PRACTICE – AIR TEST Name ___________________________

Show all work neatly.

1

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.

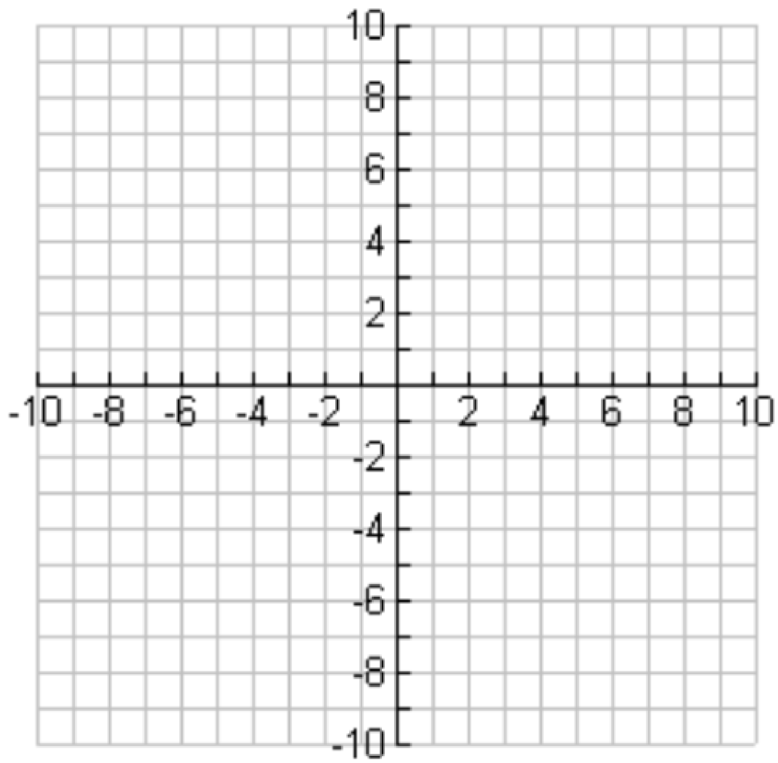
Which sequence of transformations did Felipe use?

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

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

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

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

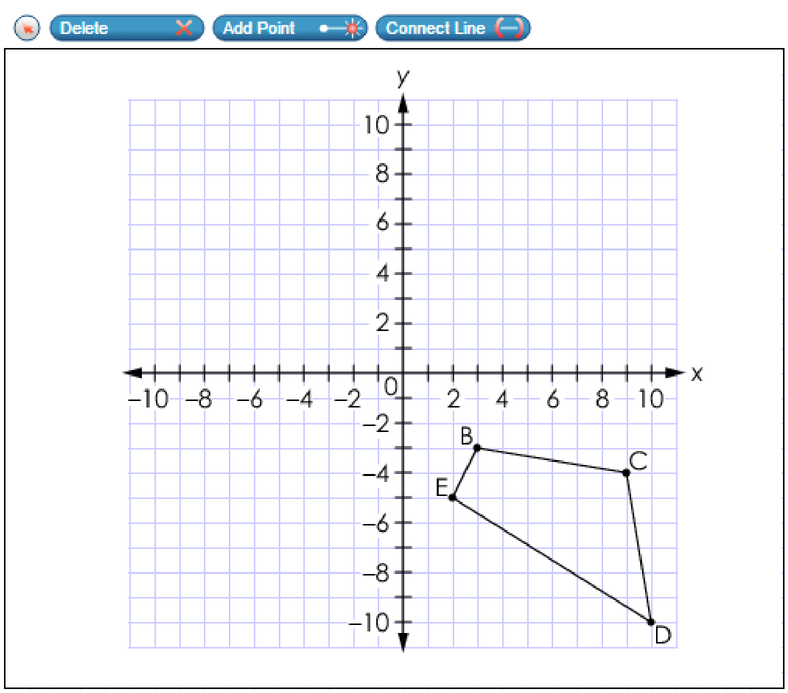


2

Quadrilateral BCDE is shown on the coordinate grid.

Keisha reflects the figure across the line $y = x$ to create B'C'D'E'.

