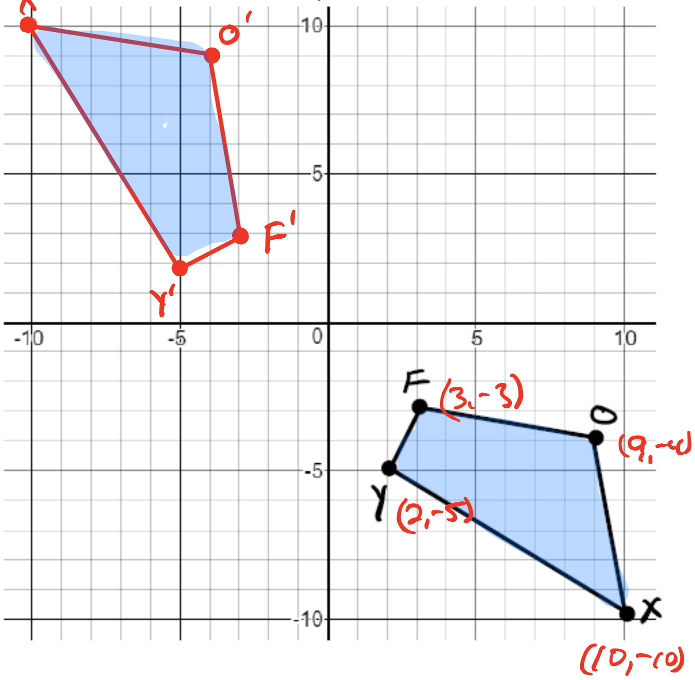
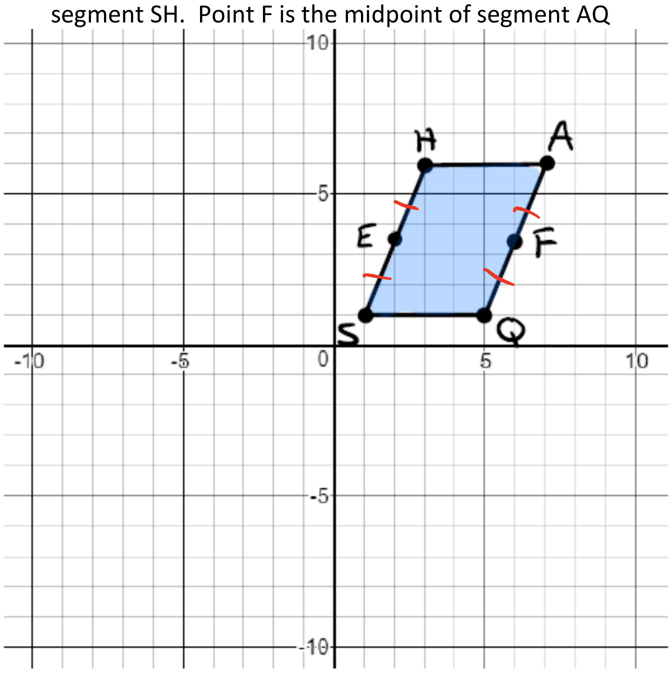
1. Reflect FOXY across line y = x.



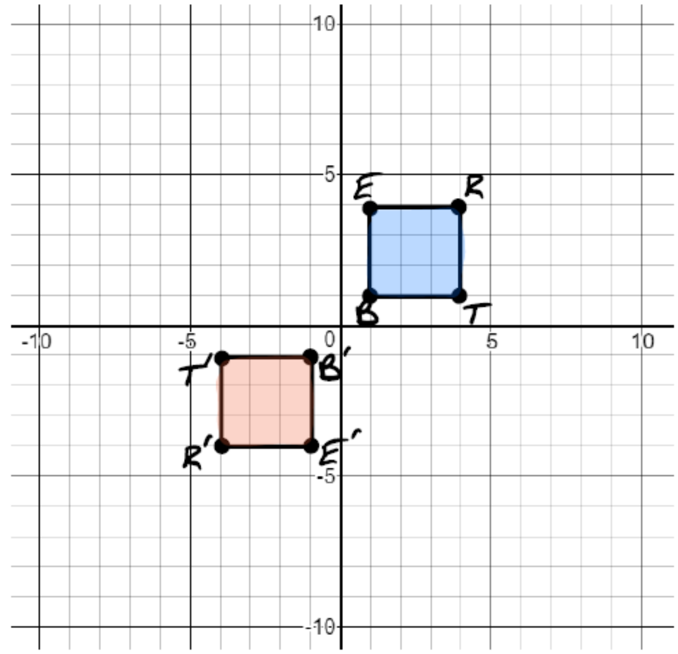
2. Parallelogram SHAQ is shown. Point E is the midpoint of segment SH. Point F is the midpoint of segment AQ



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.



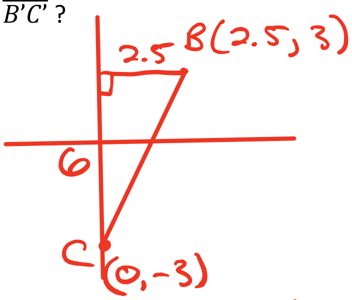
Select all of the transformations that could have been performed.

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 $\overline{B'C'}$?

