JEFFERSON MATH PROJECT

REGENTS QUESTIONS BY GEOMETRY CONTENT BAND PERFORMANCE INDICATORS

Geometry, Math A/B NY Regents Exam Questions
Sorted by Content Band Performance Indicators

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Dear Sir

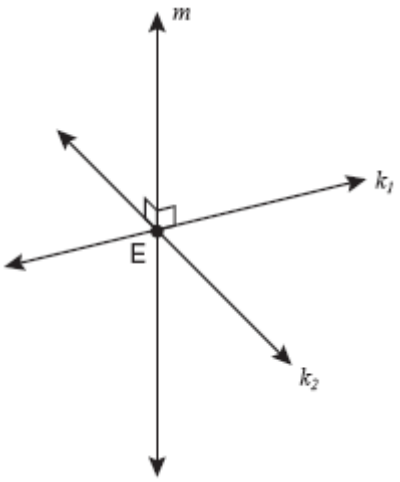
I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

CONTENT BAND	BAND DESCRIPTOR	PERFORMANCE INDICATOR	# of ?s
Geometric Relationships 8-12%	Students will use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes	G.G.1-G.G.16	21
Constructions 3-7%		G.G.17-G.G.20	12
Locus 4-8%		G.G.21-G.G.23	17
Informal and Formal Proofs 41-47%	Students will identify and justify geometric relationships formally and informally	G.G.24-G.G.53	240
Transformational Geometry 8-13%	Students will apply transformations and symmetry to analyze problem solving situations	G.G.54-G.G.61	100
Coordinate Geometry 14-19%	Students will apply coordinate geometry to analyze problem solving situations	G.G.62-G.G.74	66
		Total	456

G.G.1: Know and apply that if a line is perpendicuar to each of two intersecting lines at their point of intersection, then the line is perpendicular to the plane determined by them

1. fall0816ge, P.I. G.G.1
Lines k_1 and k_2 intersect at point E. Line *m* is perpendicular to lines k_1 and k_2 at point E.



Which statement is always true?

[A] Line *m* is perpendicular to the plane determined by lines k_1 and k_2.

[B] Lines k_1 and k_2 are perpendicular.

[C] Line *m* is parallel to the plane determined by lines k_1 and k_2.

[D] Line *m* is coplanar with lines k_1 and k_2.

G.G.2: Know and apply that through a given point there passes one and only one plane perpendicular to a given line

2. 060918ge, P.I. G.G.2
Point *P* is on line *m*. What is the total number of planes that are perpendicular to line *m* and pass through point *P*?

[A] 1 [B] infinite [C] 0 [D] 2

G.G.3: Know and apply that through a given point there passes one and only one line perpendicular to a given plane

G.G.4: Know and apply that two lines perpendicular to the same plane are coplanar

3. 080927ge, P.I. G.G.4
If two different lines are perpendicular to the same plane, they are

[A] coplanar [B] congruent

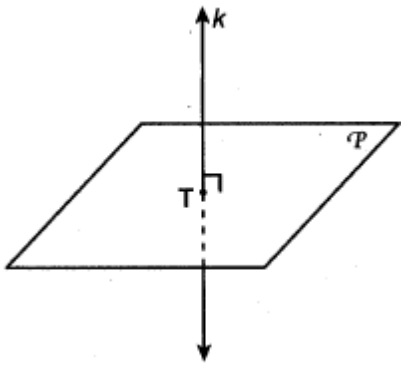
[C] collinear [D] consecutive

G.G.5: Know and apply that two planes are perpendicular to each other if and only if one plane contains a line perpendicular to the second plane

G.G.6: Know and apply that if a line is perpendicular to a plane, then any line perpendicular to the given line at its point of intersection with the given plane is in the given plane

G.G.7: Know and apply that is a line is perpendicular to a plane, then every plane containing the line is perpendicular to the given plane

4. 080914ge, P.I. G.G.7
In the diagram below, line k is perpendicular to plane $\mathcal{P}$ at point T.



Which statement is true?

[A] Any plane containing line k is perpendicular to plane $\mathcal{P}$.

[B] Only one line in plane $\mathcal{P}$ will intersect line k.

[C] Any point in plane $\mathcal{P}$ also will be on line k.

[D] All planes that intersect plane $\mathcal{P}$ will pass through T.

G.G.8: Know and apply that if a plane intersects two parallel planes, then the intersection is two parallel lines

5. 060928ge, P.I. G.G.8
In three-dimensional space, two planes are parallel and a third plane intersects both of the parallel planes. The intersection of the planes is a

[A] plane [B] point

[C] pair of parallel lines

[D] pair of intersecting lines

G.G.9: Know and apply that if two planes are perpendicular to the same line, they are parallel

6. fall0806ge, P.I. G.G.9
Line k is drawn so that it is perpendicular to two distinct planes, P and R. What must be true about planes P and R?

[A] Planes P and R are parallel.

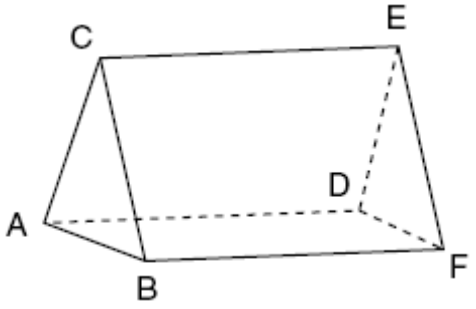
[B] Planes P and R are skew.

[C] Planes P and R are perpendicular.

[D] Plane P intersects plane R but is not perpendicular to plane R.

G.G.10: Know and apply that the lateral edges of a prism are congruent and parallel

7. fall0808ge, P.I. G.G.10
The figure in the diagram below is a triangular prism.



Which statement must be true?

[A] $\overline{AD} \parallel \overline{CE}$ [B] $\overline{AD} \cong \overline{BC}$

[C] $\overline{DE} \parallel \overline{BC}$ [D] $\overline{DE} \cong \overline{AB}$

G.G.11: Know and apply that two prisms have equal volumes if their bases have equal area and their altitudes are equal

G.G.12: Know and apply that the volume of a prism is the product of the area of the base and the altitude

8. 060103a, P.I. G.G.12
If the length of a rectangular prism is doubled, its width is tripled, and its height remains the same, what is the volume of the new rectangular prism?

[A] six times the original volume

[B] nine times the original volume

[C] double the original volume

[D] triple the original volume

9. 060427a, P.I. G.G.12
A box in the shape of a cube has a volume of 64 cubic inches. What is the length of a side of the box?

[A] 8 in [B] 16 in

[C] $21.\overline{3}$ in [D] 4 in

10. 010324a, P.I. G.G.12
A fish tank with a rectangular base has a volume of 3,360 cubic inches. The length and width of the tank are 14 inches and 12 inches, respectively. Find the height, in inches, of the tank.

11. fall0815ge, P.I. G.G.12
A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

[A] $x^2 + 6x + 8$ [B] $x + 2$

[C] 3 [D] $x + 4$

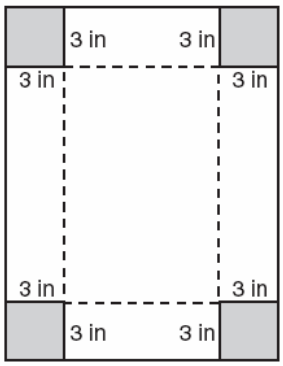
12. 010030a, P.I. G.G.12
The volume of a rectangular pool is 1,080 cubic meters. Its length, width, and depth are in the ratio 10:4:1. Find the number of meters in each of the three dimensions of the pool.

13. 010711a, P.I. G.G.12
A planned building was going to be 100 feet long, 75 feet deep, and 30 feet high. The owner decides to increase the volume of the building by 10% without changing the dimensions of the depth and the height. What will be the new length of this building?

[A] 112 ft [B] 106 ft

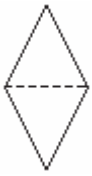
[C] 108 ft [D] 110 ft

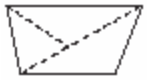
14. 060331a, P.I. G.G.12
Deborah built a box by cutting 3-inch squares from the corners of a rectangular sheet of cardboard, as shown in the accompanying diagram, and then folding the sides up. The volume of the box is 150 cubic inches, and the longer side of the box is 5 inches more than the shorter side. Find the number of inches in the shorter side of the *original* sheet of cardboard.

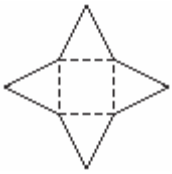


G.G.13: Apply the properties of a regular pyramid, including: lateral edges are congruent, lateral faces are congruent isosceles triangles, and volume of a pyramid equals one-third the product of the area of the base and the altitude

15. 080215a, P.I. G.G.13
Which piece of paper can be folded into a pyramid?

[A] 

[B] 

[C] 

[D] 

16. 060904ge, P.I. G.G.13
The lateral faces of a regular pyramid are composed of

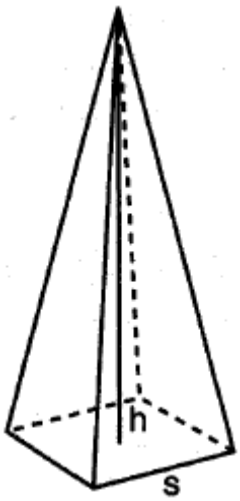
[A] squares

[B] congruent isosceles triangles

[C] rectangles

[D] congruent right triangles

17. 080930ge, P.I. G.G.13
A regular pyramid with a square base is shown in the diagram below.



A side, *s*, of the base of the pyramid is 12 meters, and the height, *h*, is 42 meters. What is the volume of the pyramid in cubic meters?

G.G.14: Apply the properties of a cylinder, including: bases are congruent, volume equals the product of the area of the base and the altitude, and lateral area of a right circular cylinder equals the product of an altitude and the circumference of the base

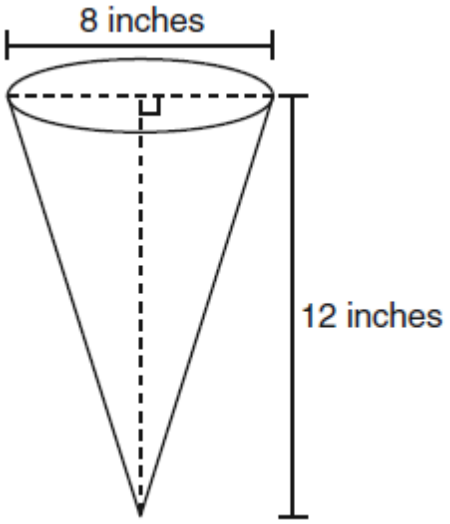
18. 080926ge, P.I. G.G.14
A right circular cylinder has a volume of 1,000 cubic inches and a height of 8 inches. What is the radius of the cylinder to the *nearest tenth of an inch.*

[A] 39.8 [B] 11.2 [C] 19.8 [D] 6.3

19. fall0833ge, P.I. G.G.14
The volume of a cylinder is 12,566.4 cm^3. The height of the cylinder is 8 cm. Find the radius of the cylinder to the *nearest tenth of a centimeter.*

G.G.15: Apply the properties of a right circular cone, including: lateral area equals one-half the product of the slant height and the circumference of its base, and volume is one-third the product of the area of its base and its altitude

20. 060921ge, P.I. G.G.15
In the diagram below, a right circular cone has a diameter of 8 inches and a height of 12 inches.



What is the volume of the cone to the *nearest cubic inch*?

[A] 804 [B] 201 [C] 603 [D] 481

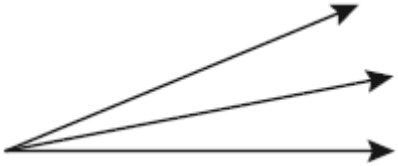
G.G.16: Apply the properties of a sphere, including: the intersection of a plane and a sphere is a circle, a great circle is the largest circle that can be drawn on a sphere, two planes equidistant from the center of the sphere and intersecting the sphere do so in congruent circles, surface area is 4 x pi x r^2, volume is 4/3 x pi x r^3

21. 060028a, P.I. G.G.16
Tamika has a hard rubber ball whose circumference measures 13 inches. She wants to box it for a gift but can only find cube-shaped boxes of sides 3 inches, 4 inches, 5 inches, or 6 inches. What is the *smallest* box that the ball will fit into with the top on?

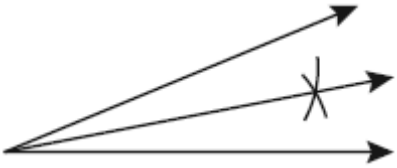
G.G.17: Construct a bisector of a given angle, using a straightedge and compass, and justify the construction

1. 060925ge, P.I. G.G.17
Which illustration shows the correct construction of an angle bisector?

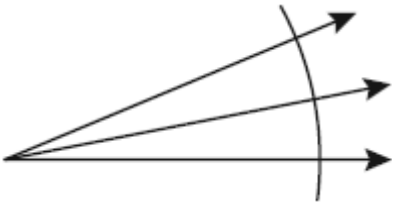
[A]



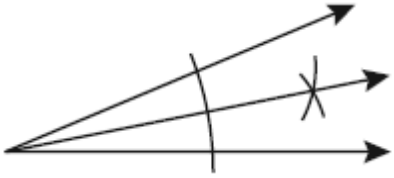
[B]



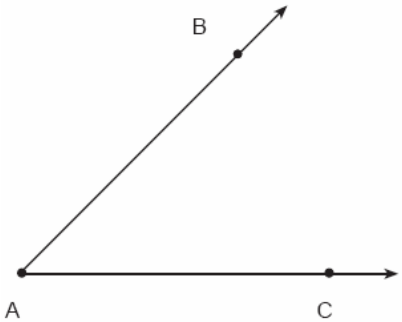
[C]



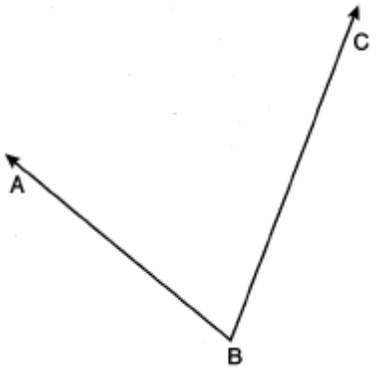
[D]



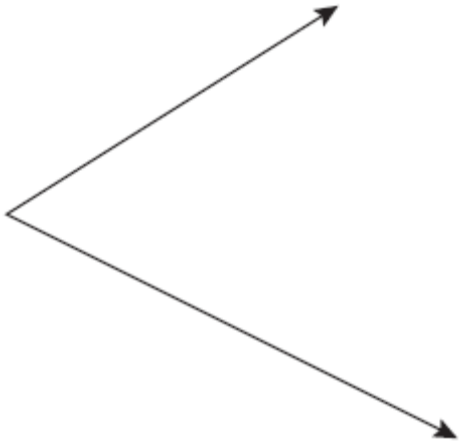
2. 060022a, P.I. G.G.17
Using only a ruler and compass, construct the bisector of angle *BAC* in the accompanying diagram.



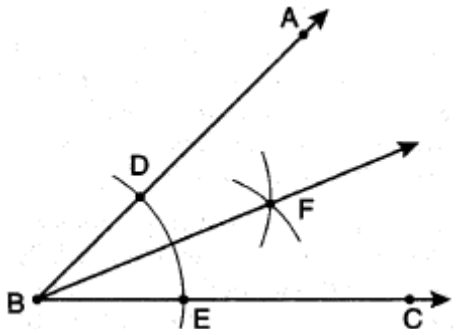
3. 080932ge, P.I. G.G.17
Using a compass and straightedge, construct the angle bisector of $\angle ABC$ shown below. [Leave all construction marks.]



4. fall0832ge, P.I. G.G.17
Using a compass and straightedge, construct the bisector of the angle shown below. [*Leave all construction marks.*]



5. 080902ge, P.I. G.G.17
The diagram below shows the construction of the bisector of $\angle ABC$.



Which statement is *not* true?

[A] $m\angle EBF = m\angle ABC$

[B] $m\angle DBF = \frac{1}{2}m\angle ABC$

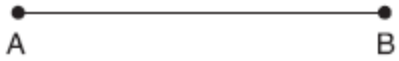
[C] $m\angle DBF = m\angle EBF$

[D] $m\angle EBF = \frac{1}{2}m\angle ABC$

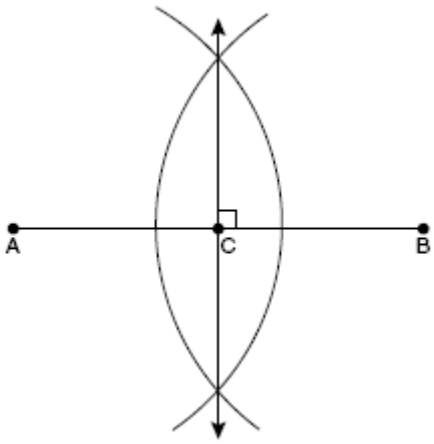
G.G.18: Construct the perpendicular bisector of a given segment, using a straightedge and compass, and justify the construction

6. 060734a, P.I. G.G.18
Using a compass and straightedge, construct the perpendicular bisector of $\overline{AB}$ shown below. Show all construction marks.

7. 060435a, P.I. G.G.18
Using only a compass and a straightedge, construct the perpendicular bisector of $\overline{AB}$ and label it *c*. [Leave all construction marks.]



8. fall0804ge, P.I. G.G.18
The diagram below shows the construction of the perpendicular bisector of $\overline{AB}$.



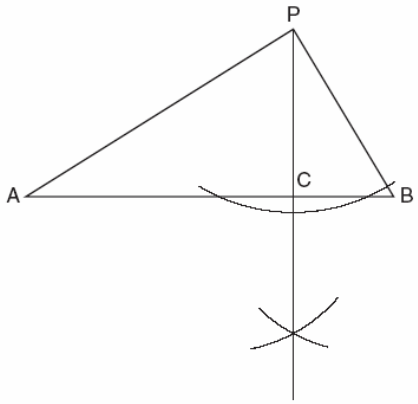
Which statement is *not* true?

[A] $AC + CB = AB$ [B] $AC = 2AB$

[C] $CB = \frac{1}{2}AB$ [D] $AC = CB$

G.G.19: Construct lines parallel (and perpendicular) to a given line through a given point, using a straightedge and compass, and justify the construction

9. 010420a, P.I. G.G.19
In the accompanying diagram of a construction, what does $\overline{PC}$ represent?



[A] the perpendicular bisector of $\overline{AB}$

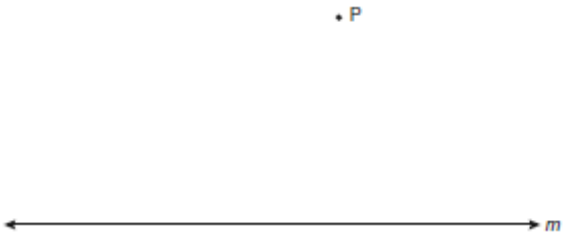
[B] a median drawn to $\overline{AB}$

[C] an altitude drawn to $\overline{AB}$

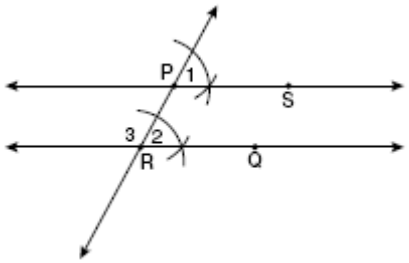
[D] the bisector of $\angle APB$

10. 080835a, P.I. G.G.19
Using a compass and straightedge, construct the line that is perpendicular to $\overleftrightarrow{AB}$ and that passes through point *P*. Show all construction marks.

11. 060930ge, P.I. G.G.19
Using a compass and straightedge, construct a line that passes through point *P* and is perpendicular to line *m*. [Leave all construction marks.]



12. fall0807ge, P.I. G.G.19
The diagram below illustrates the construction of $\overleftrightarrow{PS}$ parallel to $\overleftrightarrow{RQ}$ through point *P*.



Which statement justifies this construction?

[A] $\overline{PR} \cong \overline{RQ}$ [B] $m\angle 1 = m\angle 2$

[C] $\overline{PS} \cong \overline{RQ}$ [D] $m\angle 1 = m\angle 3$

G.G.20: Construct an equilateral triangle, using a straightedge and compass, and justify the construction

G.G.21: Investigate and apply the concurrence of medians, altitudes, angle bisectors, and perpendicular bisectors of triangles

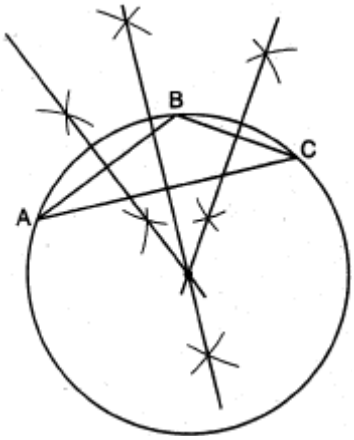
1. fall0825ge, P.I. G.G.21
In which triangle do the three altitudes intersect outside the triangle?

[A] an acute triange

[B] an equilateral triangle

[C] a right triangle [D] an obtuse triangle

2. 080925ge, P.I. G.G.21
The diagram below shows the construction of the center of the circle circumscribed about ΔABC.



This construction represents how to find the intersection of

[A] the medians to the sides of ΔABC

[B] the perpendicular bisectors of the sides of ΔABC

[C] the angle bisectors of ΔABC

[D] the altitudes to the sides of ΔABC

G.G.22: Solve problems using compound loci

3. 010020a, P.I. G.G.22
The distance between parallel lines ℓ and m is 12 units. Point A is on line ℓ. How many points are equidistant from lines ℓ and m and 8 units from point A.

[A] 2 [B] 4 [C] 3 [D] 1

4. 060912ge, P.I. G.G.22
In a coordinate plane, how many points are both 5 units from the origin and 2 units from the x-axis?

[A] 3 [B] 1 [C] 4 [D] 2

5. 080003a, P.I. G.G.22
In the coordinate plane, what is the total number of points 5 units from the origin and equidistant from both the x- and y-axes?

[A] 1 [B] 2 [C] 0 [D] 4

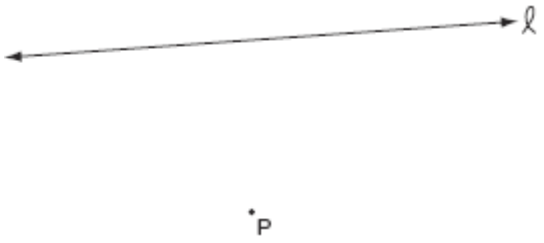
6. 080203a, P.I. G.G.22
What is the total number of points equidistant from two intersecting straight roads and also 300 feet from the traffic light at the center of the intersection?

[A] 1 [B] 2 [C] 4 [D] 0

7. 010527a, P.I. G.G.22
How many points are equidistant from two parallel lines and also equidistant from two points on one of the lines?

[A] 1 [B] 2 [C] 3 [D] 4

8. 010623a, P.I. G.G.22
In the accompanying diagram, point *P* lies 3 centimeters from line ℓ.



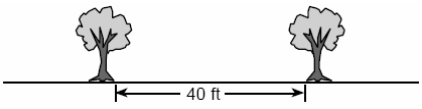
How many points are both 2 centimeters from line ℓ and 1 centimeter from point *P*?

[A] 0 [B] 4 [C] 1 [D] 2

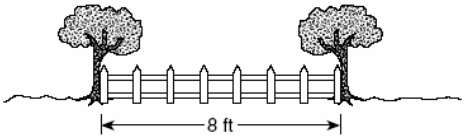
9. 080131a, P.I. G.G.22
Point *P* is located on $\overleftrightarrow{AB}$.
a Describe the locus of points that are
(1) 3 units from $\overleftrightarrow{AB}$
(2) 5 units from point *P*
b How many points satisfy both conditions in part *a*?

10. 060032a, P.I. G.G.22
A treasure map shows a treasure hidden in a park near a tree and a statue. The map indicates that the tree and the statue are 10 feet apart. The treasure is buried 7 feet from the base of the tree and also 5 feet from the base of the statue. How many places are possible locations for the treasure to be buried? Draw a diagram of the treasure map, and indicate with an **X** *each* possible location of the treasure.

11. 089925a, P.I. G.G.22
Maria's backyard has two trees that are 40 feet apart, as shown in the accompanying diagram. She wants to place lampposts so that the posts are 30 feet from both of the trees. Draw a sketch to show where the lampposts could be placed in relation to the trees. How many locations for the lampposts are possible?



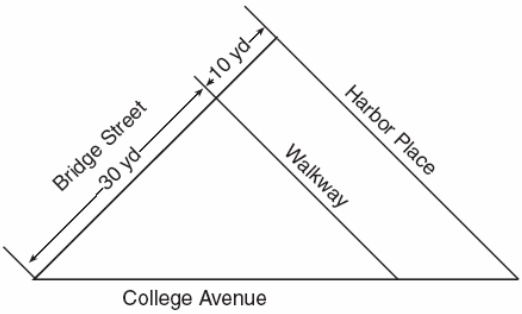
12. 010127a, P.I. G.G.22
Steve has a treasure map, represented in the accompanying diagram, that shows two trees 8 feet apart and a straight fence connecting them. The map states that treasure is buried 3 feet from the fence and equidistant from the two trees.



a Sketch a diagram to show all the places where the treasure could be buried. Clearly indicate in your diagram where the treasure could be buried.
b What is the distance between the treasure and one of the trees?

13. 060332a, P.I. G.G.22

A triangular park is formed by the intersection of three streets, Bridge Street, Harbor Place, and College Avenue, as shown in the accompanying diagram. A walkway parallel to Harbor Place goes through the park. A time capsule has been buried in the park in a location that is equidistant from Bridge Street and College Avenue and 5 yards from the walkway. Indicate on the diagram with an **X** *each* possible location where the time capsule could be buried.



14. 080737a, P.I. G.G.22

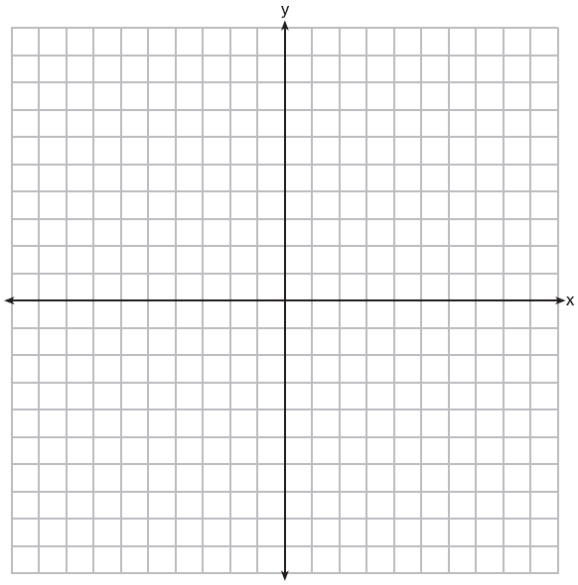
In the diagram below, town *C* lies on straight road *p*. Sketch the points that are 6 miles from town *C*. Then sketch the points that are 3 miles from road *p*. How many points satisfy both conditions?

15. 060932ge, P.I. G.G.22

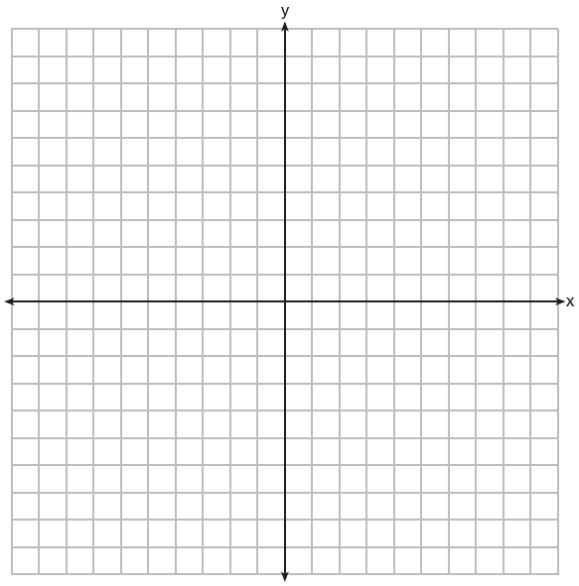
The length of $\overline{AB}$ is 3 inches. On the diagram below, sketch the points that are equidistant from *A* and *B* and sketch the points that are 2 inches from *A*. Label with an **X** all points that satisfy both conditions.

G.G.23: Graph and solve compound loci in the coordinate plane

16. 080936ge, P.I. G.G.23
On the set of axes below, sketch the points that are 5 units from the origin and sketch the points that are 2 units from the line $y = 3$. Label with an **X** all points that satisfy both conditions.



17. fall0837ge, P.I. G.G.23
A city is planning to build a new park. The park must be equidistant from school *A* at (3,3) and school *B* at (3,-5). The park also must be exactly 5 miles from the center of town, which is located at the origin on the coordinate graph. Each unit on the graph represents 1 mile. On the set of axes below, sketch the compound loci and label with an **X** all possible locations for the new park.



G.G.24: Determine the negation of a statement and establish its truth value

1. fall0802ge, P.I. G.G.24
What is the negation of the statement "The Sun is shining"?

[A] The Sun is not shining.

[B] It is daytime. [C] It is not raining.

[D] It is cloudy.

2. 080924ge, P.I. G.G.24
What is the negation of the statement "Squares are parallelograms"?

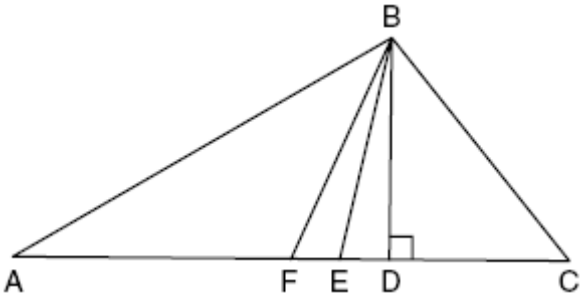
[A] It is not the case that squares are parallelograms.

