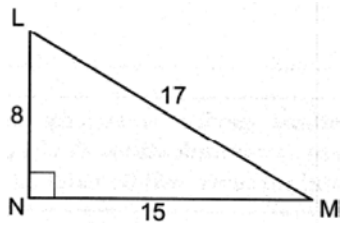
Name: _____

G.CO.B.6: Properties of Transformations 1

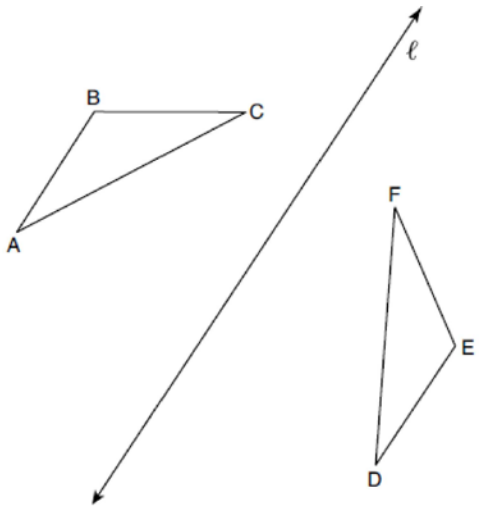
1 In right triangle LMN below, $LN = 8$, $MN = 15$, and $LM = 17$.



If triangle LMN is translated such that it maps onto triangle XYZ, which statement is always true?

1) $XY = 15$
2) $YZ = 17$
3) $m\angle Z = 90°$
4) $m\angle X = 90°$

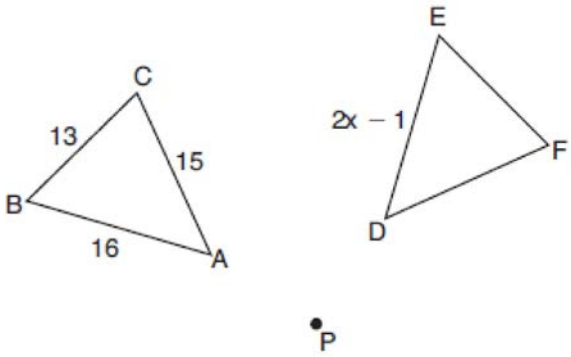
2 In the diagram below, $\triangle ABC$ is reflected over line ℓ to create $\triangle DEF$.



If $m\angle A = 40°$ and $m\angle B = 95°$, what is $m\angle F$?

1) 40°
2) 45°
3) 85°
4) 95°

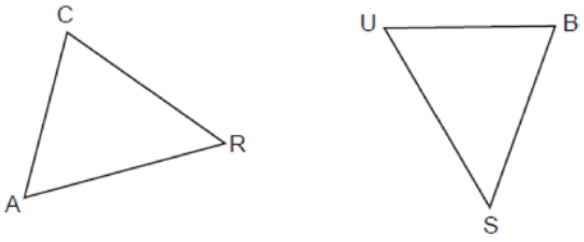
3 In the diagram below, $\triangle ABC$ with sides 13, 15, and 16, is mapped onto $\triangle DEF$ after a clockwise rotation of 90° about point P.



If $DE = 2x - 1$, what is the value of x?

1) 7
2) 7.5
3) 8
4) 8.5

4 In the diagram below, $\triangle CAR$ is mapped onto $\triangle BUS$ after a sequence of rigid motions.

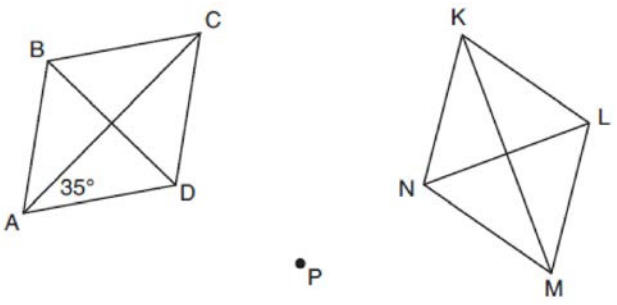


If $AR = 3x + 4$, $RC = 5x - 10$, $CA = 2x + 6$, and $SB = 4x - 4$, what is the length of $\overline{SB}$?

