Kansas City Area Teachers of Mathematics
2017 KCATM Math Competition

GEOMETRY AND MEASUREMENT TEST
GRADE 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 are not to scale.**

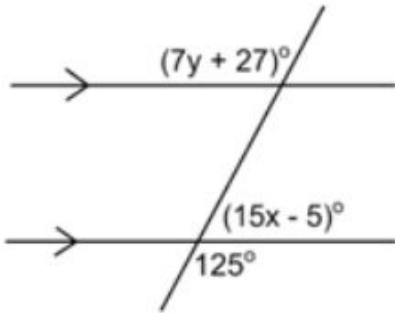| Area Formulas:	
Triangle	$A = \dfrac{bh}{2}$
Parallelogram	$A = bh$
Trapezoid	$A = \dfrac{h(b_1 + b_2)}{2}$
Volume Formulas:	
Rect. Prism	$V = lwh$
Cylinder	$V = \pi r^2 h$

Student Name _____ Student Number _____

School _____

Use the diagram with 2 parallel lines cut by a transversal to find the values of x and y in problems #51-52.
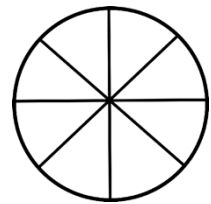
51. **Solve for x.**

A. x = 3   B. x = 4   C. x = 5
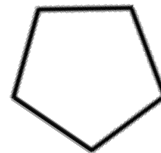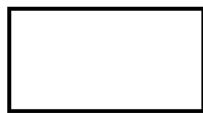
D. x = 8.7   E. None of the above

52. **Solve for y.**

A. y = 4   B. y = 10   C. y = 14

D. y = 21.7   E. None of the above

$(7y + 27)^\circ$

$(15x - 5)^\circ$

125°

53. What is the central angle (angle at the center) of 3 slices of a pizza in the diagram.

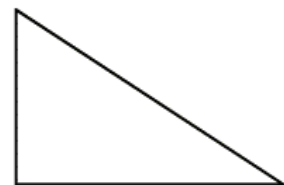A. 120° B. 90° C. 45° D. 135° E. None of the above

54. Determine which figure is the **regular** polygon and find the measure of each interior angle.

A. Rhombus, 72° B. Rectangle, 90° C. Pentagon, 108°
D. Pentagon, 100° E. None of the above
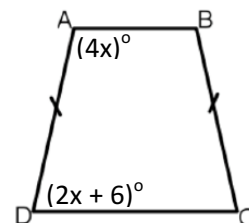
55. What is the **area** of the right triangle with base 12 and the height 2/3 the base length?

A. 48 units^2 B. 4 units^2 C. 54 units^2
D. 96 units^2 E. None of the above

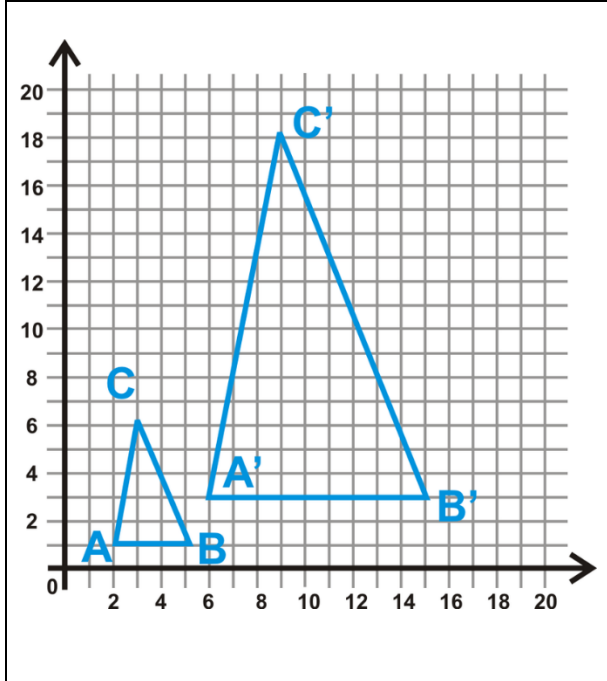56. Given the isosceles trapezoid, what is the measure of $\angle A$?

A. 12° B. 29° C. 120° D. 116°
E. None of the above

$(4x)^\circ$

$(2x + 6)^\circ$

57. Find the measure of the **supplement** of a 38° angle.

    A. 52°   B. 62°   C. 142°   D. 162°   E. None of the above

Use the <u>similar</u> triangles in the coordinate plane for problems #58-60.