[B] Parallelograms are not squares.

[C] Parallelograms are squares.

[D] It is not the case that parallelograms are squares.

3. fall0810ge, P.I. G.G.24
Given ΔABC with base $\overline{AFEDC}$, median $\overline{BF}$, altitude $\overline{BD}$, and $\overline{BE}$ bisects $\angle ABC$, which conclusion is valid?



[A] $\overline{CF} \cong \overline{FA}$ [B] $\angle ABF \cong \angle CBD$

[C] $\overline{CE} \cong \overline{EA}$ [D] $\angle FAB \cong \angle ABF$

4. 080608b, P.I. G.G.24
In ΔABC, D is a point on $\overline{AC}$ such that $\overline{BD}$ is a median. Which statement must be true?

[A] $\Delta ABD \cong \Delta CBD$ [B] $\angle ABD \cong \angle CBD$

[C] $\overline{BD} \perp \overline{AC}$ [D] $\overline{AD} \cong \overline{CD}$

G.G.25: Know and apply the conditions under which a compound statement (conjunction, disjunction, conditional, biconditional) is true

5. 069902a, P.I. G.G.25
The statement "If x is divisible by 8, then it is divisible by 6" is false if x equals

[A] 6 [B] 32 [C] 14 [D] 48

6. 060517a, P.I. G.G.25
The statement "If x is prime, then it is odd" is false when x equals

[A] 3 [B] 2 [C] 1 [D] 4

7. 060614a, P.I. G.G.25
Given the statement: "If x is a rational number, then $\sqrt{x}$ is irrational." Which value of x makes the statement *false*?

[A] 2 [B] 4 [C] $\frac{3}{2}$ [D] 3

8. 089912a, P.I. G.G.25
What is true about the statement "If two angles are right angles, the angles have equal measure" and its converse "If two angles have equal measure then the two angles are right angles"?

[A] Both the statement and its converse are true.

[B] Both the statement and its converse are false.

[C] The statement is false but its converse is true.

[D] The statement is true but its converse is false.

9. 080205a, P.I. G.G.25
Given the statement: "If two lines are cut by a transversal so that the corresponding angles are congruent, then the lines are parallel." What is true about the statement and its converse?

[A] The statement is true, but its converse is false.

[B] The statement and its converse are both true.

[C] The statement is false, but its converse is true.

[D] The statement and its converse are both false.

10. 010112a, P.I. G.G.25
Given the statement: "If two sides of a triangle are congruent, then the angles opposite these sides are congruent." Given the converse of the statement: "If two angles of a triangle are congruent, then the sides opposite these angles are congruent." What is true about this statement and its converse?

[A] The statement is false but its converse is true.

[B] Both the statement and its converse are true.

[C] Neither the statement nor its converse is true.

[D] The statement is true but its converse is false.

11. 060730a, P.I. G.G.25
Given the statement: "A right angle measures 90°." How is this statement written as a biconditional?

[A] If an angle does not measure 90°, then it is not a right angle.

[B] An angle measures 90° and it is a right angle.

[C] An angle is a right angle if, and only if, it measures 90°.

[D] If an angle is a right angle, then it measures 90°.

12. 010627a, P.I. G.G.25
Which statement is expressed as a biconditional?

[A] If two angles are both right angles, then they are congruent.

[B] If two angles are congruent, then they are both right angles.

[C] Two angles are congruent if and only if they have the same measure.

[D] Two angles are congruent if they have the same measure.

13. 010923a, P.I. G.G.25
Which statement is an example of a biconditional statement?

[A] Craig buys a car if and only if he has money.

[B] If Craig has money, he buys a car.

[C] Craig has money or he buys a car.

[D] Craig has money and he buys a car.

14. 060933ge, P.I. G.G.25
Given: Two is an even integer or three is an even integer.
Determine the truth value of this disjunction.
Justify your answer.

15. 080120a, P.I. G.G.25
What is the smallest integer greater than 1 that is both the square of an integer and the cube of an integer?

[A] 8 [B] 64 [C] 9 [D] 36

16. 010501a, P.I. G.G.25
Stan was trying to guess Melanie's age. She told him her age was an even number and a multiple of three. What could be Melanie's age?

[A] 15 [B] 16 [C] 10 [D] 12

17. 080701a, P.I. G.G.25
Given the true statements: "t is a multiple of 3" and "t is even." What could be a value of t?

[A] 8 [B] 9 [C] 15 [D] 24

18. 010803a, P.I. G.G.25
The statement "$a > 2$ and $a < 5$" is true when a is equal to

[A] 10 [B] 2 [C] 5 [D] 3

19. 010706a, P.I. G.G.25
The statement "$x \geq 4$ and $2x - 4 < 6$" is true when x is equal to

[A] 4 [B] 10 [C] 5 [D] 1

20. 060416a, P.I. G.G.25
The statement "x is *not* the square of an integer and x is a multiple of 3" is true when x is equal to

[A] 9 [B] 32 [C] 36 [D] 18

21. 010221a, P.I. G.G.25
Seth is thinking of a number between 20 and 30. The number is prime and not more than 2 away from a perfect square. What is the number?

22. 010003a, P.I. G.G.25
Mary says, "The number I am thinking of is divisible by 2 or it is divisible by 3." Mary's statement is false if the number she is thinking of is

[A] 15 [B] 8 [C] 6 [D] 11

23. 080505a, P.I. G.G.25
The statement "x is divisible by 5 or x is divisible by 4" is *false* when x equals

[A] 20 [B] 16 [C] 27 [D] 10

24. 060622a, P.I. G.G.25
If $x = 3$, which statement is *false*?

[A] x is prime and x is odd.

[B] x is not prime and x is odd.

[C] x is odd and $2x$ is even.

[D] x is odd or x is even.

25. 080819a, P.I. G.G.25
The statement "Maya plays on the basketball team or Maya joins the ski club" is *false*. Which statement is true?

[A] Maya plays on the basketball team and Maya does not join the ski club.

[B] Maya plays on the basketball team and Maya joins the ski club.

[C] Maya does not play on the basketball team and Maya joins the ski club.

[D] Maya does not play on the basketball team and Maya does not join the ski club.

26. 010129a, P.I. G.G.25
Mark says, "The number I see is odd." Jan says, "That same number is prime." The teacher says, "Mark is correct or Jan is correct." Some integers would make the teacher's statement true while other integers would make it false. Give and explain one example of when the teacher's statement is true. Give and explain one example of when the teacher's statement is false.

G.G.26: Identify and write the inverse, converse, and contrapositive of a given conditional statement and note the logical equivalences

27. 060823a, P.I. G.G.26
A conditional statement is always logically equivalent to its

[A] conjunction [B] inverse

[C] contrapositive [D] converse

28. 010303a, P.I. G.G.26
What is the inverse of the statement "If Mike did his homework, then he will pass this test"?

[A] If Mike does not pass this test, then he only did half his homework.

[B] If Mike does not pass this test, then he did not do his homework.

[C] If Mike did not do his homework, then he will not pass this test.

[D] If Mike passes this test, then he did his homework.

29. 060317a, P.I. G.G.26
What is the inverse of the statement "If Julie works hard, then she succeeds"?

[A] If Julie succeeds, then she works hard.

[B] If Julie does not work hard, then she does not succeed.

[C] If Julie works hard, then she does not succeed.

[D] If Julie does not succeed, then she does not work hard.

30. 060006a, P.I. G.G.26
What is the inverse of the statement "If it is sunny, I will play baseball"?

[A] If I do not play baseball, then it is not sunny.

[B] If I play baseball, then it is sunny.

[C] If it is not sunny, I will not play baseball.

[D] I will play baseball if and only if it is sunny.

31. 080416a, P.I. G.G.26
What is the inverse of the statement “If I do not buy a ticket, then I do not go to the concert”?

[A] If I buy a ticket, then I go to the concert.

[B] If I buy a ticket, then I do not go to the concert.

[C] If I do not go to the concert, then I do not buy a ticket.

[D] If I go to the concert, then I buy a ticket.

32. 010616a, P.I. G.G.26
Which statement is the inverse of "If the waves are small, I do not go surfing"?

[A] If I do not go surfing, the waves are small.

[B] If the waves are not small, I do not go surfing.

[C] If I go surfing, the waves are not small.

[D] If the waves are not small, I go surfing.

33. 010715a, P.I. G.G.26
What is the inverse of the statement "If Bob gets hurt, then the team loses the game"?

[A] If Bob does not get hurt, then the team does not lose the game.

[B] Bob gets hurt if the team loses the game.

[C] If the team does not lose the game, then Bob does not get hurt.

[D] If the team loses the game, then Bob gets hurt.

34. 010415a, P.I. G.G.26
Which statement is the converse of "If the sum of two angles is 180°, then the angles are supplementary"?

[A] If two angles are supplementary, then their sum is 180°.

[B] If the sum of two angles is not 180°, then the angles are supplementary.

[C] If the sum of two angles is not 180°, then the angles are not supplementary.

[D] If two angles are not supplementary, then their sum is not 180°.

35. 080813a, P.I. G.G.26
What is the converse of the statement "If $a^2 + b^2 = c^2$, then ΔABC is a right triangle"?

[A] $a^2 + b^2 = c^2$ if, and only if, ΔABC is a right triangle.

[B] If $a^2 + b^2 = c^2$, then ΔABC is not a right triangle.

[C] If ΔABC is not a right triangle, then $a^2 + b^2 = c^2$.

[D] If ΔABC is a right triangle, then $a^2 + b^2 = c^2$.

36. 080014a, P.I. G.G.26
What is the converse of the statement "If it is sunny, I will go swimming"?

[A] If I do not go swimming, then it is not sunny.

[B] If it is not sunny, I will not go swimming.

[C] I will go swimming if and only if it is sunny.

[D] If I go swimming, it is sunny.

37. 080116a, P.I. G.G.26
Which statement is the converse of "If it is a 300 ZX, then it is a car"?

[A] If it is a car, then it is a 300 ZX.

[B] If it is not a 300 ZX, then it is not a car.

[C] If it is a car, then it is not a 300 ZX.

[D] If it is not a car, then it is not a 300 ZX.

38. 060816a, P.I. G.G.26
What is the converse of the statement "If x is an even integer, then $(x+1)$ is an odd integer"?

[A] If $(x+1)$ is not an odd integer, then x is not an even integer.

[B] x is not an even integer if and only if $(x+1)$ is not an odd integer.

[C] If $(x+1)$ is an odd integer, then x is an even integer.

[D] x is an even integer if and only if $(x+1)$ is an odd integer.

39. 060520a, P.I. G.G.26
What is the converse of the statement "If it is Sunday, then I do not go to school"?

[A] If I do not go to school, then it is Sunday.

[B] If it is not Sunday, then I do not go to school.

[C] If it is not Sunday, then I go to school.

[D] If I go to school, then it is not Sunday.

40. 080521a, P.I. G.G.26
What is the converse of the statement "If Alicia goes to Albany, then Ben goes to Buffalo"?

[A] Alicia goes to Albany if and only if Ben goes to Buffalo.

[B] If Alicia does not go to Albany, then Ben does not go to Buffalo.

[C] If Ben does not go to Buffalo, then Alicia does not go to Albany.

[D] If Ben goes to Buffalo, then Alicia goes to Albany.

41. 060717a, P.I. G.G.26
What is the converse of the statement "If the Sun rises in the east, then it sets in the west"?

[A] If the Sun sets in the west, then it rises in the east.

[B] If the Sun does not rise in the east, then it does not set in the west.

[C] If the Sun rises in the west, then it sets in the east.

[D] If the Sun does not set in the west, then it does not rise in the east.

42. 060913ge, P.I. G.G.26
What is the contrapositive of the statement, "If I am tall, then I will bump my head"?

[A] If I bump my head, then I am tall.

[B] If I am tall, then I will not bump my head.

[C] If I do not bump my head, then I am not tall.

[D] If I do not bump my head, then I am tall.

43. 080427a, P.I. G.G.26
What is the contrapositive of the statement "If I study, then I pass the test"?

[A] If I do not study, then I do not pass the test.

[B] If I pass the test, then I study.

[C] I pass the test if I study.

[D] If I do not pass the test, then I do not study.

44. 060308a, P.I. G.G.26
Which statement is logically equivalent to "If it is Saturday, then I am not in school"?

[A] If I am not in school, then it is Saturday.

[B] If I am in school, then it is not Saturday.

[C] If it is Saturday, then I am in school.

[D] If it is not Saturday, then I am in school.

45. 080104a, P.I. G.G.26
Which statement is logically equivalent to "If I did not eat, then I am hungry"?

[A] If I am hungry, then I did eat.

[B] If I am not hungry, then I did not eat.

[C] If I am not hungry, then I did eat.

[D] If I did not eat, then I am not hungry.

46. 060112a, P.I. G.G.26
Which statement is logically equivalent to "If I eat, then I live"?

[A] If I do not live, then I do not eat.

[B] If I live, then I eat.

[C] I live if and only if I eat.

[D] If I eat, then I do not live.

47. 060405a, P.I. G.G.26
Which statement is logically equivalent to "If a triangle is an isosceles triangle, then it has two congruent sides"?

[A] If a triangle is not an isosceles triangle, then it has two congruent sides.

[B] If a triangle does not have two congruent sides, then it is an isosceles triangle.

[C] If a triangle is an isosceles triangle, then it does not have two congruent sides.

[D] If a triangle does not have two congruent sides, then it is not an isosceles triangle.

48. 010220a, P.I. G.G.26
Which statement is logically equivalent to "If the team has a good pitcher, then the team has a good season"?

[A] If the team does not have a good season, then the team does not have a good pitcher.

[B] If the team does not have a good pitcher, then the team does not have a good season.

[C] If the team has a good season, then the team has a good pitcher.

[D] The team has a good pitcher and the team does not have a good season.

49. 010930a, P.I. G.G.26
Which statement is logically equivalent to “If I am in a mathematics class, then I am having fun”?

[A] If I am in a mathematics class, then I am not having fun.

[B] If I am not having fun, then I am not in a mathematics class.

[C] If I am having fun, then I am in a mathematics class.

[D] If I am not in a mathematics class, then I am not having fun.

50. 010308a, P.I. G.G.26
Given the true statement: "If a person is eligible to vote, then that person is a citizen." Which statement must also be true?

[A] Marie is not eligible to vote; therefore, she is not a citizen.

[B] Juan is a citizen; therefore, he is eligible to vote.

[C] Morgan has never voted; therefore, he is not a citizen.

[D] Kayla is not a citizen; therefore, she is not eligible to vote.

51. 010513a, P.I. G.G.26
Which statement is logically equivalent to the statement "If you are an elephant, then you do not forget"?

[A] If you forget, then you are not an elephant.

[B] If you do not forget, then you are an elephant.

[C] If you are an elephant, then you forget.

[D] If you do not forget, then you are not an elephant.

52. 080629a, P.I. G.G.26
Which statement is logically equivalent to the statement "If Corey worked last summer, he buys a car"?

[A] If you are an elephant, then you forget.

[B] If Corey buys a car, he worked last summer.

[C] If Corey did not work last summer, he does not buy a car.

[D] If Corey does not buy a car, he did not work last summer.

53. 080829a, P.I. G.G.26
Which statement is logically equivalent to “If I sleep, then I will not eat”?

[A] If I eat, then I will not sleep.

[B] If I eat, then I will sleep.

[C] If I do not eat, then I will sleep.

[D] If I do not sleep, then I will eat.

54. fall0834ge, P.I. G.G.26
Write a statement that is logically equivalent to the statement "If two sides of a triangle are congruent, the angles opposite those sides are congruent." Identify the new statement as the converse, inverse, or contrapositive of the original statement.

55. 010837a, P.I. G.G.26
In the spaces provided below, write the converse, the inverse, and the contrapositive of the statement "If I run, then I am tired."

Converse:_____

_____

Inverse:_____

_____

Contrapositive:_____

_____

56. 080739a, P.I. G.G.26
Given the statement: "If I live in Albany, then I am a New Yorker."
In the spaces provided below, write the inverse, the converse, and the contrapositive of this statement.

Inverse:_____

_____

Converse:_____

_____

Contrapositive:_____

_____

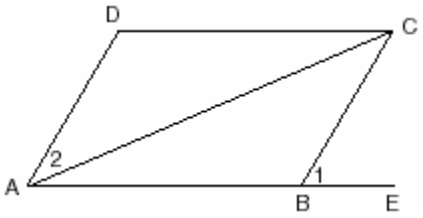
Which conditional is logically equivalent to its original statement?

inverse converse contrapositive

G.G.27: Write a proof arguing from a given hypothesis to a given conclusion

57. 060533b, P.I. G.G.27

Given: parallelogram *ABCD*, diagonal $\overline{AC}$, and $\overline{ABE}$

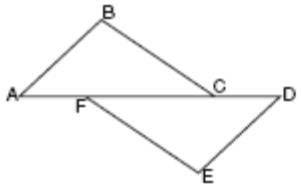


Prove: $m\angle 1 > m\angle 2$

58. 060229b, P.I. G.G.27

Complete the partial proof below for the accompanying diagram by providing reasons for steps 3, 6, 8, and 9.

Given: $\overline{AFCD}$
$\overline{AB} \perp \overline{BC}$
$\overline{DE} \perp \overline{EF}$
$\overline{BC} \parallel \overline{FE}$
$\overline{AB} = \overline{DE}$

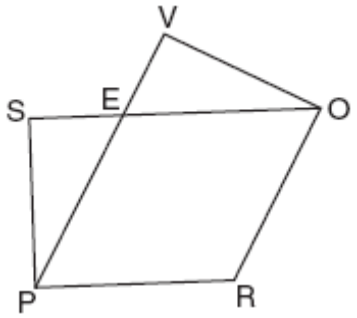


Prove: $\overline{AC} = \overline{FD}$

Statements	Reasons
1 $\overline{AFCD}$	1 Given
2 $\overline{AB} \perp \overline{BC}$, $\overline{DE} \perp \overline{EF}$	2 Given
3 $\angle B$ and $\angle E$ are right angles.	3 _____
4 $\angle B = \angle E$	4 All right angles are congruent.
5 $\overline{BC} \parallel \overline{FE}$	5 Given
6 $\angle BCA = \angle EFD$	6 _____
7 $\overline{AB} = \overline{DE}$	7 Given
8 $\triangle ABC \cong \triangle DEF$	8 _____
9 $\overline{AC} = \overline{FD}$	9 _____

59. 010934b, P.I. G.G.27

Given: *PROE* is a rhombus, $\overline{SEO}$, $\overline{PEV}$, $\angle SPR \cong \angle VOR$



Prove: $\overline{SE} \cong \overline{EV}$

60. 080834b, P.I. G.G.27

A tricolored flag is made out of a rectangular piece of cloth whose corners are labeled *A*, *B*, *C*, and *D*. The colored regions are separated by two line segments, $\overline{BM}$ and $\overline{CM}$, that meet at point *M*, the midpoint of side $\overline{AD}$. Prove that the two line segments that separate the regions will always be equal in length, regardless of the size of the flag.

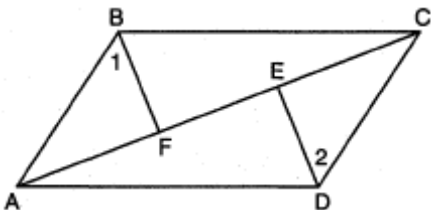
61. 010233b, P.I. G.G.27

Prove that the diagonals of a parallelogram bisect each other.

62. 080938ge, P.I. G.G.27

Given: Quadrilateral *ABCD*, diagonal $\overline{AFEC}$, $\overline{AE} \cong \overline{FC}$, $\overline{BF} \perp \overline{AC}$, $\overline{DE} \perp \overline{AC}$, $\angle 1 \cong \angle 2$

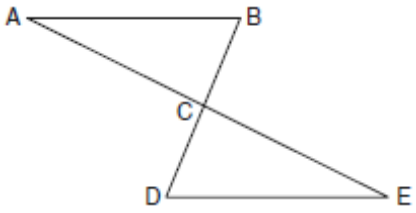
Prove: *ABCD* is a parallelogram.



63. 060938ge, P.I. G.G.27

Given: ΔABC and ΔEDC, C is the midpoint of $\overline{BD}$ and $\overline{AE}$

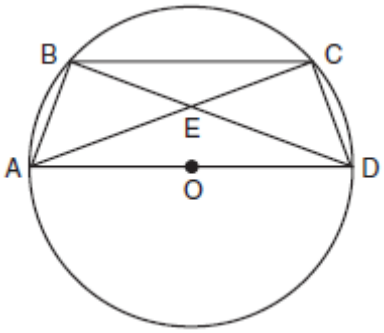
Prove: $\overline{AB} \parallel \overline{DE}$



64. 060934b, P.I. G.G.27

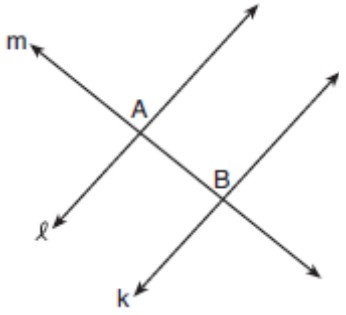
In the accompanying diagram of circle O, $\overline{AD}$ is a diameter with $\overline{AD}$ parallel to chord $\overline{BC}$, chords $\overline{AB}$ and $\overline{CD}$ are drawn, and chords $\overline{BD}$ and $\overline{AC}$ intersect at E.

Prove: $\overline{BE} \cong \overline{CE}$



65. 010814b, P.I. G.G.27

In the accompanying diagram, line ℓ is perpendicular to line m at A, line k is perpendicular to line m at B, and lines ℓ, m, and k are in the same plane.



Which statement is the first step in an indirect proof to prove that ℓ is parallel to k?

[A] Assume that ℓ is not parallel to k.

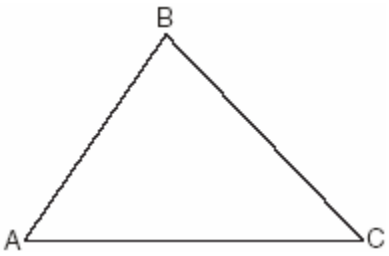
[B] Assume that ℓ is perpendicular to k.

[C] Assume that ℓ is not perpendicular to m.

[D] Assume that ℓ, m, and k are not in the same plane.

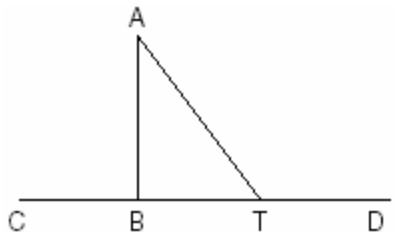
66. 080230b, P.I. G.G.27

In the accompanying diagram, ΔABC is *not* isosceles. Prove that if altitude $\overline{BD}$ were drawn, it would *not* bisect $\overline{AC}$.



67. 060425b, P.I. G.G.27

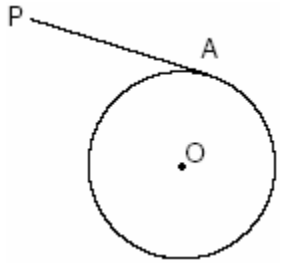
Given: ΔABT, $\overline{CBTD}$, and $\overline{AB} \perp \overline{CD}$



Write an indirect proof to show that $\overline{AT}$ is *not* perpendicular to $\overline{CD}$.

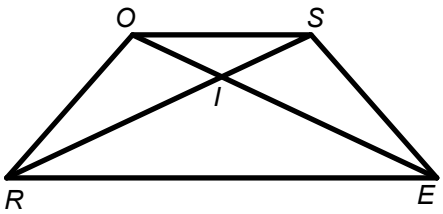
68. 010432b, P.I. G.G.27

In the accompanying diagram of circle O, $\overline{PA}$ is drawn tangent to the circle at A. Place B on $\overline{PA}$ anywhere between P and A and draw $\overline{OA}$, $\overline{OP}$, and $\overline{OB}$. Prove that $\overline{OB}$ is not perpendicular to $\overline{PA}$.



69. fall9933b, P.I. G.G.27

Given trapezoid $ROSE$ with diagonals $\overline{RS}$ and $\overline{EO}$ intersecting at point I, prove that the diagonals of the trapezoid do *not* bisect each other.



G.G.28: Determine the congruence of two triangles by using one of the five congruence techniques (SSS, SAS, ASA, AAS, HL), given sufficient information about the sides and/or angles of two congruent triangles

70. 080401b, P.I. G.G.28

Which condition does *not* prove that two triangles are congruent?

[A] $SAS \cong SAS$ [B] $SSS \cong SSS$

[C] $ASA \cong ASA$ [D] $SSA \cong SSA$

71. 080913ge, P.I. G.G.28

The diagonal $\overline{AC}$ is drawn in parallelogram $ABCD$. Which method can *not* be used to prove that $\Delta ABC \cong \Delta CDA$?

[A] SAS [B] SSS [C] SSA [D] ASA

72. 010306b, P.I. G.G.28

Which statements could be used to prove that ΔABC and $\Delta A'B'C'$ are congruent?

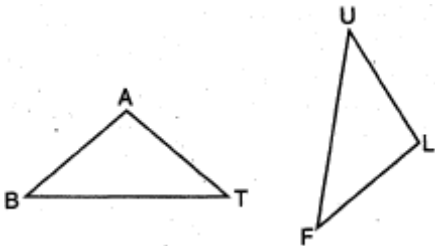
[A] $\overline{AB} \cong \overline{A'B'}$, $\angle A \cong \angle A'$, and $\angle C \cong \angle C'$

[B] $\angle A \cong \angle A'$, $\angle B \cong \angle B'$, and $\angle C \cong \angle C'$

[C] $\overline{AB} \cong \overline{A'B'}$, $\overline{BC} \cong \overline{B'C'}$, and $\angle A \cong \angle A'$

[D] $\angle A \cong \angle A'$, $\overline{AC} \cong \overline{A'C'}$, and $\overline{BC} \cong \overline{B'C'}$

73. 080907b, P.I. G.G.28
In the accompanying diagram of triangles BAT and FLU, $\angle B \cong \angle F$ and $\overline{BA} \cong \overline{FL}$.

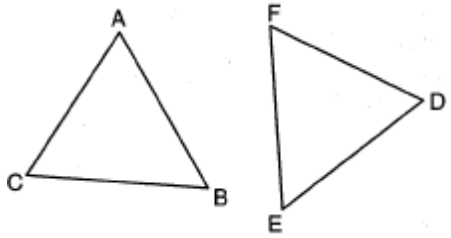


Which statement is needed to prove $\Delta BAT \cong \Delta FLU$?

[A] $\angle A \cong \angle L$ [B] $\overline{AT} \cong \overline{LU}$

[C] $\overline{BA} \parallel \overline{FL}$ [D] $\angle A \cong \angle U$

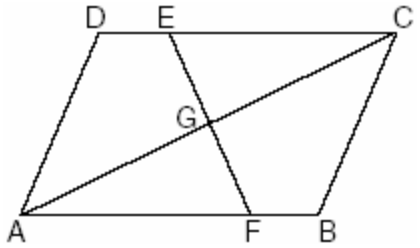
74. 060902b, P.I. G.G.28
In the diagram of ΔABC and ΔDEF below, $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\angle B \cong \angle E$.



Which method can be used to prove $\Delta ABC \cong \Delta DEF$?

[A] ASA [B] HL [C] SSS [D] SAS

75. 080310b, P.I. G.G.28
In the accompanying diagram of parallelogram $ABCD$, $\overline{DE} \cong \overline{BF}$.

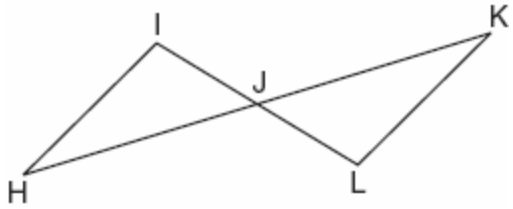


Triangle EGC can be proved congruent to triangle FGA by

[A] $HL \cong HL$ [B] $SSA \cong SSA$

[C] $AAA \cong AAA$ [D] $AAS \cong AAS$

76. 060420b, P.I. G.G.28
In the accompanying diagram, $\overline{HK}$ bisects $\overline{IL}$ and $\angle H \cong \angle K$.



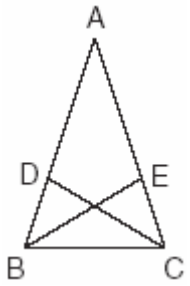
What is the most direct method of proof that could be used to prove $\Delta HIJ \cong \Delta KLJ$?

[A] $HL \cong HL$ [B] $SAS \cong SAS$

[C] $AAS \cong AAS$ [D] $ASA \cong ASA$

77. 060204b, P.I. G.G.28

In the accompanying diagram of ΔABC, $\overline{AB} \cong \overline{AC}$, $\overline{BD} = \frac{1}{3}\overline{BA}$, and $\overline{CE} = \frac{1}{3}\overline{CA}$.



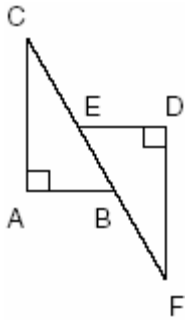
Triangle *EBC* can be proved congruent to triangle *DCB* by

[A] SSS ≅ SSS [B] ASA ≅ ASA

[C] SAS ≅ SAS [D] HL ≅ HL

78. 060320b, P.I. G.G.28

In the accompanying diagram, $\overline{CA} \perp \overline{AB}$, $\overline{ED} \perp \overline{DF}$, $\overline{ED} \parallel \overline{AB}$, $\overline{CE} \cong \overline{BF}$, $\overline{AB} \cong \overline{ED}$ and $m\angle CAB = m\angle FDE = 90$.



