

Kansas City Area Teachers of Mathematics 2018 KCATM Math Competition

GEOMETRY and MEASUREMENT GRADE 7- 8

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.
- Time limit: **20 minutes**
- Mark your answer on the answer sheet by **FILLING in the oval**.
- You **may** use calculators.
- For pi, use the π key or 3.14159 on your calculator.
- You may **not** use rulers, protractors, or other measurement devices on this test.
- Letter “**E**” is “**None of the above**” or “**Not given**”. It may be the correct answer to some of the problems.
- The **figures may not be drawn to scale**.

Area Formulas:

Triangle	$A = bh/2$
Parallelogram	$A = bh$
Trapezoid	$A = h(b_1 + b_2)/2$

Volume Formulas:

Rect. Prism	$V = l*w*h$
Cylinder	$V = \pi * r^2 * h$

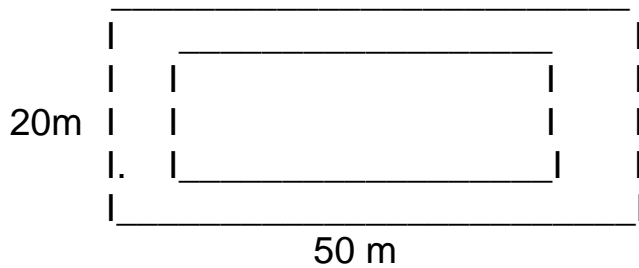
Student Name _____

Student Number _____

School _____

Use the diagram dimensions of the sketch for a new sidewalk and pool to calculate questions #51-#53.

Note: The sidewalk is uniform width of three feet.



51. What is the **perimeter of the pool**?

- A. 58 m B. 70 m C. 106 m D. 140 m E. None of the above

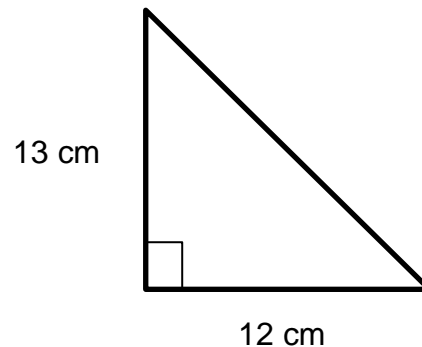
52. What is the **area covered by the sidewalk only**?

- A. 90m^2 B. 140m^2 C. 800m^2 D. 1000m^2 E. None of the above

53. What is the **volume** of the pool if it is five feet deep?

- A. 400mm^3 B. 75mm^3 C. 85mm^3 D. 105mm^3 E. None of the above

Use the right triangle for problems # 54 - # 56.



54. What is the **area of this triangle**?

- A. 25 cm^2 B. 30 cm^2 C. 60 cm^2
D. 78 cm^2 E. None of the above

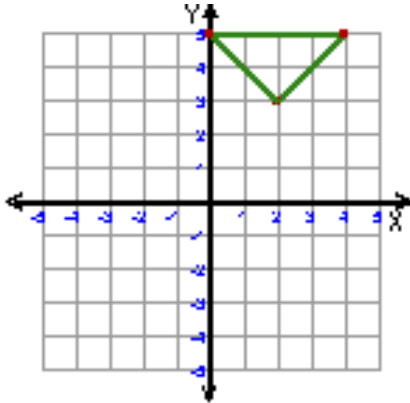
55. Which term best describes the right triangle **classifying it by its sides**?

- A. Equilateral B. Isosceles C. Scalene D. Acute E. None of the above

56. What is the **sum of the angles** in a right triangle?

- A. 45° B. 60° C. 90° D. 180° E. None of the above

Use the triangle in the coordinate plane for problems #57 - #62. On the graph Point A is the lowest point of the figure. If this was a map, A is the southern point of the triangle.