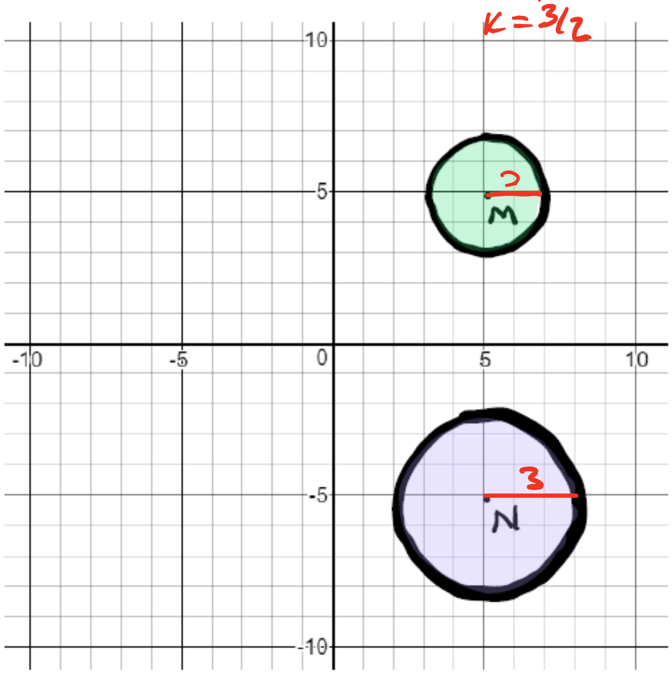


$x^2 + y^2 = (BC)^2$
$(2.5)^2 + (6)^2 = (BC)^2$
$6.25 + 36 = (BC)^2$
$42.25 = (BC)^2$
$6.5 = BC$

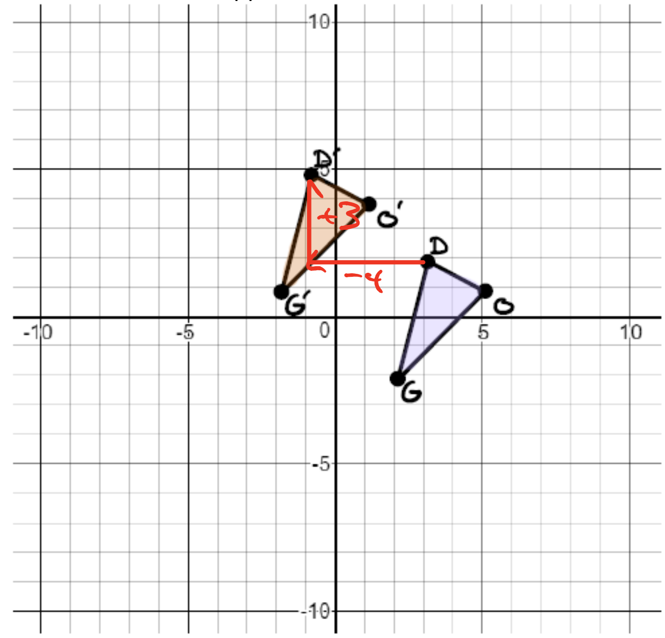
$B'C' = \frac{1}{2} BC$
$= \frac{1}{2}(6.5)$
$B'C' = 3.25$

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 $\Delta D'O'G'$.

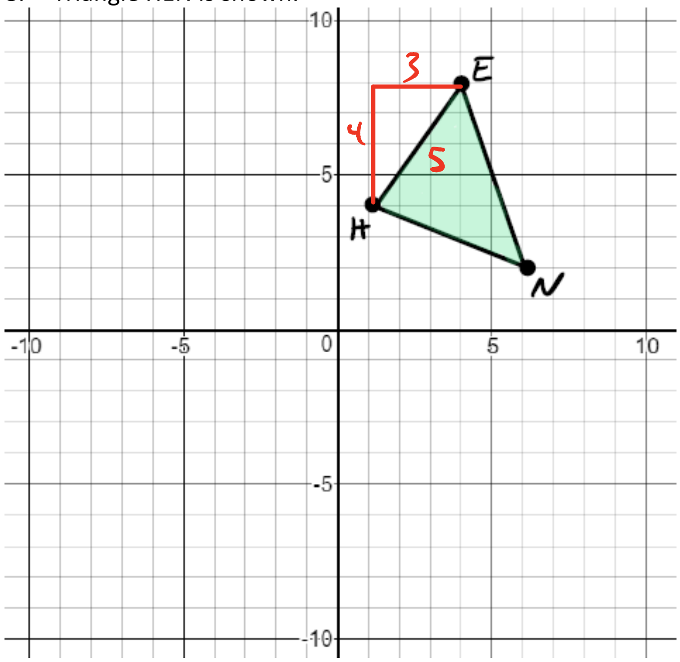


Let the statement $(x, y) \rightarrow (a, b)$ describe the translation. Create equations for *a* in terms of *x* and for *b* in terms of *y* that could be used to describe the translation.

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 $\overline{H'E'}$?

$HE \cdot k = H'E'$

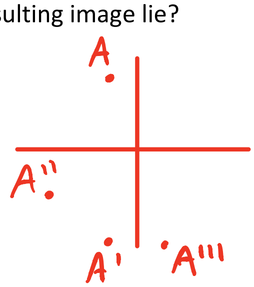
$(5) \cdot (4) = H'E'$

$20 = H'E'$

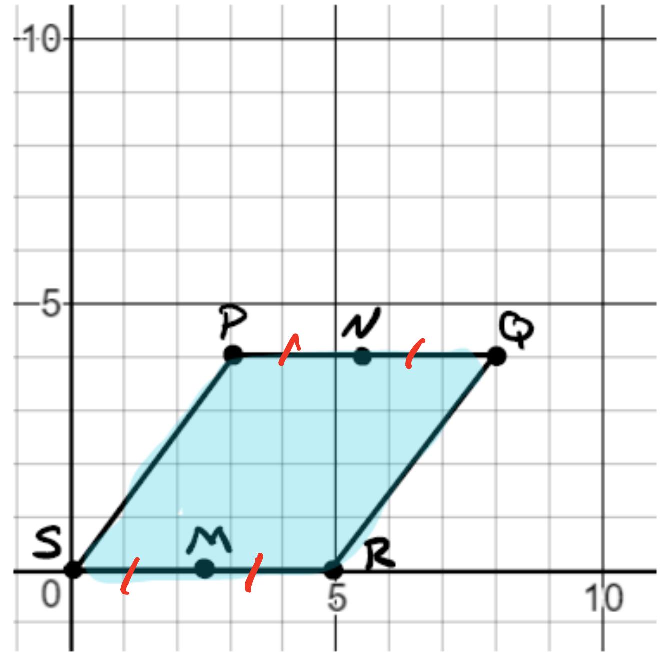
9. A figure is fully contained in Quadrant II. The figure is transformed as shown.
   - A reflection over the x-axis
   - A reflection over the line y = x
   - A 90° counterclockwise rotation about the origin.

In which quadrant does the resulting image lie?