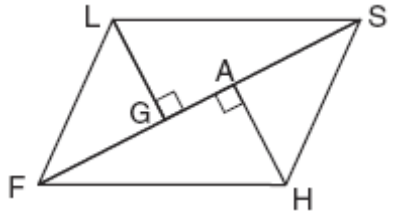
Which statement would *not* be used to prove $\Delta ABC \cong \Delta DEF$?

[A] *SSS* ≅ *SSS* [B] *HL* ≅ *HL*

[C] *SAS* ≅ *SAS* [D] *AAS* ≅ *AAS*

79. 010634b, P.I. G.G.28

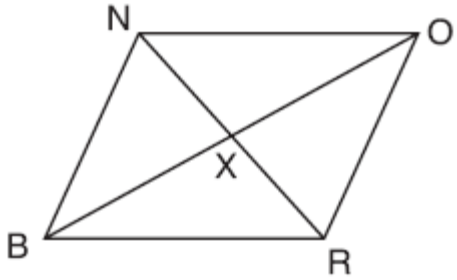
Given: parallelogram *FLSH,* diagonal $\overline{FGAS}$, $\overline{LG} \perp \overline{FS}$, $\overline{HA} \perp \overline{FS}$



Prove: $\Delta LGS \cong \Delta HAF$

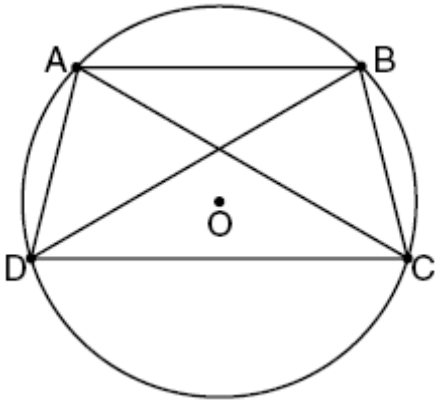
80. 080731b, P.I. G.G.28

The accompanying diagram shows quadrilateral *BRON*, with diagonals $\overline{NR}$ and $\overline{BO}$, which bisect each other at *X*.

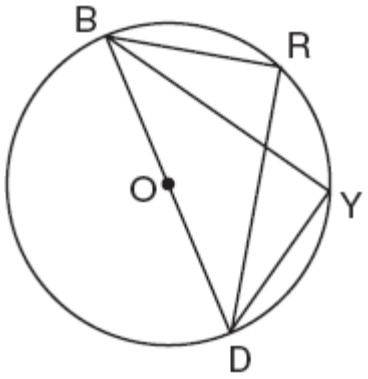


Prove: $\Delta BNX \cong \Delta ORX$

81. fall0838ge, P.I. G.G.28
In the diagram below, quadrilateral $ABCD$ is inscribed in circle O, $\overline{AB} \parallel \overline{DC}$, and diagonals $\overline{AC}$ and $\overline{BD}$ are drawn. Prove that $\Delta ACD \cong \Delta BDC$.

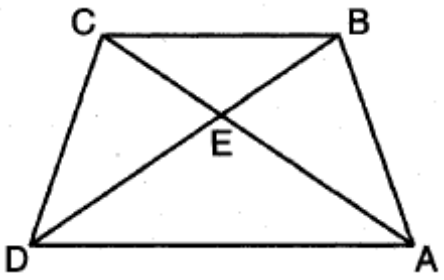


82. 010732b, P.I. G.G.28
In the accompanying diagram, $m\overset{\frown}{BR} = 70$, $m\overset{\frown}{YD} = 70$, and $\overline{BOD}$ is the diameter of circle O. Write an explanation or a proof that shows ΔRBD and ΔYDB are congruent.



G.G.29: Identify corresponding parts of congruent triangles

83. 080905ge, P.I. G.G.29
In the diagram of trapezoid $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E and $\Delta ABC \cong \Delta DCB$.



Which statement is true based on the given information?

[A] $\overline{CD} \cong \overline{AD}$ [B] $\angle CDE \cong \angle BAD$

[C] $\angle CDB \cong \angle BAC$ [D] $\overline{AC} \cong \overline{BC}$

G.G.30: Investigate, justify, and apply theorems about the sum of the measures of the angles of a triangle

84. 060901ge, P.I. G.G.30
Juliann plans on drawing ΔABC, where the measure of $\angle A$ can range from 50° to 60° and the measure of $\angle B$ can range from 90° to 100°. Given these conditions, what is the correct range of measures possible for $\angle C$?

[A] 30° to 50° [B] 80° to 90°

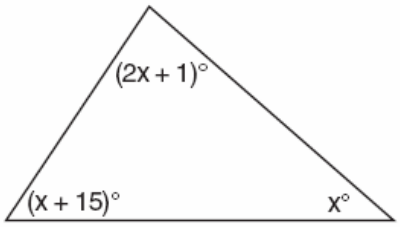
[C] 120° to 130° [D] 20° to 40°

85. 060909ge, P.I. G.G.30
In an equilateral triangle, what is the difference between the sum of the exterior angles and the sum of the interior angles?

[A] 180° [B] 90° [C] 60° [D] 120°

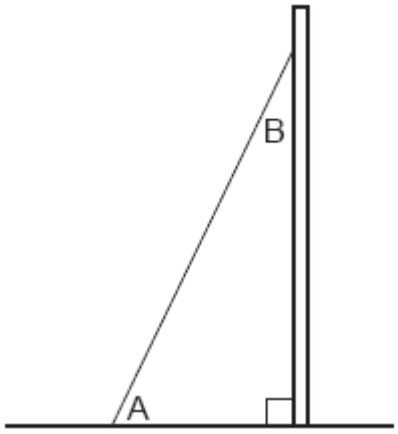
86. 080933ge, P.I. G.G.30
The degree measures of the angles of ΔABC are represented by x, $3x$, and $5x-54$. Find the value of x.

87. 080216a, P.I. G.G.30
What is the measure of the largest angle in the accompanying triangle?



[A] 41 [B] 46.5 [C] 83 [D] 56

88. 080837a, P.I. G.G.30
A billboard on level ground is supported by a brace, as shown in the accompanying diagram. The measure of angle A is 15° greater than twice the measure of angle B. Determine the measure of angle A and the measure of angle B.



89. 010538a, P.I. G.G.30
In ΔABC, the measure of $\angle B$ is 21 less than four times the measure of $\angle A$, and the measure of $\angle C$ is 1 more than five times the measure of $\angle A$. Find the measure, in degrees, of *each* angle of ΔABC.

90. 010102a, P.I. G.G.30
In right triangle ABC, $m\angle C = 3y-10$, $m\angle B = y+40$, and $m\angle A = 90$. What type of right triangle is triangle ABC?

[A] scalene [B] isosceles
[C] obtuse [D] equilateral

91. 010722a, P.I. G.G.30
If the measures of the angles of a triangle are represented by $2x$, $3x-15$, and $7x+15$, the triangle is

[A] an equiangular triangle
[B] a right triangle
[C] an isosceles triangle
[D] an acute triangle

92. 010810a, P.I. G.G.30
If the measures, in degrees, of the three angles of a triangle are x, $x+10$, and $2x-6$, the triangle must be

[A] scalene [B] isosceles
[C] equilateral [D] right

G.G.31: Investigate, justify, and apply the isosceles triangle theorem and its converse

93. fall0809ge, P.I. G.G.31
The vertices of ΔABC are $A(-1,-2)$, $B(-1,2)$ and $C(6,0)$. Which conclusion can be made about the angles of ΔABC?

[A] $m\angle ABC = 60$ [B] $m\angle A = m\angle C$
[C] $m\angle A = m\angle B$ [D] $m\angle ACB = 90$

94. 060107a, P.I. G.G.31
In isosceles triangle DOG, the measure of the vertex angle is three times the measure of one of the base angles. Which statement about ΔDOG is true?

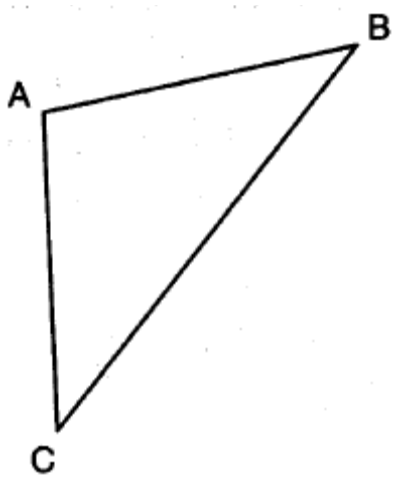
[A] ΔDOG is an obtuse triangle.

[B] ΔDOG is a right triangle.

[C] ΔDOG is an acute triangle.

[D] ΔDOG is a scalene triangle.

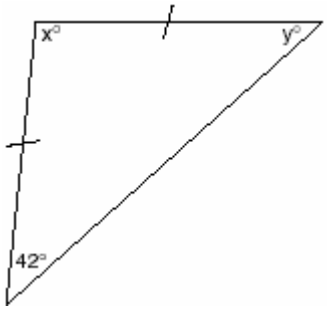
95. 080903ge, P.I. G.G.31
In the diagram of ΔABC below, $\overline{AB} \cong \overline{AC}$. The measure of $\angle B$ is 40°.



What is the measure of $\angle A$?

[A] 50° [B] 40° [C] 70° [D] 100°

96. 060510a, P.I. G.G.31
Tina wants to sew a piece of fabric into a scarf in the shape of an isosceles triangle, as shown in the accompanying diagram.



What are the values of x and y?

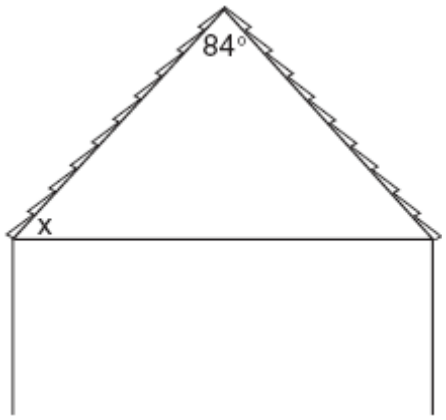
[A] $x = 69$ and $y = 69$

[B] $x = 42$ and $y = 96$

[C] $x = 90$ and $y = 48$

[D] $x = 96$ and $y = 42$

97. 060615a, P.I. G.G.31
The accompanying diagram shows the roof of a house that is in the shape of an isosceles triangle. The vertex angle formed at the peak of the roof is 84°.

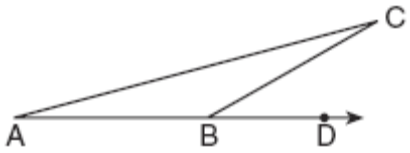


What is the measure of x?

[A] 48° [B] 96° [C] 84° [D] 138°

98. 010613a, P.I. G.G.31

In the accompanying diagram of ΔABC, $\overline{AB}$ is extended through D, $m\angle CBD = 30$, and $\overline{AB} \cong \overline{BC}$.



What is the measure of $\angle A$?

[A] 30° [B] 15° [C] 75° [D] 150°

99. 080433a, P.I. G.G.31

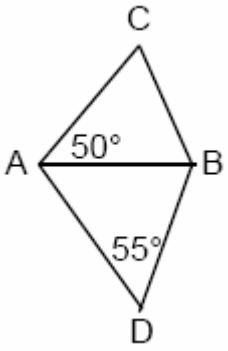
Dylan says that all isosceles triangles are acute triangles. Mary Lou wants to prove that Dylan is *not* correct. Sketch an isosceles triangle that Mary Lou could use to show that Dylan's statement is not true. In your sketch, state the measure of *each* angle of the isosceles triangle.

100. 060027a, P.I. G.G.31

Hersch says if a triangle is an obtuse triangle, then it cannot also be an isosceles triangle. Using a diagram, show that Hersch is incorrect, and indicate the measures of all the angles and sides to justify your answer.

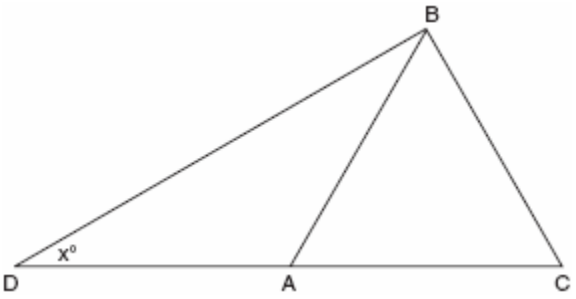
101. 069930a, P.I. G.G.31

In the accompanying diagram, ΔABC and ΔABD are isosceles triangles with $m\angle CAB = 50$ and $m\angle BDA = 55$. If $AB=AC$ and $AB=BD$, what is $m\angle CBD$?



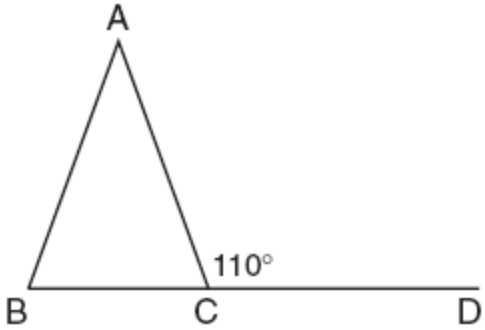
102. 080221a, P.I. G.G.31

In the accompanying diagram of ΔBCD, ΔABC is an equilateral triangle and $AD = AB$. What is the value of x, in degrees?

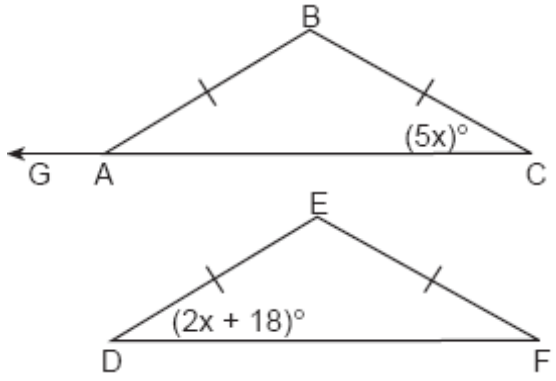


103. 080734a, P.I. G.G.31

In the accompanying diagram of isosceles triangle ABC, $\overline{AB} \cong \overline{AC}$, and exterior angle $ACD = 110°$. What is $m\angle BAC$?



104. 060838a, P.I. G.G.31
In the accompanying diagram, isosceles $\Delta ABC \cong$ isosceles ΔDEF, $m\angle C = 5x$, and $m\angle D = 2x + 18$. Find $m\angle B$ and $m\angle BAG$.

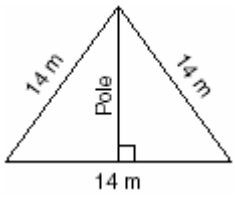


105. 010223a, P.I. G.G.31
Vertex angle A of isosceles triangle ABC measures 20° more than three times $m\angle B$. Find $m\angle C$.

106. 060733a, P.I. G.G.31
The perimeter of an isosceles triangle is 71 centimeters. The measure of one of the sides is 22 centimeters. What are all the possible measures of the other two sides?

107. 080829b, P.I. G.G.31
A parcel of land is in the shape of an isosceles triangle. The base has a length of 673 feet and the two equal legs meet at an angle of 43°. Find, to the *nearest square foot*, the area of the parcel of land.

108. 080504b, P.I. G.G.31
The accompanying diagram shows two cables of equal length supporting a pole. Both cables are 14 meters long, and they are anchored to points in the ground that are 14 meters apart.



What is the exact height of the pole, in meters?

[A] $7\sqrt{3}$ [B] 7 [C] 14 [D] $7\sqrt{2}$

109. 089920a , P.I. G.G.31
What is the perimeter of an equilateral triangle whose height is $2\sqrt{3}$?

[A] $6\sqrt{3}$ [B] 6 [C] $12\sqrt{3}$ [D] 12

110. 080914b, P.I. G.G.31
What is the length of the altitude of an equilateral triangle whose side has a length of 8?

[A] $4\sqrt{3}$ [B] 32 [C] 4 [D] $4\sqrt{2}$

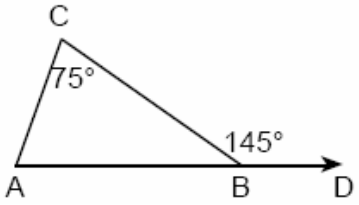
111. 080613b, P.I. G.G.31
If the perimeter of an equilateral triangle is 18, the length of the altitude of this triangle is

[A] $3\sqrt{3}$ [B] $6\sqrt{3}$ [C] 3 [D] 6

G.G.32: Investigate, justify, and apply theorems about geometric inequalities, using the exterior angle theorem

112. 069912a, P.I. G.G.32

In the accompanying diagram of ΔABC, $\overline{AB}$ is extended to D, exterior angle CBD measures 145°, and $m\angle C = 75$.

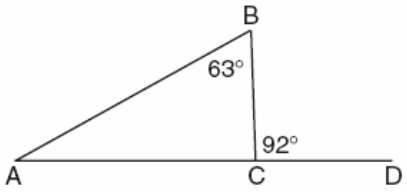


What is $m\angle CAB$?

[A] 35 [B] 70 [C] 110 [D] 220

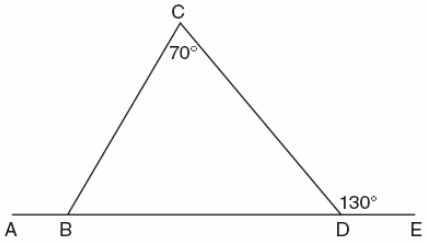
113. 080121a, P.I. G.G.32

Triangle ABC, with side $\overline{AC}$ extended to D, is shown in the accompanying diagram. If $m\angle ABC = 63$ and $m\angle BCD = 92$, what is $m\angle BAC$?



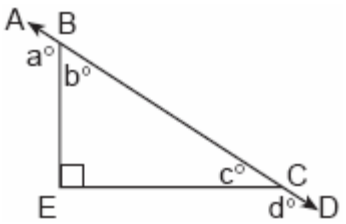
114. 060431a, P.I. G.G.32

In the accompanying diagram of ΔBCD, $m\angle C = 70$, $m\angle CDE = 130$, and side $\overline{BD}$ is extended to A and to E. Find $m\angle CBA$.



115. 010216a, P.I. G.G.32

In the accompanying diagram, $\overleftrightarrow{ABCD}$ is a straight line, and angle E in triangle BEC is a right angle.



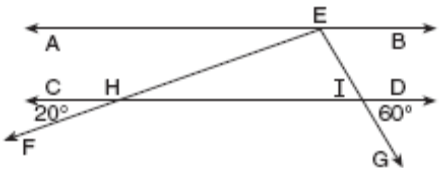
What does $a° + d°$ equal?

[A] 270° [B] 160°

[C] 135° [D] 180°

116. 060606a, P.I. G.G.32

In the accompanying diagram, $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$. From point E on $\overleftrightarrow{AB}$, transversals $\overleftrightarrow{EF}$ and $\overleftrightarrow{EG}$ are drawn, intersecting $\overleftrightarrow{CD}$ at H and I, respectively.



If $m\angle CHF = 20$ and $m\angle DIG = 60$, what is $m\angle HEI$?

[A] 80 [B] 100 [C] 120 [D] 60

G.G.33: Investigate, justify and apply the triangle inequality theorem

117. 080214a, P.I. G.G.33

If the lengths of two sides of a triangle are 4 and 10, what could be the length of the third side?

[A] 6 [B] 8 [C] 16 [D] 14

118. 080018a, P.I. G.G.33
If two sides of a triangle are 1 and 3, the third side may be

[A] 2 [B] 5 [C] 3 [D] 4

119. 080520a, P.I. G.G.33
Sara is building a triangular pen for her pet rabbit. If two of the sides measure 8 feet and 15 feet, the length of the third side could be

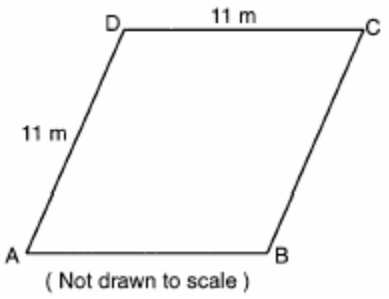
[A] 13 ft [B] 23 ft [C] 7 ft [D] 3 ft

120. 069905a, P.I. G.G.33
The direct distance between city *A* and city *B* is 200 miles. The direct distance between city *B* and city *C* is 300 miles. Which could be the direct distance between city *C* and city *A*?

[A] 50 miles [B] 350 miles

[C] 650 miles [D] 550 miles

121. 010010a, P.I. G.G.33
A plot of land is in the shape of rhombus *ABCD* as shown below.



Which can *not* be the length of diagonal *AC*?

[A] 11 m [B] 18 m [C] 4 m [D] 24 m

122. 080425a, P.I. G.G.33
Which set can *not* represent the lengths of the sides of a triangle?

[A] {5,5,11} [B] {7,7,12}

[C] {4,5,6} [D] {8,8,8}

123. 060515a, P.I. G.G.33
Which set could *not* represent the lengths of the sides of a triangle?

[A] {2,5,9} [B] {7,9,11}

[C] {5,10,12} [D] {3,4,5}

124. 080916ge, P.I. G.G.33
Which set of numbers represents the lengths of the sides of a triangle?

[A] {5, 18, 13} [B] {16, 24, 7}

[C] {6, 17, 22} [D] {26, 8, 15}

125. 080830a, P.I. G.G.33
Phil is cutting a triangular piece of tile. If the triangle is scalene, which set of numbers could represent the lengths of the sides?

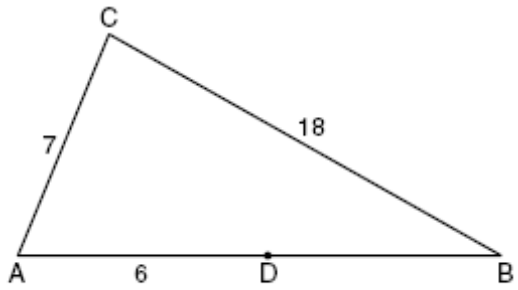
[A] {4,5,6} [B] {5,5,8}

[C] {2,4,7} [D] {3,5,8}

126. 080120b, P.I. G.G.33
A box contains one 2-inch rod, one 3-inch rod, one 4-inch rod, and one 5-inch rod. What is the maximum number of different triangles that can be made using these rods as sides?

[A] 1 [B] 4 [C] 2 [D] 3

127. fall0819ge, P.I. G.G.33
In the diagram below of ΔABC, D is a point on $\overline{AB}$, $AC = 7$, $AD = 6$, and $BC = 18$.



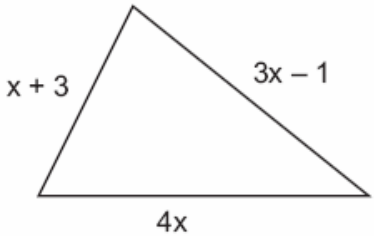
(Not drawn to scale)

The length of $\overline{DB}$ could be

[A] 5 [B] 19 [C] 12 [D] 25

128. 010534a, P.I. G.G.33
José wants to build a triangular pen for his pet rabbit. He has three lengths of boards already cut that measure 7 feet, 8 feet, and 16 feet. Explain why José cannot construct a pen in the shape of a triangle with sides of 7 feet, 8 feet, and 16 feet.

129. 060227a, P.I. G.G.33
The plot of land illustrated in the accompanying diagram has a perimeter of 34 yards. Find the length, in yards, of *each* side of the figure. Could these measures actually represent the measures of the sides of a triangle? Explain your answer.



130. 060924ge, P.I. G.G.33
Side $\overline{PQ}$ of ΔPQR is extended through Q to point T. Which statement is *not* always true?

[A] $m\angle RQT > m\angle P$

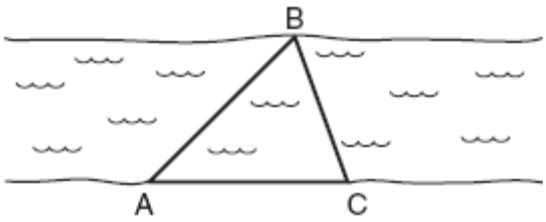
[B] $m\angle RQT > m\angle PQR$

[C] $m\angle RQT > m\angle R$

[D] $m\angle RQT = m\angle P + m\angle R$

G.G.34: Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle

131. 060629a, P.I. G.G.34
On the banks of a river, surveyors marked locations A, B, and C. The measure of $\angle ACB = 70°$ and the measure of $\angle ABC = 65°$.



Which expression shows the relationship between the lengths of the sides of this triangle?

[A] $BC < AB < AC$ [B] $AB < BC < AC$

[C] $AC < AB < BC$ [D] $BC < AC < AB$

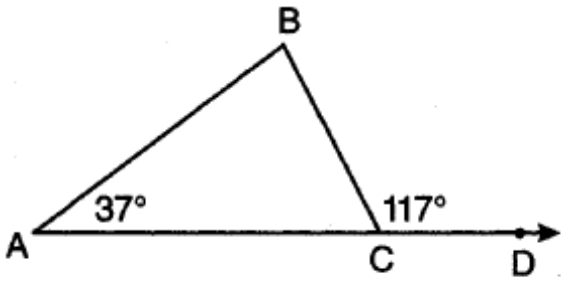
132. 060911ge, P.I. G.G.34
In ΔABC, $m\angle A = 95$, $m\angle B = 50$, and $m\angle C = 35$. Which expression correctly relates the lengths of the sides of this triangle?

[A] $AB < AC < BC$ [B] $AB < BC < CA$

[C] $BC < AC < AB$ [D] $AC < BC < AB$

133. 080934ge, P.I. G.G.34

In the diagram below of ΔABC with side $\overline{AC}$ extended through D, $m\angle A = 37$ and $m\angle BCD = 117$. Which side of ΔABC is the longest side? Justify your answer.

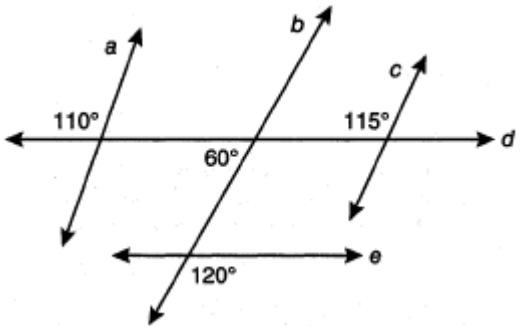


(Not drawn to scale)

G.G.35: Determine if two lines cut by a transversal are parallel, based on the measure of given pairs of angles formed by the transversal and the lines

134. 080901ge, P.I. G.G.35

Based on the diagram below, which statement is true?



[A] $b \| c$ [B] $d \| e$ [C] $a \| b$ [D] $a \| c$

G.G.36: Investigate, justify, and apply theorems about the sum of the measures of the interior and exterior angles of polygons

135. 080109a, P.I. G.G.36

The sum of the measures of the interior angles of an octagon is

[A] 360° [B] 540°

[C] 180° [D] 1,080°

136. 010514a, P.I. G.G.36

What is the sum, in degrees, of the measures of the interior angles of a pentagon?

[A] 180 [B] 360 [C] 540 [D] 900

137. 080428a, P.I. G.G.36

What is the sum, in degrees, of the measures of the interior angles of a stop sign, which is in the shape of an octagon?

[A] 1,880 [B] 1,440

[C] 1,080 [D] 360

138. 080820a, P.I. G.G.36

The measures of five of the interior angles of a hexagon are 150°, 100°, 80°, 165°, and 150°. What is the measure of the sixth interior angle?

[A] 75° [B] 105° [C] 180° [D] 80°

G.G.37: Investigate, justify, and apply theorems about each interior and exterior angle measures of regular polygons

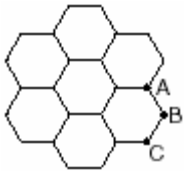
139. fall0827ge, P.I. G.G.37

What is the measure of an interior angle of a regular octagon?

[A] 60° [B] 120° [C] 135° [D] 45°

140. 060516a, P.I. G.G.37

The accompanying figure represents a section of bathroom floor tiles shaped like regular hexagons.



What is the measure of angle ABC?

[A] 90° [B] 150°

[C] 120° [D] 60°

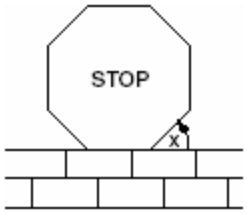
141. 060213a, P.I. G.G.37
What is the measure, in degrees, of each exterior angle of a regular hexagon?

[A] 45 [B] 135 [C] 120 [D] 60

142. 060423a, P.I. G.G.37
Melissa is walking around the outside of a building that is in the shape of a regular polygon. She determines that the measure of one exterior angle of the building is 60°. How many sides does the building have?

[A] 3 [B] 9 [C] 12 [D] 6

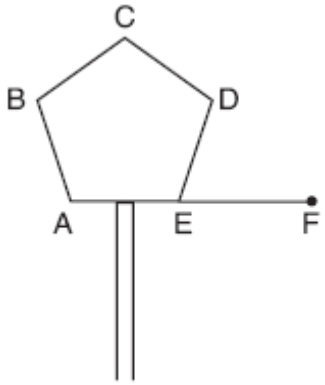
143. 080507a, P.I. G.G.37
A stop sign in the shape of a regular octagon is resting on a brick wall, as shown in the accompanying diagram.



What is the measure of angle *x*?

[A] 60° [B] 120° [C] 135° [D] 45°

144. 060718a, P.I. G.G.37
One piece of the birdhouse that Natalie is building is shaped like a regular pentagon, as shown in the accompanying diagram.



If side *AE* is extended to point *F*, what is the measure of exterior angle *DEF*?

[A] 36° [B] 108° [C] 144° [D] 72°

G.G.38: Investigate, justify, and apply theorems about parallelograms involving their angles, sides, and diagonals

145. 060106a, P.I. G.G.38
Which statement is *not* always true about a parallelogram?

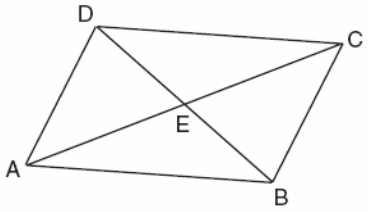
[A] The opposite sides are parallel.

