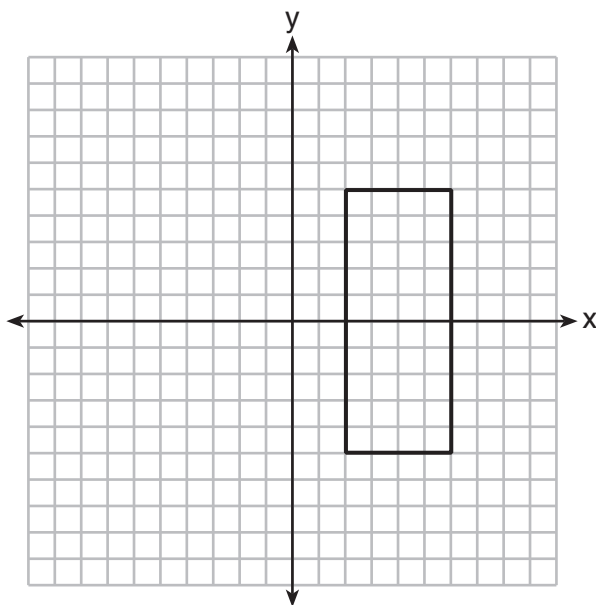


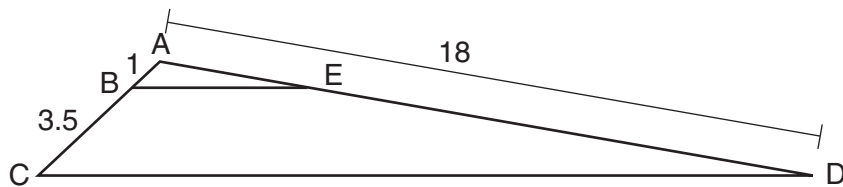
Use this space for
computations.

- 6 As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

- (1) a reflection over the x -axis
 - (2) a reflection over the line $x = 4$
 - (3) a rotation of 180° about the origin
 - (4) a rotation of 180° about the point $(4,0)$
- 7 In the diagram below, triangle ACD has points B and E on sides \overline{AC} and \overline{AD} , respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.

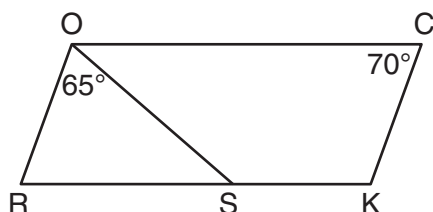


What is the length of \overline{AE} , to the *nearest tenth*?

- (1) 14.0
- (2) 5.1
- (3) 3.3
- (4) 4.0

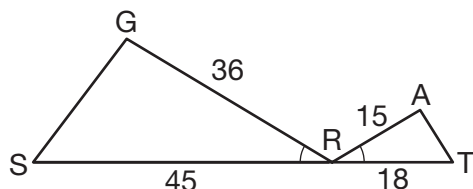
Use this space for
computations.

- 8 In the diagram below of parallelogram $ROCK$, $m\angle C$ is 70° and $m\angle ROS$ is 65° .



What is $m\angle KSO$?

- (1) 45° (3) 115°
(2) 110° (4) 135°
- 9 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



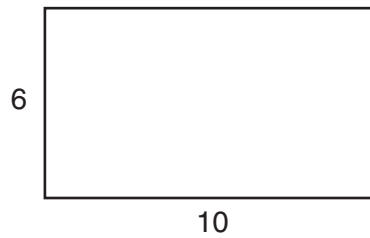
Which triangle similarity statement is correct?

- (1) $\triangle GRS \sim \triangle ART$ by AA. (3) $\triangle GRS \sim \triangle ART$ by SSS.
(2) $\triangle GRS \sim \triangle ART$ by SAS. (4) $\triangle GRS$ is not similar to $\triangle ART$.
- 10 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

- (1) $3x - 4y = 9$ (3) $4x - 3y = 9$
(2) $3x + 4y = 9$ (4) $4x + 3y = 9$

Use this space for
computations.

- 13 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π .

