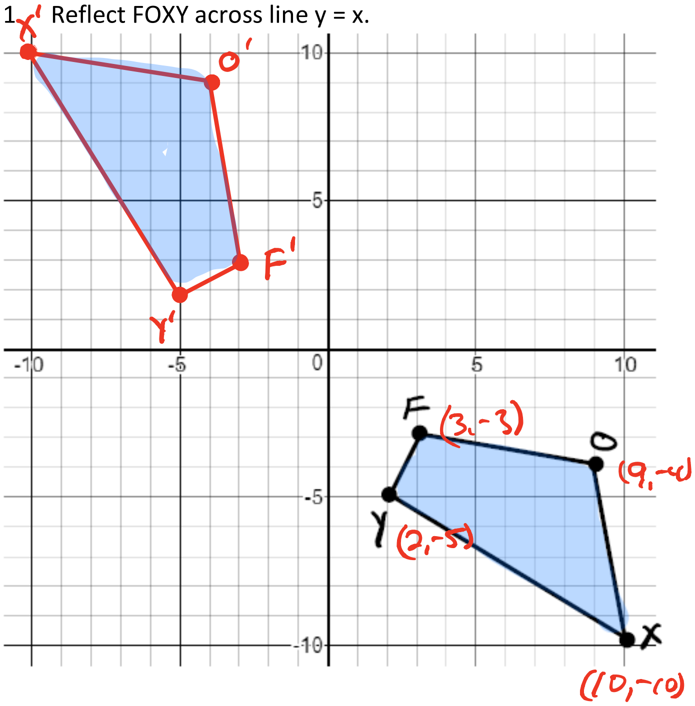
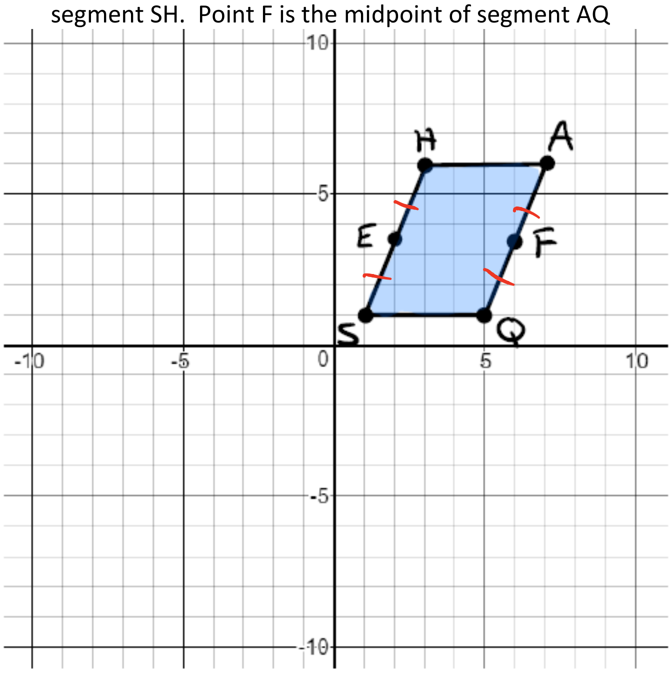
Geometry

Midterm Exam Review Name________________

1. Reflect FOXY across line y = x.



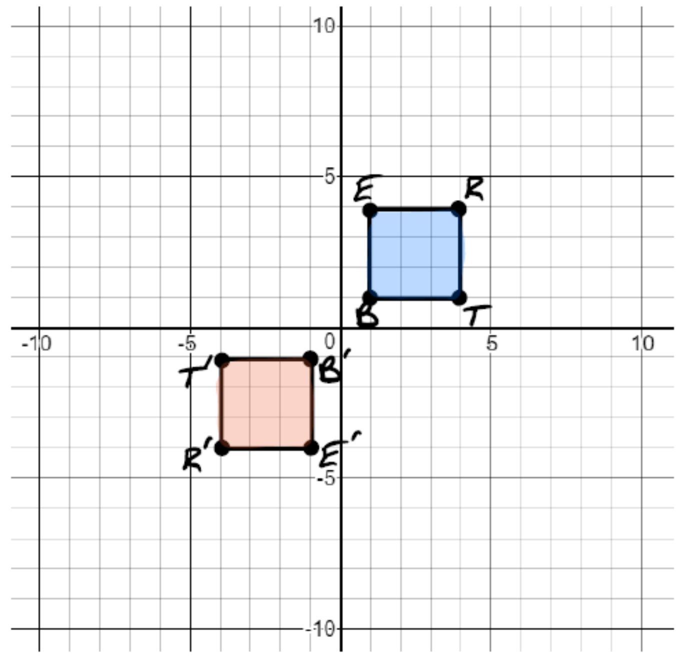
2. Parallelogram SHAQ is shown. Point E is the midpoint of segment SH. Point F is the midpoint of segment AQ



Which transformation carries the parallelogram onto itself?

A) A reflection across line segment SA
B) A reflection across line segment EF
C) A rotation of 180 degrees clockwise about the origin
D) A rotation of 180 degrees clockwise about the center of the parallelogram.