Use the Connect Line tool to draw quadrilateral B'C'D'E'.



3

Three vertices of parallelogram PQRS are shown:

Q (8, 5), R (5, 1), S (2, 5)

Place statements and reasons in the table to complete the proof that shows that parallelogram PQRS is a rhombus.

Statements	Reasons
	Pythagorean Theorem
SR = QR	Substitution
$\overline{SR} \cong \overline{QR}$	Definition of congruent line segments
$\overline{PS} \cong \overline{QR}$	Property of a parallelogram
Parallelogram PQRS is a rhombus.	Definition of a rhombus

SR = 5	$SR = \sqrt{7}$	$\angle PSR = 90°$
PQ = 5	$PQ = \sqrt{7}$	$\overline{SR} \cong \overline{PQ}$
QR = 5	$QR = \sqrt{7}$	Pythagorean Theorem
Definition of perpendicular lines	Property of a parallelogram	Definition of parallel lines

4

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

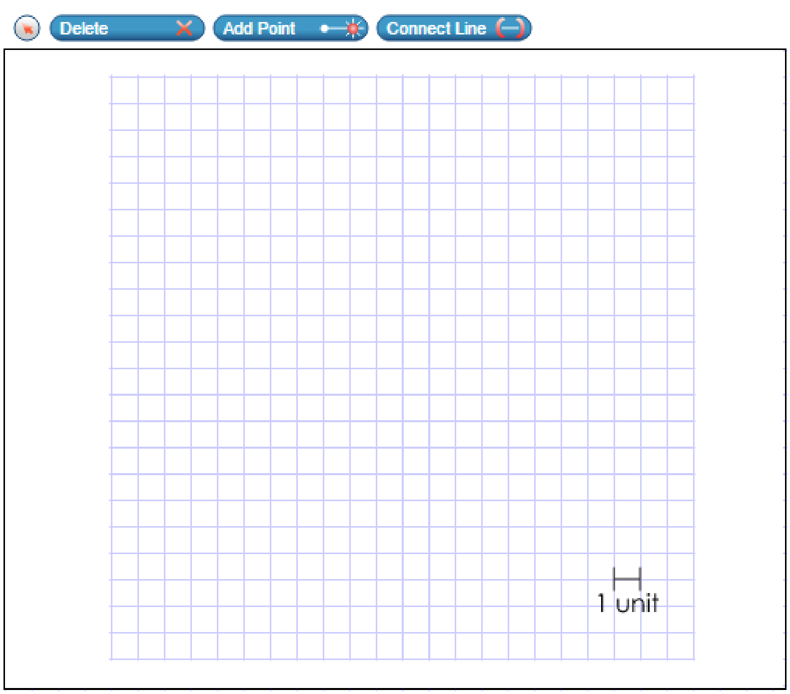
- The area of △PQR is not 6 square units.
- $\cos P = 0.6$

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

P

Q

R



5

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.

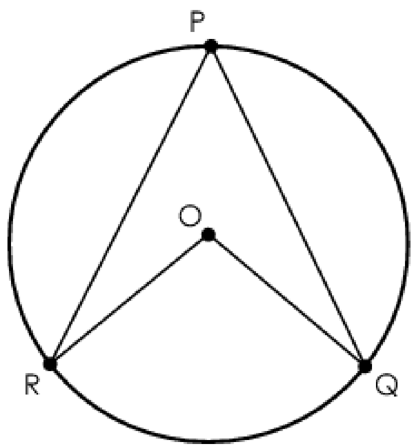
Francisco finds that the two events are independent.

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

- [ ] $P(S \mid T) = P(S)$
- [ ] $P(S \mid T) = P(T)$
- [ ] $P(T \mid S) = P(S)$
- [ ] $P(T \mid S) = P(T)$
- [ ] $P(S \cup T) = P(S) \cdot P(T)$
- [ ] $P(S \cap T) = P(S) \cdot P(T)$

6

A teacher draws circle O, $\angle RPQ$ and $\angle ROQ$, as shown.