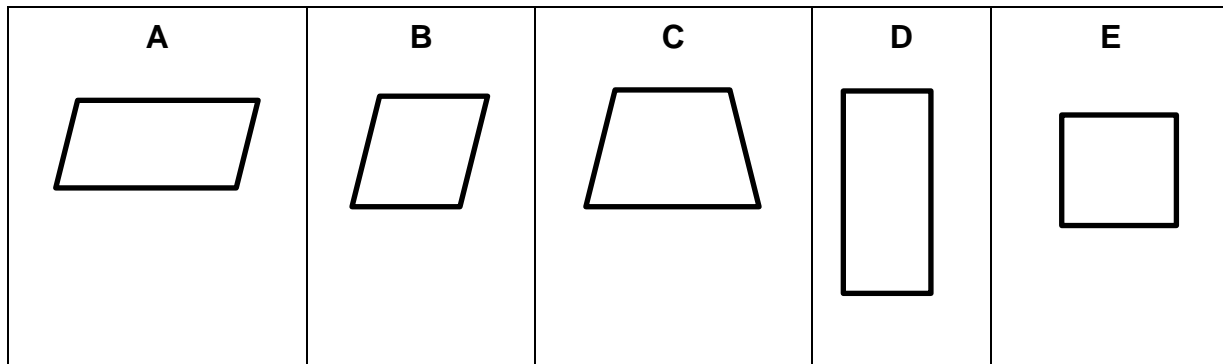


57. **Classify** the type of triangle in the diagram.
 A. Isosceles Right B. Scalene Acute
 C. Obtuse Isosceles D. Equilateral
 E. None of the above
58. If the figure is reflected across the x-axis, what would be the coordinates of reflection of point A?
 A. (-2, -3) B. (-2, 3) C. (2, 3) D. (-2, -3)
 E. None of the above.
59. If the original figure is reflected over the y-axis, what would be the coordinates of A' (the reflection of point A).
 A. (-2, -3). B. (-2, 3) C. (2, 3). D. (-2, -3)
 E. None of the above
60. If the figure is translated $\langle 2, -5 \rangle$, where would A' be located?
 A. (-3, 3). B. (0, -2). C. (4, -2). D. (4, 8)
 E. None of the above
61. If you reflect the triangle first across the y-axis, and then across the x-axis, what would be the location of A'?
 A. (2, 3) B. (-2, -3) C. (-2, 3)
 D. (2, -3) E. None of the above
62. If the triangle is stretched so that pt. A is placed vertically on the x-axis, what is the **difference** between the original area and the new **area**?
 A. 4 sq.units B. 5 sq. units
 C. 6 sq. units D. 8 sq. units
 E. None of the above

63. What is the **circumference** of a circle with diameter 10 km?
 Round to the nearest tenth.
 A. 15.7 km B. 31.4 km C. 78.5 km D. 47.1 km E. None of the above

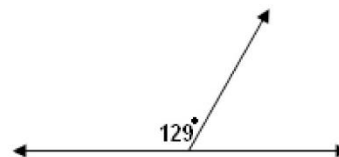
64. If the area of a circle is 201.0 cm^2 , what is the radius?
 A. 9 cm. B. 8 cm C. 7 cm D. 6 cm E. None of the above

Use the figures below to respond to problems #65-69.



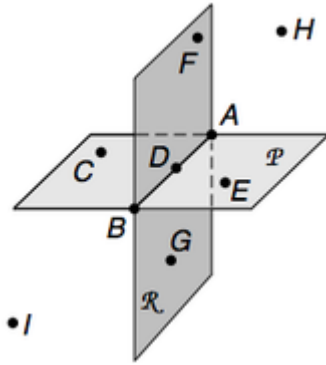
65. Which of the above figures are **quadrilaterals**?
- A. A, B B. A, D, E C. B & E D. A, B, C, D & E E. None of the above
66. Which of the above figures are **rectangles**?
- A. A B. B C. C D. E E. None of the above
67. Which of the above figures are **rhombuses**?
- A. D & E B. B & E C. B D. E E. None of the above
68. Which of the above figures are **parallelograms**?
- A. A & B B. B & D C. A, B, D & E D. A, B, C & D E. None of the above
69. Which of the following statements is **NOT** true?
- A. A parallelogram is sometimes a rectangle, and a rectangle is always a parallelogram.
- B. A square is always a rectangle, but a rectangle is always a square.
- C. A trapezoid is always a quadrilateral, but a trapezoid is never a parallelogram.
- D. A rhombus is sometimes a square, but a square is always a rhombus.
- E. All statements are true.

70. Which term best describes figure on the right?
Find the missing angle measure. Both must be true.



- A. Supplementary; 41°
- B. Linear Pair; 51°
- C. Linear Pair; 129°
- D. Vertical; 129°
- E. None of the above

Use the diagram below to answer problems #71-72.