3. Square BERT is transformed to create the image B'E'R'T', as shown.



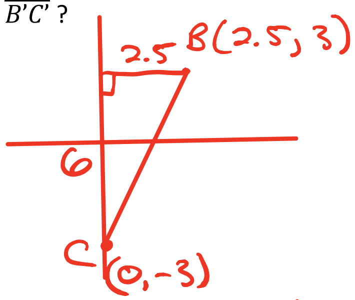
Select all of the transformations that could have been performed.

A) A reflection across the line y = x
B) A reflection across the line y = -2x
C) A rotation of 180 degrees clockwise about the origin
D) A reflection across the x-axis, and then a reflection across the y-axis.
E) A rotation of 270 degrees counterclockwise about the origin, and then a reflection across the x-axis.

4. Smelly Kid performs a transformation on a triangle. The resulting triangle is similar but not congruent to the original triangle. Which transformation did Smelly Kid perform on the triangle?

A) Dilation
B) Reflection
C) Rotation
D) Translation

5. Triangle ABC had vertices of A(1, 1), B(2.5, 3) and C(0, -3). It is dilated by a scale factor of ½ about the origin to create triangle A'B'C'. What is the length, in units, of side $\overline{B'C'}$?



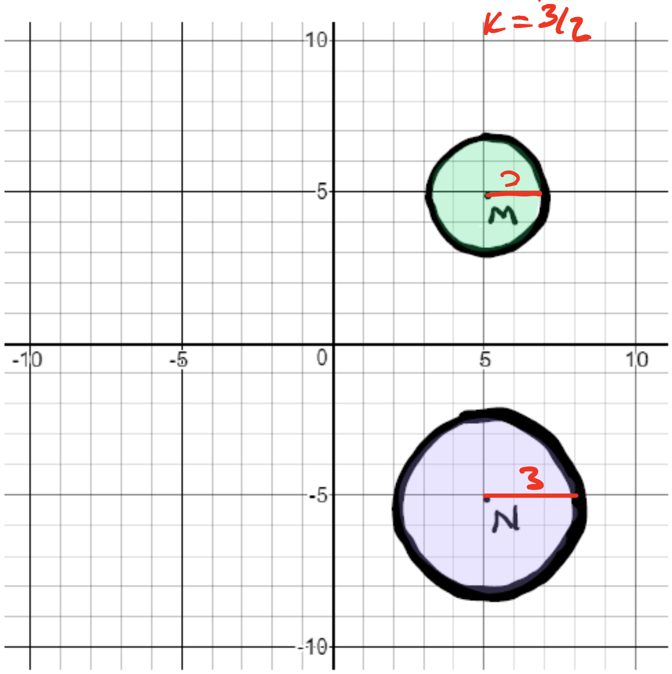
$x^2 + y^2 = (BC)^2$
$(2.5)^2 + (6)^2 = (BC)^2$
$6.25 + 36 = (BC)^2$
$42.25 = (BC)^2$
$6.5 = BC$

$B'C' = \frac{1}{2} BC$
$= \frac{1}{2}(6.5)$
$B'C' = 3.25$

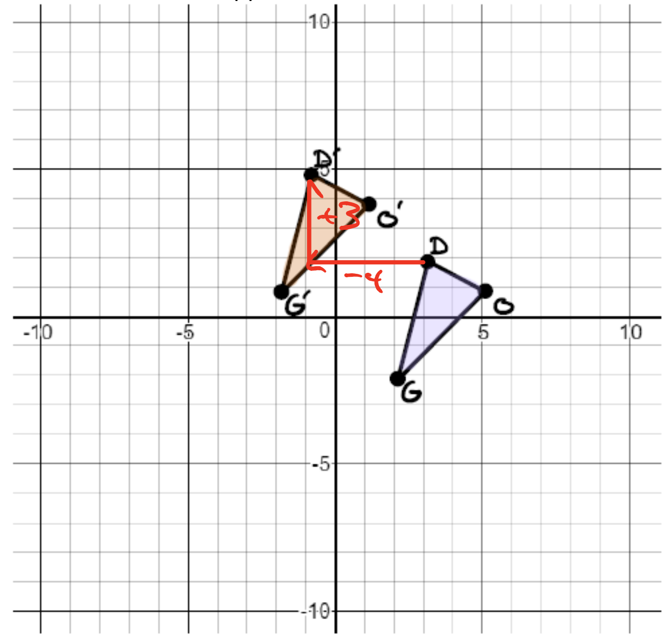
6. Complete the statement to explain how it can be shown that two circles are similar.
Circle M can be mapped onto circle N by a reflection across __x - axis__ and a dilation about the center of circle M by a scale factor of