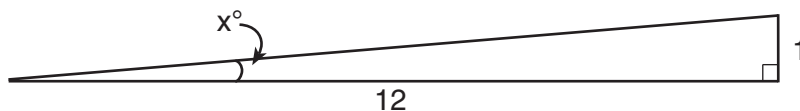


Which line could the rectangle be rotated around?

- (1) a long side (3) the vertical line of symmetry
(2) a short side (4) the horizontal line of symmetry
- 14 If $ABCD$ is a parallelogram, which statement would prove that $ABCD$ is a rhombus?

- (1) $\angle ABC \cong \angle CDA$ (3) $\overline{AC} \perp \overline{BD}$
(2) $\overline{AC} \cong \overline{BD}$ (4) $\overline{AB} \perp \overline{CD}$

- 15 To build a handicapped-access ramp, the building code states that for every 1 inch of vertical rise in height, the ramp must extend out 12 inches horizontally, as shown in the diagram below.

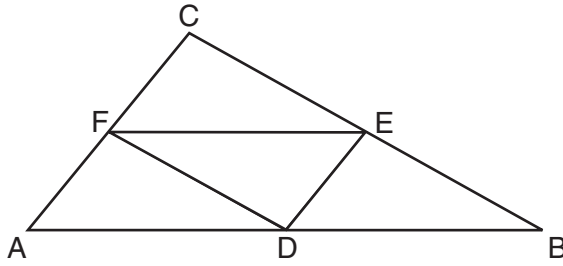


What is the angle of inclination, x , of this ramp, to the *nearest hundredth of a degree*?

- (1) 4.76 (3) 85.22
(2) 4.78 (4) 85.24

Use this space for
computations.

- 16** In the diagram below of $\triangle ABC$, D , E , and F are the midpoints of \overline{AB} , \overline{BC} , and \overline{CA} , respectively.

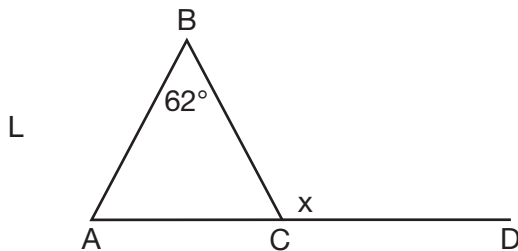


What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?

- (1) 1:1
(2) 1:2
(3) 1:3
(4) 1:4
- 17** The coordinates of the endpoints of \overline{AB} are $A(-8, -2)$ and $B(16, 6)$. Point P is on \overline{AB} . What are the coordinates of point P , such that $AP:PB$ is 3:5?

- (1) (1,1)
(2) (7,3)
(3) (9.6, 3.6)
(4) (6.4, 2.8)

- 18** Given $\triangle ABC$ with $m\angle B = 62^\circ$ and side \overline{AC} extended to D , as shown below.



Which value of x makes $\overline{AB} \cong \overline{CB}$?

- (1) 59°
(2) 62°
(3) 118°
(4) 121°

**Use this space for
computations.**

- 19** In right triangle ABC , $m\angle A = 32^\circ$, $m\angle B = 90^\circ$, and $AC = 6.2$ cm. What is the length of \overline{BC} , to the *nearest tenth of a centimeter*?
- (1) 3.3 (3) 5.3
(2) 3.9 (4) 11.7

- 20** The 2010 U.S. Census populations and population densities are shown in the table below.

State	Population Density $\left(\frac{\text{people}}{\text{mi}^2}\right)$	Population in 2010
Florida	350.6	18,801,310
Illinois	231.1	12,830,632
New York	411.2	19,378,102
Pennsylvania	283.9	12,702,379

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?

- (1) Illinois, Florida, New York, Pennsylvania
(2) New York, Florida, Illinois, Pennsylvania
(3) New York, Florida, Pennsylvania, Illinois
(4) Pennsylvania, New York, Florida, Illinois
- 21** In a right triangle, $\sin (40 - x)^\circ = \cos (3x)^\circ$. What is the value of x ?
- (1) 10 (3) 20
(2) 15 (4) 25
- 22** A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be
- (1) 10° (3) 225°
(2) 150° (4) 252°

**Use this space for
computations.**

23 In a circle with a diameter of 32, the area of a sector is $\frac{512\pi}{3}$. The measure of the angle of the sector, in radians, is