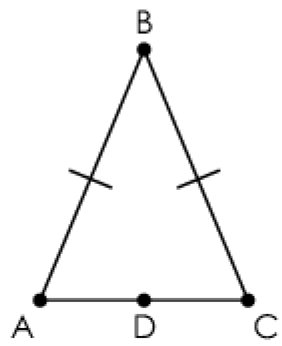
The teacher asks students to select the correct claim about the relationship between $m\angle RPQ$ and $m\angle ROQ$.

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

Which claim is correct? Justify your answer.

Type your answer in the space provided.

Triangle ABC is shown.



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

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

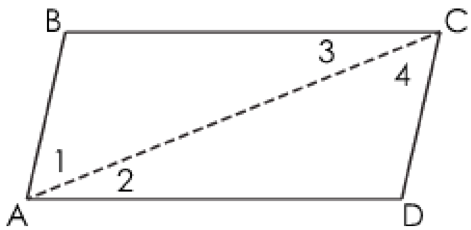
Place reasons in the table to complete the proof.

Statements	Reasons
1. Triangle ABC is isosceles. D is the midpoint of $\overline{AC}$.	1. Given
2. 2. $\overline{AD} \cong \overline{DC}$	2. Definition of midpoint
3. 3. $\overline{BA} \cong \overline{BC}$	3. Definition of isosceles triangle
4. 4. $\overline{BD}$ exists.	4. A single line segment can be drawn between any two points.
5. 5. $\overline{BD} \cong \overline{BD}$	5.
6. 6. $\triangle ABD \cong \triangle CBD$	6.
7. 7. $\angle BAC \cong \angle BCA$	7.

AA congruency postulate	Reflexive property
SAS congruency postulate	Symmetric property
SSS congruency postulate	Midpoint theorem
Corresponding parts of congruent triangles are congruent.	

8

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



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

Proof:

Statements	Reasons
ABCD is a parallelogram with diagonal $\overline{AC}$.	Given
$\overline{AB} \parallel \overline{CD}$ and $\overline{AD} \parallel \overline{BC}$	Definition of parallelogram
$\angle 2 \cong \angle 3$ $\angle 1 \cong \angle 4$	Alternate interior angles are congruent.
$m\angle 2 = m\angle 3$ and $m\angle 1 = m\angle 4$	Measures of congruent angles are equal.
$m\angle 1 + m\angle 2 = m\angle 4 + m\angle 2$	Addition property of equality
$m\angle 1 + m\angle 2 = m\angle 4 + m\angle 3$	?
$m\angle 1 + m\angle 2 = m\angle BAD$ $m\angle 3 + m\angle 4 = m\angle DCB$	Angle addition postulate
$m\angle BAD = m\angle DCB$	Substitution
$\angle BAD \cong \angle DCB$	Angles are congruent when their measures are equal.

What is the missing reason in this partial proof?

(A) ASA

(B) Substitution

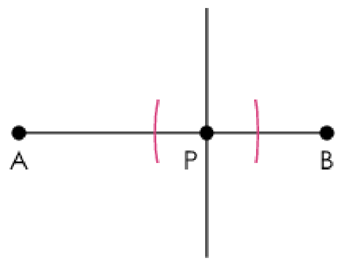
(C) Angle addition postulate

(D) Alternate interior angles are congruent.