__$K = 3/2$__

$r_M \cdot K = r_N$
$2K = 3$
$K = 3/2$



7. A translation is applied to ΔDOG to create $\Delta D'O'G'$.

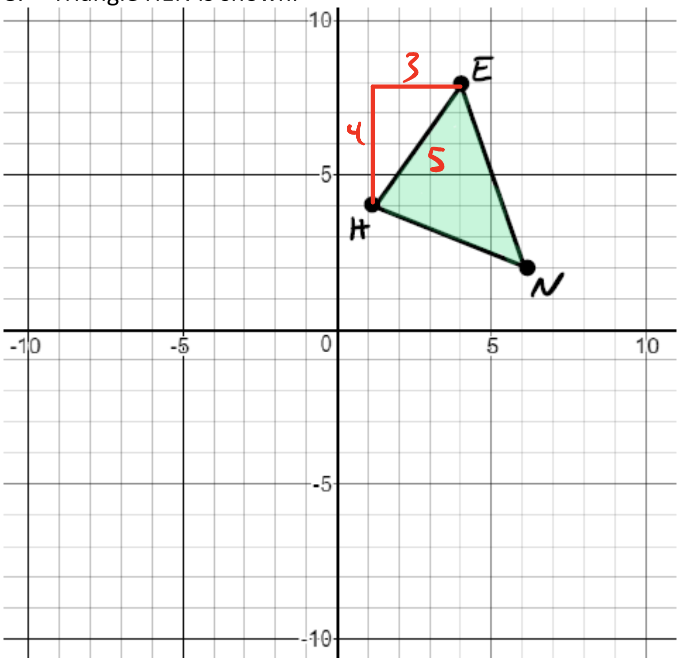


Let the statement $(x, y) \to (a, b)$ describe the translation. Create equations for *a* in terms of *x* and for *b* in terms of *y* that could be used to describe the translation.

a = __$x - 4$__

b = __$y + 3$__

8. Triangle HEN is shown.



Triangle $H'E'N'$ is created by dilating triangle HEN by a scale factor of 4. What is the length of $\overline{H'E'}$?

$HE \cdot k = H'E'$

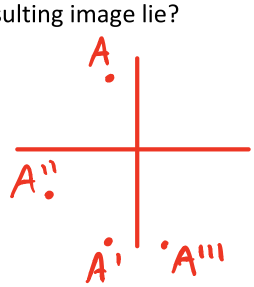
$(5)\cdot(4) = H'E'$

$20 = H'E'$

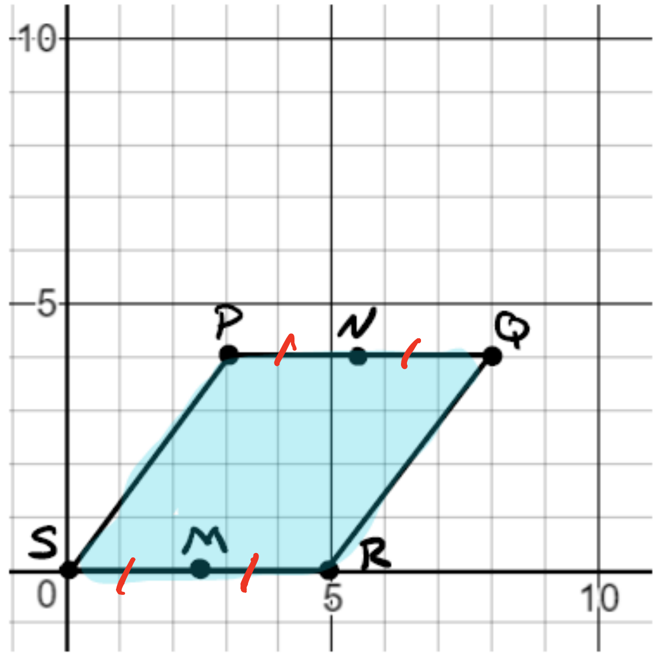
9. A figure is fully contained in Quadrant II. The figure is transformed as shown.
   - A reflection over the x-axis
   - A reflection over the line y = x
   - A 90° counterclockwise rotation about the origin.

In which quadrant does the resulting image lie?

A) Quadrant I
B) Quadrant II
C) Quadrant III
D) Quadrant IV

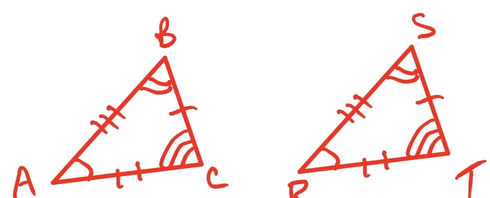


10. Rhombus PQRS is shown in the coordinate plane. Points M and N are midpoints of their respective sides.



Select all of the transformations that map the rhombus onto itself.

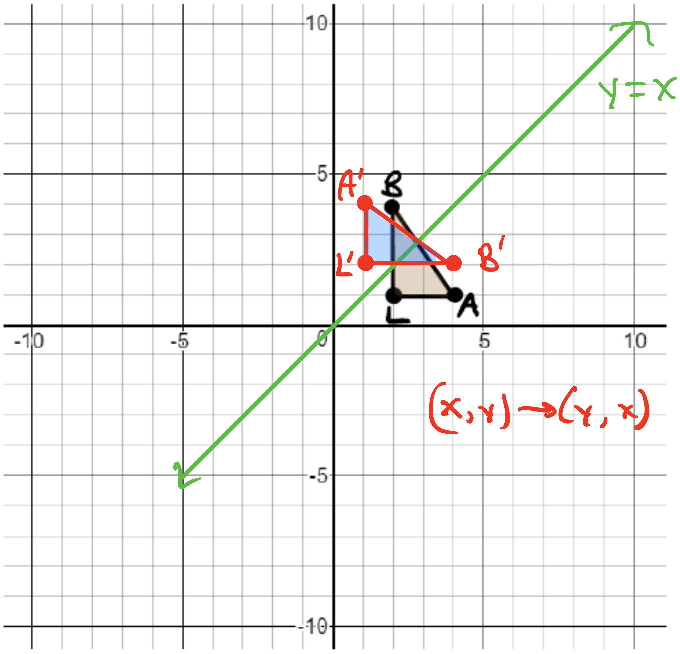
A) A 90° clockwise rotation around the center of the rhombus
B) A 180° clockwise rotation around the center of the rhombus
C) A reflection across $\overline{NM}$
D) A reflection across $\overline{QS}$