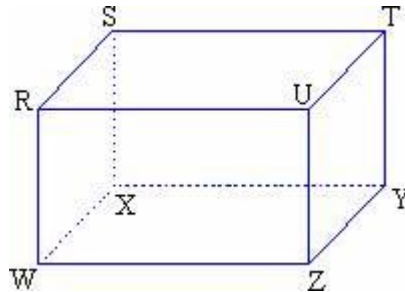
71. Name a line that is **on** Plane P and Plane R.

- A. \overleftrightarrow{AB} B. \overleftrightarrow{FG} C. \overleftrightarrow{CH} D. \overleftrightarrow{IE}
 E. None of the above

72. Name a point **not** on either Plane R or Plane P.

- A. C B. G C. F D. B
 E. None of the above

Use the rectangular solid below to answer problems #73-76.



73. Name a **line segment** that is **parallel** to segment XY on the rectangular solid.

- A. RU B. ST C. SX D. YZ E. None of the above

74. Name a line segment that is **skew** to \overline{XY} .

- A. UZ B. WX C. SX D. ST E. None of the above

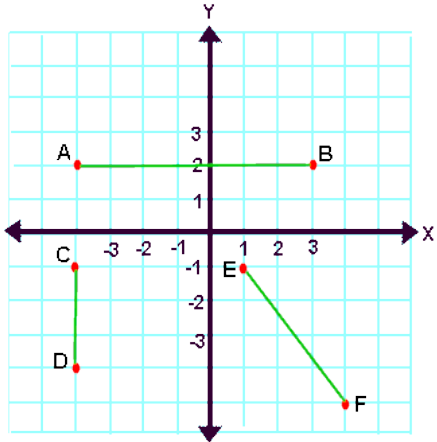
75. Name a line segment that is **perpendicular** to \overline{XY} .

- A. \overline{YZ} B. \overline{RW} C. \overline{WZ} D. \overline{UZ} E. None of the above

76. Given: WZ is four less than twice ZY and ZY = UZ. If ZY = 9m, what is the volume of the rectangular solid?

- A. $1782m^3$ B. $396m^3$ C. $252m^2$ D. $1134m^3$ E. None of the above

Use the coordinate graph below for problems #77-80.



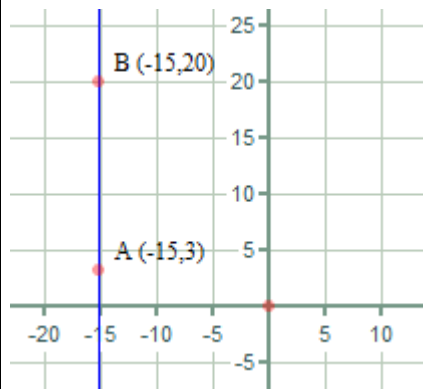
77. What is the **slope** of \overline{AB} ?
 A. 1 B. $1/7$ C. undefined
 D. 0 E. None of the above

78. What is the **slope** of \overline{EF} ?
 A. $3/4$ B. 0 C. $-3/4$
 D. $-4/3$ E. None of the above

79. Given the Pythagorean Theorem: In a right triangle, the sum of the squares of the legs equals the square of the hypotenuse, **find EF**.
 A. 1 B. 3 C. 5 D. 7
 E. None of the above

80. What is the **linear equation** that best describes EF?

- A. $y = -1x + -5$ B. $Y = -1x + 0$
- C. $Y = -1x + 0$ D. $y = 2$
- E. None of the above



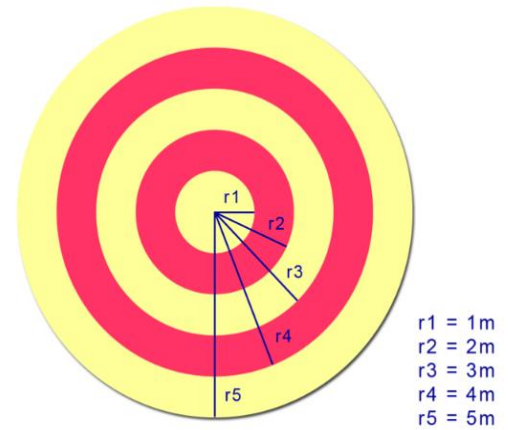
81. What is the **linear equation** for the line BA?