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

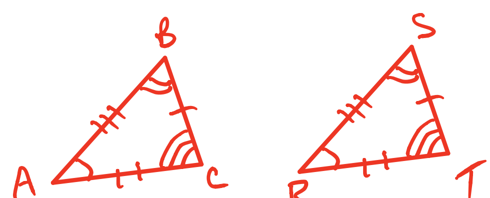


10. Rhombus PQRS is shown in the coordinate plane. Points M and N are midpoints of their respective sides.



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

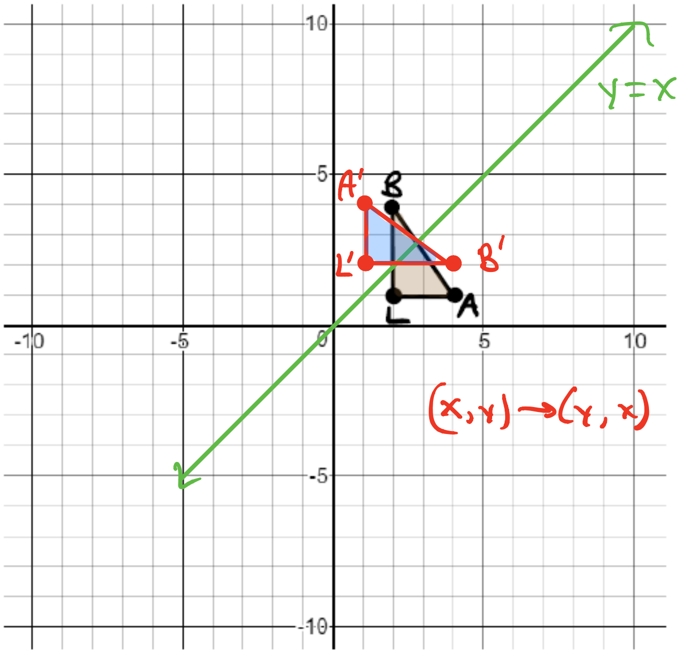
A) A 90° clockwise rotation around the center of the rhombus
B) A 180° clockwise rotation around the center of the rhombus
C) A reflection across $\overline{NM}$
D) A reflection across $\overline{QS}$



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) $m\angle BAC = 2 \cdot m\angle SRT$

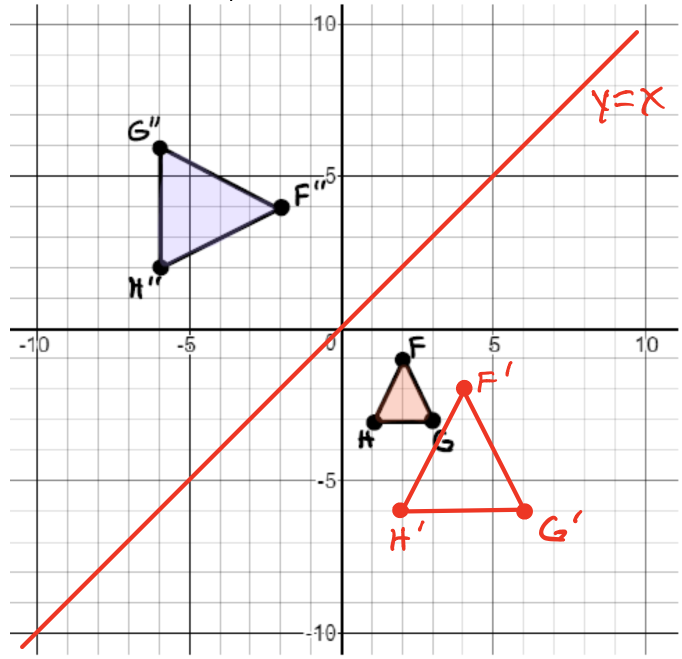
12. Triangle BAL is reflected across the line y = x. Draw the resulting triangle.



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 $\Delta F''G''H''$



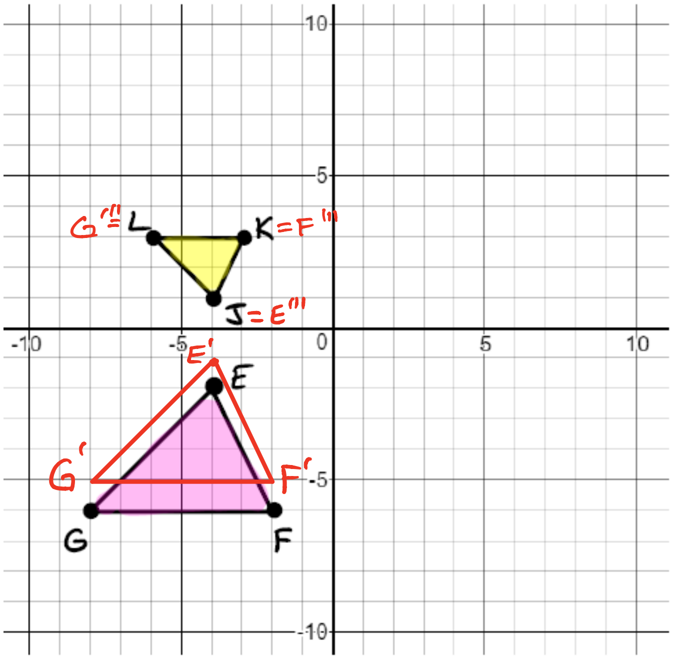
Which sequence of transformations can be used to show that $\Delta FGH \sim \Delta F''G''H''$?

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.

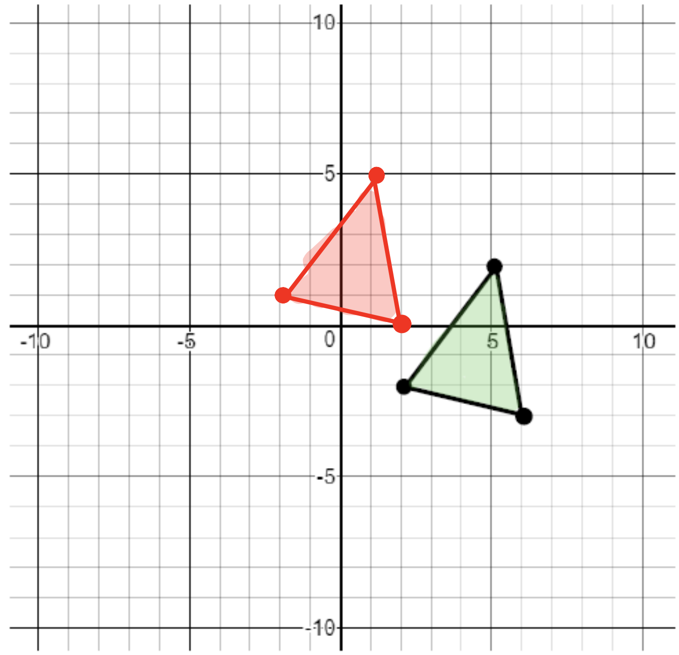


Which sequence of transformations could be performed on ΔEFG to show that it is similar to ΔJKL?