11. Triangle ABC is reflected across the line y = 2x to form triangle RST. Select all of the true statements.

A) $\overline{AB} = \overline{RS}$ (I know this notation is wrong, but some moron used this wrong notation on the state test.)
B) $\overline{AB} = 2 \cdot \overline{RS}$ (I know this notation is wrong, but some moron used this wrong notation on the state test.)
C) $\Delta ABC \sim \Delta RST$
D) $\Delta ABC \cong \Delta RST$
E) $m\angle BAC = m\angle SRT$
F) $m\angle BAC = 2 \cdot m\angle SRT$

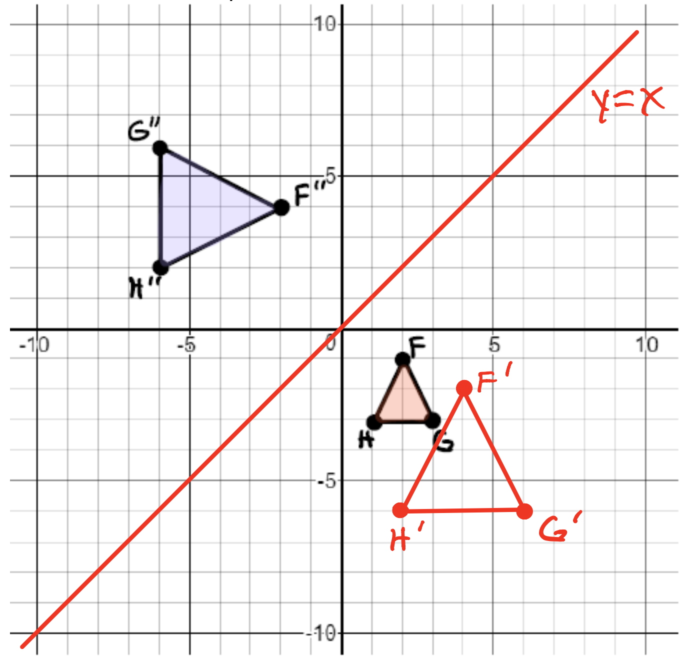
12. Triangle BAL is reflected across the line y = x. Draw the resulting triangle.



13. All corresponding sides and angles of ΔRST and ΔDEF are congruent. Select all of the statements that must be true.

A) There is a reflection that maps $\overline{RS}$ to $\overline{DE}$ Maybe
B) There is a dilation that maps ΔRST to ΔDEF Never
C) There is a translation followed by a rotation that maps $\overline{RT}$ to $\overline{DF}$ Always
D) There is a sequence of transformations that maps ΔRST to ΔDEF Always
E) There is not necessarily a sequence of rigid motions that maps ΔRST to ΔDEF Maybe

14. The coordinate plane shows ΔFGH and $\Delta F''G''H''$



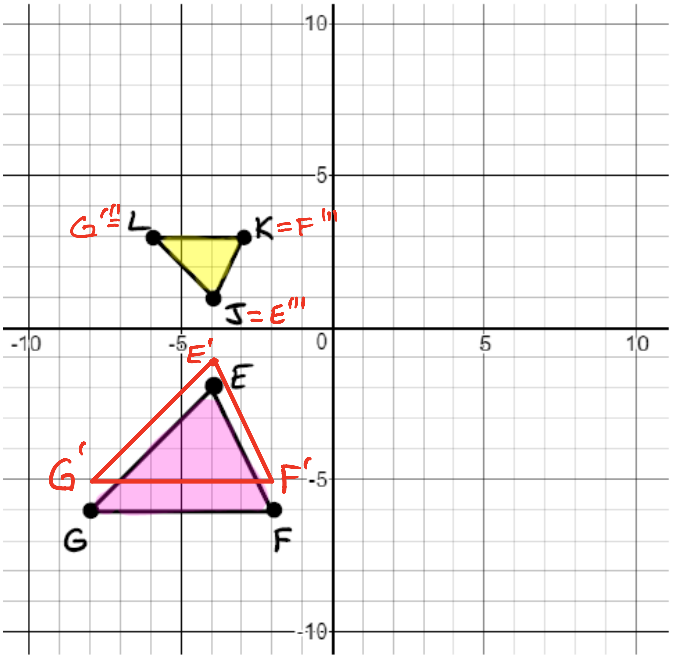
Which sequence of transformations can be used to show that $\Delta FGH \sim \Delta F''G''H''$?