58. What are the coordinates of A' ?

      A. (2, 1)   B. (1, 2)   C. (6, 3)
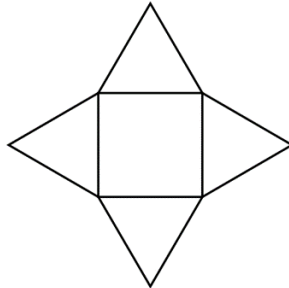   D. (3, 6)   E. None of the above

59. What is the **area** of $\triangle A'B'C'$?

      A. 67.5 units^2 B. 135 units^2
      C. 270 units^2 D. 81 units^2
      E. None of the above

60. What is the ratio of $\triangle A'B'C'$ to $\triangle ABC$?

      A. 5:1   B. 4:1   C. 3:1   D. 2:1
      E. None of the above

61. What is the technically correct name for the polyhedron that is formed when the net is folded. *Note: All sides are congruent in the figure.*
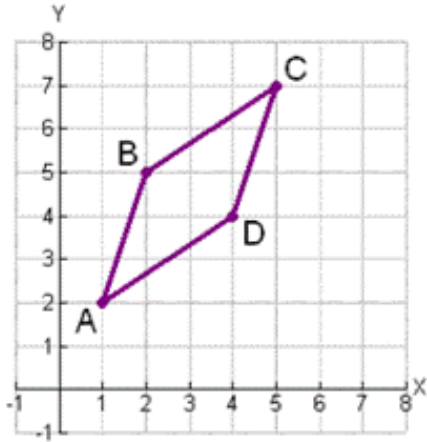
    A. Triangular Prism   B. Triangular Pyramid   C. Square Pyramid   D. Cube
    E. None of the above

62. If you slice a cylinder through the 2 bases (see figure), what cross-section shape would you get if you opened the cylinder?

    A. rectangle   B. circle   C. square   D. semi-circle
    E. None of the above

Use the triangle in the coordinate plane for problems #63-65.

63. What is the slope of $\overline{AB}$?

A. $\dfrac{3}{1}$ B. $\dfrac{1}{3}$ C. $\dfrac{2}{1}$ D. $\dfrac{1}{2}$

E. None of the above

64. Use the Pythagorean Theorem to find the distance BC. Leave your answer in radical form.

A. $\sqrt{5}$ B. $\sqrt{13}$ C. $\sqrt{1}$

D. $\sqrt{10}$ E. None of the above

65. Comparing the slopes of slopes and the distances of opposite sides of the quadrilateral, what is the best name for the shape?

A. Rhombus   B. Kite   C. Parallelogram
D. Trapezoid   E. None of the above

66. A rectangular prism is packed with cubes that measure ¼ inch on each side. What is the **volume** of the rectangular prism?

A. 0.9375 in^3 B. 15 in^3 C. 3.75 in^3

D. 7.5 in^3 E. None of the above
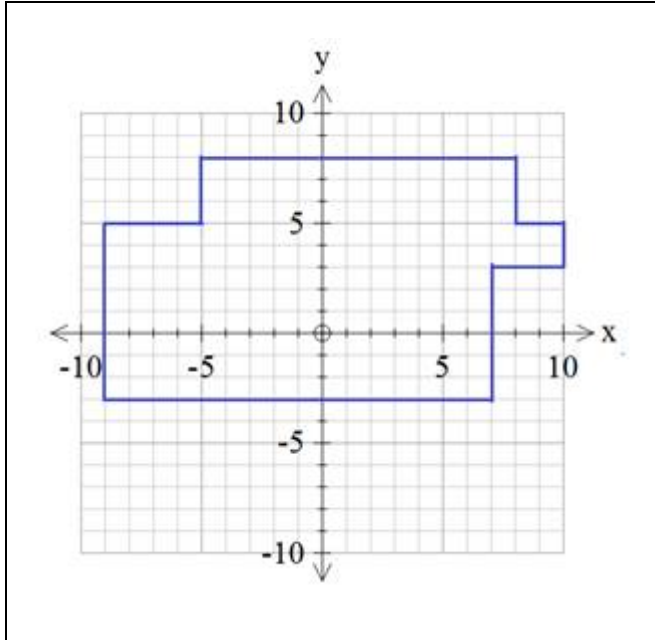
$\dfrac{1}{4}$ in. {
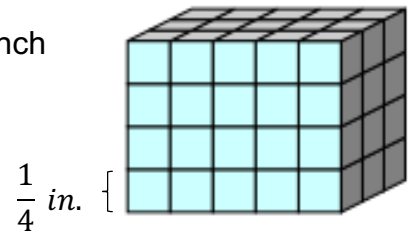
67. What is the **radius** of a circle that has a circumference of $12\pi\ inches$?