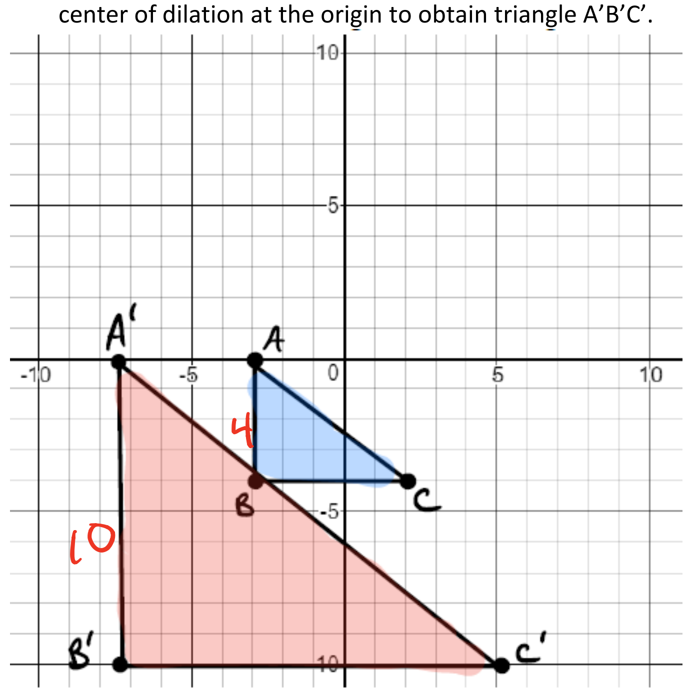
A) Rotate ΔEFG 90° clockwise about the origin, and then dilate it by a scale factor of ½ with a center of dilation at point F' — no
B) Rotate ΔEFG 180° clockwise about point E, and then dilate it by a ~~scale factor of 2~~ with a center of dilation at point E'
C) Translate ΔEFG 1 unit up, then reflect 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?

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

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

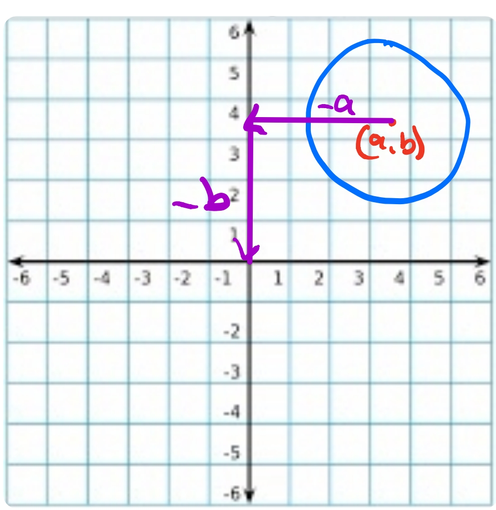
A) 45 degrees
B) 60 degrees
C) 90 degrees
D) 120 degrees
E) 180 degrees
F) 270 degrees

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 $\frac{s}{t}$

$(x-a, y-b)$

Preimage · k = image
$s \cdot k = t$
$k = t/s$



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.

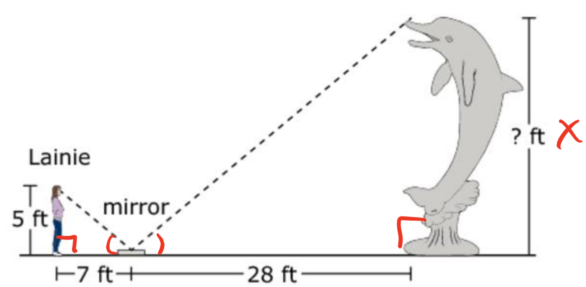
Based on the study, what was the population density, in people per square mile, of the United States in 2010? Round your answer to the nearest tenth.

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.



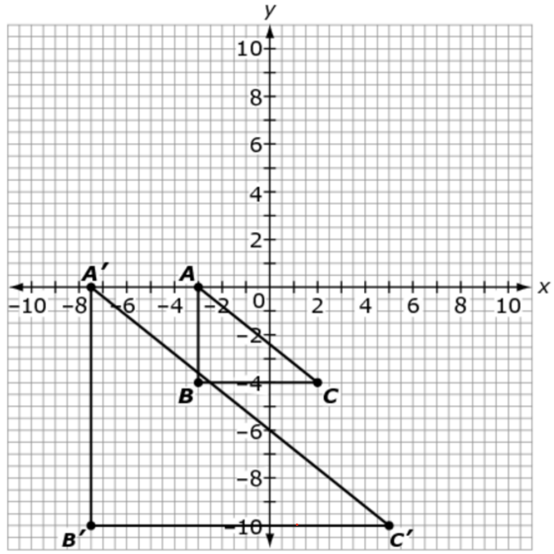
What is the height, in feet, of the sculpture?

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

$20 = x$

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?

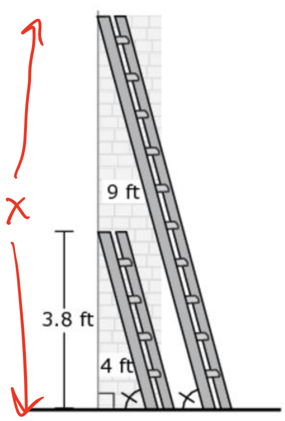
$AB \cdot K = A'B'$

$4 \cdot K = 10$

$K = \frac{10}{4}$

$\boxed{K = \frac{5}{2}}$ 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?

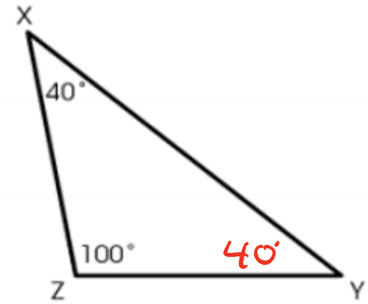
$3.8 \cdot \frac{x}{3.8} = \frac{9}{4}(3.8)$

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

$x = 8.55$

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)

$AB = \sqrt{[\Delta x]^2 + [\Delta y]^2}$

$= \sqrt{[-1 - 0.2]^2 + [-3.5 - (-3)]^2}$

$= \sqrt{[-1.2]^2 + [-.5]^2}$

$= \sqrt{1.44 + .25}$

$= \sqrt{1.69}$

$AB = 1.3$

$BC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$

$BC = \sqrt{[.2 - 5]^2 + [-3 - (-1)]^2}$

$= \sqrt{(-4.8)^2 + [-2]^2}$

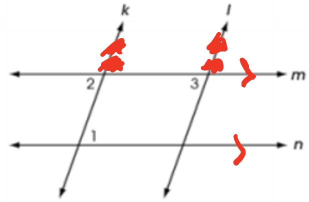
$= \sqrt{23.04 + 4}$

$= \sqrt{27.04}$

$BC = 5.2$

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

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

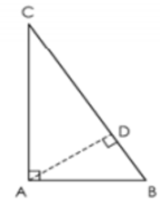


Place statements and reasons in the table to complete the proof that the opposite angles in a parallelogram are congruent.