[B] The opposite sides are congruent.

[C] The opposite angles are congruent.

[D] The diagonals are congruent.

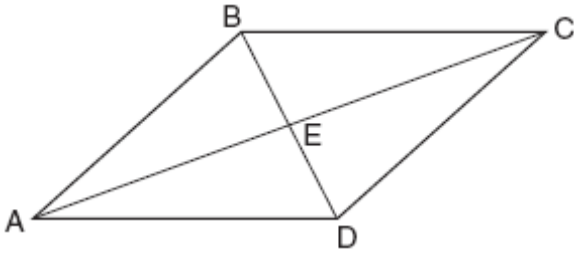
146. 080202a, P.I. G.G.38
In the accompanying diagram of parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{DB}$ intersect at E, $AE = 3x - 4$, and $EC = x + 12$.



What is the value of x?

[A] 40 [B] 16 [C] 20 [D] 8

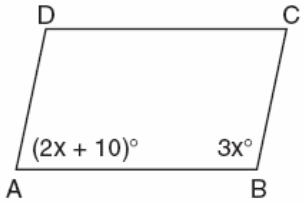
147. 060626a, P.I. G.G.38
In the accompanying diagram of parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E, $BE = \frac{2}{3}x$, and $ED = x - 10$.



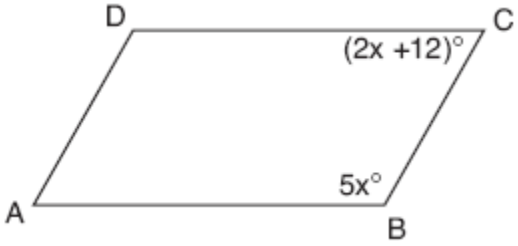
What is the value of x?

[A] 30 [B] -6 [C] 6 [D] -30

148. 060126a, P.I. G.G.38
In the accompanying diagram of parallelogram $ABCD$, $m\angle A = (2x + 10)$ and $m\angle B = 3x$. Find the number of degrees in $m\angle B$.



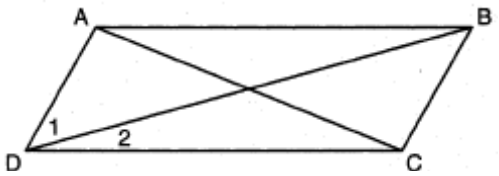
149. 060736a, P.I. G.G.38
In the accompanying diagram of parallelogram $ABCD$, $m\angle B = 5x$ and $m\angle C = 2x + 12$. Find the number of degrees in $\angle D$.



150. 080618a, P.I. G.G.38
The measures of two consecutive angles of a parallelogram are in the ratio 5:4. What is the measure of an obtuse angle of the parallelogram?

[A] 80° [B] 20° [C] 160° [D] 100°

151. 080907ge, P.I. G.G.38
In the diagram below of parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$, $m\angle 1 = 45$ and $m\angle DCB = 120$.



What is the measure of $\angle 2$?

[A] 15° [B] 45° [C] 30° [D] 60°

G.G.39: Investigate, justify, and apply theorems about special parallelogrms (rectangles, rhombuses, squares) involving their angles, sides, and diagonals

152. 010919a, P.I. G.G.39
Which statement is *false*?

[A] All rectangles are squares.

[B] All parallelograms are quadrilaterals.

[C] All squares are rhombuses.

[D] All rectangles are parallelograms.

153. 010025a, P.I. G.G.39
Al says, "If *ABCD* is a parallelogram, then *ABCD* is a rectangle." Sketch a quadrilateral *ABCD* that shows that Al's statement is not always true. Your sketch must show the length of each side and the measure of each angle for the quadrilateral you draw.

154. 010736a, P.I. G.G.39
The perimeter of a square is 56. Express the length of a diagonal of the square in simplest radical form.

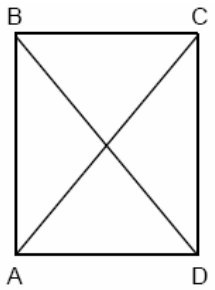
155. 080735a, P.I. G.G.39
In rhombus *ABCD*, the measure, in inches, of $\overline{AB}$ is $3x+2$ and $\overline{BC}$ is $x+12$. Find the number of inches in the length of $\overline{DC}$.

156. 010533a, P.I. G.G.39
In rectangle *ABCD*, $AC = 3x+15$ and $BD = 4x-5$. Find the length of $\overline{AC}$.

157. 010615a, P.I. G.G.39
A builder is building a rectangular deck with dimensions of 16 feet by 30 feet. To ensure that the sides form 90° angles, what should each diagonal measure?

[A] 34 ft [B] 30 ft [C] 46 ft [D] 16 ft

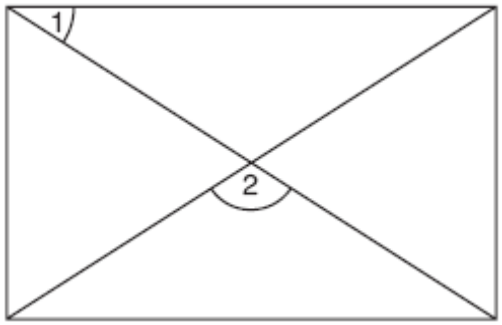
158. 089909a, P.I. G.G.39
In the accompanying diagram of rectangle ABCD, $m\angle BAC = 3x+4$ and $m\angle ACD = x+28$.



What is $m\angle CAD$?

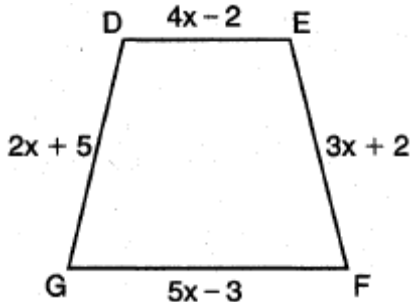
[A] 50 [B] 12 [C] 40 [D] 37

159. 010835a, P.I. G.G.39
As shown in the accompanying diagram, a rectangular gate has two diagonal supports. If $m\angle 1 = 42$, what is $m\angle 2$?



G.G.40: Investigate, justify, and apply theorems about trapezoids (including isosceles trapezoids) involving their angles

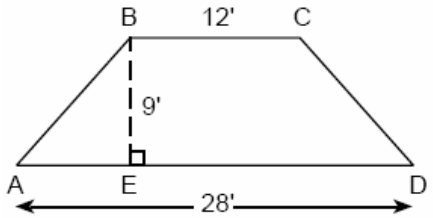
160. 080929ge, P.I. G.G.40
In the diagram below of isosceles trapezoid $DEFG$, $\overline{DE} \parallel \overline{GF}$, $DE = 4x - 2$, $EF = 3x + 2$, $FG = 5x - 3$, and $GD = 2x + 5$. Find the value of x.



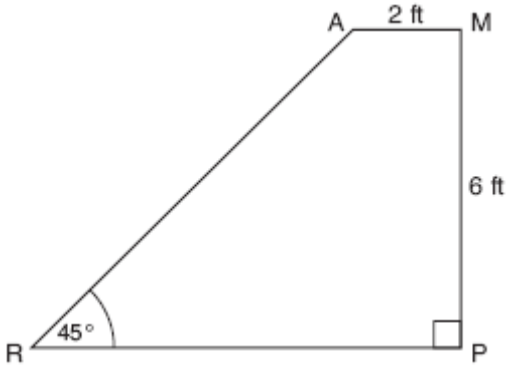
161. fall0801ge, P.I. G.G.40
Isosceles trapezoid $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. If $AC = 5x + 13$ and $BD = 11x - 5$, what is the value of x?

[A] $\frac{1}{2}$ [B] 3 [C] $10\frac{3}{4}$ [D] 28

162. 069933a, P.I. G.G.40
The cross section of an attic is in the shape of an isosceles trapezoid, as shown in the accompanying figure. If the height of the attic is 9 feet, $BC = 12$ feet, and $AD = 28$ feet, find the length of $\overline{AB}$ to the *nearest foot*.



163. 080726b, P.I. G.G.40
The accompanying diagram shows ramp $\overline{RA}$ leading to level platform $\overline{AM}$, forming an angle of 45° with level ground. If platform $\overline{AM}$ measures 2 feet and is 6 feet above the ground, explain why the exact length of ramp $\overline{RA}$ is $6\sqrt{2}$ feet.



G.G.41: Justify that some quadrilaterals are parallelograms, rhombuses, rectangles, squares, or trapezoids

164. 080918ge, P.I. G.G.41
A quadrilateral whose diagonals bisect each other and are perpendicular is a

[A] trapezoid [B] rectangle
[C] parallelogram [D] rhombus

165. 080517a, P.I. G.G.41
In a certain quadrilateral, two opposite sides are parallel, and the other two opposite sides are *not* congruent. This quadrilateral could be a

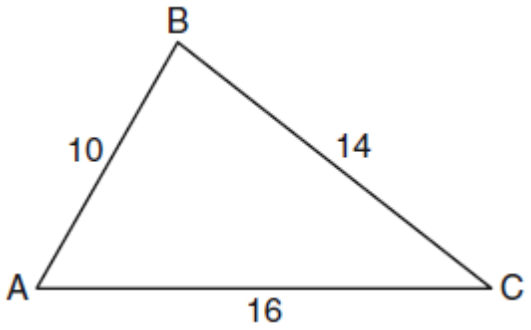
[A] parallelogram [B] square
[C] rhombus [D] trapezoid

G.G.42: Investigate, justify and apply theorems about geometric relationships, based on the properties of the line segment joining the midpoints of two sides of the triangle

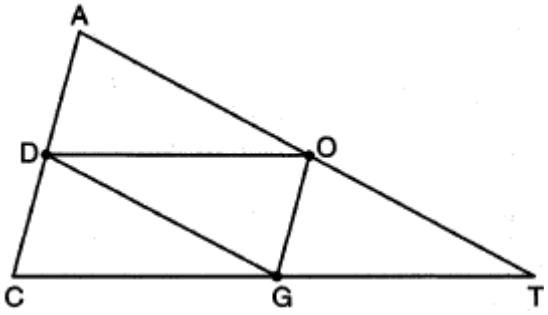
166. 010521a, P.I. G.G.42
If the midpoints of the sides of a triangle are connected, the area of the triangle formed is what part of the area of the original triangle?

[A] $\frac{3}{8}$ [B] $\frac{1}{3}$ [C] $\frac{1}{2}$ [D] $\frac{1}{4}$

167. 060929ge, P.I. G.G.42
In the diagram of ΔABC below, $AB = 10$, $BC = 14$, and $AC = 16$. Find the perimeter of the triangle formed by connecting the midpoints of the sides of ΔABC.



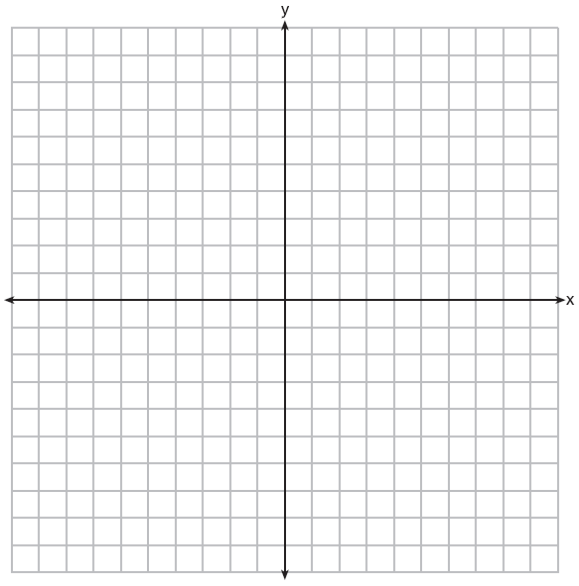
168. 080920ge, P.I. G.G.42
In the diagram below of ΔACT, D is the midpoint of $\overline{AC}$, O is the midpoint of $\overline{AT}$, and G is the midpoint of $\overline{CT}$.



If $AC = 10$, $AT = 18$, and $CT = 22$, what is the perimeter of parallelogram $CDOG$?

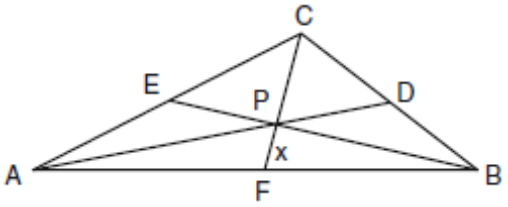
[A] 40 [B] 25 [C] 21 [D] 32

169. fall0835ge, P.I. G.G.42
On the set of axes below, graph and label ΔDEF with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$. If G is the midpoint of $\overline{EF}$ and H is the midpoint of $\overline{DF}$, state the coordinates of G and H and label each point on your graph. Explain why $\overline{GH} \parallel \overline{DE}$.



G.G.43: Investigate, justify, and apply theorems about the centroid of a triangle, dividing each median into segments who lengths are in the ratio 2:1

170. 060914ge, P.I. G.G.43
In the diagram of ΔABC below, Jose found centroid P by constructing the three medians. He measured $\overline{CF}$ and found it to be 6 inches.



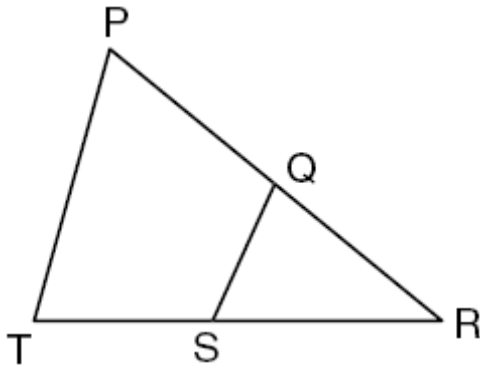
If $PF = x$, which equation can be used to find x?

[A] $3x + 2x = 6$ [B] $2x + x = 6$

[C] $x + x = 6$ [D] $x + \frac{2}{3}x = 6$

G.G.44: Establish similarity of triangles, using the following theorems: AA, SAS, and SSS

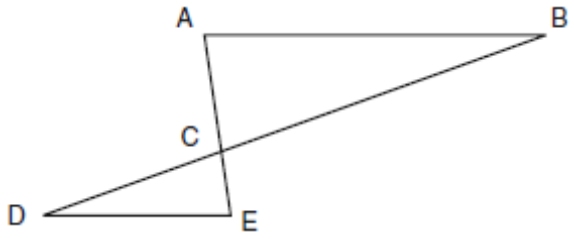
171. fall0821ge, P.I. G.G.44
In the diagram below of ΔPRT, Q is a point on $\overline{PR}$, S is a point on $\overline{TR}$, $\overline{QS}$ is drawn, and $\angle RPT \cong \angle RSQ$.



Which reason justifies the conclusion that $\Delta PRT \sim \Delta SRQ$?

[A] SAS [B] SSS [C] AA [D] ASA

172. 060917ge, P.I. G.G.44
In the diagram of ΔABC and ΔEDC below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$.

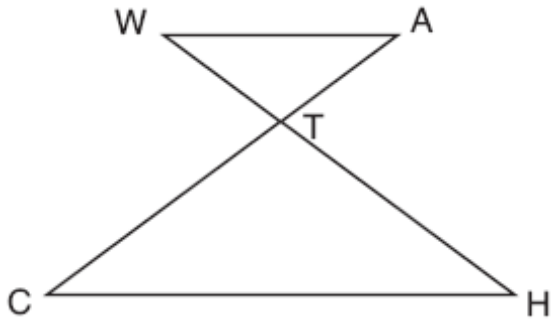


Which method can be used to show that ΔABC must be similar to ΔEDC?

[A] AA [B] SSS [C] SAS [D] HL

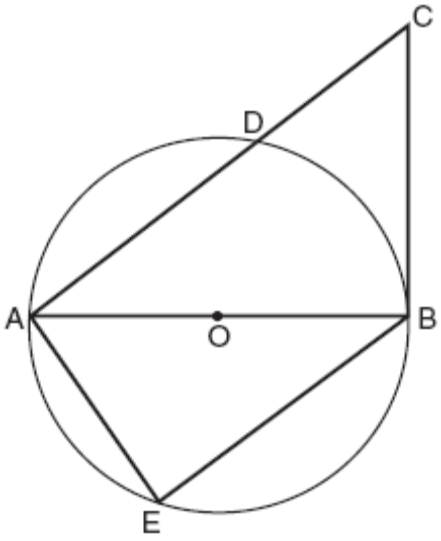
173. 010833b, P.I. G.G.44

In the accompanying diagram, $\overline{WA} \| \overline{CH}$ and $\overline{WH}$ and $\overline{AC}$ intersect at point T. Prove that $(WT)(CT) = (HT)(AT)$.



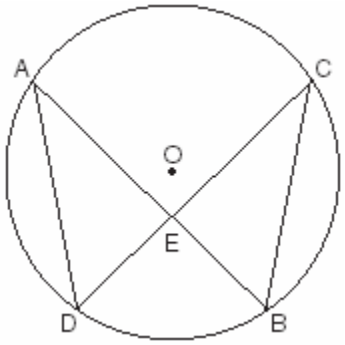
174. 080627b, P.I. G.G.44

In the accompanying diagram of circle O, diameter $\overline{AOB}$ is drawn, tangent $\overline{CB}$ is drawn to the circle at B, E is a point on the circle, and $\overline{BE} \| \overline{ADC}$. Prove: $\Delta ABE \sim \Delta CAB$



175. 060133b, P.I. G.G.44

Given: chords $\overline{AB}$ and $\overline{CD}$ of circle O intersect at E, an interior point of circle O; chords $\overline{AD}$ and $\overline{CB}$ are drawn.

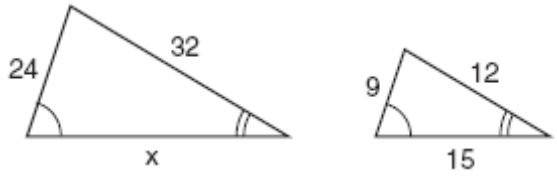


Prove: *(AE)(EB) = (CE)(ED)*

G.G.45: Investigate, justify, and apply theorems about similar triangles

176. 010410a, P.I. G.G.45

The accompanying diagram shows two similar triangles.

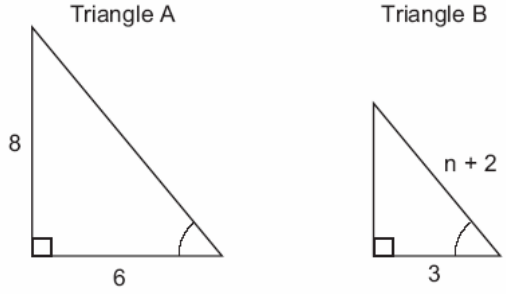


Which proportion could be used to solve for x?

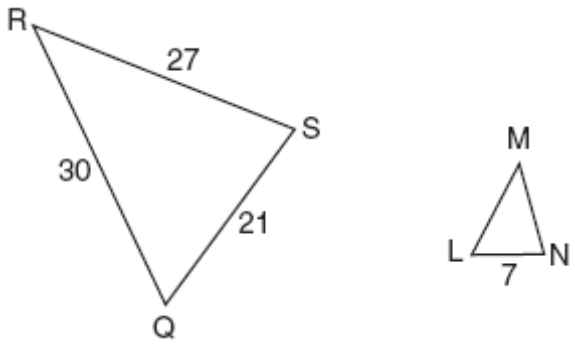
[A] $\frac{x}{24} = \frac{9}{15}$ [B] $\frac{32}{x} = \frac{12}{15}$

[C] $\frac{24}{9} = \frac{15}{x}$ [D] $\frac{32}{12} = \frac{15}{x}$

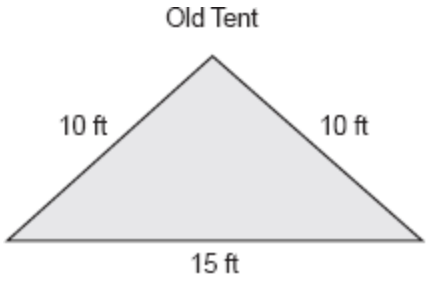
177. 060230a, P.I. G.G.45
In the accompanying diagram, triangle *A* is similar to triangle *B*. Find the value of *n*.



178. 010931a, P.I. G.G.45
In the accompanying diagram, ΔQRS is similar to ΔLMN, $RQ = 30$, $QS = 21$, $SR = 27$, and $LN = 7$. What is the length of $\overline{ML}$?

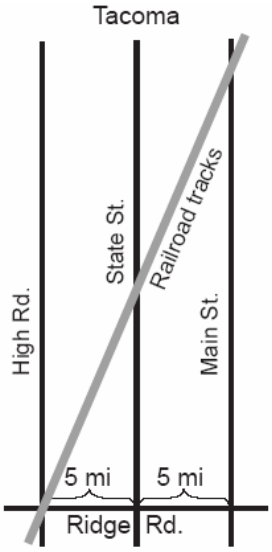


179. 060024a, P.I. G.G.45
The Rivera family bought a new tent for camping. Their old tent had equal sides of 10 feet and a floor width of 15 feet, as shown in the accompanying diagram.



If the new tent is similar in shape to the old tent and has equal sides of 16 feet, how wide is the floor of the new tent?

180. 080021a, P.I. G.G.45
The accompanying diagram shows a section of the city of Tacoma. High Road, State Street, and Main Street are parallel and 5 miles apart. Ridge Road is perpendicular to the three parallel streets. The distance between the intersection of Ridge Road and State Street and where the railroad tracks cross State Street is 12 miles. What is the distance between the intersection of Ridge Road and Main Street and where the railroad tracks cross Main Street?



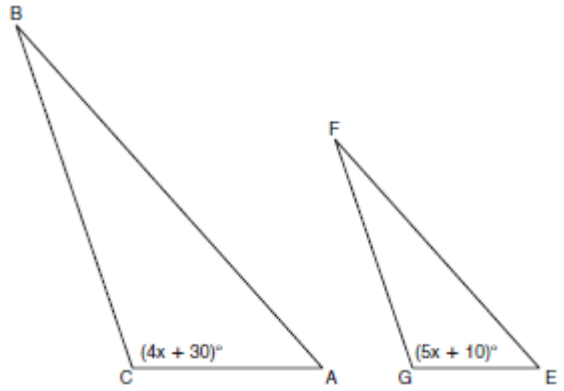
181. 060927ge, P.I. G.G.45

In ΔABC, point D is on $\overline{AB}$, and point E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If $DB = 2$, $DA = 7$, and $DE = 3$, what is the length of $\overline{AC}$?

[A] 10.5 [B] 13.5 [C] 9 [D] 8

182. 060934ge, P.I. G.G.45

In the diagram below, $\Delta ABC \sim \Delta EFG$, $m\angle C = 4x + 30$, and $m\angle G = 5x + 10$. Determine the value of x.



183. 010505a, P.I. G.G.45

The perimeter of $\Delta A'B'C'$, the image of ΔABC, is twice as large as the perimeter of ΔABC. What type of transformation has taken place?

[A] reflection [B] translation

[C] rotation [D] dilation

184. 060411a, P.I. G.G.45

Delroy's sailboat has two sails that are similar triangles. The larger sail has sides of 10 feet, 24 feet, and 26 feet. If the shortest side of the smaller sail measures 6 feet, what is the perimeter of the *smaller* sail?

[A] 36 ft [B] 60 ft

[C] 15 ft [D] 100 ft

185. 060208a, P.I. G.G.45

Two triangles are similar. The lengths of the sides of the smaller triangle are 3, 5, and 6, and the length of the longest side of the larger triangle is 18. What is the perimeter of the larger triangle?

[A] 42 [B] 24 [C] 18 [D] 14

186. 080729a, P.I. G.G.45

Which is *not* a property of all similar triangles?

[A] The corresponding angles are congruent.

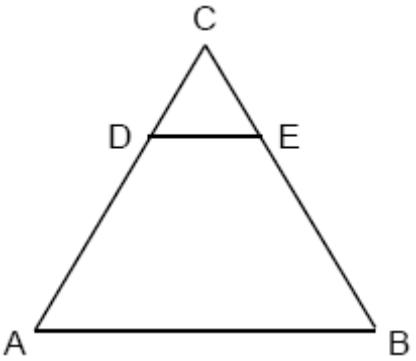
[B] The perimeters are in the same ratio as the corresponding sides.

[C] The corresponding sides are congruent.

[D] The altitudes are in the same ratio as the corresponding sides.

187. 089915a, P.I. G.G.45

In the accompanying diagram of equilateral triangle ABC, $DE = 5$ and $\overline{DE} \parallel \overline{AB}$.



If AB is three times as long as DE, what is the perimeter of quadrilateral $ABED$?

[A] 40 [B] 35 [C] 20 [D] 30

188. 060524a, P.I. G.G.45
On a scale drawing of a new school playground, a triangular area has sides with lengths of 8 centimeters, 15 centimeters, and 17 centimeters. If the triangular area located on the playground has a perimeter of 120 meters, what is the length of its longest side?

[A] 40 m [B] 45 m

[C] 51 m [D] 24 m

189. 010704a, P.I. G.G.45
The base of an isosceles triangle is 5 and its perimeter is 11. The base of a similar isosceles triangle is 10. What is the perimeter of the larger triangle?

[A] 15 [B] 110 [C] 22 [D] 21

190. fall0826ge, P.I. G.G.45
Two triangles are similar, and the ratio of each pair of corresponding sides is 2 : 1. Which statement regarding the two triangles is *not* true?

[A] Their areas have a ratio of 4 : 1.

[B] Their corresponding angles have a ratio of 2 : 1.

[C] Their altitudes have a ratio of 2 : 1.

[D] Their perimeters have a ratio of 2 : 1.

191. 060307a, P.I. G.G.45
A triangle has sides whose lengths are 5, 12, and 13. A similar triangle could have sides with lengths of

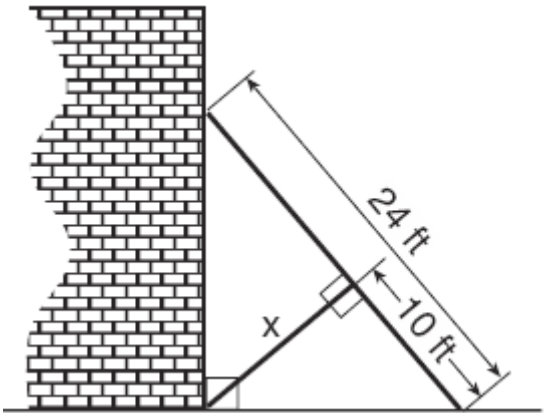
[A] 10, 24, and 26 [B] 7, 24, and 25

[C] 3, 4, and 15 [D] 6, 8, and 10

G.G.46: Investigate, justify, and apply theorems about proportional relationships among the segments of the sides of the triangle, given one or more lines parallel to one side of a triangle and intersecting the other two sides of the triangle

G.G.47: Investigate, justify, and apply theorems about mean proportionality: the altitude to the hypotenuse of a right triangle is the mean proportional between the two segments along the hyoptenuse; and the altitude to the hypotenuse of a right triangle divides the hypotenuse so that either leg of the right triangle is the mean proportional between the hypotenuse and segment of the hypotenuse adjacent to that leg

192. 010619b, P.I. G.G.47
The accompanying diagram shows a 24-foot ladder leaning against a building. A steel brace extends from the ladder to the point where the building meets the ground. The brace forms a right angle with the ladder.

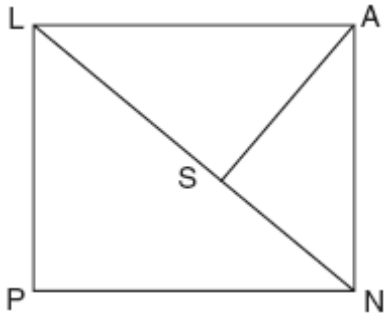


If the steel brace is connected to the ladder at a point that is 10 feet from the foot of the ladder, which equation can be used to find the length, x, of the steel brace?

[A] $10^2 + x^2 = 24^2$ [B] $\frac{10}{x} = \frac{x}{14}$

[C] $\frac{10}{x} = \frac{x}{24}$ [D] $10^2 + x^2 = 14^2$

193. 010920b, P.I. G.G.47
The accompanying diagram shows part of the architectural plans for a structural support of a building. $PLAN$ is a rectangle and $\overline{AS} \perp \overline{LN}$.

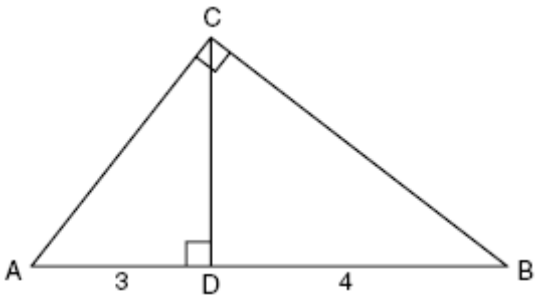


Which equation can be used to find the length of $\overline{AS}$?

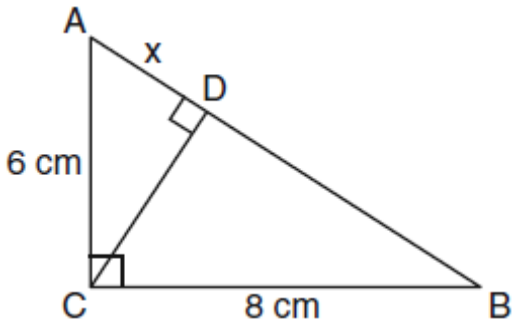
[A] $\frac{AS}{SN} = \frac{AS}{LS}$ [B] $\frac{AN}{LN} = \frac{AS}{LS}$

[C] $\frac{AS}{LS} = \frac{LS}{SN}$ [D] $\frac{LS}{AS} = \frac{AS}{SN}$

194. fall0829ge, P.I. G.G.47
In the diagram below of right triangle ACB, altitude $\overline{CD}$ intersects $\overline{AB}$ at D. If $AD = 3$ and $DB = 4$, find the length of $\overline{CD}$ in simplest radical form.