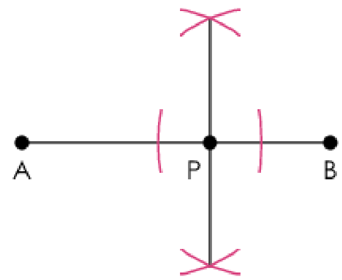
9

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

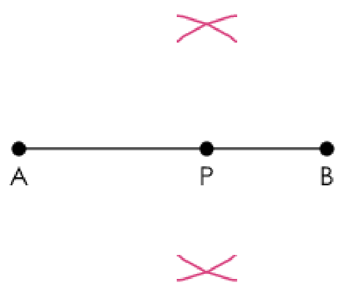
Ⓐ



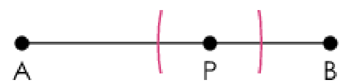
Ⓒ



Ⓑ

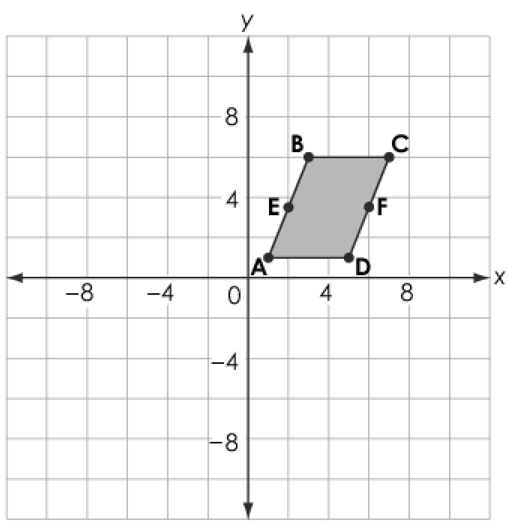


Ⓓ



10

Parallelogram ABCD is shown. Point E is the midpoint of segment AB. Point F is the midpoint of segment CD.



Which transformation carries the parallelogram onto itself?

Ⓐ a reflection across line segment AC

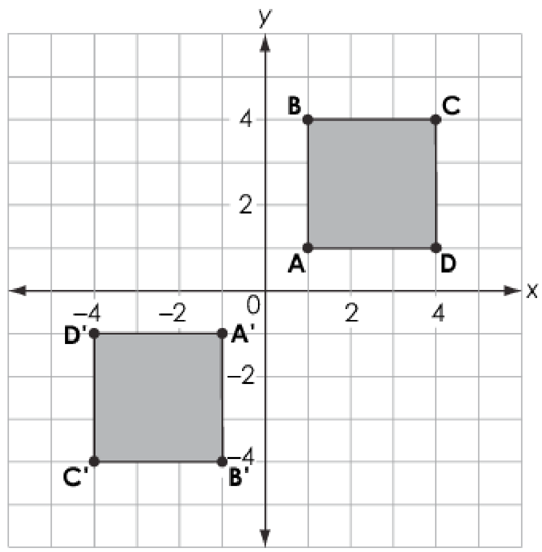
Ⓑ a reflection across line segment EF

Ⓒ a rotation of 180 degrees clockwise about the origin

Ⓓ a rotation of 180 degrees clockwise about the center of the parallelogram

11

Square ABCD is transformed to create the image A′B′C′D′, as shown.

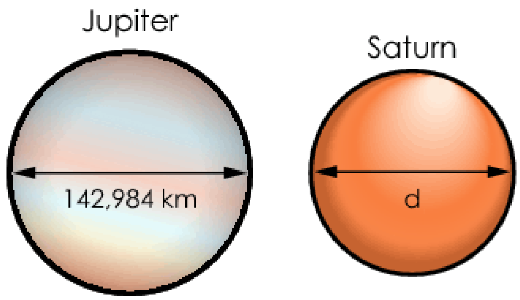


Select all of the transformations that could have been performed.

- [ ] a reflection across the line $y = x$
- [ ] a reflection across the line $y = -2x$
- [ ] a rotation of 180 degrees clockwise about the origin
- [ ] a reflection across the x-axis, and then a reflection across the y-axis
- [ ] a rotation of 270 degrees counterclockwise about the origin, and then a reflection across the x-axis

12

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



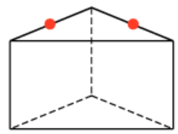
The volume of Saturn is 59.9% the volume of Jupiter.