A) A dilation about the origin with a ~~scale factor of 2~~, followed by a 180° clockwise rotation about the origin.
B) A dilation about the origin with a ~~scale factor of 2~~, followed by a reflection over the line y = x
C) A translation 5 units up and 4 units left, followed by a dilation with a scale factor of ½ about point F"
D) A 180° clockwise rotation about the origin, followed by a dilation with a scale factor of ½ about F"

SF=2

Orientation is different so it must be a reflection

15. Two triangles are shown.



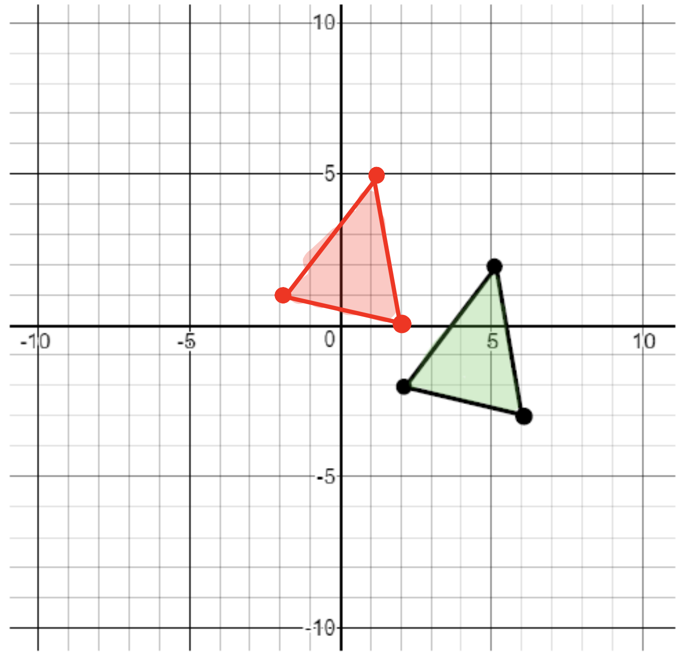
Which sequence of transformations could be performed on ΔEFG to show that it is similar to ΔJKL?

A) Rotate ΔEFG 90° clockwise about the origin, and then dilate it by a scale factor of ½ with a center of dilation at point F' no
B) Rotate ΔEFG 180° clockwise about point E, and then dilate it by a ~~scale factor of 2~~ with a center of dilation at point E'
C) Translate ΔEFG 1 unit up, then reflect it across the x-axis, and then dilate it by a factor of ½ with a center of dilation at point E"
D) Reflect ΔEFG across the x-axis, then reflect it across the line y = x, and then dilate it by a ~~scale factor of 2~~ with a center of dilation at point F"

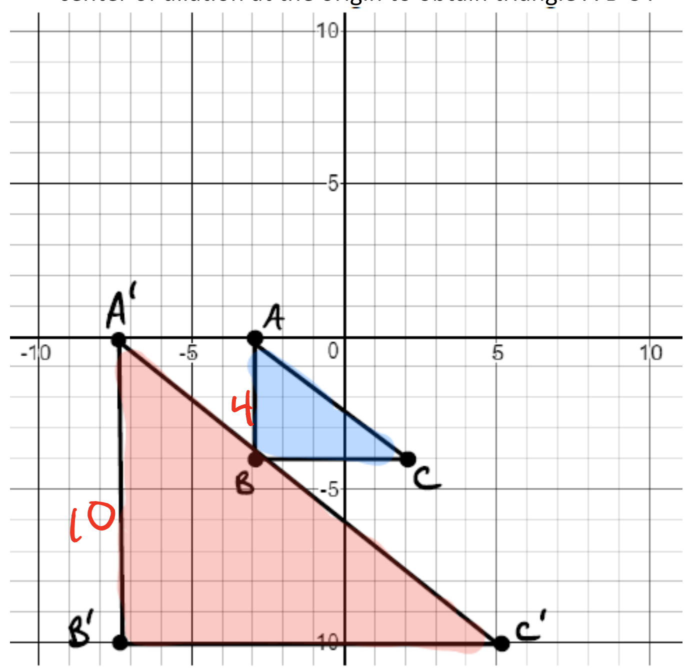
$SF = \frac{1}{2}$

Orientation is different, so reflection

16. A triangle is shown on the coordinate grid. Draw the triangle after a transformation following the rule $(x, y) \rightarrow (x - 4, y + 3)$



17. Triangle ABC is dilated with a scale factor of k and a center of dilation at the origin to obtain triangle A'B'C'.



What is the scale factor?

$AB \cdot k = A'B'$
$(4)k = 10$
$k = \frac{10}{4}$
$\boxed{k = 5/2}$

18. A square is rotated about its center. Select all of the angles of rotation that will map the square onto itself.

A) 45 degrees
B) 60 degrees
C) 90 degrees
D) 120 degrees
E) 180 degrees
F) 270 degrees

19. Circle J is located in the first quadrant with center (a, b) and radius s. Felipe transforms Circle J to prove that it is similar to any circle centered at the origin with radius t. Which sequence of transformations did Felipe use?

A) Translate Circle J by $(x + a, y + b)$ and dilate by a factor of $\frac{t}{s}$
B) Translate Circle J by $(x + a, y + b)$ and dilate by a factor of $\frac{s}{t}$
C) Translate Circle J by $(x - a, y - b)$ and dilate by a factor of $\frac{t}{s}$
D) Translate Circle J by $(x - a, y - b)$ and dilate by a factor of $\frac{s}{t}$

20. ______Kyle performs a transformation on a triangle. The resulting is similar but not congruent to the original triangle. Which transformation did Kyle use?