A. 12 in.   B. 26 in.   C. 6 in.   D. 36 in.   E. None of the above

68. The scale of a drawing is 2 cm: 5 m. What is the actual width of a room if the width in the scale drawing is 7 cm?

A. 14 m   B. 17.5 m   C. 10 m   D. 35 m   E. None of the above
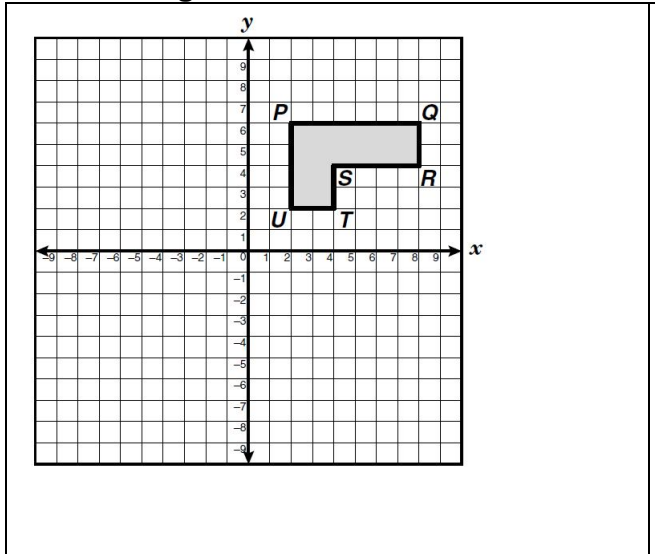
Use the diagram below for #69-70.

69. What is the perimeter of the composite shape?

   A. 59 units   B. 60 units
   C. 54 units   D. 66 units
   E. None of the above

70. What is the area of the composite shape?

   A. 290 units^2 B. 176 units^2
   C. 158 units^2 D. 173 units^2
   E. None of the above

Use the diagram for #71-72.
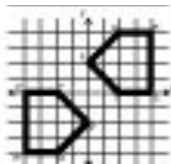
71. What would be the coordinates of P' when the figure is reflected over the x axis?

   A. (2, -6)   B. (-2, 6)   C. (6, -2)
   D. (-6, 2)   E. None of the above

72. What would be the coordinates of P' when rule is:
$(x, y) \rightarrow (x - 1, y + 3)$?

   A. (5, 5)   B. (1, 9)   C. (2, 6)
   D. (7, -1)   E. None of the above
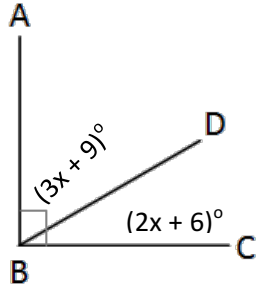
73. Which single transformation is shown on the graph?

   A. Translation   B. Reflection
   C. Rotation   D. Dilation
   E. None of the above

74. Find the equation of a line in slope-intercept form through the points (0, 5) and (-2, 8)
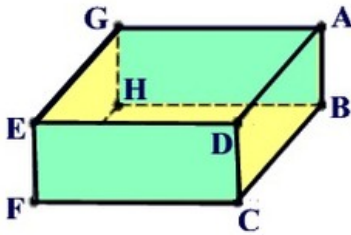
A. $y = -\frac{3}{2}x + 8$ B. $y = -\frac{3}{2}x + 5$ C. $y = -\frac{2}{3}x + 5$

D. $y = \frac{3}{2}x + 11$ E. None of the above

75. Use the diagram below to **solve for x**.

A

A. 12   B. 13   C. 14
D. 15   E. None of the above
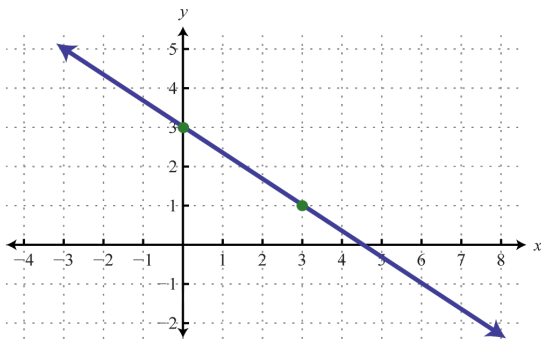
Use the rectangular prism below to answer problems #76-77.

76. Name a line that is **skew** to $\overline{EG}$.

A. $\overline{FH}$ B. $\overline{GA}$ C. $\overline{DC}$ D. $\overline{EF}$
E. None of the above

77. Name a line that is **perpendicular** to $\overline{EG}$.

A. $\overline{BC}$ B. $\overline{GA}$ C. $\overline{DC}$ D. $\overline{AB}$
E. None of the above

Use coordinate graph below for problems #78-79.