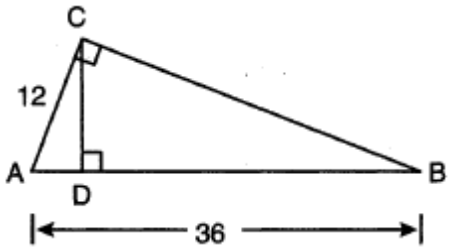
195. 060915ge, P.I. G.G.47
In the diagram below, the length of the legs $\overline{AC}$ and $\overline{BC}$ of right triangle ABC are 6 cm and 8 cm, respectively. Altitude $\overline{CD}$ is drawn to the hypotenuse of ΔABC.



What is the length of $\overline{AD}$ to the *nearest tenth of a centimeter*?

[A] 4.0 [B] 6.0 [C] 6.4 [D] 3.6

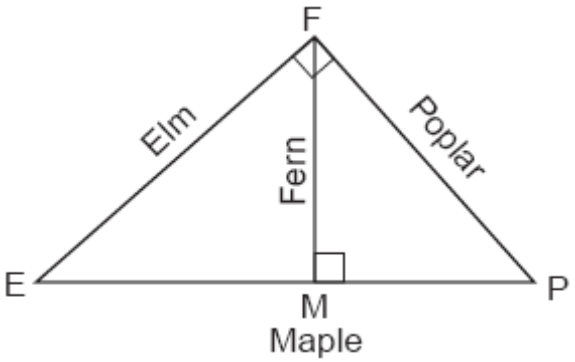
196. 080922ge, P.I. G.G.47
In the diagram below of right triangle ACB, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.



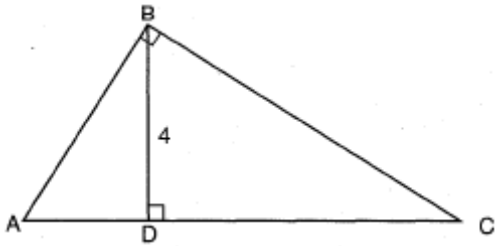
If $AB = 36$ and $AC = 12$, what is the length of $\overline{AD}$?

[A] 4 [B] 3 [C] 32 [D] 6

197. 060828b, P.I. G.G.47
Four streets in a town are illustrated in the accompanying diagram. If the distance on Poplar Street from *F* to *P* is 12 miles and the distance on Maple Street from *E* to *M* is 10 miles, find the distance on Maple Street, in miles, from *M* to *P*.



198. 080932b, P.I. G.G.47
The drawing for a right triangular roof truss, represented by ΔABC, is shown in the accompanying diagram. If $\angle ABC$ is a right angle, altitude $BD = 4$ meters, and $\overline{DC}$ is 6 meters longer than $\overline{AD}$, find the length of base $\overline{AC}$, in meters.



G.G.48: Investigate, justify, and apply the Pythagorean Theorem and its converse

199. 060009a, P.I. G.G.48
The set of integers {3,4,5} is a Pythagorean triple. Another such set is

[A] {8,15,17} [B] {6,7,8}

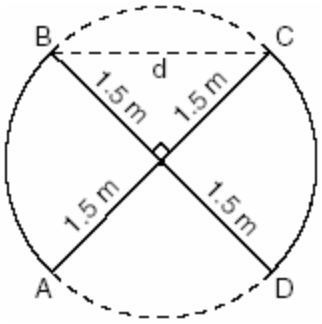
[C] {6,12,13} [D] {6,8,12}

200. 010827a, P.I. G.G.48
Which set of numbers could be the lengths of the sides of a right triangle?

[A] {4,7,8} [B] {12,16,30}

[C] {10,24,26} [D] {3,4,6}

201. 010403b, P.I. G.G.48
An overhead view of a revolving door is shown in the accompanying diagram. Each panel is 1.5 meters wide.

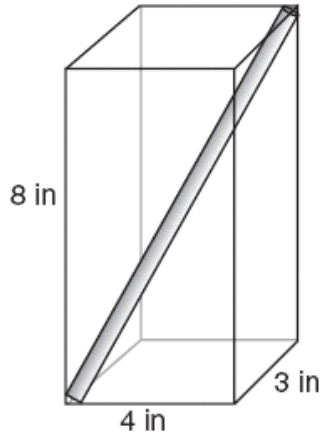


What is the approximate width of *d*, the opening from *B* to *C*?

[A] 1.73 m [B] 2.12 m

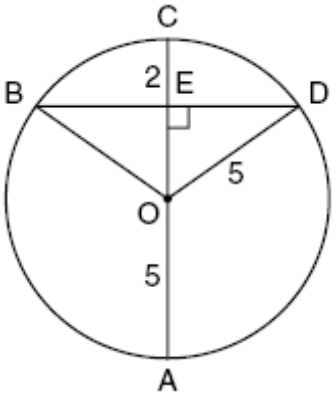
[C] 1.50 m [D] 3.00 m

202. 060334a, G.G.48
A straw is placed into a rectangular box that is 3 inches by 4 inches by 8 inches, as shown in the accompanying diagram. If the straw fits exactly into the box diagonally from the bottom left front corner to the top right back corner, how long is the straw, to the *nearest tenth of an inch*?



G.G.49: Investigate, justify, and apply theorems regarding chords of a circle: perpendicular bisectors of chords; the relative length of chords as compared to their distance from the center of the circle

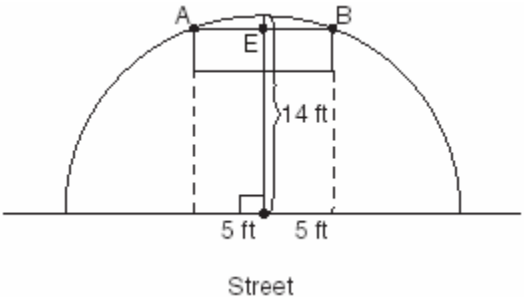
203. fall0811ge, P.I. G.G.49
In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter $\overline{AC}$ is perpendicular to chord $\overline{BD}$ at E.



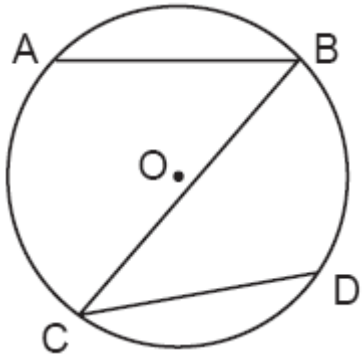
What is the length of $\overline{BD}$?

[A] 4 [B] 12 [C] 10 [D] 8

204. 080124b P.I. G.G.49
The accompanying diagram shows a semicircular arch over a street that has a radius of 14 feet. A banner is attached to the arch at points A and B, such that $AE = EB = 5$ feet. How many feet above the ground are these points of attachment for the banner?



205. 060811b, P.I. G.G.49
In the accompanying diagram of circle O, $\overset{\frown}{AB} \cong \overset{\frown}{CD}$.



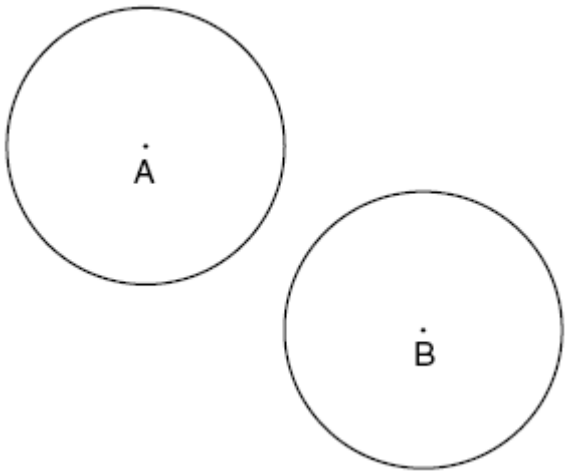
Which statement is true?

[A] $\overline{AB} \cong \overline{CD}$ [B] $\overline{AB} \parallel \overline{CD}$

[C] $\overset{\frown}{AC} \cong \overset{\frown}{BD}$ [D] $\angle ABC \cong \angle BCD$

G.G.50: Investigate, justify, and apply theorems about tangent lines to a circle: a perpendicular to the tangent at the point of tangency; two tangents to a circle from the same external point; common tangent of two non-intersecting or tangent circles

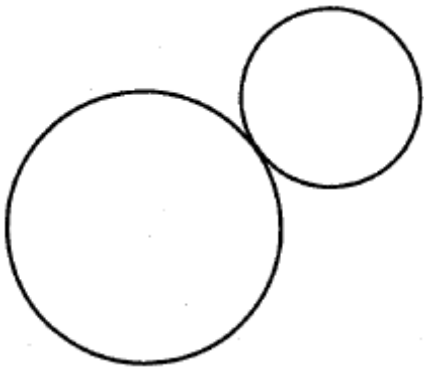
206. fall0824ge, P.I. G.G.50
In the diagram below, circle A and circle B are shown.



What is the total number of lines of tangency that are common to circle A and circle B?

[A] 2 [B] 4 [C] 3 [D] 1

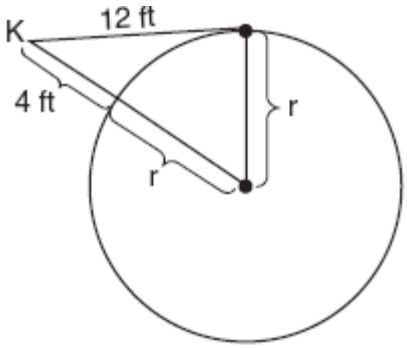
207. 080928ge, P.I. G.G.50
How many common tangent lines can be drawn to the two externally tangent circles shown below?



[A] 2 [B] 3 [C] 4 [D] 1

208. 080518b, P.I. G.G.50

Kimi wants to determine the radius of a circular pool without getting wet. She is located at point *K*, which is 4 feet from the pool and 12 feet from the point of tangency, as shown in the accompanying diagram.



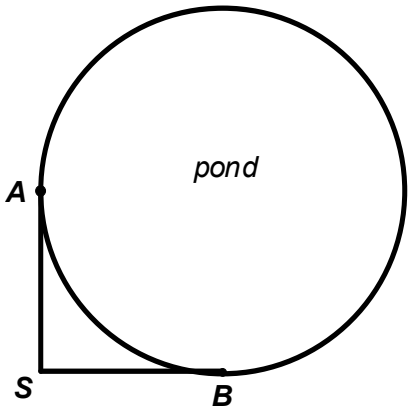
What is the radius of the pool?

[A] $4\sqrt{10}$ ft [B] 16 ft

[C] 32 ft [D] 20 ft

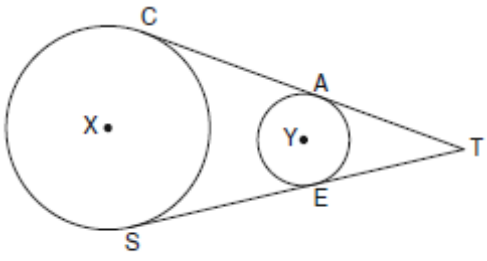
209. fall9926b, P.I. G.G.50

Two docks, *A* and *B*, are located on a circular pond as shown in the diagram below. A surveyor wants to determine the distance these two docks are from each other across the pond. The surveyor, located at point *S*, knows that he is 200 yards from both docks and his measuring equipment indicates that there is a 90° angle between his sight lines to dock *A* and to dock *B*. How far, to the *nearest tenth of a yard*, is it across the pond from dock *A* to dock *B*?



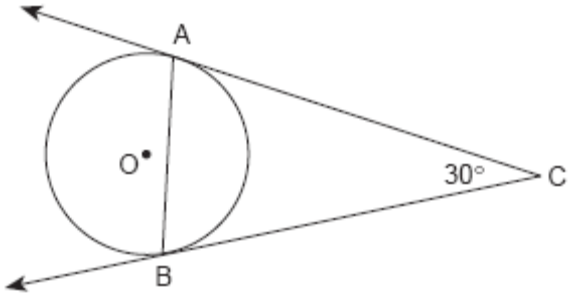
210. 060935ge, P.I. G.G.50

In the diagram below, circles *X* and *Y* have two tangents drawn to them from external point *T*. The points of tangency are *C*, *A*, *S*, and *E*. The ratio of *TA* to *AC* is 1:3. If $TS = 24$, find the length of $\overline{SE}$.



(Not drawn to scale)

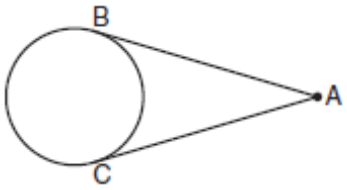
211. 010213b, P.I. G.G.50
The accompanying diagram represents circular pond O with docks located at points A and B. From a cabin located at C, two sightings are taken that determine an angle of 30° for tangents $\overrightarrow{CA}$ and $\overrightarrow{CB}$.



What is $m\angle CAB$?

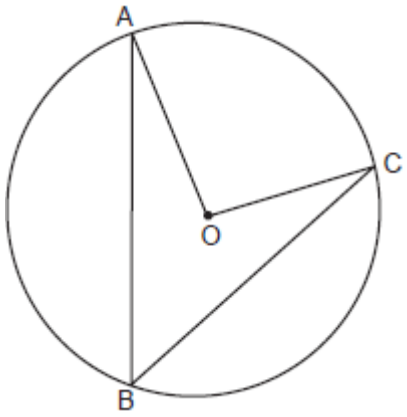
[A] 60 [B] 150 [C] 30 [D] 75

212. 060924b, P.I. G.G.50
The accompanying diagram shows two lengths of wire attached to a wheel, so that $\overline{AB}$ and $\overline{AC}$ are tangent to the wheel. If the major arc $\overset{\frown}{BC}$ has a measure of 220°, find the number of degrees in $m\angle A$.



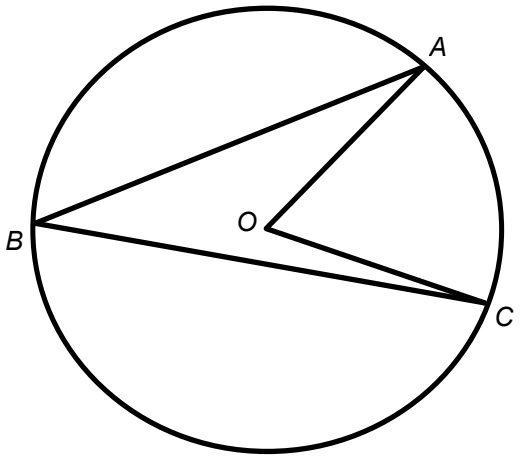
G.G.51: Investigate, justify, and apply theorems about the arcs determined by the rays of angles formed by two lines intersecting a circle when the vertex is: inside the circle (two chords); on the circle (tangent and chord); outside the circle (two tangents, two secants, or tangent and secant)

213. 060802b, P.I. G.G.51
In the accompanying diagram of circle O, $\overline{AB}$ and $\overline{BC}$ are chords and $m\angle AOC = 96$. What is $m\angle ABC$?



[A] 96 [B] 48 [C] 192 [D] 32

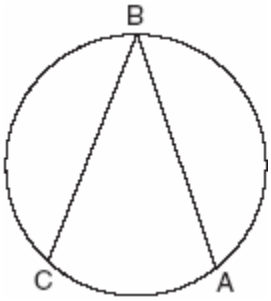
214. fall9914b, P.I. G.G.51
In the diagram below, circle O has $m\angle ABC = z$. What is $m\angle AOC$?



[A] z^2 [B] z [C] $2z$ [D] $\frac{1}{2}z$

215. 080107b, P.I. G.G.51

The new corporate logo created by the design engineers at Magic Motors is shown in the accompanying diagram.

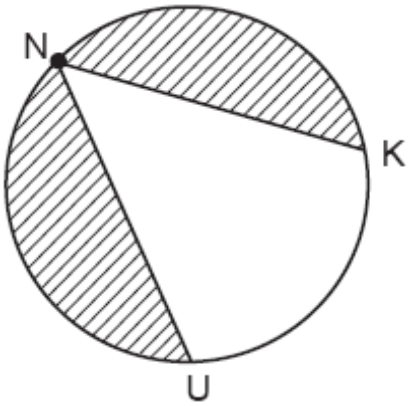


If chords $\overline{BA}$ and $\overline{BC}$ are congruent and $m\widehat{BC} = 140$, what is $m\angle B$?

[A] 40 [B] 280 [C] 80 [D] 140

216. 080803b, P.I. G.G.51

The NUK Energy Company is designing a new logo, as shown in the accompanying diagram, with $m\widehat{NK} = 130$ and $m\widehat{NK} = m\widehat{NU}$.

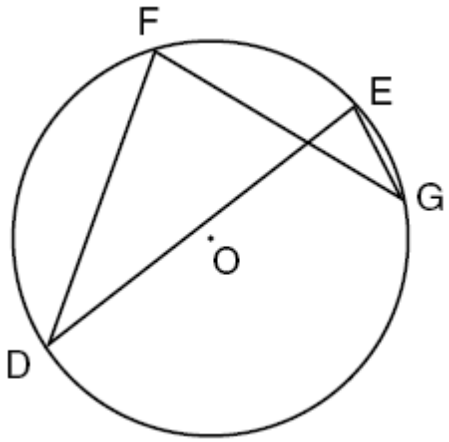


What is the measure of $\angle KNU$?

[A] 65° [B] 100° [C] 80° [D] 50°

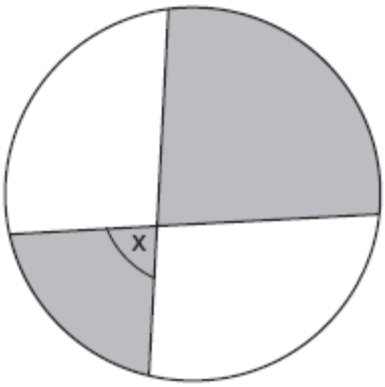
217. fall0836ge, P.I. G.G.51

In the diagram below of circle *O*, chords $\overline{DF}$, $\overline{DE}$, $\overline{FG}$, and $\overline{EG}$ are drawn such that $m\widehat{DF} : m\widehat{FE} : m\widehat{EG} : m\widehat{GD} = 5 : 2 : 1 : 7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.



218. 080408b, P.I. G.G.51

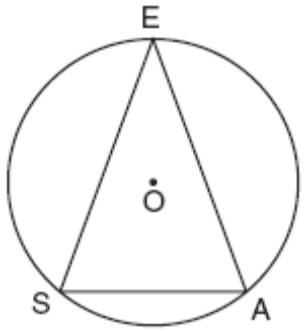
The accompanying diagram shows a child's spin toy that is constructed from two chords intersecting in a circle. The curved edge of the larger shaded section is one-quarter of the circumference of the circle, and the curved edge of the smaller shaded section is one-fifth of the circumference of the circle.



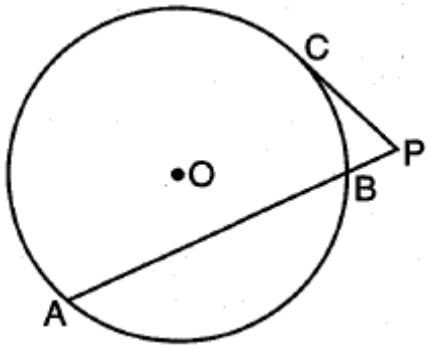
What is the measure of angle *x*?

[A] 108° [B] 81° [C] 72° [D] 40°

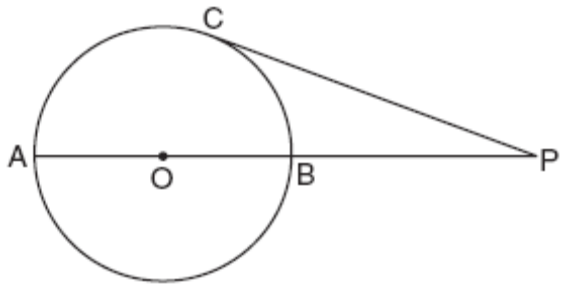
219. 080629b, P.I. G.G.51
A machine part consists of a circular wheel with an inscribed triangular plate, as shown in the accompanying diagram. If $\overline{SE} \cong \overline{EA}$, $SE = 10$, and $m\overset{\frown}{SE} = 140$, find the length of $\overline{SA}$ to the *nearest tenth*.



220. 080925b, P.I. G.G.51
In the accompanying diagram of circle *O*, $\overline{PC}$ is a tangent, $\overline{PBA}$ is a secant, $m\overset{\frown}{AB} = 132$, and $m\overset{\frown}{CB} = 46$. Find $m\angle P$.



221. 010721b, P.I. G.G.51
In the accompanying diagram of circle *O*, diameter $\overline{AOB}$ is extended through *B* to external point *P*, tangent $\overline{PC}$ is drawn to point *C* on the circle, and $m\overset{\frown}{AC} : m\overset{\frown}{BC} = 7 : 2$. Find $m\angle CPA$.



(Not drawn to scale)

222. 060132b, P.I. G.G.51
Point *P* lies outside circle *O*, which has a diameter of $\overline{AOC}$. The angle formed by tangent $\overline{PA}$ and secant $\overline{PBC}$ measures 30°. Sketch the conditions given above and find the number of degrees in the measure of minor arc *CB*.

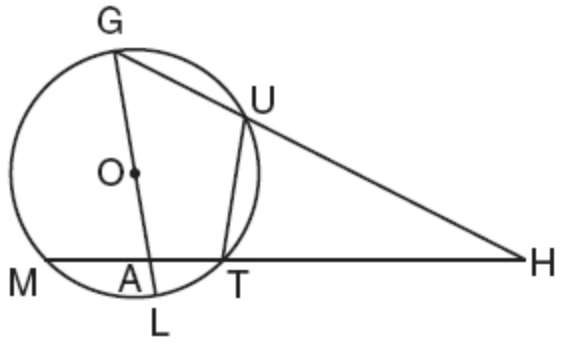
223. 010510b, P.I. G.G.51
A small fragment of something brittle, such as pottery, is called a shard. The accompanying diagram represents the outline of a shard from a small round plate that was found at an archaeological dig.

If $\overleftrightarrow{BC}$ is a tangent to $\overset{\frown}{AB}$ at *B* and $m\angle ABC = 45$, what is the measure of $\overset{\frown}{AB}$, the outside edge of the shard?

[A] 135° [B] 45° [C] 225° [D] 90°

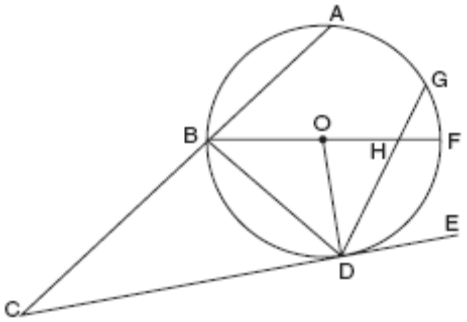
224. 080333b, P.I. G.G.51

Given circle O with diameter $\overline{GOAL}$; secants $\overline{HUG}$ and $\overline{HTAM}$ intersect at point H; $m\overset{\frown}{GM} : m\overset{\frown}{ML} : m\overset{\frown}{LT} = 7:3:2$; and chord $\overline{GU} \cong$ chord $\overline{UT}$. Find the ratio of $m\angle UGL$ to $m\angle H$.



225. 080633b, P.I. G.G.51

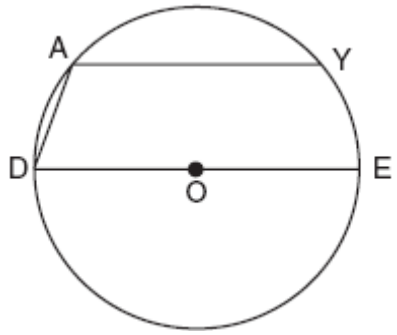
In the accompanying diagram, circle O has radius $\overline{OD}$, diameter $\overline{BOHF}$, secant $\overline{CBA}$, and chords $\overline{DHG}$ and $\overline{BD}$; $\overline{CE}$ is tangent to circle O at D; $m\overset{\frown}{DF} = 80$; and $m\overset{\frown}{BA} : m\overset{\frown}{AG} : m\overset{\frown}{GF} = 3:2:1$. Find $m\overset{\frown}{GF}$, and $m\angle BHD$, $m\angle BDG$, $m\angle GDE$, $m\angle C$, and $m\angle BOD$.



G.G.52: Investigate, justify, and apply theorems about arcs of a circle cut by two parallel lines

226. 060603b, P.I. G.G.52

In the accompanying diagram of circle O, chord $\overline{AY}$ is parallel to diameter $\overline{DOE}$, $\overline{AD}$ is drawn, and $m\overset{\frown}{AD} = 40$.

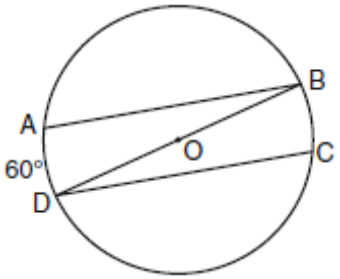


What is $m\angle DAY$?

[A] 130 [B] 150 [C] 110 [D] 90

227. 060906ge, P.I. G.G.52

In the diagram of circle O below, chords $\overline{AB}$ and $\overline{CD}$ are parallel, and $\overline{BD}$ is a diameter of the circle.

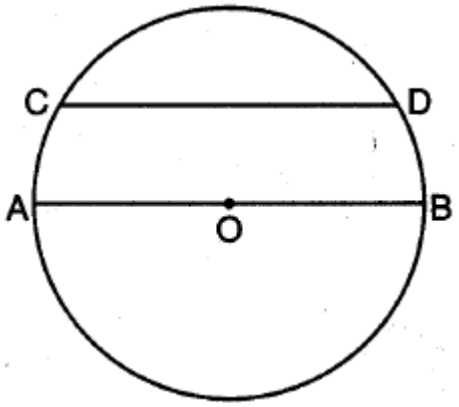


If $m\overset{\frown}{AD} = 60$, what is $m\angle CDB$?

[A] 20 [B] 30 [C] 120 [D] 60

228. 080904ge, P.I. G.G.52

In the diagram of circle *O* below, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{AC} = 30$.



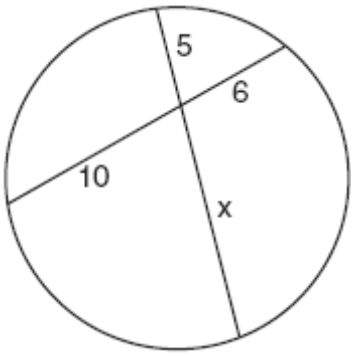
What is $m\overset{\frown}{CD}$?

[A] 100 [B] 120 [C] 60 [D] 150

G.G.53: Investigate, justify, and apply theorems regarding segments intersected by a circle: along two tangents from the same external point; along two secants from the same external point; along a tangent and a secant from the same external point; along two intersecting chords of a given circle

229. 010908b, P.I. G.G.53

The accompanying diagram shows two intersecting paths within a circular garden.

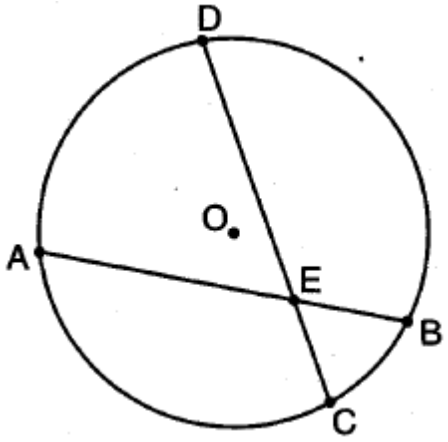


What is the length of the portion of the path marked *x*?

[A] $8\frac{1}{3}$ [B] 11 [C] 3 [D] 12

230. 080923ge, P.I. G.G.53

In the diagram of circle *O* below, chord $\overline{AB}$ intersects chord $\overline{CD}$ at *E*, $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$.

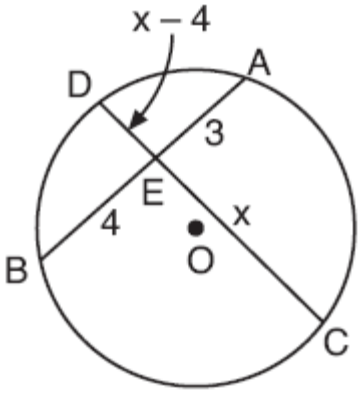


What is the value of *x*?

[A] 3.6 [B] 5 [C] 10.25 [D] 1

231. 060723b, P.I. G.G.53

In the accompanying diagram of circle *O*, chords $\overline{AB}$ and $\overline{CD}$ intersect at *E*. If $AE = 3$, $EB = 4$, $CE = x$, and $ED = x - 4$, what is the value of *x*?

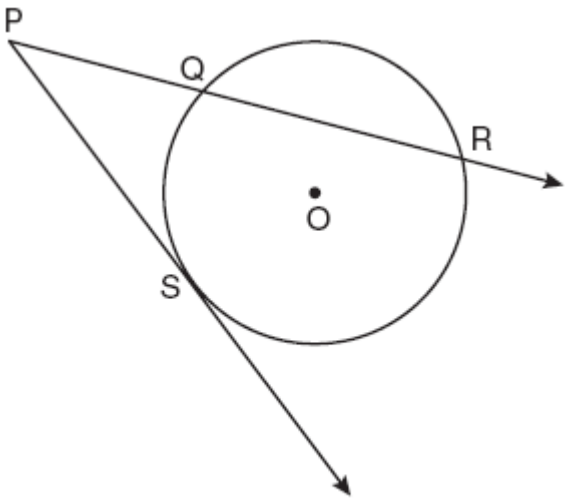


232. 080225b, P.I. G.G.53

A toy truck is located within a circular play area. Alex and Dominic are sitting on opposite endpoints of a chord that contains the truck. Alex is 4 feet from the truck, and Dominic is 3 feet from the truck. Meira and Tamara are sitting on opposite endpoints of another chord containing the truck. Meira is 8 feet from the truck. How many feet, to the *nearest tenth of a foot*, is Tamara from the truck? Draw a diagram to support your answer.

