



A. 28 in. B. 27 in. C. 26 in. D. 25 in. E. None of the above

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23. Use the **geoboard** in **Figure 14**. The distance between **each dot on the geoboard is 1 cm**. Find the area of the composite shape made up of the four triangles and one square.

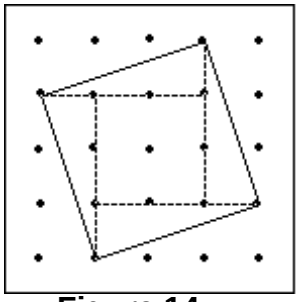

Figure 14

A. 5 sq. units
B. 6 sq. units
C. 8 sq. units
D. 10 sq. units
E. None of the above

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24. Determine the length of the line segment represented by x, given 2 parallel lines cut by the two transversals in **Figure 15**.

A. 18 B. 3

C. 27 D. 36

E. None of the above

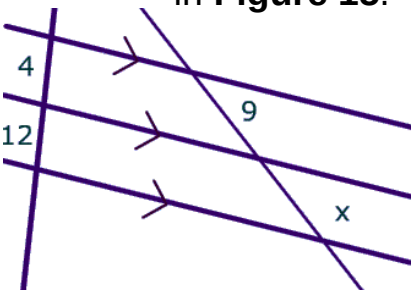


Figure 15

25. Determine the length CD given similar triangles in **Figure 16**.

A. 5 B. 8
C. 10 D. 12
E. None of the above

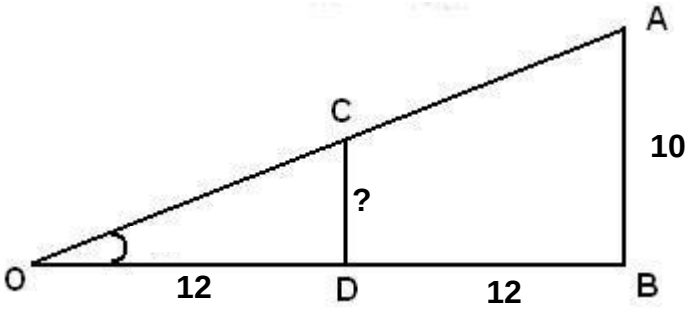
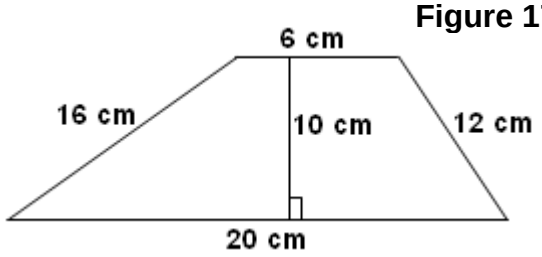


Figure 16

26. Find the area of the trapezoid in **Figure 17**. $A = \frac{1}{2} h(b_1 + b_2)$

A. 130 sq. cm
B. 208 sq. cm
C. 156 sq. cm
D. 494 sq. cm
E. None of the above

Figure 17



27. Determine the amount of wax (to the nearest cubic inch) in a candle that is 3" in diameter and stands 5 ¾" tall as in **Figure 18**.

Figure 18

Formula for Volume of a Cylinder: $V = \pi r^2 h$

A. 163 in^3
B. 41 in^3
C. 94 in^3
D. 47 in^3
E. None of the above

28. How many **faces** does an **<u>octagonal prism</u>** have? **(See Figure 19)**

A. 2 B. 5 C. 8 D. 10

E. None of the above

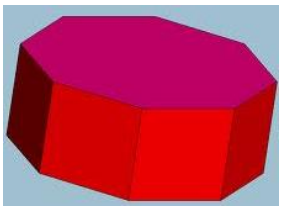


Figure 19

29. How many sides does a decagon have?

A. 7 B. 10 C. 12 D. 9 E. None of the above.

30. **Figure 20** is a tetrahedron. What other name can it be called?