78. What is the **linear equation** for the line?
A. $y = -\frac{3}{2}x + 3$ B. $y = -\frac{2}{3}x + 3$

C. $y = -3x + 2$ D. $y = 3x + 1$
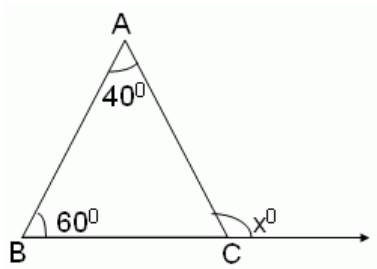
E. None of the above

79. What is the **equation** for a line **perpendicular** to the given line?
A. $y = \frac{3}{2}x$ B. $y = -\frac{2}{3}x$

C. $y = \frac{2}{3}x$ D. $y = -\frac{3}{2}x$

E. None of the above

80. If a 10 ft. flagpole casts a 15 ft. shadow, **how long is a shadow cast by a 24 ft. house** at the same time?
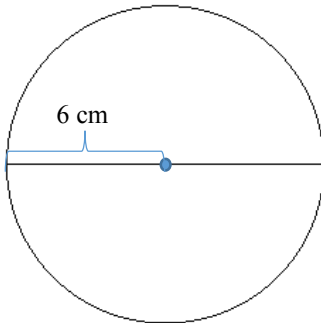
    A. 16 ft.   B. 32 ft.   C. 36 ft.   D. 48 ft.   E. None of the above

81. Find the value of the **exterior angle, x.**

A. 100°   B. 80°

C. 60°   D. 140°

E. None of the above

A triangle ABC with angle $A = 40°$, angle $B = 60°$, and exterior angle $x°$ at vertex C.

Use the circle to for problems #82-83.

82. Find the **circumference** of the circle in terms of π.

    A. $144\,\pi$ cm   B. $36\,\pi$ cm
    C. $12\,\pi$ cm   D. $24\,\pi$ cm
    E. None of the above

Circle with radius 6 cm.

83. Find the **area** of the circle in terms of π.

    A. $144\,\pi$ cm^2 B. $36\,\pi$ cm^2
    C. $12\,\pi$ cm^2 D. $24\,\pi$ cm^2
    E. None of the above

84. If a square garden is enclosed by 24.8 meters of fencing. What is the area of the garden?
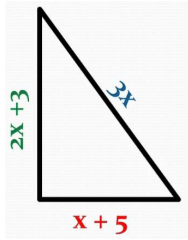
    A. 153.8 m^2 B. 38.4 m^2 C. 615.0 m^2 D. 17.1 m^2 E. None of the above

85. Which conclusion can be drawn from these statements?

If it is summer, then I go on vacation.
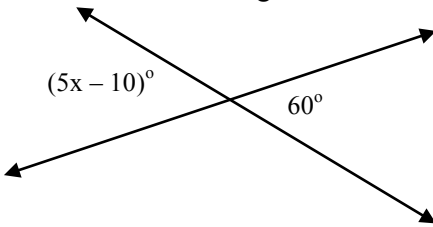**I go on vacation.**

A. It is summer.   B. It is not summer.
C. I did not go on vacation.   D. All of these
E. None of the above

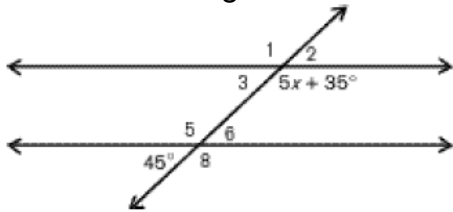86. The perimeter of the triangle is 50. **Solve for the value of x.**

(triangle with sides labeled $2x+3$, $3x$, and $x+5$)

A. x = 7   B. x = 8   C. x = 9

D. x = 11   E. None of the above

87. Use the diagram to **solve for x.**

$(5x - 10)^{\circ}$ 60°

A. x = 26   B. x = 12   C. x = 13

D. x = 14   E. None of the above

88. Use the diagram to **solve for x.**

(parallel lines cut by transversal; angles labeled 1, 2, 3, $5x + 35^{\circ}$, 5, 6, 45°, 8)

A. x = 2   B. x = 20   C. x = 45

D. x = 25   E. None of the above

Use the Volume Formulas for problems #89-90

Rectangular Prism   V = l x w x h   **Cylinder:**   V = π r² h

(figure: cylinder on top of rectangular prism; cylinder labeled 4 ft and 8 ft; prism labeled 12 ft, 8 ft, 14 ft)

89. Find the **volume of the cylinder** to the nearest whole number.

A. 804 ft³   B. 101 ft³
C. 145 ft³   D. 402 ft³
E. None of the above

90.   What is the total **volume of the figure** to the nearest whole number?

A. 1746 ft³
B. 2550 ft³
C. 1891 ft³
D. 1847 ft³
E.   None of the above