233. fall0817ge, P.I. G.G.53

In the diagram below, $\overline{PS}$ is a tangent to circle O at point S, $\overline{PQR}$ is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.



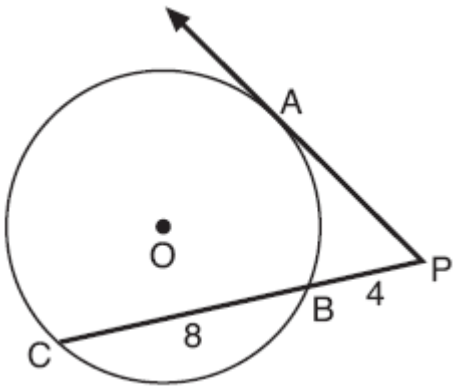
(Not drawn to scale)

What is the length of $\overline{PS}$?

[A] 6 [B] 27 [C] 9 [D] 3

234. 080719b, P.I. G.G.53

In the accompanying diagram, $\overline{PA}$ is tangent to circle O at A, $\overline{PBC}$ is a secant, $PB = 4$, and $BC = 8$.

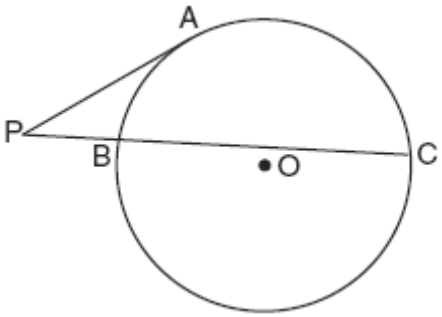


What is the length of $\overline{PA}$?

[A] $4\sqrt{6}$ [B] 4 [C] $4\sqrt{3}$ [D] $4\sqrt{2}$

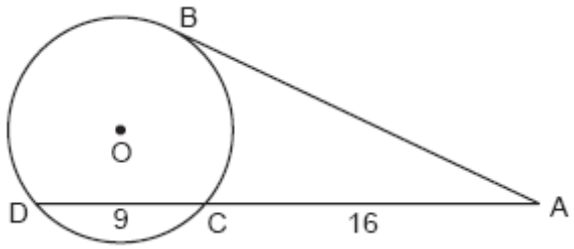
235. 010623b, P.I. G.G.53

In the accompanying diagram, $\overline{PA}$ is tangent to circle O at A, secant $\overline{PBC}$ is drawn, $PB = 4$, and $BC = 12$. Find PA.



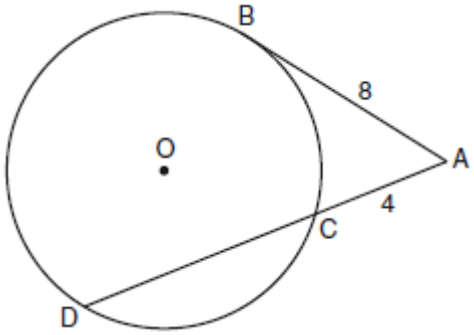
236. 010821b, P.I. G.G.53

In the accompanying diagram, $\overline{AB}$ is tangent to circle O at B. If $AC = 16$ and $CD = 9$, what is the length of $\overline{AB}$?



237. 060916ge, P.I. G.G.53

In the diagram below, tangent $\overline{AB}$ and secant $\overline{ACD}$ are drawn to circle O from an external point A, $AB = 8$, and $AC = 4$.

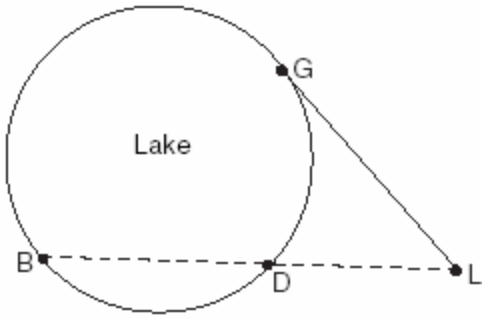


What is the length of $\overline{CD}$?

[A] 10 [B] 12 [C] 13 [D] 16

238. 080103b, P.I. G.G.53

In the accompanying diagram, cabins B and G are located on the shore of a circular lake, and cabin L is located near the lake. Point D is a dock on the lake shore and is collinear with cabins B and L. The road between cabins G and L is 8 miles long and is tangent to the lake. The path between cabin L and dock D is 4 miles long.



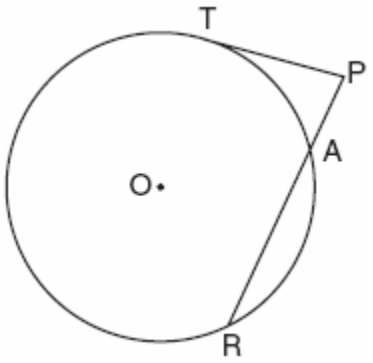
(Not drawn to scale)

What is the length, in miles, of $\overline{BD}$?

[A] 8 [B] 24 [C] 4 [D] 12

239. 060433b, P.I. G.G.53

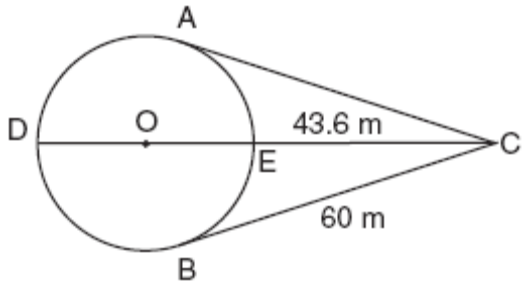
The accompanying diagram shows a circular machine part that has rods $\overline{PT}$ and $\overline{PAR}$ attached at points *T, A*, and *R,* which are located on the circle; $m\overset{\frown}{TA}:m\overset{\frown}{AR}:m\overset{\frown}{RT}=1:3:5;\ RA=12$ centimeters; and $PA=5$ centimeters.



Find the measure of $\angle P$, in degrees, and find the length of rod $\overline{PT}$, to the *nearest tenth of a centimeter.*

240. 060534b, P.I. G.G.53

An architect is designing a park with an entrance represented by point *C* and a circular garden with center *O*, as shown in the accompanying diagram. The architect plans to connect three points on the circumference of the garden, *A*, *B*, and *D*, to the park entrance, *C*, with walkways so that walkways $\overline{CA}$ and $\overline{CB}$ are tangent to the garden, walkway $\overline{DOEC}$ is a path through the center of the garden, $m\overset{\frown}{ADB}:m\overset{\frown}{AEB}=3:2$, $BC=60$ meters, and $EC=43.6$ meters. Find the measure of the angle between walkways $\overline{CA}$ and $\overline{CB}$. Find the diameter of the circular garden, to the *nearest meter.*



G.G.54: Define, investigate, justify, and apply isometries in the plane (rotations, reflections, translations, glide reflections) Note: Use proper function notation

1. 060809b, P.I. G.G.54
If point (5, 2) is rotated counterclockwise 90° about the origin, its image will be point

[A] (2, 5) [B] (-2, 5)

[C] (-5, -2) [D] (2, -5)

2. 060217b, P.I. G.G.54
Point P' is the image of point $P(-3,4)$ after a translation defined by $T_{(7,-1)}$. Which other transformation on P would also produce P'?

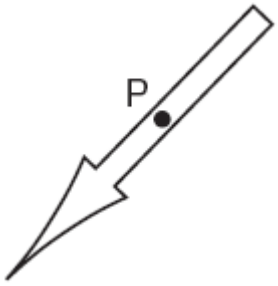
[A] $R_{90°}$ [B] $r_{y=-x}$

[C] $R_{-90°}$ [D] r_{y-axis}

3. 080721a, P.I. G.G.54
The accompanying diagram shows the starting position of the spinner on a board game.

How does this spinner appear after a 270° counterclockwise rotation about point P?

[A]


[B]


[C]


[D]


4. 010809a, P.I. G.G.54
Which transformation produces a figure that is always the mirror image of the original figure?

[A] translation [B] dilation

[C] line reflection [D] rotation

5. 060313b, P.I. G.G.54
Which transformation is an opposite isometry?

[A] translation [B] dilation

[C] rotation of 90° [D] line reflection

6. 060218b, P.I. G.G.54
Which transformation does *not* preserve orientation?

[A] dilation [B] rotation

[C] reflection in the *y*-axis

[D] translation

7. 080418a, P.I. G.G.54
What is the image of point $(-3, -1)$ under a reflection in the origin?

[A] (-3, 1) [B] (3, 1)

[C] (-1, -3) [D] (1, 3)

8. 010007a, P.I. G.G.54
When the point $(2, -5)$ is reflected in the *x*-axis, what are the coordinates of its image?

[A] (-5, 2) [B] (-2, 5)

[C] (5, 2) [D] (2, 5)

9. 010918a, P.I. G.G.54
What is the image of point (-3,7) after a reflection in the *x*-axis?

[A] (-3,-7) [B] (3,7)

[C] (3,-7) [D] (7,-3)

10. 080713a, P.I. G.G.54
What are the coordinates of point $(2, -3)$ after it is reflected over the *x*-axis?

[A] (-3, 2) [B] (2, 3)

[C] (-2, 3) [D] (-2, -3)

11. 060825a, P.I. G.G.54
Point (-2, 3) is reflected in the *x*-axis. In which quadrant does its image lie?

[A] II [B] IV [C] I [D] III

12. 060905ge, P.I. G.G.54
Point *A* is located at (4,-7). The point is reflected in the *x*-axis. Its image is located at

[A] (-4,-7) [B] (4,7)

[C] (-4,7) [D] (7,-4)

13. 060306b, P.I. G.G.54
What are the coordinates of point *P*, the image of point (3,-4) after a reflection in the line $y = x$?

[A] (-3,4) [B] (-4,3)

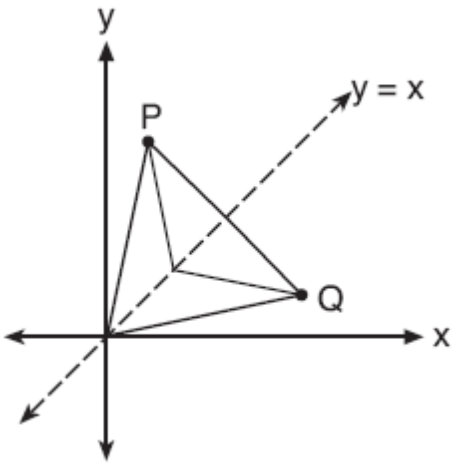
[C] (4,-3) [D] (3,4)

14. 060710b, P.I. G.G.54
A function, f, is defined by the set {(2,3), (4,7), (-1,5)}. If f is reflected in the line $y = x$, which point will be in the reflection?

[A] (1,-5) [B] (5,-1)

[C] (-1,5) [D] (-5,1)

15. 010804b, P.I. G.G.54
Matthew is a fan of the Air Force's Thunderbirds flying team and is designing a jacket patch for the team, as shown in the accompanying diagram.

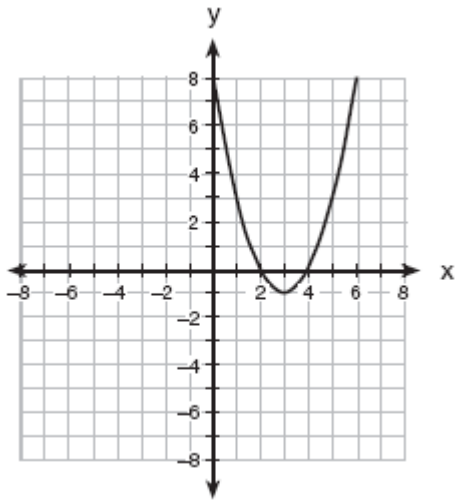


If P has the coordinates (a,b), what are the coordinates of Q, the reflection of P in the line $y = x$?

[A] (y,x) [B] (a,b)

[C] $(-a,b)$ [D] (b,a)

16. 010901b, P.I. G.G.54
The parabola shown in the accompanying diagram undergoes a reflection in the y-axis.



What will be the coordinates of the turning point after the reflection?

[A] (-3,-1) [B] (3,1)

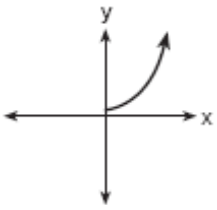
[C] (3,-1) [D] (-3,1)

17. 060908b, P.I. G.G.54
Point $A(1,0)$ is a point on the graph of the equation $y = x^2 - 4x + 3$. When point A is reflected across the axis of symmetry, what are the coordinates of its image, point A'?

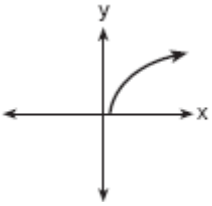
[A] (2,-1) [B] (0,3)

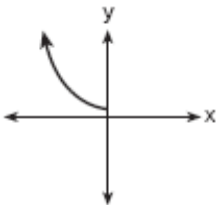
[C] (3,0) [D] (-1,2)

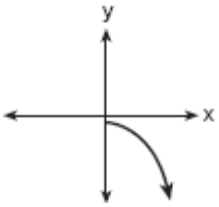
18. 080820b, P.I. G.G.54
The accompanying graph shows the relationship between kinetic energy, y, and velocity, x.

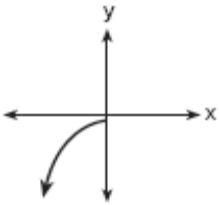


The reflection of this graph in the line $y = x$ is

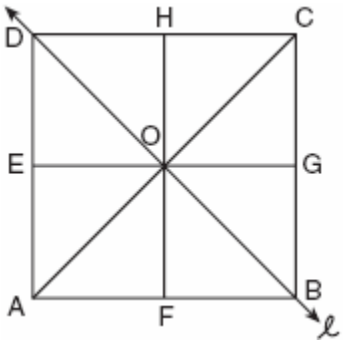
[A] 

[B] 

[C] 

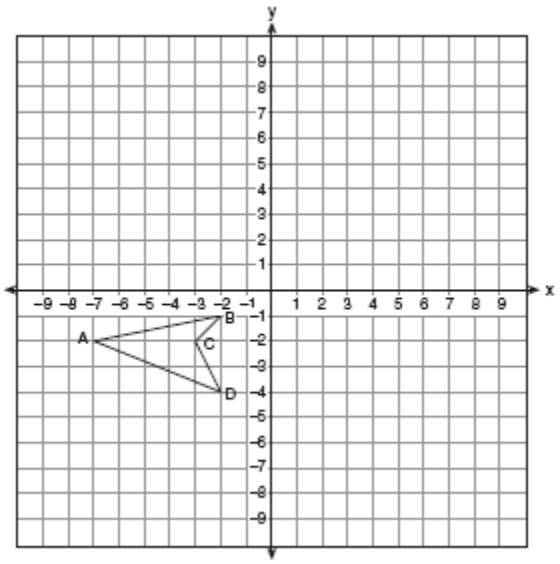
[D] 

19. 060424b, P.I. G.G.54
In the accompanying diagram of square $ABCD$, F is the midpoint of $\overline{AB}$, G is the midpoint of $\overline{BC}$, H is the midpoint of $\overline{CD}$, and E is the midpoint of $\overline{DA}$.



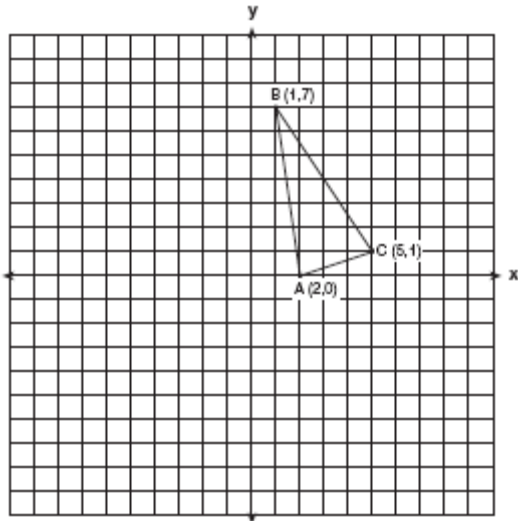
Find the image of ΔEOA after it is reflected in line ℓ. Is this isometry direct or opposite? Explain your answer.

20. 060537a, P.I. G.G.54
On the accompanying set of axes, draw the reflection of $ABCD$ in the y-axis. Label and state the coordinates of the reflected figure.



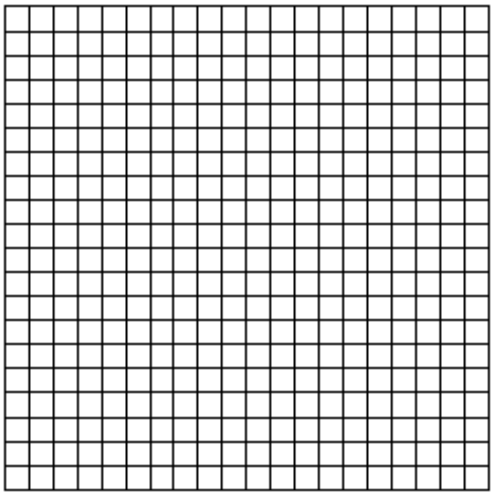
21. 080637a, P.I. G.G.54

Triangle ABC has coordinates $A(2,0)$, $B(1,7)$, and $C(5,1)$. On the accompanying set of axes, graph, label, and state the coordinates of $\Delta A'B'C'$, the reflection of ΔABC in the y-axis.



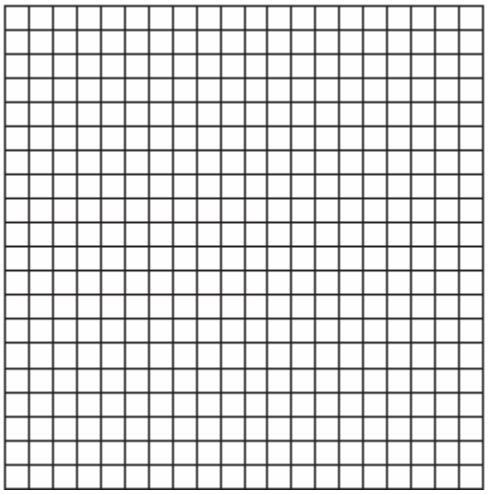
22. 010124a, P.I. G.G.54

The coordinates of the endpoints of $\overline{AB}$ are $A(0,2)$ and $B(4,6)$. Graph and state the coordinates of A' and B', the images of A and B after $\overline{AB}$ is reflected in the x-axis.



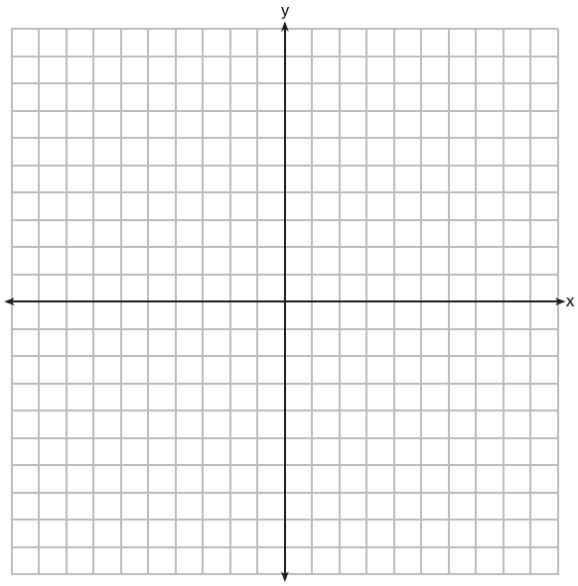
23. 060135a, P.I. G.G.54

Triangle SUN has coordinates $S(0,6)$, $U(3,5)$, and $N(3,0)$. On the accompanying grid, draw and label ΔSUN. Then, graph and state the coordinates of $\Delta S'U'N'$, the image of ΔSUN after a reflection in the y-axis.



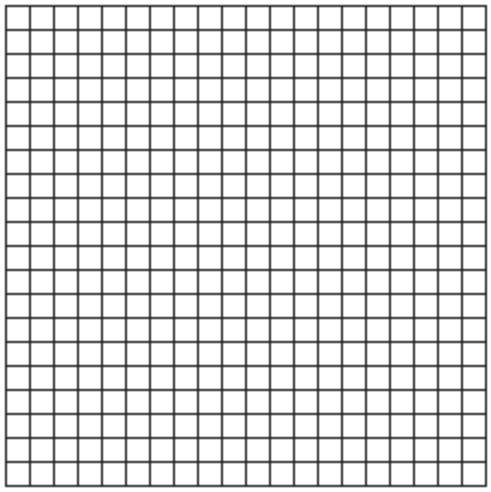
24. 060739a, P.I. G.G.54

Carson is a decorator. He often sketches his room designs on the coordinate plane. He has graphed a square table on his grid so that its corners are at the coordinates $A(2,6)$, $B(7,8)$, $C(9,3)$, and $D(4,1)$. To graph a second identical table, he reflects $ABCD$ over the y-axis. On the accompanying set of coordinate axes, sketch and label $ABCD$ and its image $A'B'C'D'$, which show the locations of the two tables. Then find the number of square units in the area of $ABCD$.



25. 010333a, P.I. G.G.54

On the accompanying grid, draw and label quadrilateral $ABCD$ with points $A(1,2)$, $B(6,1)$, $C(7,6)$, and $D(3,7)$. On the same set of axes, plot and label quadrilateral $A'B'C'D'$, the reflection of quadrilateral $ABCD$ in the y-axis. Determine the area, in square units, of quadrilateral $A'B'C'D'$.



26. fall0803ge, P.I. G.G.54

Triangle ABC has vertices $A(1,3)$, $B(0,1)$, and $C(4,0)$. Under a translation, A', the image point of A, is located at (4,4). Under this same translation, point C' is located at

[A] (1,-1) [B] (7,1)

[C] (3,2) [D] (5,3)

27. 060309a, P.I. G.G.54

A translation moves $P(3,5)$ to $P'(6,1)$. What are the coordinates of the image of point $(-3,-5)$ under the same translation?

[A] (-6,-1) [B] (0,-9)

[C] (-5,-3) [D] (-6,-9)

28. 010614a, P.I. G.G.54
The image of point (-2,3) under translation T is (3,-l). What is the image of point (4,2) under the same translation?

[A] (5,4) [B] (0,7)

[C] (-1,6) [D] (9,-2)

29. 080508b, P.I. G.G.54
The image of the origin under a certain translation is the point (2,-6). The image of point $(-3,-2)$ under the same translation is the point

[A] (-6,12) [B] (-5,4)

[C] $(-\frac{3}{2},\frac{1}{3})$ [D] (-1,-8)

30. spring9823a, P.I. G.G.54
A design was constructed by using two rectangles *ABDC* and *A'B'D'C'*. Rectangle *A'B'D'C'* is the result of a translation of rectangle *ABDC*. The table of translations is shown below. Find the coordinates of points *B* and *D'*.

Rectangle *ABDC*	Rectangle *A'B'D'C'*
A (2,4)	A' (3,1)
B	B' (-5,1)
C (2,-1)	C' (3,-4)
D (-6,-1)	D'

31. 010605b, P.I. G.G.54
Which transformation of the graph of $y = x^2$ would result in the graph of $y = x^2 + 2$?

[A] $r_{y=2}$ [B] $T_{0,2}$ [C] $R_{0,90}$ [D] D_2

32. 080801b, P.I. G.G.54
Which transformation of $y = 2^x$ results in the function $y = 2^x - 2$?

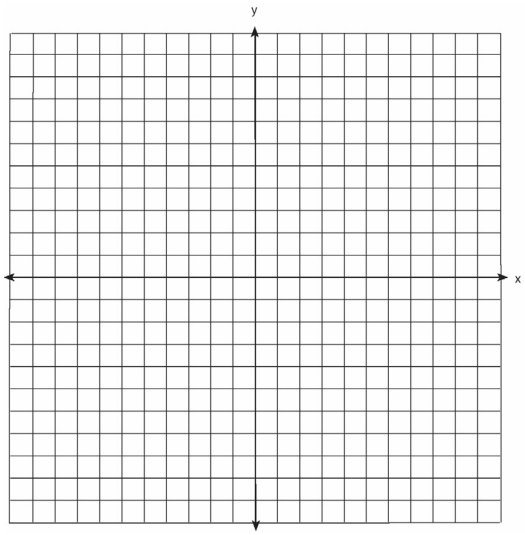
[A] $r_{x-\text{axis}}$ [B] $T_{0,-1}$

[C] $r_{y-\text{axis}}$ [D] $T_{0,-2}$

33. 080105b, P.I. G.G.54
Which transformation is a direct isometry?

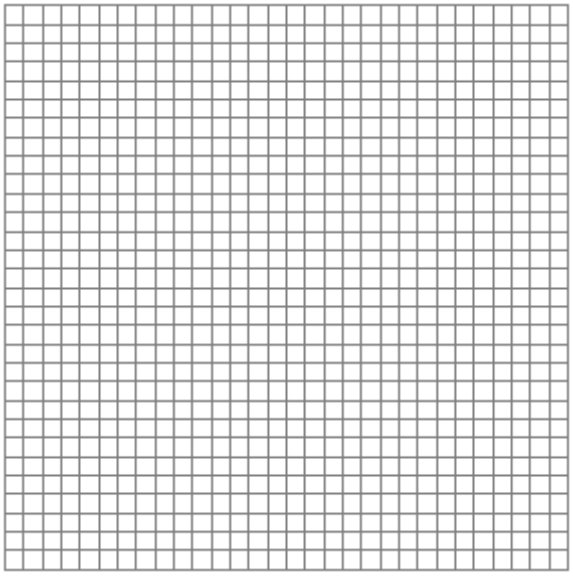
[A] r_{y-axis} [B] $T_{2,5}$ [C] D_2 [D] D_{-2}

34. 060129b, P.I. G.G.54
Two parabolic arches are to be built. The equation of the first arch can be expressed as $y = -x^2 + 9$, with a range of $0 \le y \le 9$, and the second arch is created by the transformation $T_{7,0}$. On the accompanying set of axes, graph the equations of the two arches. Graph the line of symmetry formed by the parabola and its transformation and label it with the proper equation.

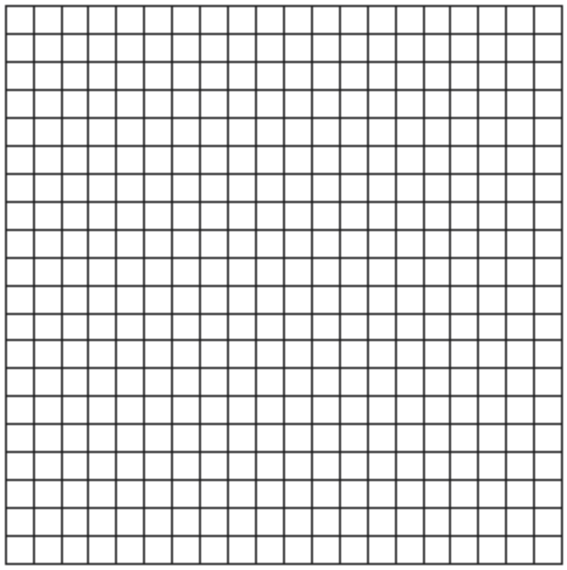


G.G.55: Investigate, justify, and apply the properties that remain invariant under translations, rotations, reflections, and glide reflections

35. fall0830ge, P.I. G.G.55
The vertices of ΔABC are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of ΔABC such that its image, $\Delta A'B'C'$, results in $\overline{AB} \parallel \overline{A'B'}$.

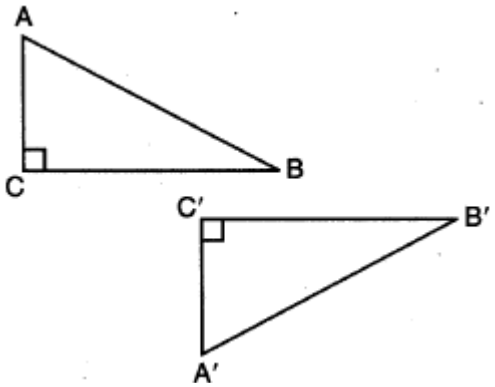


36. 080937ge, P.I. G.G.55
Triangle DEG has the coordinates $D(1,1)$, $E(5,1)$, and $G(5,4)$. Triangle DEG is rotated 90° about the origin to form $\Delta D'E'G'$. On the grid below, graph and label ΔDEG and $\Delta D'E'G'$. State the coordinates of the vertices D', E', and G'. Justify that this transformation preserves distance.



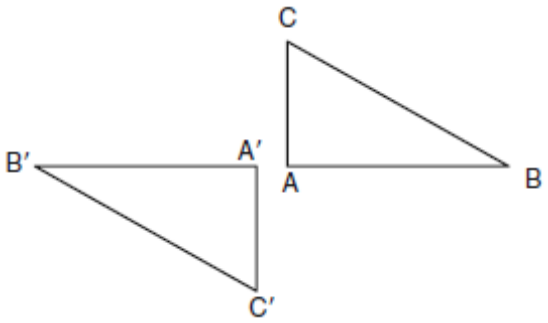
G.G.56: Identify specific isometries by observing orientation, numbers of invariant points, and/or parallelism

37. 080915ge, P.I. G.G.56
In the diagram below, which transformation was used to map ΔABC to $\Delta A'B'C'$?



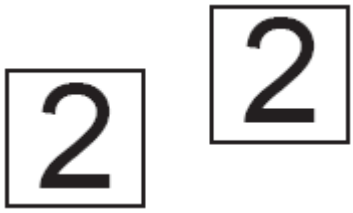
[A] rotation [B] glide reflection
[C] reflection [D] dilation

38. 060903ge, P.I. G.G.56
In the diagram below, under which transformation will $\Delta A'B'C'$ be the image of ΔABC?