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.

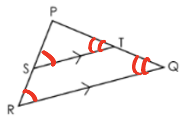


His incomplete proof is shown.

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

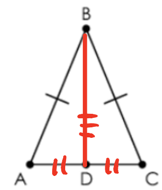
A. $\frac{PR}{PS} = \frac{PQ}{PT}$

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.

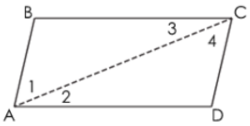


Given: ΔABC is isosceles. Point D is the midpoint of $\overline{AC}$.
Prove: $\angle BAC \cong \angle BCA$

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

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

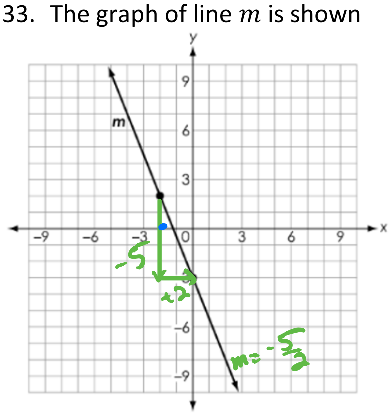


Given: ABCD is a parallelogram with diagonal $\overline{AC}$
Prove: $\angle BAD \cong \angle DCB$

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)?

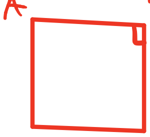
Point
(3, 2)

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

Point-Slope form
$y - y_1 = m(x - x_1)$
$y - (2) = \frac{3}{5}(x - 3)$
$y = \frac{3}{5}(x-3) + 2$

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

(1,2) A B (3,-3)



D C

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

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

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

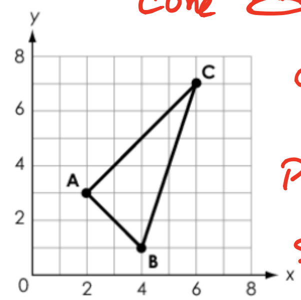
$AC = \sqrt{[\Delta x]^2 + [\Delta y]^2}$
$= \sqrt{[-4 - 3]^2 + [0 - -1]^2}$
$= \sqrt{[-7]^2 + [1]^2}$
$= \sqrt{49 + 1}$
$AC = \sqrt{50}$

Perimeter $= \sqrt{45} + \sqrt{65} + \sqrt{50}$
Perimeter ≈ 21.8

37.

Triangle ABC is shown.

cone 

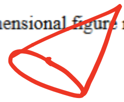


Cylinder 

Pyramid 

Sphere 

Which three-dimensional figure results from rotating the triangle 360° about $\overline{AC}$?



- Ⓐ cone
- Ⓑ cylinder
- Ⓒ pyramid
- Ⓓ sphere

38. $(x^2-10x+25)+(y^2+8y+16)=-16+25+16$

The equation of a circle is shown.

$x^2+y^2-10x+8y+16=0$

$(x-5)^2+(y+4)^2=25$

What is the radius of the circle?

$r=\sqrt{25}=5$

radius: 5

39.

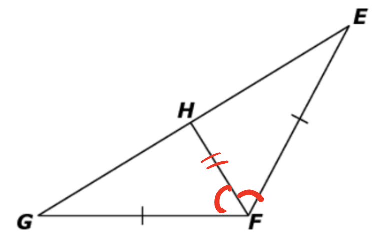
Triangle ABC is shown.

What is tan(A)? $\frac{24}{10}$

$\tan A = \frac{24}{10}$

40.

Isosceles $\triangle EFG$ is shown, where $\overline{FH}$ is an angle bisector.



Drag statements and reasons to the table to complete the proof that the base angles of the isosceles triangle are congruent.

Statements	Reasons
1. FG ≅ EF and FH bisects ∠EFG.	1. Given
2. ∠GFH ≅ ∠EFH	2. Definition of an angle bisector
3. FH ≅ EG	3. Reflexive Prop
4. △GFH ≅ △EFH	4. SAS Th'm
5. ∠E ≅ ∠G	5. Corresponding angles of congruent triangles are congruent.

FH ≅ FH	Reflexive property
EG ≅ EG	∠FHG ≅ ∠FHE
Transitive property	SAS theorem
Substitution	SSS theorem
△GFH ≅ △EFH	AA theorem
∠GFH ≅ ∠EFH	

41.

4

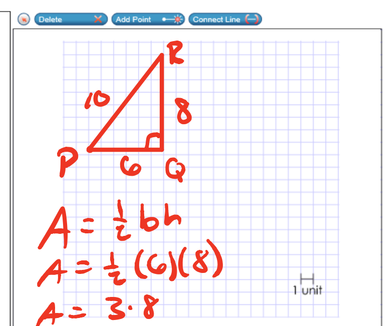
Felicia wants to draw △PQR such that the conditions shown are true.

- The area of △PQR is not 6 square units.
- cos P = 0.6

Use the Connect Line tool to draw one possible △PQR. Then drag letters to the vertices to label the triangle.

P
Q
R

Delete Add Point Connect Line



$\cos P = .6$

$\cos P = \frac{6}{10} = \frac{\text{Adj leg}}{\text{hyp}}$

Pythag Triple
6-8-10

$A=\frac{1}{2}bh$

$A=\frac{1}{2}(6)(8)$

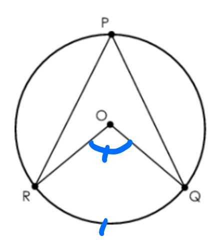
$A=3\cdot 8$

$A=24$

This Area is not 6, so the triangle works.

42.

A teacher draws circle O, ∠RPQ and ∠ROQ, as shown.



The teacher asks students to select the correct claim about the relationship between m∠RPQ and m∠ROQ.

- Claim 1: The measure of ∠RPQ is equal to the measure of ∠ROQ.
- Claim 2: The measure of ∠ROQ is twice the measure of ∠RPQ.