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

[ ] *km*

13

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

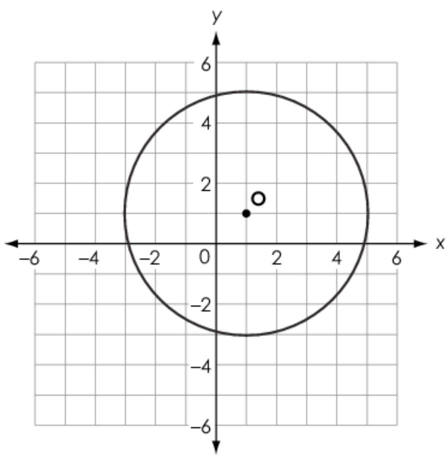
Ⓑ rectangle

Ⓒ trapezoid

Ⓓ parallelogram

14

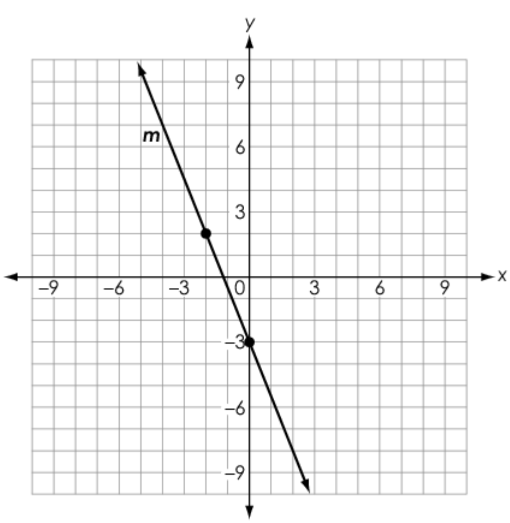
A circle with center O is shown.



Create the equation for the circle.

15

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 $(3,\ 2)$?

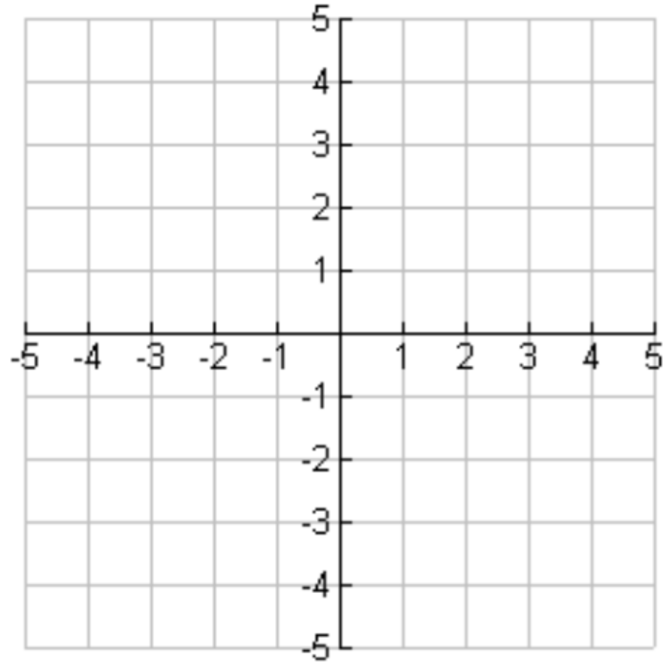
$y =$

16

Line segment AC has endpoints A $(-1, -3.5)$ and C $(5, -1)$.

Point B is on line segment AC and is located at $(0.2, -3)$.

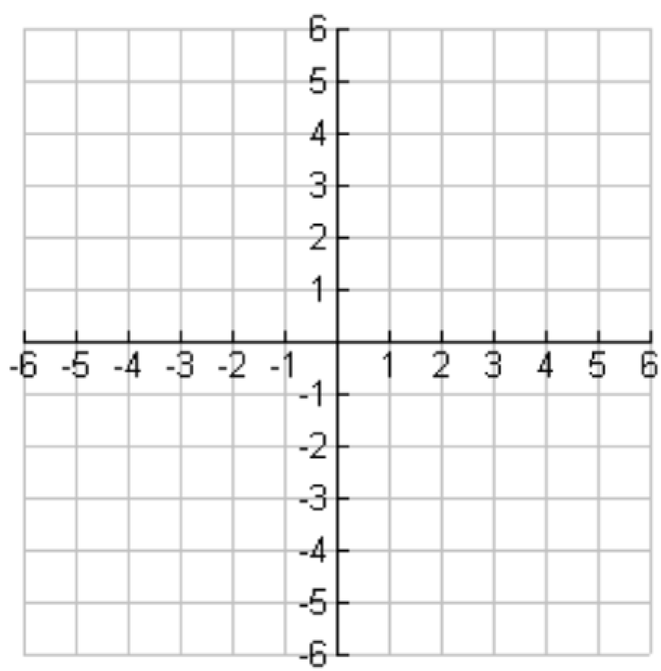
What is the ratio of $\frac{AB}{BC}$?



