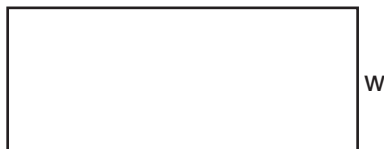


## Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. [48]

Use this space for  
computations.

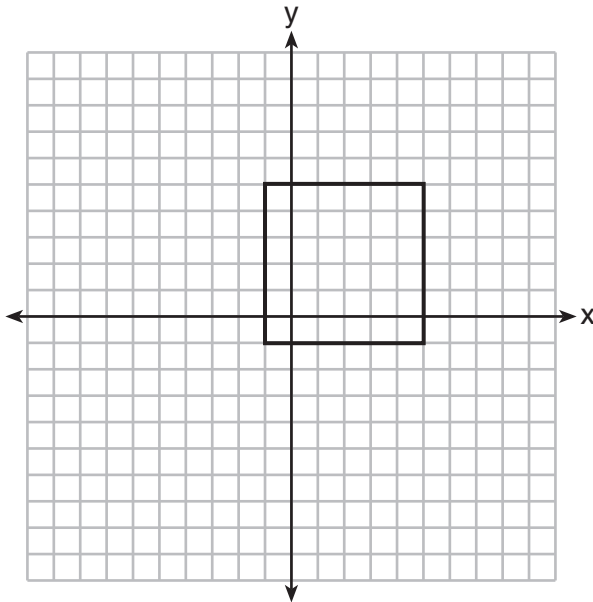
- 1 A parallelogram must be a rectangle when its
- (1) diagonals are perpendicular
  - (2) diagonals are congruent
  - (3) opposite sides are parallel
  - (4) opposite sides are congruent
- 2 If  $\triangle A'B'C'$  is the image of  $\triangle ABC$ , under which transformation will the triangles *not* be congruent?
- (1) reflection over the  $x$ -axis
  - (2) translation to the left 5 and down 4
  - (3) dilation centered at the origin with scale factor 2
  - (4) rotation of  $270^\circ$  counterclockwise about the origin
- 3 If the rectangle below is continuously rotated about side  $w$ , which solid figure is formed?



- (1) pyramid
  - (2) rectangular prism
  - (3) cone
  - (4) cylinder
- 4 Which expression is always equivalent to  $\sin x$  when  $0^\circ < x < 90^\circ$ ?
- (1)  $\cos(90^\circ - x)$
  - (2)  $\cos(45^\circ - x)$
  - (3)  $\cos(2x)$
  - (4)  $\cos x$

Use this space for  
computations.

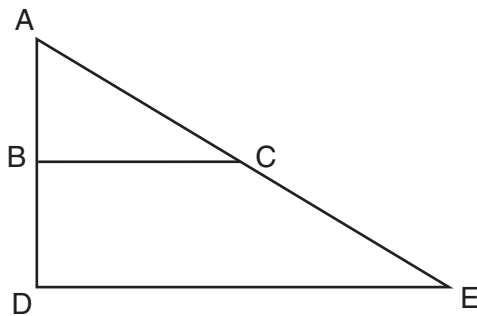
5 In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?

- (1)  $x = 5$
- (2)  $y = 2$
- (3)  $y = x$
- (4)  $x + y = 4$

6 The image of  $\triangle ABC$  after a dilation of scale factor  $k$  centered at point  $A$  is  $\triangle ADE$ , as shown in the diagram below.

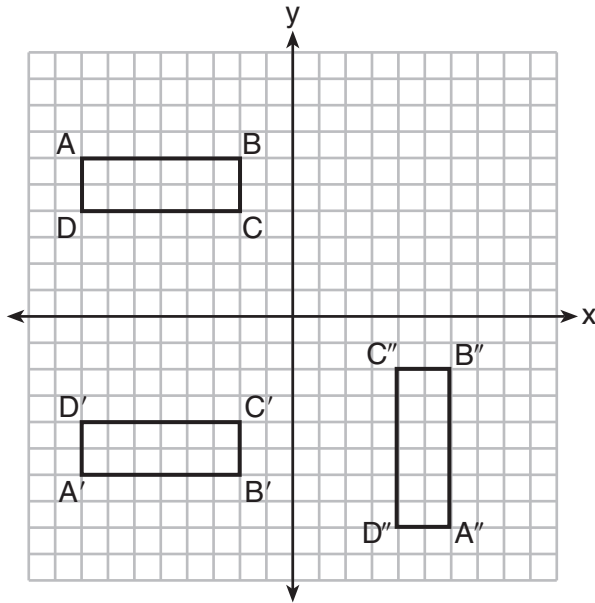


Which statement is always true?