Figure 20

A. Triangular prism
B. Triangular pyramid
C. Square pyramid
D. Triangle
E. None of the above

31. Determine the value of the vertex angle in the obtuse isosceles triangle in **Figure 21**.

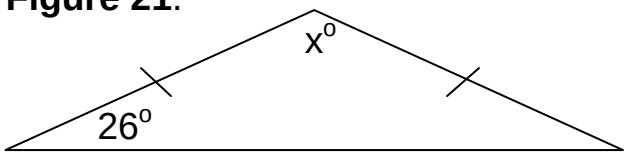


Figure 21

A. 26^o B. 52^o
C. 154^o D. 126^o
E. None of the above

32. Find the value of the **<u>acute</u>** angle in **Figure 22**.

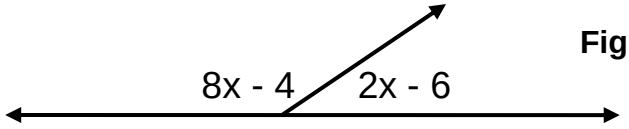


Figure 22

A. 19^o B. 148^o C. 32^o D. 38^o E. None of the above

33. Find the measure of $\angle B$ in the isosceles trapezoid ABCD in **Figure 23**.

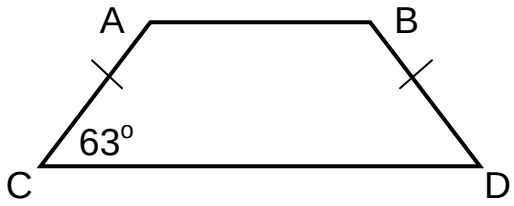


Figure 23

A. 123^o B. 117^o C. 63^o D. 127^o E. None of the above

34. Find the surface area of the earth if the radius of earth is approximately 3960 miles. See **Figure 24**. Surface Area of a Sphere: $A = 4\pi r^2$

A. 11,581,167 sq. miles
B. 49,762 sq. miles
C. 99,525 sq. miles.
D. 197,060,797 sq. miles
E. None of the above

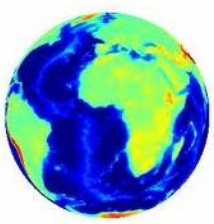
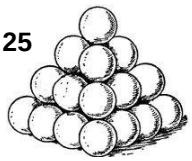


Figure 24

35. How many marbles would be in the triangular pyramid stack **Figure 25**?

Figure 25



A. 24 B. 21 C . 20 D. 16
E. None of the above

36. Find the area of the T in **Figure 26**.

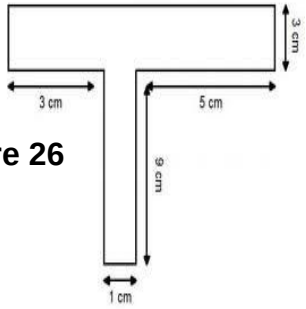


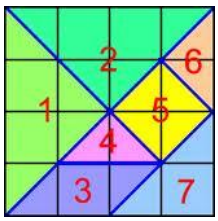
Figure 26

A. 29 cm^2 B. 36 cm^2
C. 33 cm^2 D. 42 cm^2
E. None of the above

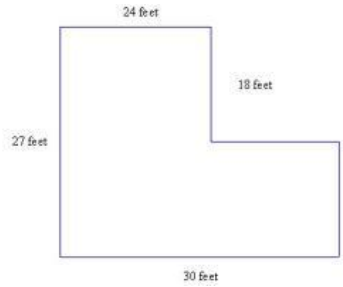
37. What is the geometric probability of landing on square ***(#5)*** in the square grid of tangram pieces in **Figure 27**?

A. 1/4 B. 1/3
C. 1/6 D. 1/8
E. None of the above

Figure 27



38. Find the perimeter of the composite figure in **Figure 28**?



A. 114 ft. B. 99 ft. C. 432 sq. ft. D. 702 sq. ft.
E. None of the above

Figure 28

39. How many edges does a cube have?
A. 6 B. 8 C. 10 D. 12 E. None of the above

40. President Dwight D. Eisenhower signed a decree on August 21, 1959 stating the correct proportions of each part of the US Flag. Find the area of the canton (blue section) on an indoor flag measuring 3' by 5'. The length of the canton is 2/5 the length of the flag and its width goes to the bottom of the 4th red stripe? See **Figure 29**.

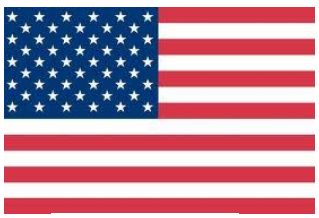


Figure 29

A. 3.23 sq. feet B. 2.77 sq. feet
C. 1.85 sq. feet D. 3.75 sq. feet
E. None of the above