A) Dilation
B) Reflection
C) Rotation
D) Translation

21. A study reports that in 2010 the population of the United States was 308,745,538 people and the land area was approximately 3,531,905 square miles.

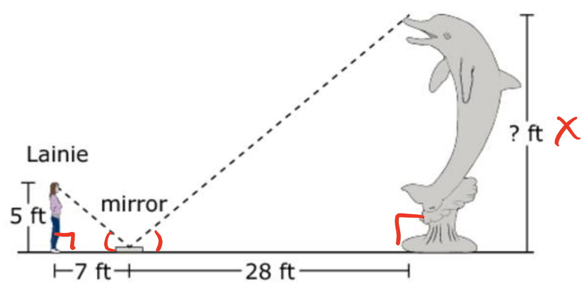
Based on the study, what was the population density, in people per square mile, of the United States in 2010? Round your answer to the nearest tenth.

pop density $= \frac{\text{People}}{mi^2}$

$= \frac{308,745,538}{3,531,905}$

$= 87.4$ people/mi^2

22. Lainie wants to calculate the height of the sculpture. She places a mirror on the ground so that when she looks into the mirror she sees the top of the sculpture, as shown.



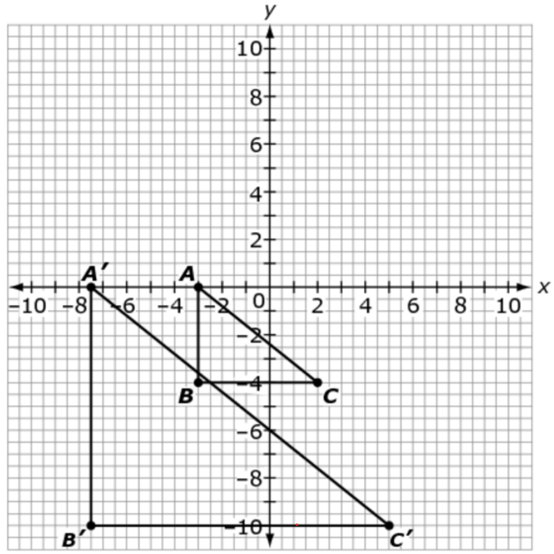
What is the height, in feet, of the sculpture?

$4 \cdot \cancel{28} \cdot \frac{5}{\cancel{7}} = \frac{x}{\cancel{28}} \cdot \cancel{28}$

$20 = x$

The dolphin is 20 feet tall.

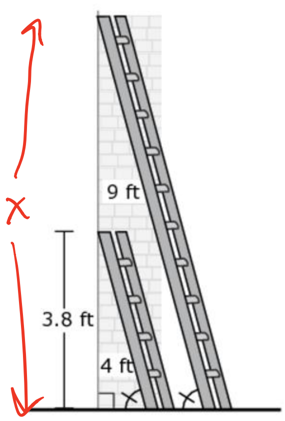
23. Triangle ABC is dilated with a scale factor of k and a center of dilation at the origin to obtain triangle A’B’C’.



What is the scale factor?

$AB \cdot K = A'B'$
$4 \cdot K = 10$
$K = \frac{10}{4}$
$K = \frac{5}{2}$
or 2.5

24. A 9-foot ladder and a 4-foot ladder are leaning against a house. The two ladders create angles of the same measure with the ground. The 4-foot ladder has a height of 3.8 feet against the house.



What is the height, in feet, of the 9-foot ladder against the house?

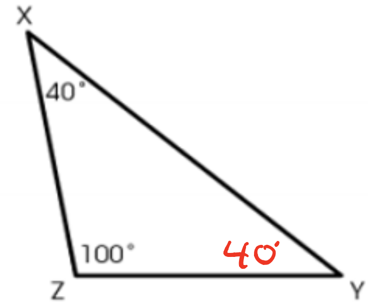
$3.8 \cdot \frac{x}{3.8} = \frac{9}{4}(3.8)$

$x = \frac{34.2}{4}$

$x = 8.55$

The height is 8.55 feet.

25. Triangle XYZ is shown.



Which triangle must be similar to ΔXYZ?

A) A triangle with two angles that measure 40 degrees. ✓
~~B)~~ A triangle with angles that measure 40 and 60 degrees
~~C)~~ A scalene triangle with only one angle that measures 100 degrees
~~D)~~ An isosceles triangle with only one angle that measures 40 degrees

A(-1.5,0) C(0,2) B(4.5,8)

26. $\overline{AB}$ has endpoints A(-1.5, 0) and B(4.5, 8). Point C is on line $\overline{AB}$ and is located at (0, 2). What the ratio of $\frac{AC}{CB}$? Round to 2 decimal places.