17

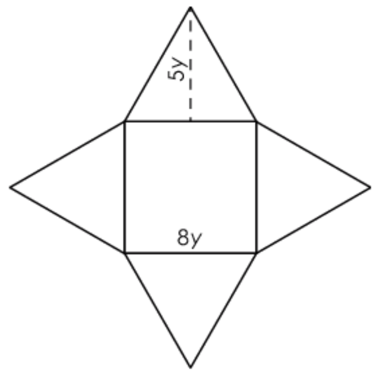
Triangle ABC has vertices at $(-4, 0)$, $(-1, 6)$ and $(3, -1)$.

What is the perimeter of triangle ABC, rounded to the nearest tenth?



18

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. [ ]

B. Length of Base = [ ] *centimeters*

B. Height of Triangular Face = [ ] *centimeters*

19

Kyle performs a transformation on a triangle. The resulting triangle is similar but not congruent to the original triangle.

Which transformation did Kyle perform on the triangle?

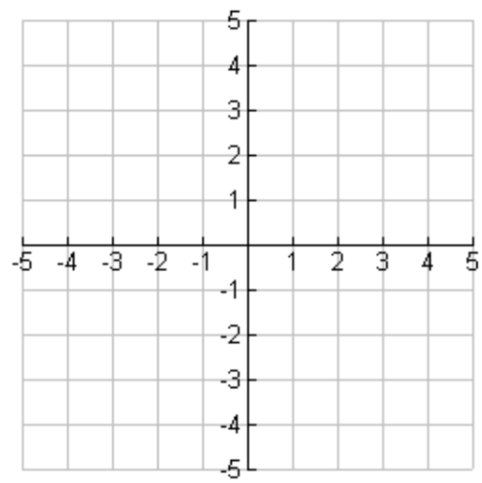
Ⓐ dilation

Ⓑ reflection

Ⓒ rotation

Ⓓ translation

Use this graph for question #20



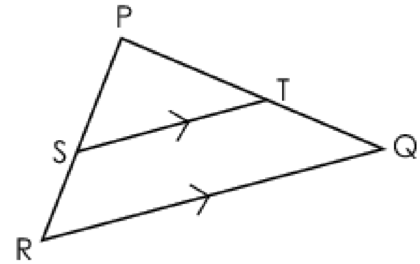
20

Triangle ABC has vertices A $(1, 1)$, B $(2.5, 3)$, and C $(0, -3)$. It is dilated by a scale factor of $\frac{1}{2}$ about the origin to create triangle A'B'C'.

What is the length, in units, of side $\overline{B'C'}$?

[ ]

Triangle PQR is shown, where $\overline{ST}$ is parallel to $\overline{RQ}$.



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

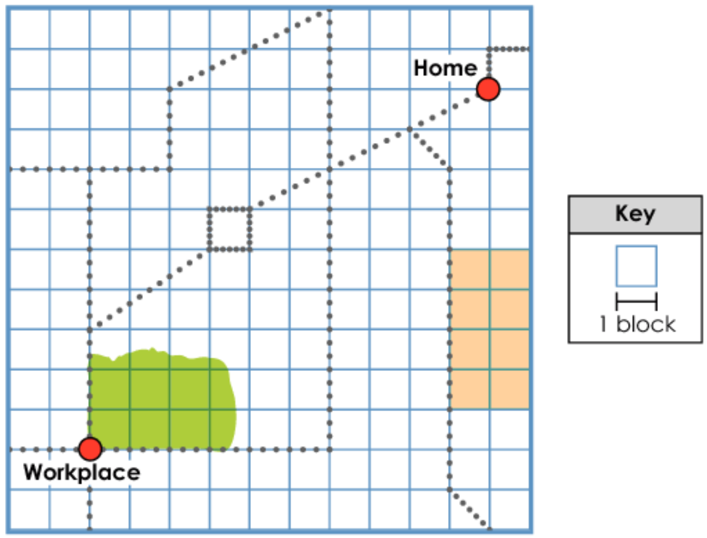
Place a statement or reason in each blank box to complete Marta's proof.