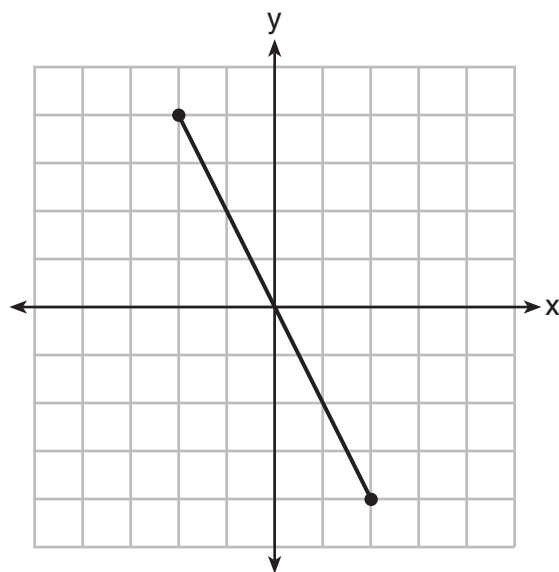
(1) $\frac{\pi}{3}$

(3) $\frac{16\pi}{3}$

(2) $\frac{4\pi}{3}$

(4) $\frac{64\pi}{3}$

24 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?



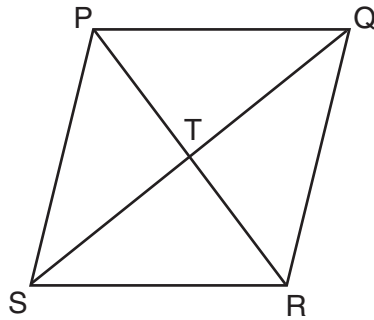
(1) $y + 2x = 0$

(3) $2y + x = 0$

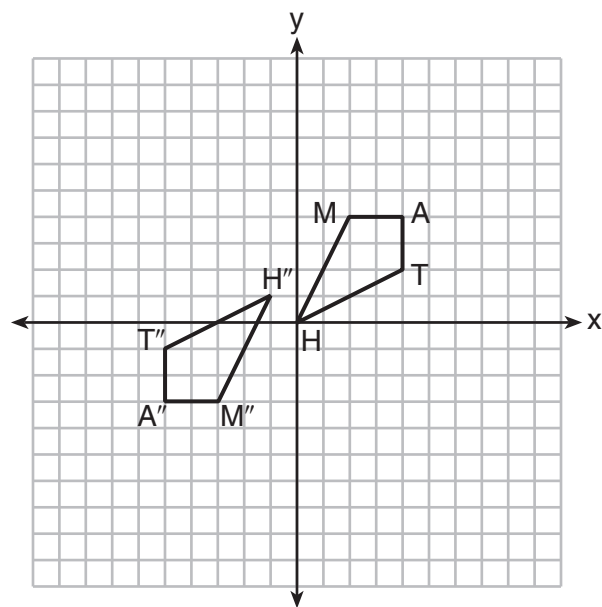
(2) $y - 2x = 0$

(4) $2y - x = 0$

- 26** In the diagram of rhombus $PQRS$ below, the diagonals \overline{PR} and \overline{QS} intersect at point T , $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.