$AC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-1.5-0]^2 + [0-2]^2}$
$= \sqrt{[-1.5]^2 + [-2]^2}$
$= \sqrt{2.25+4}$
$= \sqrt{6.25}$
$AC = 2.5$

$CB = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[0-4.5]^2 + [2-8]^2}$
$= \sqrt{[-4.5]^2 + [-6]^2}$
$= \sqrt{20.25+36}$
$= \sqrt{56.25}$
$CB = 7.5$

$\frac{AC}{CB} = \frac{2.5}{7.5} = \frac{1}{3}$

27. $\overline{AC}$ has endpoints A(-1, -3.5) and C(5, -1). Point B is on $\overline{AC}$ and is located at (0.2, -3). What is the ratio of $\frac{AB}{BC}$?

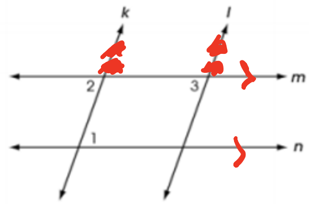
A(-1,-3.5) B(0.2,-3) C(5,-1)

$AB = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-1-0.2]^2 + [-3.5-(-3)]^2}$
$= \sqrt{[-1.2]^2 + [-.5]^2}$
$= \sqrt{1.44+.25}$
$= \sqrt{1.69}$
$AB = 1.3$

$BC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$BC = \sqrt{[.2-5]^2 + [-3-(-1)]^2}$
$= \sqrt{(-4.8)^2 + [-2]^2}$
$= \sqrt{23.04+4}$
$= \sqrt{27.04}$
$BC = 5.2$

$\frac{AB}{BC} = \frac{1.3}{5.2} = \frac{1}{4}$

28. Two pairs of parallel lines intersect to form a parallelogram as shown.

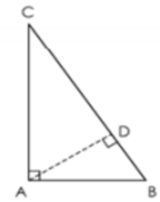


Place statements and reasons in the table to complete the proof that the opposite angles in a parallelogram are congruent.

Statement	Reason
1. $m \parallel n$ and $k \parallel l$	1. Given
2. $\angle 1 \cong \angle 2$	2. Alt INT ∠s Theorem
3. $\angle 2 \cong \angle 3$	3. Corr. ∠s Post
4. $\angle 1 \cong \angle 3$	4. Trans prop of ≅

A. $\angle 1 \cong \angle 2$
B. $\angle 1 \cong \angle 3$
C. $\angle 2 \cong \angle 3$
D. Alternate exterior angles theorem
E. Alternate interior angles theorem
F. Transitive property of congruence
G. Opposite angles are congruent
H. Corresponding angles postulate

29. James correctly proves the similarity of triangles DAC and DBA as shown.



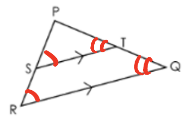
His incomplete proof is shown.

Statement	Reason
1. $m\angle CAB = m\angle ADB = 90°$	1. Given
2. $\angle ADB$ and $\angle ADC$ are a linear pair	2. Definition of linear pair
3. $\angle ADB$ and $\angle ADC$ are supplementary	3. Supplement postulate
4. $m\angle ADB + m\angle ADC = 180°$	4. Definition of supplementary angles
5. $90° + m\angle ADC = 180°$	5. Substitution PoE
6. $m\angle ADC = 90°$	6. Subtraction PoE
7. $\angle CAB \cong \angle ADB$ $\angle CAB \cong \angle ADC$	7. Definition of congruent angles
8. $\angle ABC \cong \angle DBA$ $\angle DCA \cong \angle ACB$	8. Reflexive property of congruent angles
9. $\Delta ABC \sim \Delta DBA$ $\Delta ABC \sim \Delta DAC$	9. AA Postulate
10. $\Delta DBA \sim \Delta DAC$	10. Substitution PoE

What is the missing reason for the 9th statement?
A) CPCTC
B) AA postulate
C) All right triangles are similar
D) Transitive property of similarity

30.

ΔPQR is shown, where $\overline{ST} \parallel \overline{RQ}$



Marta wants to prove that $\frac{SR}{PS} = \frac{TQ}{PT}$.

Place a statement or reason in each blank box to complete Marta's proof.

Statement	Reason
1. $\overline{ST} \parallel \overline{RQ}$	1. Given
2. $\angle PST \cong \angle R$ $\angle PTS \cong \angle Q$	2. Corresponding angles postulate
3. $\Delta PQR \sim \Delta PTS$	3. AA Similarity
4. $\frac{PR}{PS} = \frac{PQ}{PT}$	4. corresponding sides of similar Δs are proportional
5. $PR = PS + SR$ $PQ = PT + TQ$	5. Segment addition postulate
6. $\frac{PS+SR}{PS} = \frac{PT+TQ}{PT}$	6. Substitution PoE
7. $\frac{PS}{PS} + \frac{SR}{PS} = \frac{PT}{PT} + \frac{TQ}{PT}$	7. Communitive PoE
8. $\frac{SR}{PS} = \frac{TQ}{PT}$	8. Subtraction PoE

A. $\frac{PR}{PS} = \frac{PQ}{PT}$

B. $\frac{PS}{SR} = \frac{PT}{ST}$

C. $\angle P \cong \angle P$

D. AA Similarity ✓

E. ASA Similarity

F. SSS Similarity

G. Reflexive Property

H. Segment addition postulate

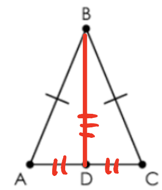
I. Corresponding sides of similar triangles are proportional ✓

J. Corresponding sides of similar triangles are congruent

K. Alternate interior angles theorem

L. Alternate exterior angles theorem

31. Triangle ABC is shown.



Given: ΔABC is isosceles. Point D is the midpoint of $\overline{AC}$.