Statements	Reasons
1. $\overline{ST} \parallel \overline{RQ}$	1. Given
2. $\angle PST \cong \angle R$ and $\angle PTS \cong \angle Q$	2. If two parallel lines are cut by a transversal, then corresponding angles are congruent.
3. $\triangle PQR \sim \triangle PTS$	3.
4.	4.
5. PR = PS + SR, PQ = PT + TQ	5. Segment addition postulate
6. $\frac{PS + SR}{PS} = \frac{PT + TQ}{PT}$	6. Substitution
7. $\frac{PS}{PS} + \frac{SR}{PS} = \frac{PT}{PT} + \frac{TQ}{PT}$	7. Commutative property of addition
8. $\frac{SR}{PS} = \frac{TQ}{PT}$	8. Subtraction property of equality

$\frac{PR}{PS} = \frac{PQ}{PT}$	$\frac{PS}{SR} = \frac{PT}{ST}$	$\angle P \cong \angle P$
AA Similarity	ASA Similarity	SSS Similarity
Reflexive property	Segment addition postulate	Corresponding sides of similar triangles are proportional.
Corresponding sides of similar triangles are congruent.	If two parallel lines are cut by a transversal, then alternate interior angles are congruent.	If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.

22

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



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?

[ ] *blocks*

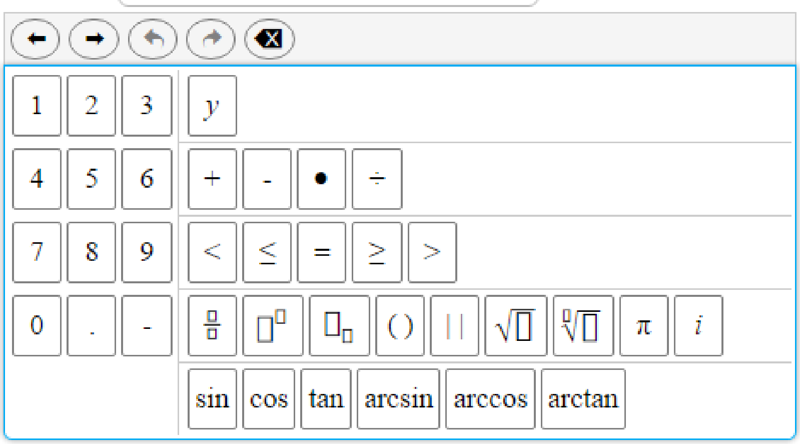
23

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.

$x =$ [ ]



24

Two events, A and B, are independent.

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

What is P(B)?

$P(B) =$ [ ]

25

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	[ ]	[ ]	80
Female	[ ]	[ ]	120
Total	150	50	200

26

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.