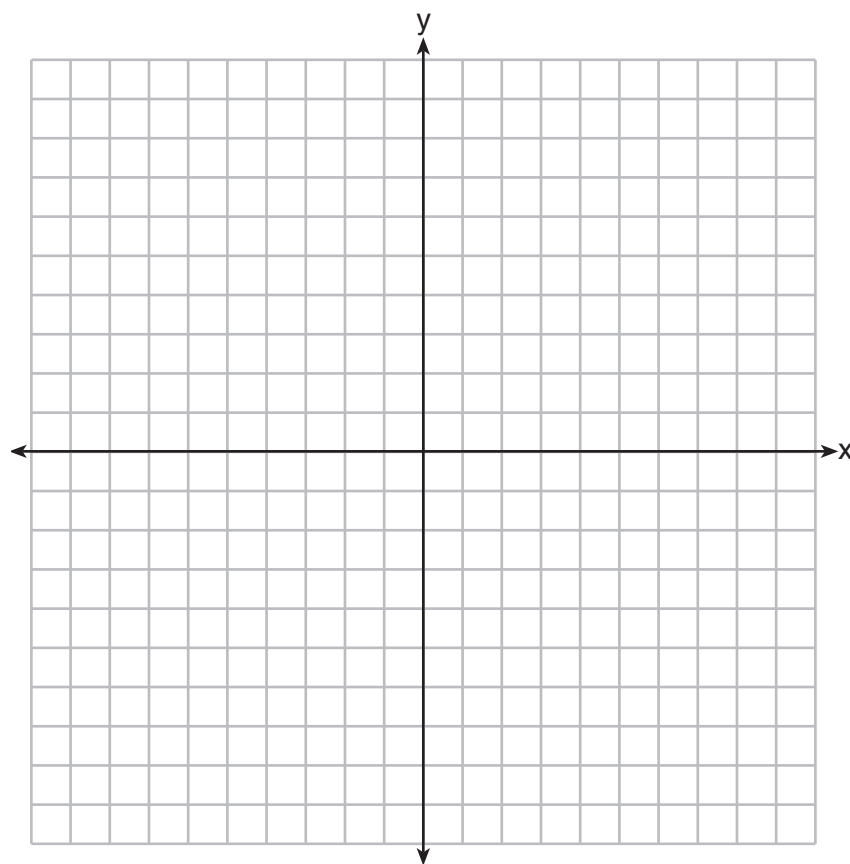
27 Quadrilateral $MATH$ and its image $M''A''T''H''$ are graphed on the set of axes below.



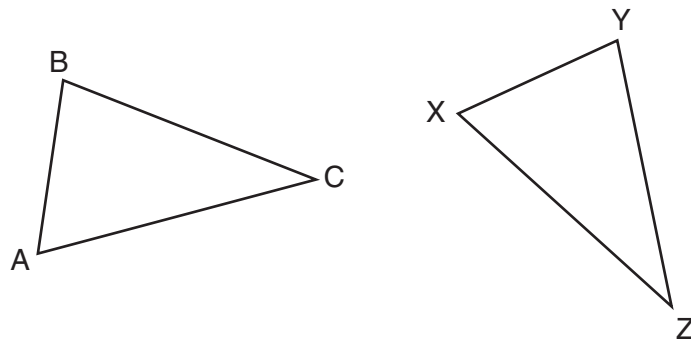
Describe a sequence of transformations that maps quadrilateral $MATH$ onto quadrilateral $M''A''T''H''$.

- 29** The coordinates of the endpoints of \overline{AB} are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of \overline{AB} , after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]



- 30** In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and \overline{AC} onto \overline{XZ} .



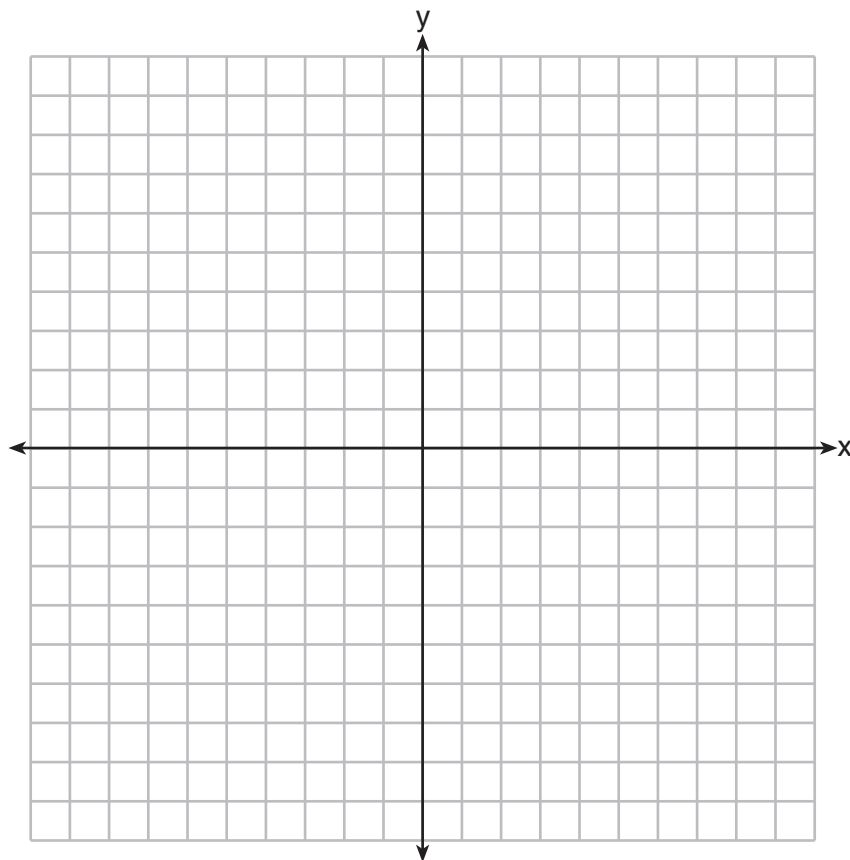
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