Prove: $\angle BAC \cong \angle BCA$

Statement	Reason
1. ΔABC is isosceles. D is the midpoint of $\overline{AC}$	1. Given
2. $\overline{AD} \cong \overline{DC}$	2. Definition of midpoint
3. $\overline{BA} \cong \overline{BC}$	3. Definition of isosceles triangle
4. $\overline{BD}$ exists	4. A line segment can be drawn between any two points
5. $\overline{BD} \cong \overline{BD}$	5. Reflexive prop
6. $\Delta ABD \cong \Delta CBD$	6. SSS Congruency Post
7. $\angle BAC \cong \angle BCA$	7. CPCTC

AA congruency postulate

SAS congruency postulate

SSS congruency postulate

CPCTC

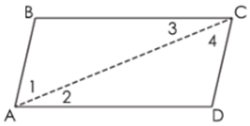
Reflexive property

Symmetric property

Midpoint theorem

Name________________

32. The proof shows that opposite angles of a parallelogram are congruent.

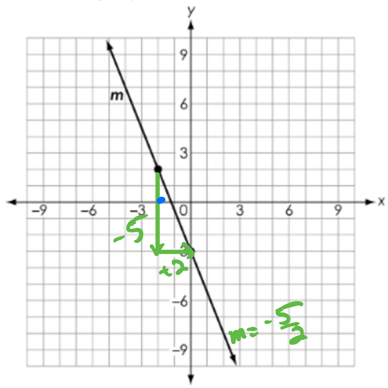


Given: ABCD is a parallelogram with diagonal $\overline{AC}$
Prove: $\angle BAD \cong \angle DCB$

Statement	Reason
1. ABCD is a parallelogram with diagonal $\overline{AC}$	1. Given
2. $\overline{AB} \parallel \overline{CD}$ and $\overline{AD} \parallel \overline{BC}$	2. Definition of parallelogram
3. $\angle 2 \cong \angle 3$ $\angle 1 \cong \angle 4$	3. Alternate interior angles theorem
4. $m\angle 2 = m\angle 3$ $m\angle 1 = m\angle 4$	4. Definition of congruent angles
5. $m\angle 1 + m\angle 2 = m\angle 4 + m\angle 2$	5. Addition property of equality
6. $m\angle 1 + m\angle 2 = m\angle 4 + m\angle 3$	6. Subst Prop of =
7. $m\angle 1 + m\angle 2 = m\angle BAD$ $m\angle 3 + m\angle 4 = m\angle DCB$	7. Angle addition postulate
8. $m\angle BAD = m\angle DCB$	8. Substitution PoE
9. $\angle BAD \cong \angle DCB$	9. Definition of congruent angles

What is the missing reason in this partial proof?
A) ASA
B) Substitution PoE
C) Angle addition postulate
D) Alternate interior angles postulate

33. The graph of line m is shown



What is the equation of the line that is perpendicular to line m and passes through the point (3, 2)?

Point
(3,2)

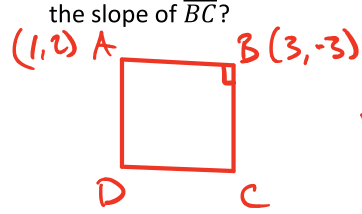
Slope
$m = \frac{5}{-3}$

$\perp m = \frac{3}{5}$

Point-Slope form
$y - y_1 = m(x - x_1)$

$y-(2) = \frac{3}{5}(x-3)$

34. Square ABCD has vertices at A(1, 2) and B(3, -3). What is the slope of $\overline{BC}$?



$m_{\overline{BC}} = \perp m$ of AB

$m_{\overline{AB}} = \frac{\Delta Y}{\Delta x}$

$= \frac{2-(-3)}{1-(3)}$

$m_{\overline{AB}} = \frac{5}{-2}$

$m_{\overline{BC}} = 2/5$

35. Kevin asked Olivia what parallel lines are. Olivia responded, "They are lines that never intersect." What important piece of information is missing form Olivia's response?
A. The lines must be straight.
B. The lines must be coplanar.
C. The lines can be noncoplanar.
D. The lines form four right angles.

36. Triangle ABC has vertices at (-4, 0), (-1, 6) and (3, -1). What is the perimeter of triangle ABC, rounded to the nearest tenth?

A B C

$AB = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-4 - -1]^2 + [0-6]^2}$
$= \sqrt{[-3]^2 + [-6]^2}$
$= \sqrt{9+36}$
$AB = \sqrt{45}$

$BC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-1-3]^2 + [6 - -1]^2}$
$= \sqrt{[-4]^2 + [7]^2}$
$= \sqrt{16+49}$
$BC = \sqrt{65}$

$AC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-4-3]^2 + [0 - -1]^2}$
$= \sqrt{[-7]^2 + [1]^2}$
$= \sqrt{49+1}$
$AC = \sqrt{50}$

Perimeter $= \sqrt{45} + \sqrt{65} + \sqrt{50}$

Perimeter ≈ 21.8