1) 6
2) 16
3) 20
4) 28

Name: _____

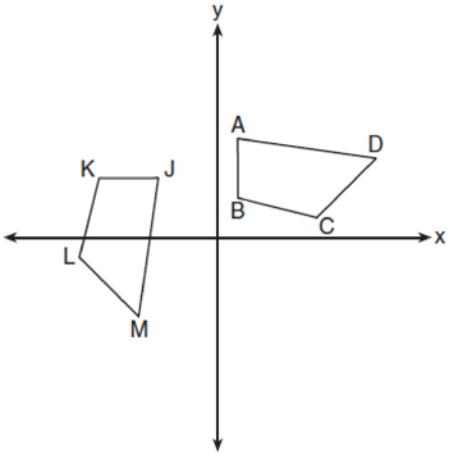
5 Rhombus *ABCD* can be mapped onto rhombus *KLMN* by a rotation about point *P*, as shown below.



What is the measure of $\angle KNM$ if the measure of $\angle CAD = 35$?

1) 35°
2) 55°
3) 70°
4) 110°

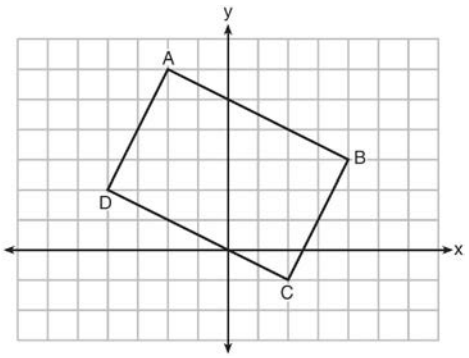
6 In the diagram below, a sequence of rigid motions maps *ABCD* onto *JKLM*.



If $m\angle A = 82°$, $m\angle B = 104°$, and $m\angle L = 121°$, the measure of $\angle M$ is

1) 53°
2) 82°
3) 104°
4) 121°

7 Quadrilateral *ABCD* is graphed on the set of axes below.

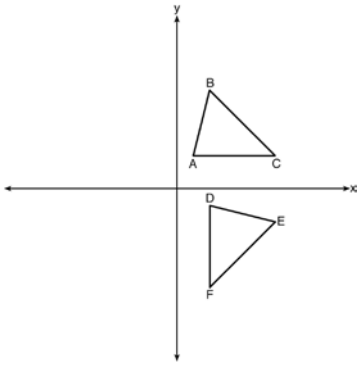


When *ABCD* is rotated 90° in a counterclockwise direction about the origin, its image is quadrilateral *A'B'C'D'*. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?

1) no and $C'(1,2)$
2) no and $D'(2,4)$
3) yes and $A'(6,2)$
4) yes and $B'(-3,4)$

Name: _____

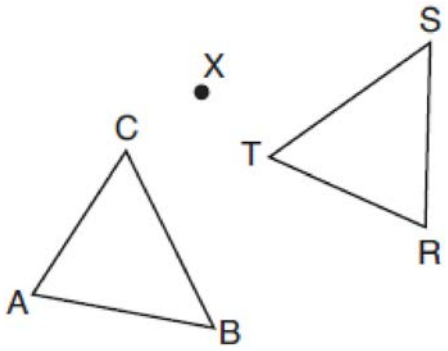
8 The image of $\triangle ABC$ after a rotation of 90º clockwise about the origin is $\triangle DEF$, as shown below.



Which statement is true?

1) $\overline{BC} \cong \overline{DE}$
2) $\overline{AB} \cong \overline{DF}$
3) $\angle C \cong \angle E$
4) $\angle A \cong \angle D$

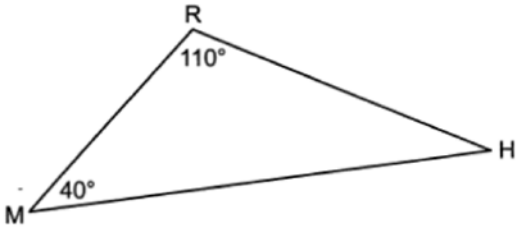
9 After a counterclockwise rotation about point X, scalene triangle ABC maps onto $\triangle RST$, as shown in the diagram below.



Which statement must be true?