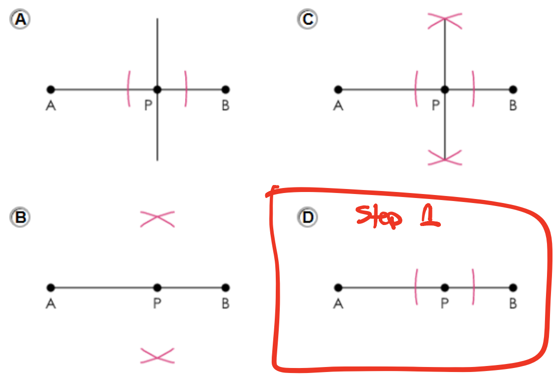
Which claim is correct? Justify your answer.

Type your answer in the space provided.

Claim 2 is correct. ∠ROQ and ∠RPQ share the same intercepted arc. Since ∠ROQ is a central angle it's twice the size of ∠RPQ, which is an inscribed angle.

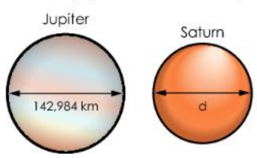
43.

Which diagram shows only the first step of constructing the line perpendicular to $\overline{AB}$ through point P?



44.

The planets in our solar system can be modeled using spheres. The diameters for Jupiter and Saturn are shown in the diagram.



The volume of Saturn is 59.9% the volume of Jupiter.

What is Saturn's diameter, d, in kilometers? Round your answer to the nearest thousandth.

______ km

$V_S = .599\, V_J$

$\frac{4}{3}\pi r_S^3 = .599 \cdot \frac{4}{3}\pi r_J^3$

$\cancel{\frac{4}{3}\pi} r^3 = .599 \cdot \cancel{\frac{4}{3}\pi}(71492)^3$

$r^3 = .599\,(71492)^3$

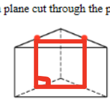
$r = \sqrt[3]{.599(71492)^3}$

$r = 60265.170208$

$d = 2r = 2(60265.170208)$

45.

A cross section of a right triangular prism is created by a plane cut through the points shown and is also perpendicular to the opposite base.

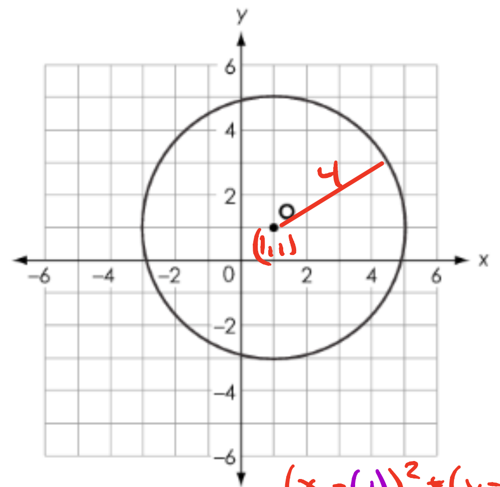


What is the most specific name of the shape representing the cross section?

- Ⓐ triangle
- Ⓑ rectangle
- Ⓒ trapezoid
- Ⓓ parallelogram

46.

A circle with center O is shown.



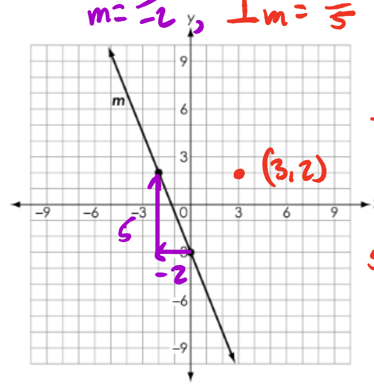
$(x-(1))^2+(y-(1))^2=(4)^2$

Create the equation for the circle.

$(x-1)^2+(y-1)^2=16$

47.

$m = \frac{5}{-2}$, $\perp m = \frac{2}{5}$



Point-Slope Form

$y - y_1 = m(x - x_1)$

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

$5y - 10 = 2(x-3)$

$5y - 10 = 2x - 6$

$5y = 2x + 4$

$y = \frac{2}{5}x + \frac{4}{5}$

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

$y = \frac{2}{5}x + \frac{4}{5}$

48.

An equation is shown, where $0 < x < 90$ and $0 < y < 90$.

$\cos(x°) = \sin(y°)$

Create an expression for x in terms of y.

$x = 90° - y$

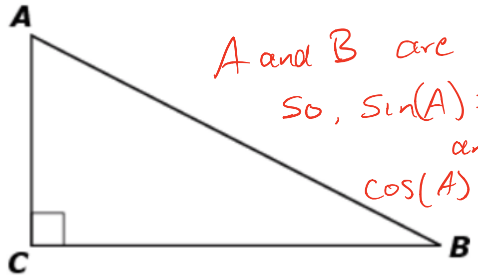
If $\cos(x°) = \sin(y°)$, then x & y are complimentary.

So $x + y = 90°$

$x = 90 - y$

49.

Triangle *ABC* is shown.



A and B are Complimentary

So, $\sin(A) = \cos(B)$

and

$\cos(A) = \sin(B)$

Which statement must be true?

Ⓐ $\cos(A) = \sin(A)$

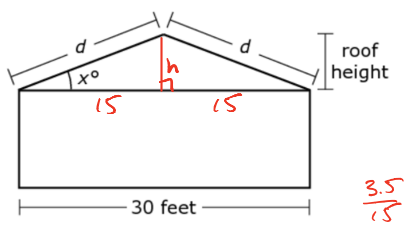
Ⓑ $\cos(A) = \sin(B)$

Ⓒ $\cos(A) = \cos(B)$

Ⓓ $\sin(A) = \sin(B)$

50.

Jeremy is building a garage, as shown. He wants the roof height to be between 3.5 and 5 feet. He must decide the angle measure to use for the pitch, or slant, of the roof when the slant height is *d* feet.



$3.5 \le h \le 5$

$\tan x = \frac{h}{15}$

So

$\frac{3.5}{15} \le \tan(x) \le \frac{5}{15}$

Which inequality can Jeremy use to ensure that his roof will be within the necessary height range?