- A. $y = 20$ B. $x = -15$
- C. $x = 1y + -15$ D. $y = 17x - 5$
- E. None of the above

82. What is the total area in square meters of red rings on this dartboard?

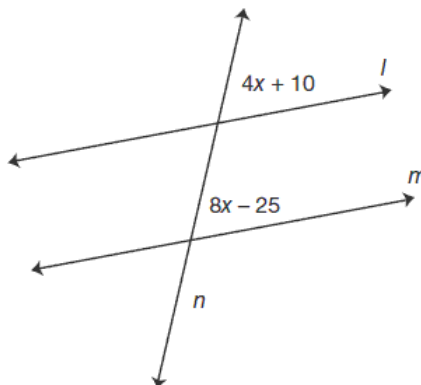
- A. 8π
- B. 10π
- C. 11π
- D. 16π
- E. None of the above

Note: Each band is 1 m in width.



<p>Stage 1</p>		<p>2 unit squares</p>	<p>83. How many unit squares would be in Stage 6 ?</p> <ul style="list-style-type: none"> A. 30 B. 42 C. 56 D. 72 E. None of the above
<p>Stage 2</p>		<p>6 unit squares</p>	
<p>Stage 3</p>		<p>12 unit squares</p>	
<p>Stage 4</p>			

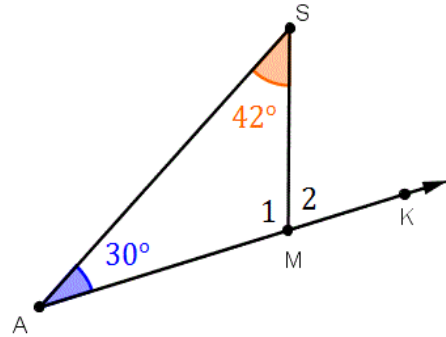
84. Provided $l \parallel m$, find the value of one acute angle labeled with x .



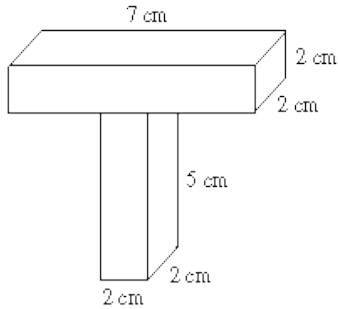
- A. $x = 8.75$
- B. $x = 20$
- C. $x = 45$
- D. $x = 70$
- E. None of the above

85. What are the **measures of angle 2** in the diagram b

A.	72°
B.	82°
C.	98°
D.	108°
E.	None of the above



<p>86. Perimeter = 31 Find the value of x when the triangle has the following lengths for sides.</p> <p style="text-align: center;">$x, 2x - 5, 3x + 6$</p>	<p>A. 1 B. 4 C. 5 D. 6 E. None of the above</p>																		
<p>87. Find the exact circumference and the area of a circle with a radius of 5 cm.</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 40%; text-align: center;">Circumference</th> <th style="width: 50%; text-align: center;">Area</th> </tr> </thead> <tbody> <tr> <td>A.</td> <td style="text-align: center;">5π cm</td> <td style="text-align: center;">10π cm²</td> </tr> <tr> <td>B.</td> <td style="text-align: center;">5π cm</td> <td style="text-align: center;">25π cm²</td> </tr> <tr> <td>C.</td> <td style="text-align: center;">10π cm</td> <td style="text-align: center;">20π cm²</td> </tr> <tr> <td>D.</td> <td style="text-align: center;">10π cm</td> <td style="text-align: center;">25π cm²</td> </tr> <tr> <td>E.</td> <td colspan="2" style="text-align: center;">None of the above</td> </tr> </tbody> </table>		Circumference	Area	A.	5π cm	10π cm ²	B.	5π cm	25π cm ²	C.	10π cm	20π cm ²	D.	10π cm	25π cm ²	E.	None of the above	
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D.	10π cm	25π cm ²																	
E.	None of the above																		
<p>88. Find the amount of tape that would wrap around this shape both directions once.</p> <div style="text-align: center;"> </div>	<p>A. 20 cm B. 24 cm C. 40 cm D. 48 cm E. None of the above</p>																		

Volume Formulas:**Rectangular Prism** $V = l * w * h$ **Cylinder:** $V = \pi r^2 h$ 89. Find the **volume of the “T” bar.**

- A. 20 cm^3
- B. 28 cm^3
- C. 48 cm^3
- D. 56 cm^3
- E. None of the above

90. Find the volume of the cylinder post on a wind turbine with an 80 meters height and a base 50 feet in diameter.

- A. $80 \pi \text{ m}^3$
- B. $225 \pi \text{ m}^3$
- C. $4500 \pi \text{ m}^3$
- D. $18000 \pi \text{ m}^3$
- E. None of the above