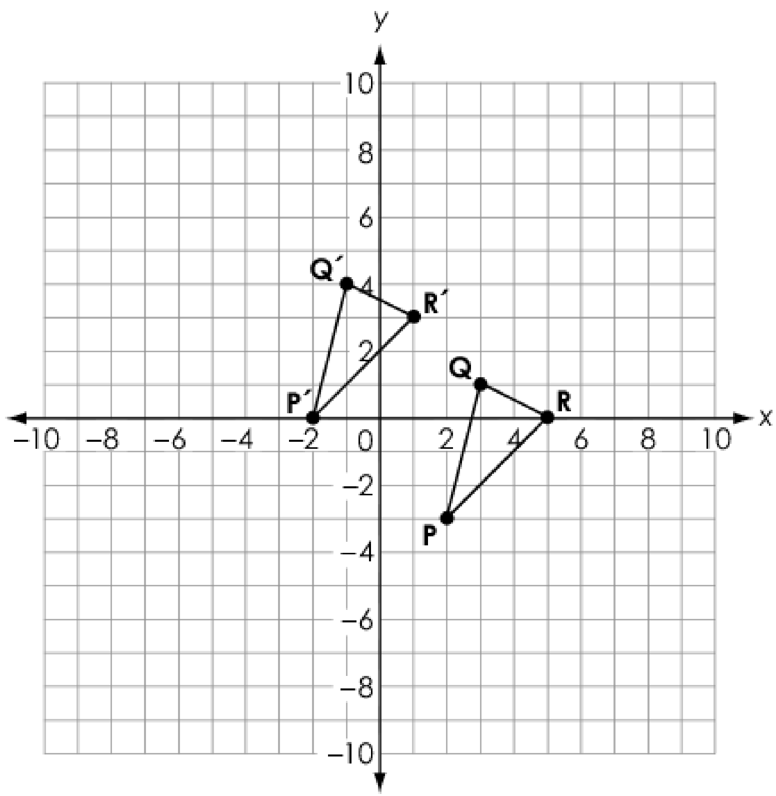
27

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?

28

A translation is applied to △PQR to create △P'Q'R'.



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.

$a =$

$b =$

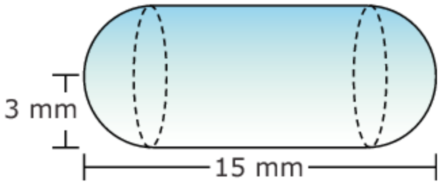
1

In 2014, the population of Hong Kong was estimated to be approximately 7,112,688 people. The city covers an area of approximately 426.25 square miles.

What was the population density of Hong Kong in 2014, in people per square mile, rounded to the nearest person?

2

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.

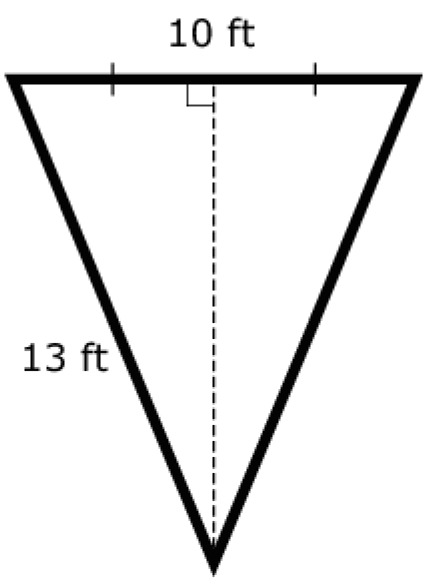
Ⓑ Add the volume of a sphere with a radius of 3 millimeters to the volume of a cylinder with a radius of 3 millimeters and a height of 15 millimeters.

Ⓒ 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.

Ⓓ 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.

3

A sign company is building a sign with the dimensions shown.



What is the area, in square feet, of the sign?

Ohio's State Tests Reference Sheet
High School

$1\ foot = 12\ inches$

$1\ yard = 3\ feet$

$1\ mile = 1{,}760\ yards$

$1\ mile = 5{,}280\ feet$

$1\ mile \approx 1.609\ kilometers$

$1\ inch = 2.54\ centimeters$

$1\ kilometer \approx 0.62\ mile$

$1\ meter \approx 39.37\ inches$

$1\ pound = 16\ ounces$

$1\ pound \approx 0.454\ kilograms$

$1\ kilogram \approx 2.2\ pounds$

$1\ radian = \frac{180}{\pi}\ degrees$

$1\ cup = 8\ fluid\ ounces$

$1\ pint = 2\ cups$

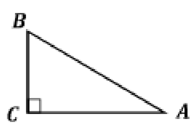
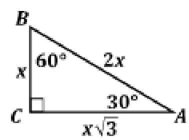
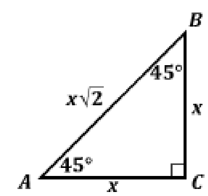
$1\ quart = 2\ pints$

$1\ gallon = 4\ quarts$

$1\ gallon \approx 3.785\ liters$

$1\ liter \approx 0.264\ gallons$

$1\ liter = 1000\ cubic\ centimeters$

Right Triangle Relationships			
	$a^2 + b^2 = c^2$ $\sin A = \frac{a}{c}$ $\cos A = \frac{b}{c}$ $\tan A = \frac{a}{b}$		

Key			
$b = base$	$B = area\ of\ base$	$h = height$	$r = radius$

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$C = 2\pi r$
Circle	$A = \pi r^2$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$