Ⓐ $\frac{3.5}{30} \le \tan(x) \le \frac{5}{30}$

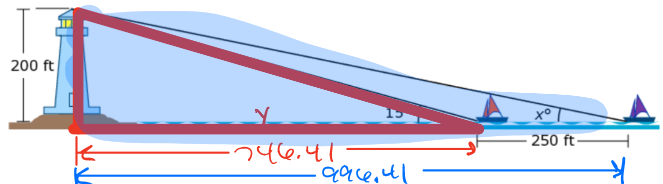
Ⓑ $\frac{3.5}{15} \le \tan(x) \le \frac{5}{15}$

Ⓒ $\frac{3.5}{15} \le \sin(x) \le \frac{5}{15}$

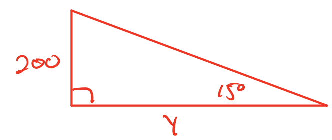
Ⓓ $\frac{3.5}{30} \le \sin(x) \le \frac{5}{30}$

51.

Two boats are traveling toward a lighthouse that is 200 feet (ft) above sea level at its top. When the two boats and the lighthouse are collinear, the boats are exactly 250 feet apart and the boat closest to the lighthouse has an angle of elevation to the top of the lighthouse of 15°, as shown.



What is the value of *x*, rounded to the nearest hundredth?

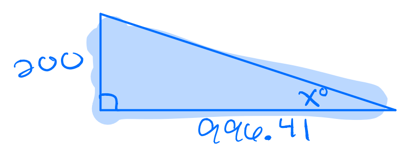


$\tan 15° = \frac{200}{y}$

$y \tan 15° = 200$

$y = \frac{200}{\tan 15°}$

$y \approx 746.41$



$\tan x = \frac{200}{996.41}$

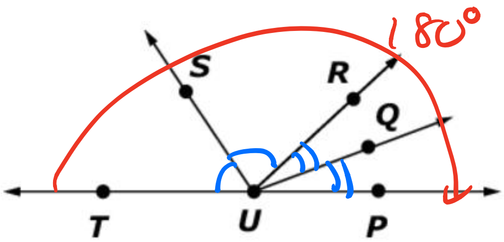
$x = \tan^{-1}\left(\frac{200}{996.41}\right)$

$x \approx 11.35°$

52.

Mikayla is using the following information to prove that ∠TUS and ∠PUQ are complementary angles in the diagram shown.

Given: The ray *US* bisects ∠TUR and the ray *UQ* bisects ∠PUR.



Part of her proof is shown.

Statements	Reasons
1. ∠TUR and ∠PUR are supplementary angles.	1. TUP is a line.
2. $m\angle TUR + m\angle PUR = 180°$	2. Definition of supplementary angles
3. $m\angle TUR = 2 \cdot m\angle TUS$ $m\angle PUR = 2 \cdot m\angle PUQ$	3. Property of angle bisectors
4. $2m\angle TUS + 2m\angle PUQ = 180°$	4. Substitution
5. $m\angle TUS + m\angle PUQ = 90°$	5. Division property of equality
6. ∠TUS and ∠PUQ are complementary angles.	6. Definition of complementary angles

Which statements could be used to complete Mikayla's proof?

Ⓐ 4. $2 \cdot m\angle TUS = 2 \cdot m\angle PUQ$
5. $m\angle TUS = m\angle PUQ$

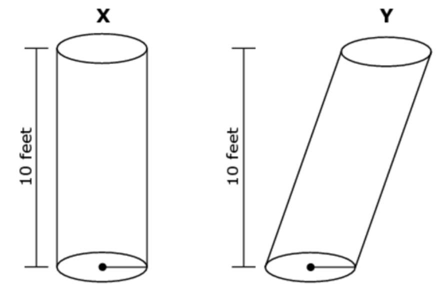
Ⓑ 4. $2 \cdot m\angle TUS = 2 \cdot m\angle PUQ$
5. $m\angle TUS + m\angle PUQ = 90°$

Ⓒ 4. $2 \cdot m\angle TUS + 2 \cdot m\angle PUQ = 180°$ ✓
5. $m\angle TUS = m\angle PUQ$

Ⓓ 4. $2 \cdot m\angle TUS + 2 \cdot m\angle PUQ = 180°$ ✓
5. $m\angle TUS + m\angle PUQ = 90°$ ✓

53.

Two cylinders, X and Y, are shown. Each cylinder has a height of 10 feet.



Which statement about these cylinders is true?

Ⓐ The volumes of the two cylinders are always equal because they have the same height.

Ⓑ The volume of cylinder Y is always greater because the slant height of cylinder Y is greater than the height of cylinder X.

Ⓒ The relationship between the volumes of the two cylinders cannot be determined because the slant height of cylinder Y is not given.

Ⓓ The relationship between the volumes of the two cylinders cannot be determined because the radii of the two cylinders are not given.

54.

Francisco asks the students in his school what pets they have. He studies the events shown.

- Event S: The student has a cat.
- Event T: The student has a dog.

Francisco finds that the two events are independent.

Select all the equations that must be true for events S and T.

- [x] $P(S \mid T) = P(S)$
- [ ] ~~$P(S \mid T) = P(T)$~~
- [ ] ~~$P(T \mid S) = P(S)$~~
- [x] $P(T \mid S) = P(T)$
- [ ] ~~$P(S \cup T) = P(S) + P(T)$~~ mutually Exclusive
- [x] $P(S \cap T) = P(S) \cdot P(T)$

55.

Two events, A and B, are independent.

- P(A) = 0.3
- P(A and B) = 0.24

What is P(B)?

$P(B) =$ 0.80

$P(A \cap B) = P(A) \cdot P(B)$

$0.24 = 0.30 \cdot P(B)$

$0.80 = P(B)$

56.

A total of 200 people attend a party, as shown in the table.

A person is selected at random to win a prize. The probability of selecting a female is 0.6. The probability of selecting a child, given that the person is female, is 0.25. The probability of selecting a male, given that the person is a child, is 0.4.

Complete the two-way table to show the number of adults, children, males, and females who attended the party.

	Adults	Children	Total
Male	60	20	80
Female	90	30	120
Total	150	50	200

$P(f) = \frac{120}{200} = 0.6$

ch

$.40(50) = 20$ male children

$.25(120) = 30$ female children

57.

Sam is picking fruit from a basket that contains many different kinds of fruit.

Which set of events is independent?

Ⓐ Event 1: He picks a kiwi and eats it.
Event 2: He picks an apple and eats it.

Ⓑ Event 1: He picks an apple and eats it.
Event 2: He picks an apple and eats it.

Ⓒ Event 1: He picks a kiwi and eats it.
Event 2: He picks a kiwi and puts it back.