Part III

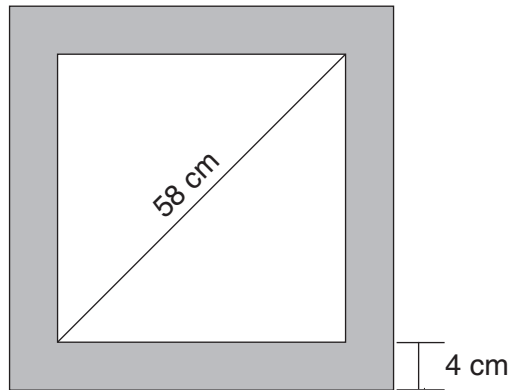
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

- 32 Triangle PQR has vertices $P(-3, -1)$, $Q(-1, 7)$, and $R(3, 3)$, and points A and B are midpoints of \overline{PQ} and \overline{RQ} , respectively. Use coordinate geometry to prove that \overline{AB} is parallel to \overline{PR} and is half the length of \overline{PR} .

[The use of the set of axes below is optional.]

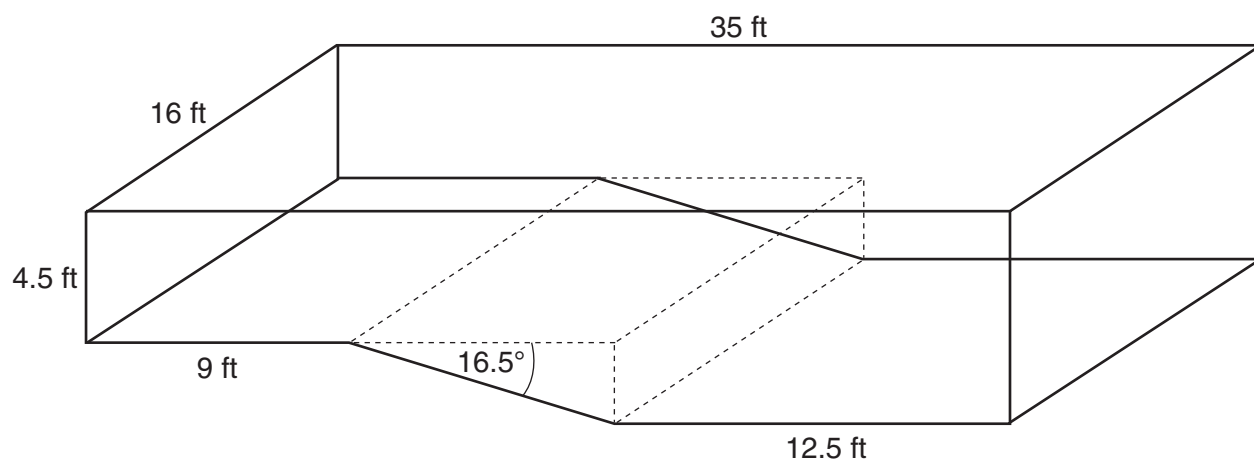


- 34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter*.

- 36** A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

Find the volume of the inside of the pool to the *nearest cubic foot*.

Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour*, will it take to fill the pool 6 inches from the top?
[1 ft³ = 7.48 gallons]