- (1)  $2AB = AD$
- (2)  $\overline{AD} \perp \overline{DE}$
- (3)  $AC = CE$
- (4)  $\overline{BC} \parallel \overline{DE}$

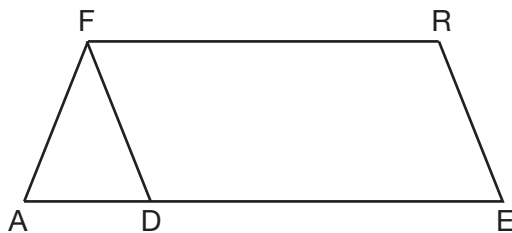
Use this space for computations.

- 7 A sequence of transformations maps rectangle  $ABCD$  onto rectangle  $A''B''C''D''$ , as shown in the diagram below.



Which sequence of transformations maps  $ABCD$  onto  $A'B'C'D'$  and then maps  $A'B'C'D'$  onto  $A''B''C''D''$ ?

- (1) a reflection followed by a rotation
  - (2) a reflection followed by a translation
  - (3) a translation followed by a rotation
  - (4) a translation followed by a reflection
- 8 In the diagram of parallelogram  $FRED$  shown below,  $\overline{ED}$  is extended to  $A$ , and  $\overline{AF}$  is drawn such that  $\overline{AF} \cong \overline{DF}$ .



If  $m\angle R = 124^\circ$ , what is  $m\angle AFD$ ?

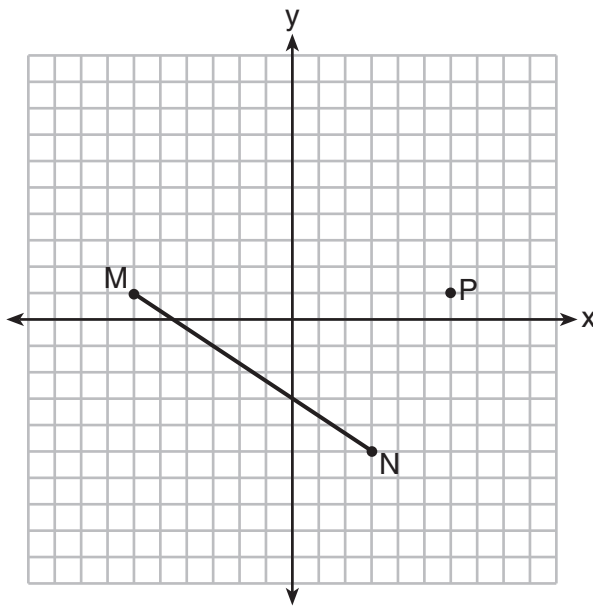
- (1)  $124^\circ$
- (2)  $112^\circ$
- (3)  $68^\circ$
- (4)  $56^\circ$

Use this space for computations.

9 If  $x^2 + 4x + y^2 - 6y - 12 = 0$  is the equation of a circle, the length of the radius is

- (1) 25
- (2) 16
- (3) 5
- (4) 4

10 Given  $\overline{MN}$  shown below, with  $M(-6,1)$  and  $N(3,-5)$ , what is an equation of the line that passes through point  $P(6,1)$  and is parallel to  $\overline{MN}$ ?



- (1)  $y = -\frac{2}{3}x + 5$
- (2)  $y = -\frac{2}{3}x - 3$
- (3)  $y = \frac{3}{2}x + 7$
- (4)  $y = \frac{3}{2}x - 8$

11 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region.

To the *nearest tenth of an inch*, the largest possible length of a side of the square is

- (1) 3.5
- (2) 4.9
- (3) 5.0
- (4) 6.9