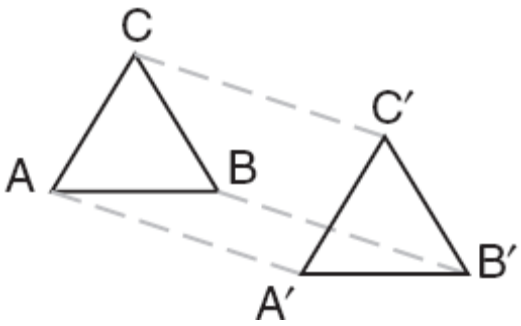
[A] translation [B] glide reflection
[C] rotation [D] dilation

39. 060812a, P.I. G.G.56
Which transformation is illustrated by the accompanying diagram?



[A] rotation [B] translation
[C] dilation [D] reflection

40. 080719a, P.I. G.G.56
In the accompanying diagram, $\Delta A'B'C'$ is the image of ΔABC and $\Delta A'B'C' \cong \Delta ABC$.



Which type of transformation is shown in the diagram?

[A] line reflection [B] rotation
[C] dilation [D] translation

41. 010701a, P.I. G.G.56
Which image represents a line reflection?

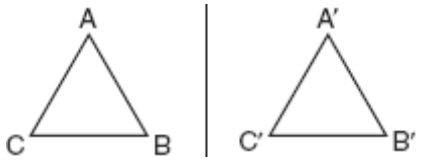
[A] 

[B]

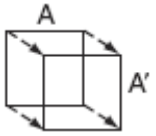
[C] 

[D] 

42. 010602a, P.I. G.G.56
Ms. Brewer's art class is drawing reflected images. She wants her students to draw images reflected in a line. Which diagram represents a correctly drawn image?

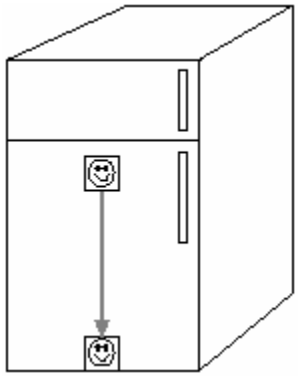
[A] 

[B] 

[C] 

[D] 

43. 060508a, P.I. G.G.56
A picture held by a magnet to a refrigerator slides to the bottom of the refrigerator, as shown in the accompanying diagram.

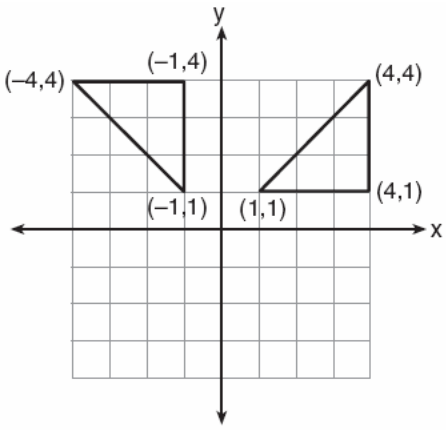


This change of position is an example of a

[A] reflection [B] rotation

[C] translation [D] dilation

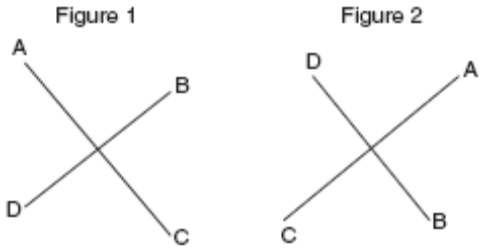
44. 060410a, P.I. G.G.56
Which type of transformation is illustrated in the accompanying diagram?



[A] dilation [B] translation

[C] reflection [D] rotation

45. 010305a, P.I. G.G.56
The accompanying diagram shows a transformation.

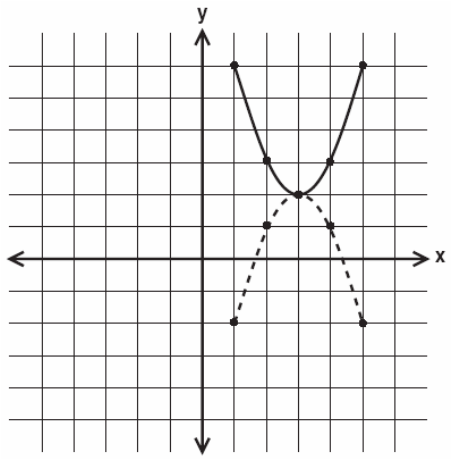


Which transformation performed on figure 1 resulted in figure 2?

[A] reflection [B] dilation

[C] translation [D] rotation

46. 080212a, P.I. G.G.56
In the accompanying diagram, which transformation changes the solid-line parabola to the dotted-line parabola?

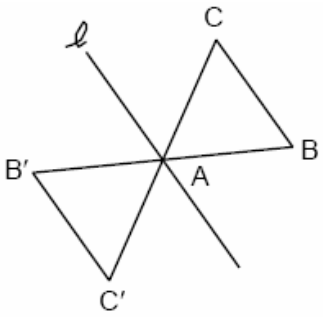


[A] line reflection or rotation

[B] translation [C] rotation, only

[D] line reflection, only

47. 089903a, P.I. G.G.56
The transformation of ΔABC to $\Delta AB'C'$ is shown in the accompanying diagram.



This transformation is an example of a

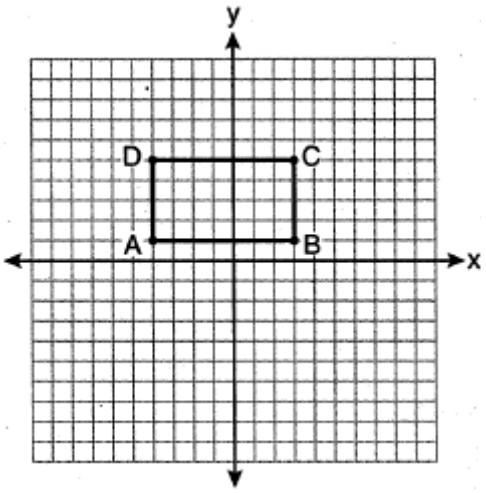
[A] translation [B] rotation about point A

[C] dilation

[D] line reflection in line ℓ

G.G.57: Justify geometric relationships (perpendicularity, parallelism, congruence) using transformational techniques (translations, rotations, reflections)

48. 080908ge, P.I. G.G.57
On the set of axes below, Geoff drew rectangle $ABCD$. He will transform the rectangle by using the translation $(x, y) \rightarrow (x+2, y+1)$ and then will reflect the translated rectangle over the x-axis.



What will be the area of the rectangle after these transformations?

[A] greater than 28 square units

[B] exactly 28 square units

[C] It cannot be determined from the information given.

[D] less than 28 square units

G.G.58: Define, investigate, justify, and apply similarities (dilations and the composition of dilations and isometries

49. 060013a, P.I. G.G.58
Which transformation does *not* always produce an image that is congruent to the original figure?

[A] rotation [B] translation

[C] dilation [D] reflection

50. 080611a, P.I. G.G.58
Which transformation does *not* always result in an image that is congruent to the original figure?

[A] reflection [B] translation

[C] dilation [D] rotation

51. 060603a, P.I. G.G.58
One function of a movie projector is to enlarge the image on the film. This procedure is an example of a

[A] line of symmetry [B] translation

[C] line reflection [D] dilation

52. 010210b, P.I. G.G.58
Which transformation is *not* an isometry?

[A] $r_{y=x}$ [B] D_2 [C] $T_{3,6}$ [D] $R_{0,90°}$

53. 080308b, P.I. G.G.58
Which transformation is *not* an isometry?

[A] translation [B] rotation

[C] dilation [D] line reflection

54. 010725a, P.I. G.G.58
The image of point A after a dilation of 3 is (6,15). What was the original location of point A?

[A] (2,5) [B] (9,18)

[C] (3,12) [D] (18,45)

55. 010311b, P.I. G.G.58
In which quadrant would the image of point $(5,-3)$ fall after a dilation using a factor of -3?

[A] I [B] II [C] IV [D] III

56. 080711b, P.I. G.G.58
Under a dilation with respect to the origin, the image of $P(-15,6)$ is $P'(-5,2)$. What is the constant of dilation?

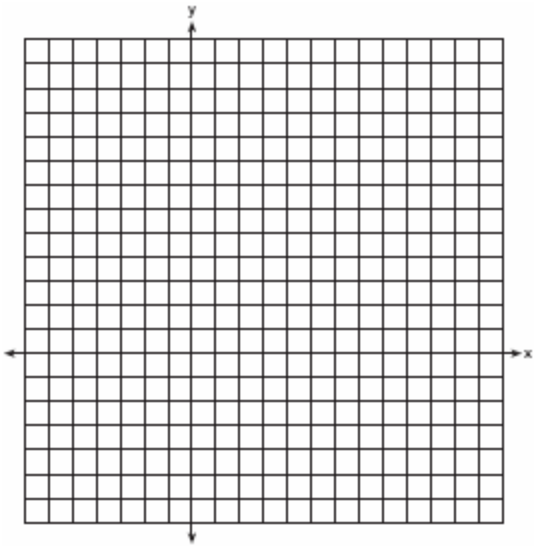
[A] 10 [B] -4 [C] 3 [D] $\frac{1}{3}$

57. 010803b, P.I. G.G.58
Under a dilation where the center of dilation is the origin, the image of $A(-2,-3)$ is $A'(-6,-9)$. What are the coordinates of B', the image of $B(4,0)$ under the same dilation?

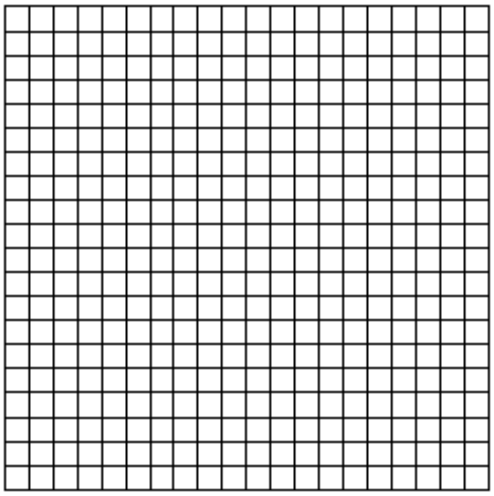
[A] (12,0) [B] (-12,0)

[C] (-4,0) [D] (4,0)

58. 080128a, P.I. G.G.58
On the accompanying set of axes, graph ΔABC with coordinates A(-1,2), B(0,6), and C(5,4). Then graph $\Delta A'B'C'$, the image of ΔABC after a dilation of 2.



59. 010937a, P.I. G.G.58
On the accompanying grid, graph and label quadrilateral *ABCD*, whose coordinates are *A*(-l,3), *B*(2,0), *C*(2,-l), and *D*(-3,-l). Graph, label, and state the coordinates of *A'B'C'D'*, the image of *ABCD* under a dilation of 2, where the center of dilation is the origin.



60. 060831b, P.I. G.G.58
The engineering office in the village of Whitesboro has a map of the village that is laid out on a rectangular coordinate system. A traffic circle located on the map is represented by the equation $(x+4)^2+(y-2)^2=81$. The village planning commission asks that the transformation D_2 be applied to produce a new traffic circle, where the center of dilation is at the origin. Find the coordinates of the center of the new traffic circle. Find the length of the radius of the new traffic circle.

61. 060911b, P.I. G.G.58
Using a drawing program, a computer graphics designer constructs a circle on a coordinate plane on her computer screen. She determines that the equation of the circle's graph is $(x-3)^2+(y+2)^2=36$. She then dilates the circle with the transformation D_3. After this transformation, what is the center of the new circle?

[A] (6,-5) [B] (9,-6)

[C] (-6,5) [D] (-9,6)

62. 010532a, P.I. G.G.58
Fran's favorite photograph has a length of 6 inches and a width of 4 inches. She wants to have it made into a poster with dimensions that are similar to those of the photograph. She determined that the poster should have a length of 24 inches. How many inches wide will the poster be?

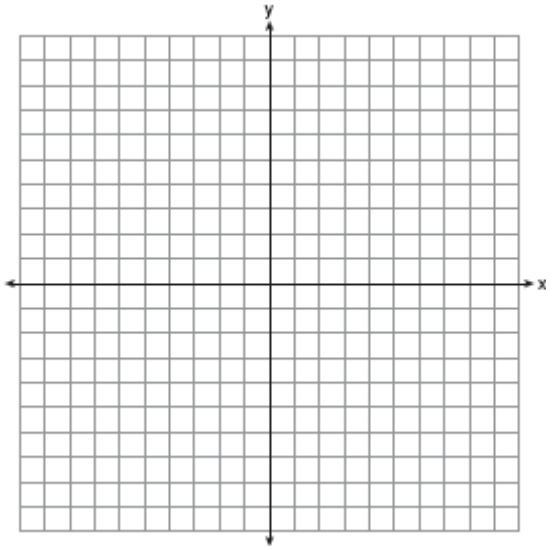
63. 089918a, P.I. G.G.58
The ratio of the corresponding sides of two similar squares is 1 to 3. What is the ratio of the area of the smaller square to the area of the larger square ?

[A] 1:3 [B] 1:9 [C] $1:\sqrt{3}$ [D] 1:6

64. 060322a, P.I. G.G.58
The lengths of the sides of two similar rectangular billboards are in the ratio 5:4. If 250 square feet of material is needed to cover the larger billboard, how much material, in square feet, is needed to cover the smaller billboard?

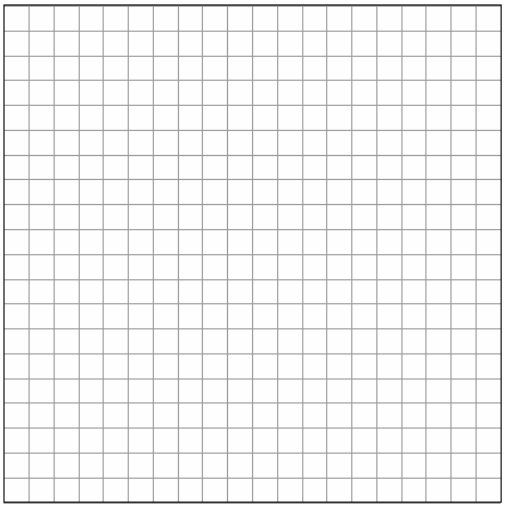
65. 060937ge, P.I. G.G.58

The coordinates of the vertices of parallelogram $ABCD$ are $A(-2,2)$, $B(3,5)$, $C(4,2)$, and $D(-1,-1)$. State the coordinates of the vertices of parallelogram $A''B''C''D''$ that result from the transformation $r_{y-\text{axis}} \circ T_{2,-3}$. [The use of the set of axes below is optional.]

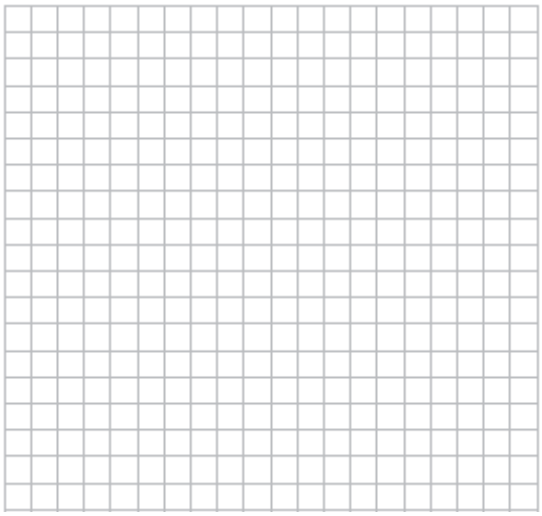


66. 060928b, P.I. G.G.58

On the accompanying grid, graph and label ΔABC with vertices $A(3,1)$, $B(0,4)$, and $C(-5,3)$. On the same grid, graph and label $\Delta A''B''C''$, the image of ΔABC after the transformation $r_{x-\text{axis}} \circ r_{y=x}$.



67. 010930b, P.I. G.G.58
Farmington, New York, has plans for a new triangular park. If plotted on a coordinate grid, the vertices would be $A(3,3)$, $B(5,-2)$, and $C(-3,-1)$. However, a tract of land has become available that would enable the planners to increase the size of the park, which is based on the following transformation of the original triangular park, $R_{270} \circ D_2$. On the grid below, graph and label both the original park ΔABC and its image, the new park $\Delta A''B''C''$, following the transformation.



68. fall0823ge, P.I. G.G.58
The endpoints of $\overline{AB}$ are $A(3,2)$ and $B(7,1)$. If $\overline{A''B''}$ is the result of the transformation of $\overline{AB}$ under $D_2 \circ T_{-4,3}$ what are the coordinates of A'' and B''?

[A] $A''(-1,5)$ and $B''(3,4)$

[B] $A''(-2,10)$ and $B''(6,8)$

[C] $A''(2,7)$ and $B''(10,5)$

[D] $A''(14,-2)$ and $B''(22,-4)$

69. 080715b, P.I. G.G.58
The coordinates of ΔJRB are $J(1,-2)$, $R(-3,6)$, and $B(4,5)$. What are the coordinates of the vertices of its image after the transformation $T_{2,-1} \circ r_{y-\text{axis}}$?

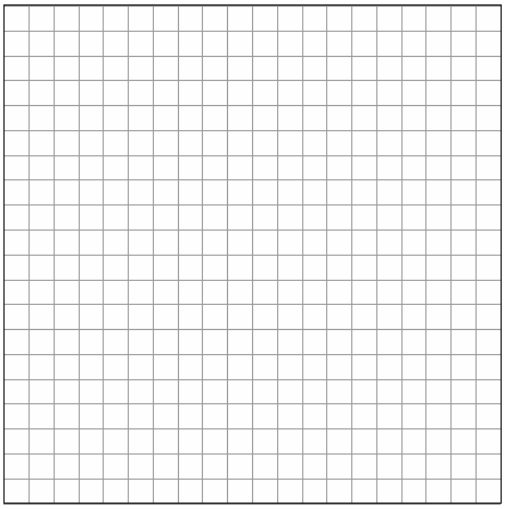
[A] (3,1), (-1,-7), (6,-6)

[B] (-1,-2), (3,6), (-4,5)

[C] (1,-3), (5,5), (-2,4)

[D] (3,-3), (-1,5), (6,4)

70. 080626b, P.I. G.G.58
Given point $A(-2,3)$. State the coordinates of the image of A under the composition $T_{-3,-4} \circ r_{x-axis}$. [The use of the grid is optional.]



71. 010618b, P.I. G.G.58
What are the coordinates of point A', the image of point $A(-4,1)$ after the composite transformation $R_{90°} \circ r_{y=x}$ where the origin is the center of rotation?

[A] (-1,-4) [B] (-4,-1)

[C] (4,1) [D] (1,4)

72. 010520b, P.I. G.G.58
If the coordinates of point A are (-2,3), what is the image of A under $r_{y-axis} \circ D_3$?

[A] (5,6) [B] (9,-6)

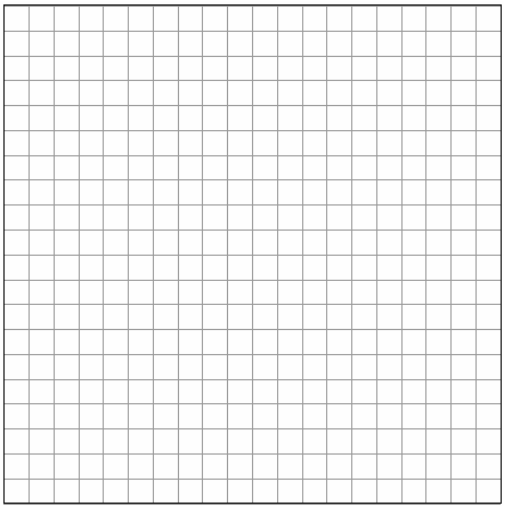
[C] (6,9) [D] (-6,-9)

73. 080413b, P.I. G.G.58
What is the image of point (1,1) under $r_{x-axis} \circ R_{0,90°}$?

[A] (1,1) [B] (-1,1)

[C] (1,-1) [D] (-1,-1)

74. 080327b, P.I. G.G.58
On the accompanying grid, graph and label $\overline{AB}$, where A is (0,5) and B is (2,0). Under the transformation $r_{x-axis} \circ r_{y-axis}(\overline{AB})$, A maps to A'' and B maps to B''. Graph and label $\overline{A''B''}$. What single transformation would map $\overline{AB}$ to $\overline{A''B''}$?

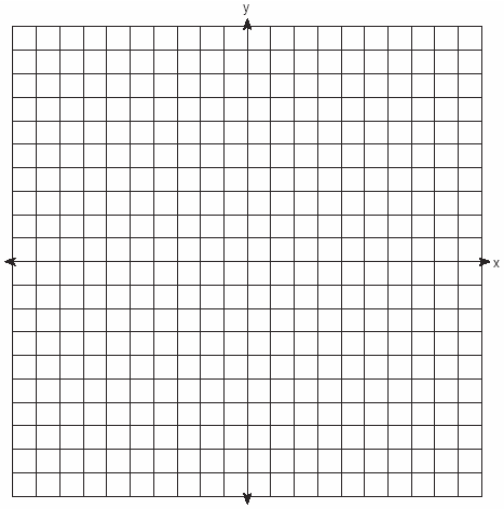


75. 080231b, P.I. G.G.58
Graph and label the following equations, a and b, on the accompanying set of coordinate axes.

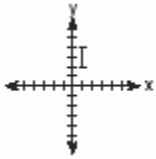
$$a: y = x^2$$

$$b: y = -(x-4)^2 + 3$$

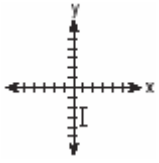
Describe the composition of transformations performed on a to get b.

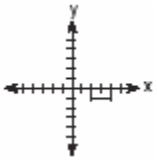


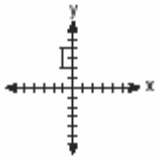
76. 080219b, P.I. G.G.58
The accompanying graph represents the figure ⌶ .

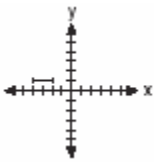


Which graph represents ⌶ after a transformation defined by $r_{y=x} \circ R_{90°}$?

[A] 

[B] 

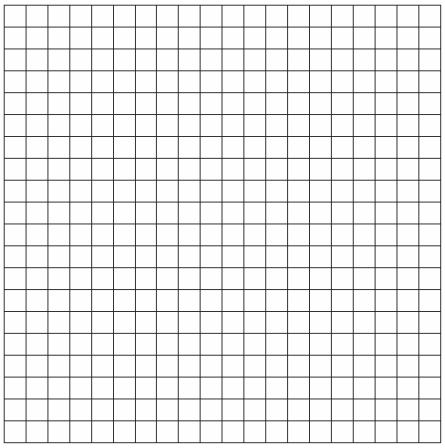
[C] 

[D] 

77. 010232b, P.I. G.G.58

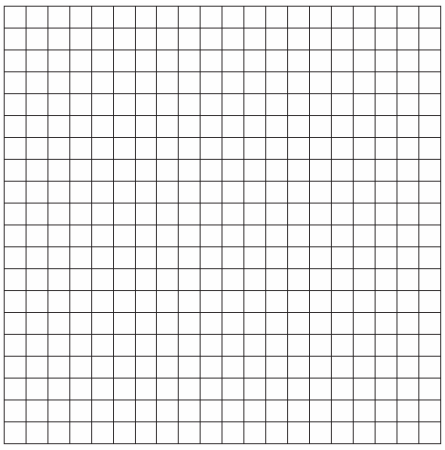
a On the accompanying grid, graph the equation $2y = 2x^2 - 4$ in the interval $-3 \le x \le 3$ and label it *a*.

b On the same grid, sketch the image of *a* under $T_{5,-2} \circ r_{x-axis}$ and label it *b*.



78. 080028a, P.I. G.G.58

The coordinates of the endpoints of $\overline{AB}$ are *A*(2,6) and *B*(4,2). Is the image $\overline{A''B''}$ the same if it is reflected in the *x*-axis, then dilated by $\frac{1}{2}$ as the image is if it is dilated by $\frac{1}{2}$, then reflected in the *x*-axis? Justify your answer.



G.G.59: Investigate, justify, and apply properties that remain invariant under similarities

79. 080906ge, P.I. G.G.59

Which transformation produces a figure similar but *not* congruent to the original figure?

[A] $D_{\frac{1}{2}}$ [B] $r_{y=x}$ [C] $T_{1,3}$ [D] $R_{90°}$

80. 080810b, P.I. G.G.59

Under the transformation $(x, y) \rightarrow (2x, 2y)$, which property is *not* preserved?

[A] orientation [B] distance

[C] parallelism [D] angle measure

81. 010302a, P.I. G.G.59

Triangle $A'B'C'$ is the image of ΔABC under a dilation such that $A'B' = 3AB$. Triangles *ABC* and $A'B'C'$ are

[A] congruent but not similar

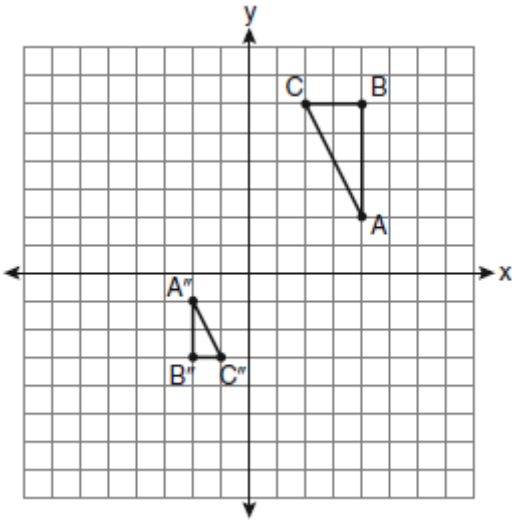
[B] neither congruent nor similar

[C] both congruent and similar

[D] similar but not congruent

G.G.60: Identify specific similarities by observing orientation, numbers of invariant points, and/or parallelism.

82. 060908ge, P.I. G.G.60
After a composition of transformations, the coordinates $A(4,2)$, $B(4,6)$, and $C(2,6)$ become $A''(-2,-1)$, $B''(-2,-3)$, and $C''(-1,-3)$, as shown on the set of axes below.

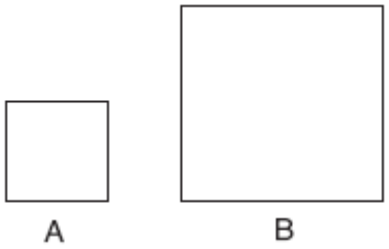


Which composition of transformations was used?

[A] $D_{\frac{1}{2}} \circ R_{90°}$ [B] $D_{\frac{1}{2}} \circ R_{180°}$

[C] $R_{90°} \circ D_2$ [D] $R_{180°} \circ D_2$

83. 010804a, P.I. G.G.60
In the accompanying diagram, figure B is the image of figure A.

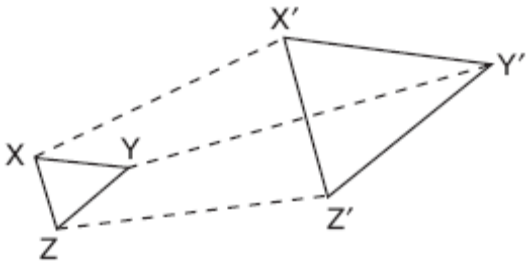


Which type of transformation was performed?

[A] reflection [B] dilation

[C] translation [D] rotation

84. 060711a, P.I. G.G.60
The accompanying diagram shows the transformation of ΔXYZ to $\Delta X'Y'Z'$.

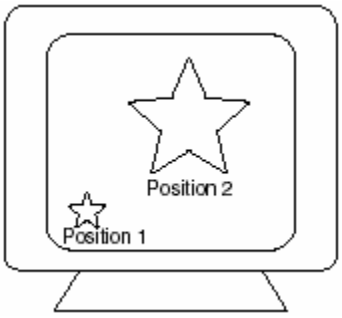


This transformation is an example of a

[A] rotation [B] translation

[C] line reflection [D] dilation

85. 080506a, P.I. G.G.60
As shown in the accompanying diagram, the star in position 1 on a computer screen transforms to the star in position 2.

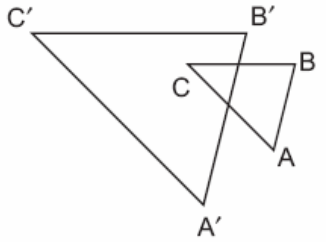


This transformation is best described as a

[A] line reflection [B] dilation

[C] translation [D] rotation

86. 060216a, P.I. G.G.60
In the accompanying diagram, ΔABC is similar to but not congruent to $\Delta A'B'C'$. Which transformation is represented by $\Delta A'B'C'$?



[A] translation [B] dilation

[C] rotation [D] reflection

G.G.61: Investigate, justify, and apply the analytical representations for translations, rotations about the origin of 90º and 180º, reflections over the lines x=0, y=0, and y=x, and dilations centered at the origin

87. fall0818ge, P.I. G.G.61
A polygon is transformed according to the rule: $(x, y) \rightarrow (x + 2, y)$. Every point of the polygon moves two units in which direction?

[A] down [B] right [C] left [D] up

88. 080908b, P.I. G.G.61
Which type of transformation is $(x, y) \rightarrow (x + 2, y - 2)$?

[A] dilation [B] reflection

[C] translation [D] rotation

89. 060402a, P.I. G.G.61
What is the image of (x, y) after a translation of 3 units right and 7 units down?

[A] $(x - 3, y + 7)$ [B] $(x + 3, y - 7)$

[C] $(x - 3, y - 7)$ [D] $(x + 3, y + 7)$

90. 069903a, P.I. G.G.61
What is the image of point (2,5) under the translation that shifts (x,y) to $(x + 3, y - 2)$?