1) $\angle A \cong \angle R$
2) $\angle A \cong \angle S$
3) $\overline{CB} \cong \overline{TR}$
4) $\overline{CA} \cong \overline{TS}$

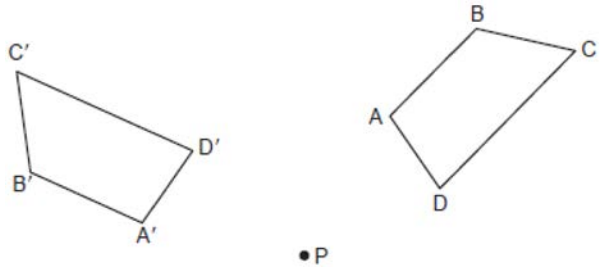
10 In $\triangle RHM$ below, $m\angle R = 110°$ and $m\angle M = 40°$.



If $\triangle RHM$ is reflected over side $\overline{HM}$ to form quadrilateral $RHR'M$, which statement is always true?

1) Quadrilateral $RHR'M$ is a parallelogram.
2) $m\angle MHR' = 40°$
3) $m\angle HMR' = 40°$
4) $\overline{MR} \cong \overline{HR'}$

11 Trapezoid $ABCD$ is drawn such that $\overline{AB} \parallel \overline{DC}$. Trapezoid $A'B'C'D'$ is the image of trapezoid $ABCD$ after a rotation of 110° counterclockwise about point P.

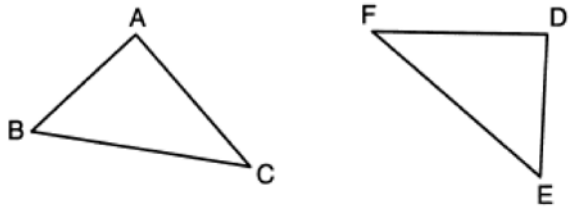


Which statement is always true?

1) $\angle A \cong \angle D'$
2) $\overline{AC} \cong \overline{B'D'}$
3) $\overline{A'B'} \parallel \overline{D'C'}$
4) $\overline{B'A'} \cong \overline{C'D'}$

Name: _____

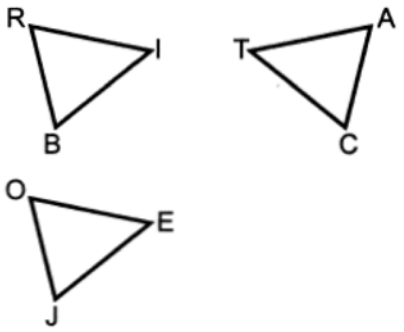
12 In the diagram below, a line reflection followed by a rotation maps $\triangle ABC$ onto $\triangle DEF$.



Which statement is always true?

1) $\overline{BC} \cong \overline{EF}$
2) $\overline{AC} \cong \overline{DE}$
3) $\angle A \cong \angle F$
4) $\angle B \cong \angle D$

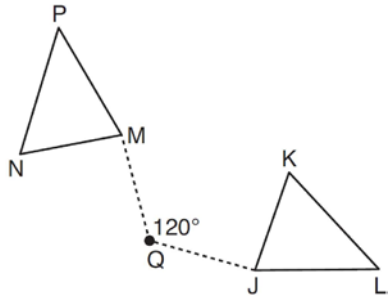
13 In the diagram below, $\triangle BRI$ is the image of $\triangle JOE$ after a translation. Triangle CAT is the image of $\triangle BRI$ after a line reflection.



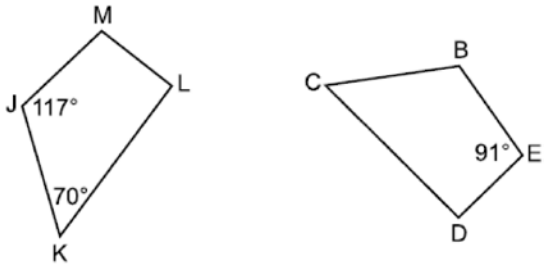
Which statement is always true?

1) $\angle R \cong \angle T$
2) $\angle J \cong \angle A$
3) $\overline{JE} \cong \overline{RI}$
4) $\overline{OE} \cong \overline{AT}$

14 Triangle MNP is the image of triangle JKL after a 120° counterclockwise rotation about point Q. If the measure of angle L is 47° and the measure of angle N is 57°, determine the measure of angle M. Explain how you arrived at your answer.