Ⓓ Event 1: He picks a kiwi and puts it back.
Event 2: He picks an apple and puts it back.

58.

The probability of flipping a fair coin and heads landing face up is 0.5. The probability of rolling a fair number cube, with sides numbered 1 through 6, and an odd number landing face up is 0.5.

What is the probability of flipping heads or rolling an odd number?

An event = coin flip and roll die !

H1 T1
H2 T2
H3 T3
H4 T4
H5 T5
H6 T6

$P(H \text{ or } o) = \frac{9}{12} = 3/4$

Same

or

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$= 0.5 + 0.5 - (0.5)(0.5)$

$= 1 - (0.25)$

$P(A \text{ or } B) = 0.75$

60.

An online retailer conducts a random survey of its customers. The survey shows that 80% of the customers receive their purchases within four days, and 95% of those customers are satisfied with the quality of their purchases.

What percent of all customers receive their purchases within four days and are not satisfied with the quality of their purchases?

- (A) 4%
- (B) 5%
- (C) 19%
- (D) 24%

	< 4 days	≥ 4 days	
Satisfied	0.76		
not Satisfied	0.04		
	0.80	0.20	1

59.

During a 90-day semester, a student records whether he arrives at school on time and whether he goes to bed by 10:00 p.m. the night before. The results are shown in the table.

Number of Occurrences

	Arrives at School on Time	Arrives at School Late	
Goes to Bed by 10:00 p.m.	72	8	80
Goes to Bed After 10:00 p.m.	9	1	10
	81	9	90

Does the student arriving at school on time depend on whether the student goes to bed by 10:00 p.m.? Justify your reasoning.

Type your answer in the space provided.

The probability of arriving to school on time is $81/90 = 0.9$

The probability of arriving on time given that a student is in bed by 10:00 is $72/80 = 0.9$

Therefore arriving at school on time is independent to going to bed by 10:00pm

61.

Josh has a bag containing pieces of candy. The bag contains 10 red circular pieces, 10 red square pieces, 10 blue triangular pieces, and 10 blue star-shaped pieces. He draws a red piece of candy from the bag.

What is the complement of this event?

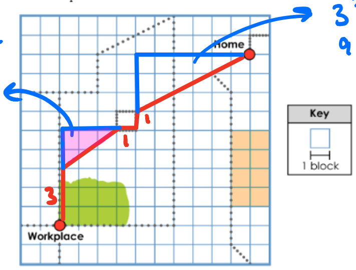
- (A) He draws a blue piece.
- (B) He draws a square piece.
- (C) He draws a circular piece.
- (D) He draws a star-shaped piece.

$P(R^c) = P(B)$

62.

A map of Jane's town with her home and workplace is shown.

$2^2+3^2=d^2$
$4+9=d^2$
$13=d^2$
$\sqrt{13}=d$



$3^2+6^2=d^2$
$9+36=d^2$
$45=d^2$
$\sqrt{45}=d$

Jane wants to determine the shortest route from her home to her workplace. She walks only on the sidewalks indicated by dotted lines on the map.

What is the distance of the shortest route, to the nearest whole block?

15.3 *blocks*

$B = 3+\sqrt{13}+1+1+\sqrt{45}$

$B = 15.3$

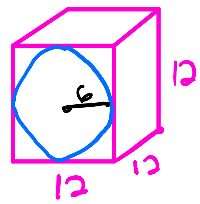
64.

A globe has a diameter of 12 inches. It fits inside a cube-shaped box that has a side length of 12 inches.

What is the volume, rounded to the nearest hundredth of a cubic inch, of the space inside the box that is not taken up by the globe?

823.22 *cubic inches*

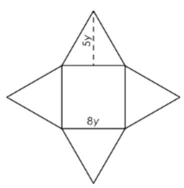
1	2	3
4	5	6
7	8	9
	0	



$V_{FIG} = V_{cube} - V_{sphere}$
$= Bh - \frac{4}{3}\pi r^3$
$= (12)(12)(12) - \frac{4}{3}\pi(6)^3$
$= 1728 - \frac{4}{3}\pi(216)$
$= 1728 - 288\pi$
$V \approx 823.22$

63.

Allison designs fancy boxes to fill with chocolates. The boxes are in the shape of a right square pyramid as shown, where $8y$ represents the length of one side of the base of the pyramid, and $5y$ represents the height of one triangular face of the pyramid.



The large size box must be designed to have a volume of 1,000 cubic centimeters.

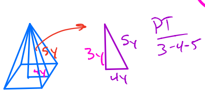
A. Create an equation that can be used to calculate the length of the base and height of the triangular face of the box. Enter your equation in the first response box.

B. What dimensions for the length, in centimeters, of the base and the height of the triangular face, in centimeters, satisfy these constraints?

A. $1000 = 64y^3$

B. Length of Base = 20 *centimeters*

B. Height of Triangular Face = 12.5 *centimeters*



(A) $V_{PYR} = \frac{1}{3}Bh$
$= \frac{1}{3}(8y)(8y)\cdot 3y$
$1000 = 64y^3$

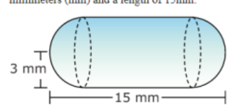
(B) $1000 = 64y^3$
$\frac{1000}{64} = y^3$
$\sqrt[3]{\frac{1000}{64}} = y$
$\frac{10}{4} = y$
$2.5 = y$

$\boxed{\begin{aligned} base &= 8y \\ &= 8(2.5) \\ base &= 20 \end{aligned}}$

$\boxed{\begin{aligned} height_{face} &= 5y \\ &= 5(2.5) \\ &= 12.5 \end{aligned}}$

65.

A company wants to determine the amount of a vitamin mix that can be enclosed in a capsule like the one shown. The capsule has a radius of 3 millimeters (mm) and a length of 15mm.



Which statement **best** explains how to find the amount of vitamin mix that fits in the capsule?

- Ⓐ Add the volume of a sphere with a radius of 3 millimeters to the volume of a cylinder with a radius of 3 millimeters and a height of 9 millimeters.
- Ⓑ Add the volume of a sphere with a radius of 3 millimeters to the volume of a cylinder with a radius of 3 millimeters and a height of 15 millimeters. False
- Ⓒ Add the volume of a sphere with a radius of 6 millimeters to the volume of a cylinder with a radius of 6 millimeters and a height of 9 millimeters. False False
- Ⓓ Add the volume of a sphere with a radius of 6 millimeters to the volume of a cylinder with a radius of 6 millimeters and a height of 15 millimeters. False False False