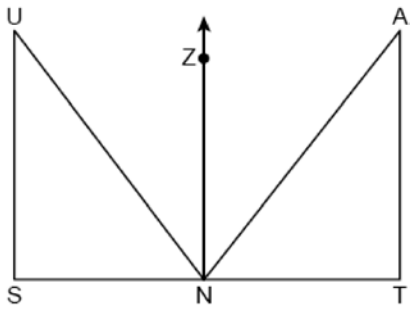
15 In the diagram below, quadrilateral $BCDE$ maps onto quadrilateral $JKLM$ using a sequence of rigid motions.



Determine and state the degree measure of angle D.

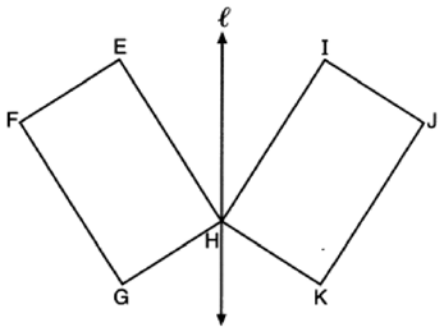
Name: _____

16 In the diagram below, $\triangle TAN$ is the image of $\triangle SUN$ after a reflection over $\overline{NZ}$.



Use the properties of rigid motions to explain why $\triangle TAN \cong \triangle SUN$.

17 In the diagram below, parallelogram *EFGH* is mapped onto parallelogram *IJKH* after a reflection over line ℓ.



Use the properties of rigid motions to explain why parallelogram *EFGH* is congruent to parallelogram *IJKH*.

18 If $\triangle ABC$ is mapped onto $\triangle DEF$ after a line reflection and $\triangle DEF$ is mapped onto $\triangle XYZ$ after a translation, the relationship between $\triangle ABC$ and $\triangle XYZ$ is that they are always
1) congruent and similar
2) congruent but not similar
3) similar but not congruent
4) neither similar nor congruent

19 Quadrilateral *MATH* is congruent to quadrilateral *WXYZ*. Which statement is always true?
1) $MA = XY$
2) $m\angle H = m\angle W$
3) Quadrilateral *WXYZ* can be mapped onto quadrilateral *MATH* using a sequence of rigid motions.
4) Quadrilateral *MATH* and quadrilateral *WXYZ* are the same shape, but not necessarily the same size.

20 Triangle *A'B'C'* is the image of triangle *ABC* after a translation of 2 units to the right and 3 units up. Is triangle *ABC* congruent to triangle *A'B'C'*? Explain why.

G.CO.B.6: Properties of Transformations 1
Answer Section

1 ANS: 3
The measures of the angles of a triangle remain the same after a translation because translations are rigid motions which preserve angle measure.

REF: 082401geo

2 ANS: 2
$180 - 40 - 95 = 45$

REF: 082201geo

3 ANS: 4
$2x - 1 = 16$

$x = 8.5$

REF: 011902geo

4 ANS: 3
$5x - 10 = 4x - 4$ $4(6) - 4 = 20$

$x = 6$

REF: 012408geo

5 ANS: 4
$90 - 35 = 55$ $55 \times 2 = 110$

REF: 012015geo

6 ANS: 1
$360 - (82 + 104 + 121) = 53$

REF: 011801geo

7 ANS: 4 REF: 011611geo

8 ANS: 4
The measures of the angles of a triangle remain the same after all rotations because rotations are rigid motions which preserve angle measure.

REF: fall1402geo

9 ANS: 1 REF: 061801geo

10 ANS: 3 REF: 062407geo

11 ANS: 3 REF: 062302geo

12 ANS: 1
The lengths of the sides of a triangle remain the same after all rotations and reflections because rotations and reflections are rigid motions which preserve distance.

REF: 012301geo

13 ANS: 4 REF: 062401geo

14 ANS:
$M = 180 - (47 + 57) = 76$ Rotations do not change angle measurements.

REF: 081629geo

15 ANS:
$D = 360 - (117 + 70 + 91) = 82$

REF: 012525geo

16 ANS:
Reflections preserve distance, so the corresponding sides are congruent.

REF: 082430geo

17 ANS:
Reflections preserve distance and angle measure.

REF: 062228geo

18 ANS: 1
Distance and angle measure are preserved after a reflection and translation.

REF: 081802geo

19 ANS: 3 REF: 082203geo

20 ANS:
Yes, as translations do not change angle measurements.

REF: 061825geo