[A] (5,8) [B] (5,3) [C] (0,8) [D] (0,3)

91. 080409a, P.I. G.G.61
What are the coordinates of P', the image of $P(-4, 0)$ under the translation $(x - 3, y + 6)$?

[A] (1,6) [B] (7,-6)

[C] (-7,6) [D] (2,-3)

92. 010509a, P.I. G.G.61
The image of point (3,-5) under the translation that shifts (x,y) to $(x - 1, y - 3)$ is

[A] (2,-8) [B] (-4,8)

[C] (-3,15) [D] (2,8)

93. 080609a, P.I. G.G.61
What is the image of point (-3, 4) under the translation that shifts (x,y) to $(x-3, y+2)$?

[A] (6,6) [B] (-6,8)

[C] (0,6) [D] (-6,6)

94. 010719b, P.I. G.G.61
Which transformation represents a dilation?

[A] $(8,4) \rightarrow (11,7)$ [B] $(8,4) \rightarrow (-8,4)$

[C] $(8,4) \rightarrow (4,2)$ [D] $(8,4) \rightarrow (-4,-8)$

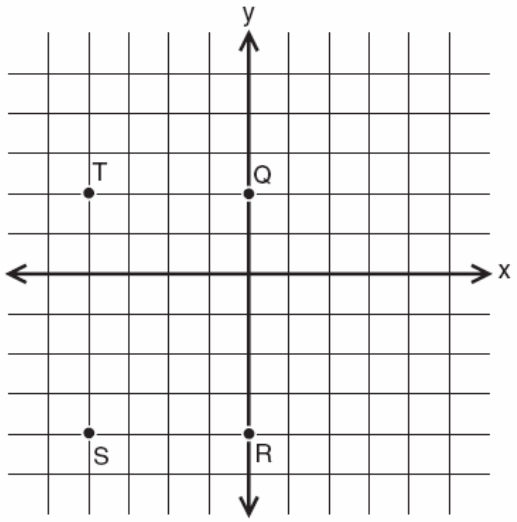
95. 010507b, P.I. G.G.61
Which transformation is an example of an opposite isometry?

[A] $(x,y) \rightarrow (y,x)$ [B] $(x,y) \rightarrow (y,-x)$

[C] $(x,y) \rightarrow (3x,3y)$

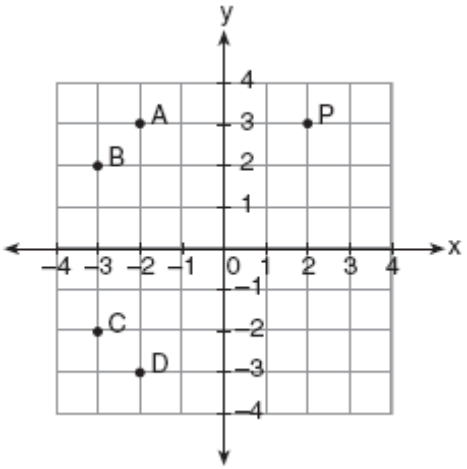
[D] $(x,y) \rightarrow (x + 3,y - 6)$

96. 080211a, P.I. G.G.61
If $x = -2$ and $y = -1$, which point on the accompanying set of axes represents the translation $(x, y) \rightarrow (x+2, y-3)$?



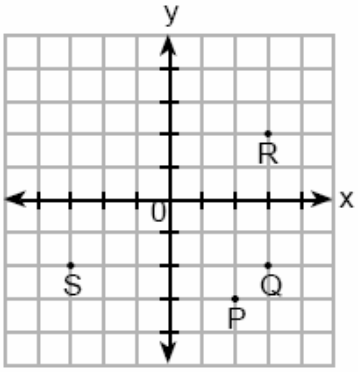
[A] *S* [B] *Q* [C] *R* [D] *T*

97. 010418a, P.I. G.G.61
In the accompanying graph, if point *P* has coordinates (a,b), which point has coordinates $(-b,a)$?



[A] *B* [B] *D* [C] *A* [D] *C*

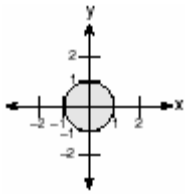
98. 069908a, P.I. G.G.61
If $x = -3$ and $y = 2$, which point on the accompanying graph represents $(-x, -y)$?



[A] *R* [B] *S* [C] *Q* [D] *P*

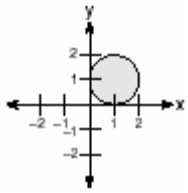
99. 060405b, P.I. G.G.61

In the accompanying graph, the shaded region represents set A of all points (x,y) such that $x^2 + y^2 \le 1$. The transformation T maps point (x, y) to point $(2x, 4y)$.

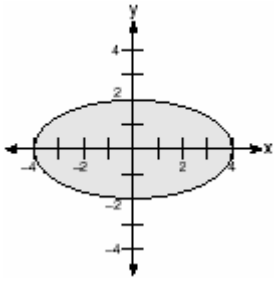


Which graph shows the mapping of set A by the transformation T?

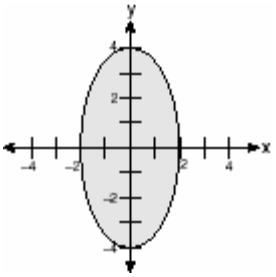
[A]



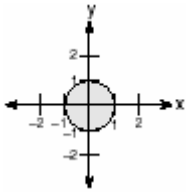
[B]



[C]

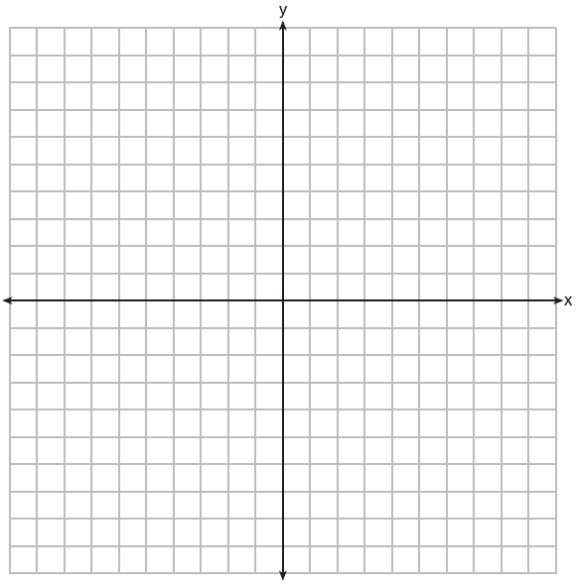


[D]



100. 080838a, P.I. G.G.61

On the accompanying set of axes, draw ΔABC, whose coordinates are $A(-7,9)$, $B(-2,8)$, and $C(-3,4)$. Then draw, label, and state the coordinates of $\Delta A'B'C'$, the image of ΔABC after the transformation that maps (x, y) to $(-x,-y)$. Based on your diagram, identify the type of transformation that was performed.



G.G.62: Find the slope of a perpendicular line, given the equation of a line

1. 080917ge, P.I. G.G.62
What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

[A] $-\frac{3}{2}$ [B] $\frac{3}{2}$ [C] $\frac{2}{3}$ [D] $-\frac{2}{3}$

2. fall0828ge, P.I. G.G.62
What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

[A] $-\frac{3}{5}$ [B] $\frac{3}{5}$ [C] $\frac{5}{3}$ [D] $-\frac{5}{3}$

G.G.63: Determine whether two lines are parallel, perpendicular, or neither, given their equations

3. fall0822ge, P.I. G.G.63
The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are

[A] neither parallel nor perpendicular

[B] perpendicular

[C] the same line [D] parallel

4. 060722a, P.I. G.G.63
Which statement describes the lines whose equations are $y = \frac{1}{3}x + 12$ and $6y = 2x + 6$?

[A] They are segments.

[B] They are perpendicular to each other.

[C] They intersect each other.

[D] They are parallel to each other.

5. 080909ge, P.I. G.G.63
What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?

[A] $x + y = 5$ [B] $2x + y = -2$

[C] $y - x = -1$ [D] $y - 2x = 3$

6. 060926ge, P.I. G.G.63
Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?

[A] $2y = 3x + 6$ [B] $2y = -3x + 6$

[C] $6y = -4x + 12$ [D] $3y = -2x + 12$

7. 060528a, P.I. G.G.63
Which equation represents a line that is perpendicular to the line whose equation is $-2y = 3x + 7$?

[A] $y = x + 7$ [B] $y = \frac{2}{3}x - 3$

[C] $y = \frac{3}{2}x - 3$ [D] $2y = 3x - 3$

8. 080630a, P.I. G.G.63
Which line is perpendicular to the line whose equation is $5y + 6 = -3x$?

[A] $y = -\frac{3}{5}x + 7$ [B] $y = \frac{5}{3}x + 7$

[C] $y = -\frac{5}{3}x + 7$ [D] $y = \frac{3}{5}x + 7$

9. 080130a, P.I. G.G.63
Shanaya graphed the line represented by the equation $y = x - 6$. Write an equation for a line that is parallel to the given line. Write an equation for a line that is perpendicular to the given line. Write an equation for a line that is identical to the given line but has different coefficients.

10. fall9925b, P.I. G.G.63
Given two lines whose equations are $3x + y - 8 = 0$ and $-2x + by + 9 = 0$, determine the value of *b* such that the two lines will be perpendicular.

G.G.64: Find the equation of a line, given a point on the line and the equation of a line perpendicular to the given line

11. 060907ge, P.I. G.G.64
What is an equation of the line that passes through the point (-2,5) and is perpendicular to the line whose equation is $y = \frac{1}{2}x + 5$?

[A] $y = -2x - 9$ [B] $y = 2x + 1$

[C] $y = 2x + 9$ [D] $y = -2x + 1$

12. 010834a, P.I. G.G.64
Write an equation of a line that is perpendicular to the line $y = \frac{2}{3}x + 5$ and that passes through the point (0,4).

G.G.65: Find the equation of a line, given a point on the line and the equation of a line parallel to the desired line

13. 080931ge, P.I. G.G.65
Write an equation of the line that passes through the point $(6,-5)$ and is parallel to the line whose equation is $2x - 3y = 11$.

14. fall0812ge, P.I. G.G.65
What is the equation of a line that passes through the point $(-3,-11)$ and is parallel to the line whose equation is $2x - y = 4$?

[A] $y = -\frac{1}{2}x - \frac{25}{2}$ [B] $y = 2x + 5$

[C] $y = \frac{1}{2}x + \frac{25}{2}$ [D] $y = 2x - 5$

15. 060931ge, P.I. G.G.65
Find an equation of the line passing through the point (5,4) and parallel to the line whose equation is $2x + y = 3$.

G.G.66: Find the midpoint of a line segment, given its endpoints

16. 080910ge, P.I. G.G.66
The endpoints of $\overline{CD}$ are $C(-2,-4)$ and $D(6,2)$. What are the coordinates of the midpoint of $\overline{CD}$?

[A] (4,3) [B] (4,–2)

[C] (2,3) [D] (2,–1)

17. fall0813ge, P.I. G.G.66
Line segment *AB* has endpoints *A*(2,-3) and *B*(-4,6). What are the coordinates of the midpoint of $\overline{AB}$?

[A] $(-1,1\frac{1}{2})$ [B] $(3,4\frac{1}{2})$

[C] $(-1,3)$ [D] $(-2,3)$

18. 060822a, P.I. G.G.66
What is the midpoint of the line segment that joins points $(4,-2)$ and $(-2,5)$?

[A] $(1,\frac{3}{2})$ [B] $(2,\frac{3}{2})$

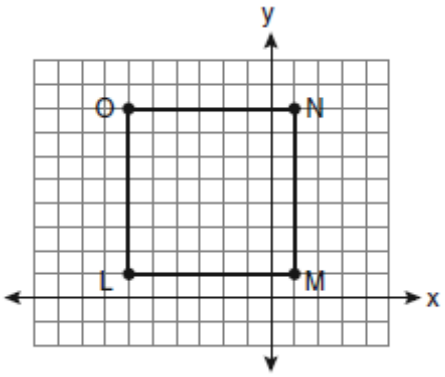
[C] $(\frac{3}{2},3)$ [D] $(1,\frac{7}{2})$

19. 080624a, P.I. G.G.66
The coordinates of *A* are (-9, 2) and the coordinates of *G* are (3, 14). What are the coordinates of the midpoint of $\overline{AG}$?

[A] (-6,16) [B] (-21,-10)

[C] (-3,8) [D] (-6,6)

20. 060919ge, P.I. G.G.66
Square *LMNO* is shown in the diagram below.



What are the coordinates of the midpoint of diagonal $\overline{LN}$?

[A] $(-3\frac{1}{2},3\frac{1}{2})$ [B] $(-2\frac{1}{2},3\frac{1}{2})$

[C] $(4\frac{1}{2},-2\frac{1}{2})$ [D] $(-2\frac{1}{2},4\frac{1}{2})$

21. 080217a, P.I. G.G.66
M is the midpoint of $\overline{AB}$. If the coordinates of *A* are (-1,5) and the coordinates of *M* are (3,3), what are the coordinates of *B*?

[A] (2,8) [B] (7,1)

[C] (-5,7) [D] (1,4)

22. 010914a, P.I. G.G.66
The midpoint of $\overline{AB}$ has coordinates of (5,-l). If the coordinates of *A* are (2,-3), what are the coordinates of *B*?

[A] (3.5,-2) [B] (8,-5)

[C] (7,0) [D] (8,1)

23. 010718a, P.I. G.G.66
The midpoint of $\overline{AB}$ is $(-1,5)$ and the coordinates of point *A* are $(-3,2)$. What are the coordinates of point *B*?

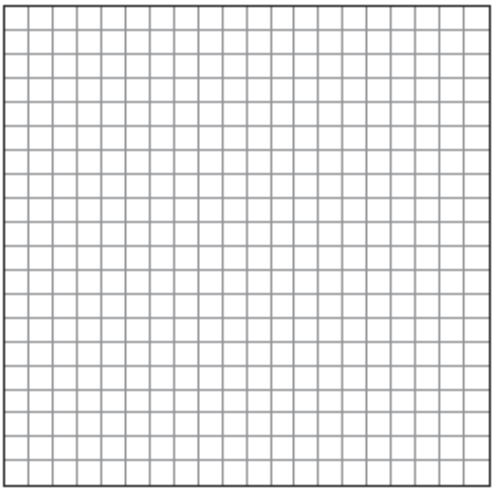
[A] (1,8) [B] (0,7)

[C] (1,10) [D] (-5,8)

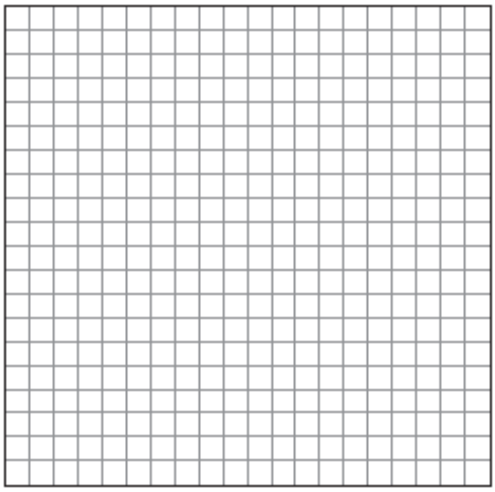
24. 080515a, P.I. G.G.66
A line segment on the coordinate plane has endpoints (2,4) and (4,*y*). The midpoint of the segment is point (3,7). What is the value of *y*?

[A] 10 [B] 5 [C] 11 [D] -2

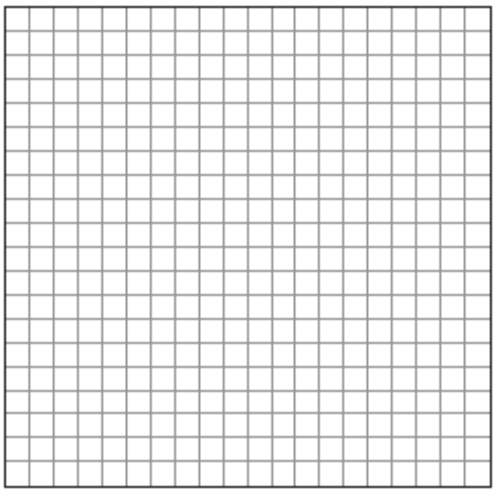
25. 060434a, P.I. G.G.66
The coordinates of the midpoint of $\overline{AB}$ are (2,4), and the coordinates of point *B* are (3,7). What are the coordinates of point *A*? [The use of the grid is optional.]



26. 080834a, P.I. G.G.66
One endpoint of a line segment is (6,2). The midpoint of the segment is (2,0). Find the coordinates of the other endpoint. [The use of the grid is optional.]



27. 010021a, P.I. G.G.66
The midpoint *M* of line segment *AB* has coordinates (-3,4). If point *A* is the origin, (0,0), what are the coordinates of point *B*? [The use of the grid is optional.]



G.G.67: Find the length of a line segment, given its endpoints

28. 080919ge, P.I. G.G.67
If the endpoints of $\overline{AB}$ are $A(-4,5)$ and $B(2,-5)$, what is the length of $\overline{AB}$?

[A] 8 [B] 2 [C] $\sqrt{61}$ [D] $2\sqrt{34}$

29. 080726a, P.I. G.G.67
What is the length of the line segment that joins the points whose coordinates are $(4,7)$ and $(-3,5)$?

[A] $\sqrt{5}$ [B] $\sqrt{193}$
[C] $3\sqrt{6}$ [D] $\sqrt{53}$

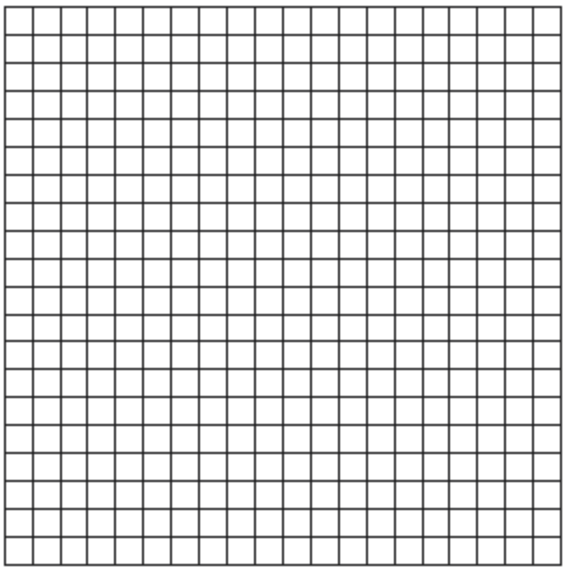
30. 010524a, P.I. G.G.67
The coordinates of point *R* are (-3,2) and the coordinates of point *T* are (4,1). What is the length of $\overline{RT}$?

[A] $4\sqrt{3}$ [B] $\sqrt{10}$
[C] $2\sqrt{2}$ [D] $5\sqrt{2}$

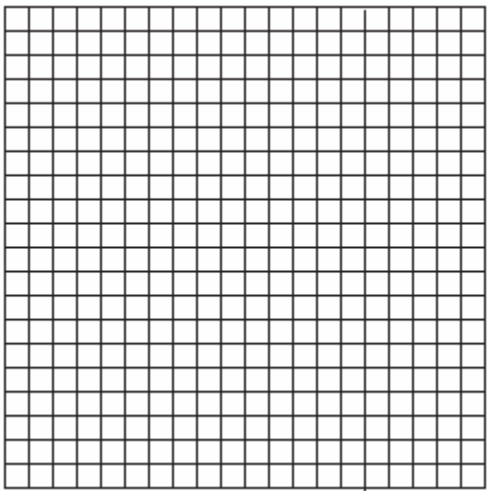
31. fall0831ge, P.I. G.G.67
The endpoints of $\overline{PQ}$ are *P*(-3,1) and *Q*(4,25). Find the length of $\overline{PQ}$.

G.G.68: Find the equation of a line that is the perpendicular bisector of a line segment, given the endpoints of the line segment

32. 080935ge, P.I. G.G.68
Write an equation of the perpendicular bisector of the line segment whose endpoints are $(-1,1)$ and $(7,-5)$. [The use of the grid below is optional]

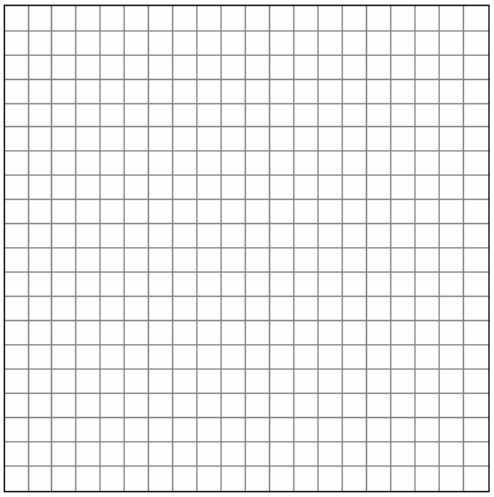


33. 080235a, P.I. G.G.68
Determine the distance between point $A(-1,-3)$ and point $B(5,5)$. Write an equation of the perpendicular bisector of $\overline{AB}$. [The use of the grid is optional.]



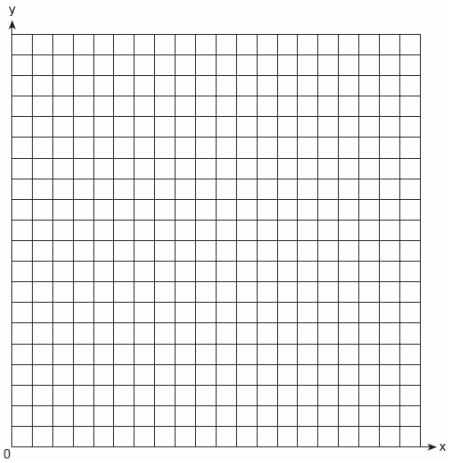
G.G.69: Investigate, justify, and apply the properties of triangle and quadrilaterals in the coordinate plane, using the distance, midpoint, and slope formulas

34. 060936ge, P.I. G.G.69
Triangle ABC has coordinates $A(-6,2)$, $B(-3,6)$, and $C(5,0)$. Find the perimeter of the triangle. Express your answer in simplest radical form. [The use of the grid below is optional.]

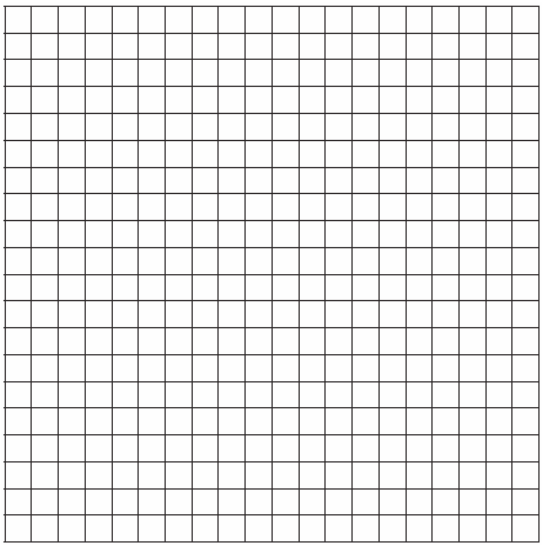


35. 060824b, P.I. G.G.69
The coordinates of quadrilateral $PRAT$ are $P(a,b)$, $R(a,b+3)$, $A(a+3,b+4)$, and $T(a+6,b+2)$. Prove that $\overline{RA}$ is parallel to $\overline{PT}$.

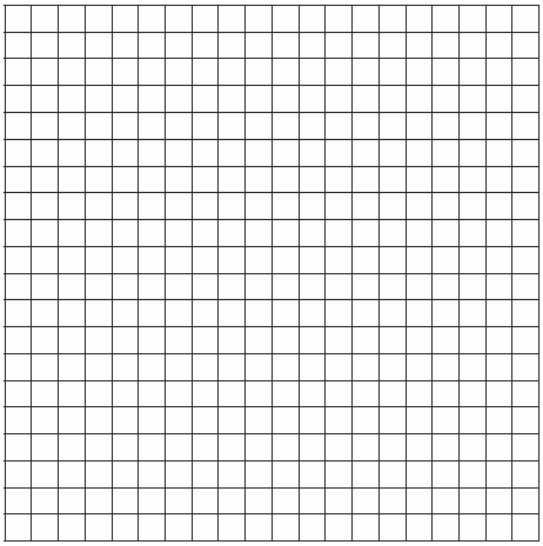
36. 080032a, P.I. G.G.69
Ashanti is surveying for a new parking lot shaped like a parallelogram. She knows that three of the vertices of parallelogram *ABCD* are *A*(0,0), *B*(5,2), and *C*(6,5). Find the coordinates of point *D* and sketch parallelogram *ABCD* on the accompanying set of axes. Justify mathematically that the figure you have drawn is a parallelogram.



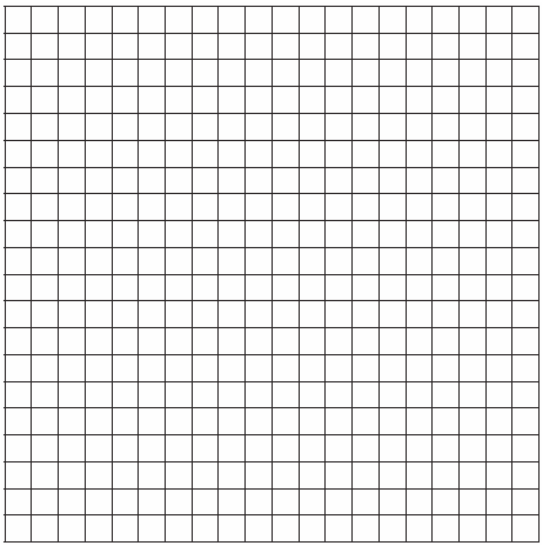
37. 060327b, P.I. G.G.69
The coordinates of quadrilateral *ABCD* are *A*(-1,-5), *B*(8,2), *C*(11,13), and *D*(2,6). Using coordinate geometry, prove that quadrilateral *ABCD* is a rhombus. [The use of the grid is optional.]



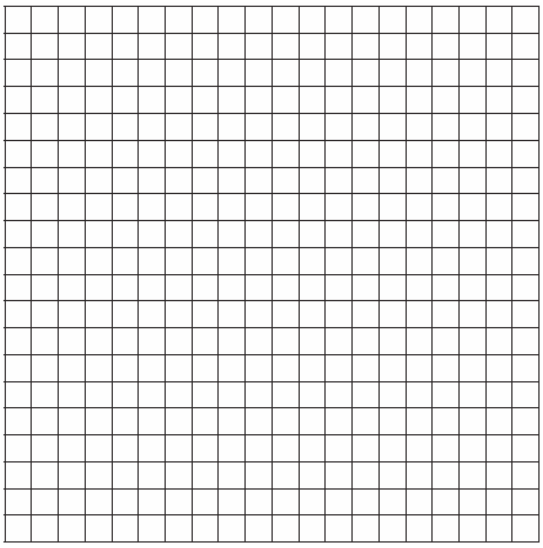
38. 010533b, P.I. G.G.69
Jim is experimenting with a new drawing program on his computer. He created quadrilateral *TEAM* with coordinates *T*(−2,3), *E*(−5,−4), *A*(2,−1), and *M*(5,6). Jim believes that he has created a rhombus but not a square. Prove that Jim is correct. [The use of the grid is optional.]



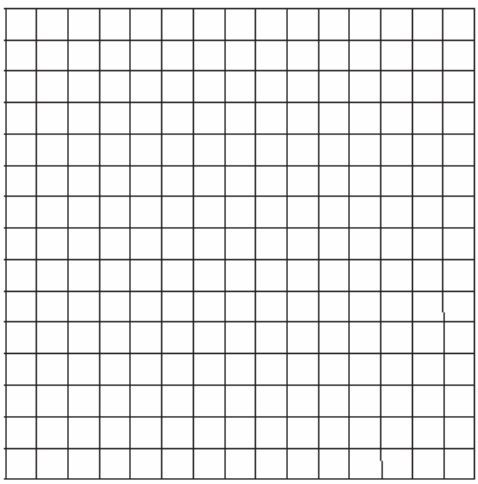
39. 060633b, P.I. G.G.69
Given: *A*(-2,2), *B*(6,5), *C*(4,0), *D*(-4,-3)
Prove: *ABCD* is a parallelogram but not a rectangle. [The use of the grid is optional.]



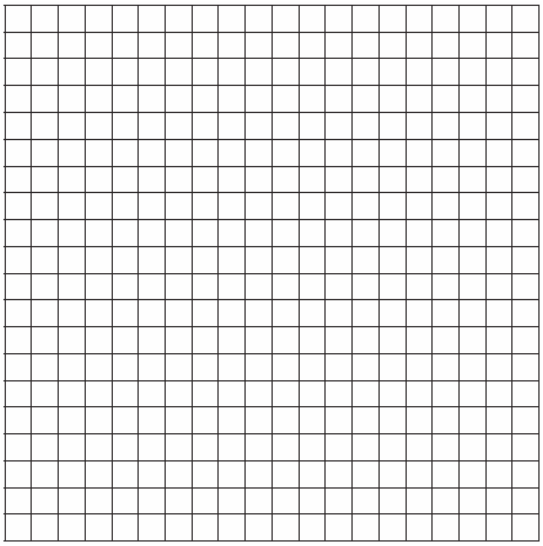
40. 060733b, P.I. G.G.69
Given: quadrilateral *ABCD* with vertices $A(-2,2)$, $B(8,-4)$, $C(6,-10)$, and $D(-4,-4)$. State the coordinates of *A'B'C'D'*, the image of quadrilateral *ABCD* under a dilation of factor $\frac{1}{2}$. Prove that *A'B'C'D'* is a parallelogram. [The use of the grid is optional.]



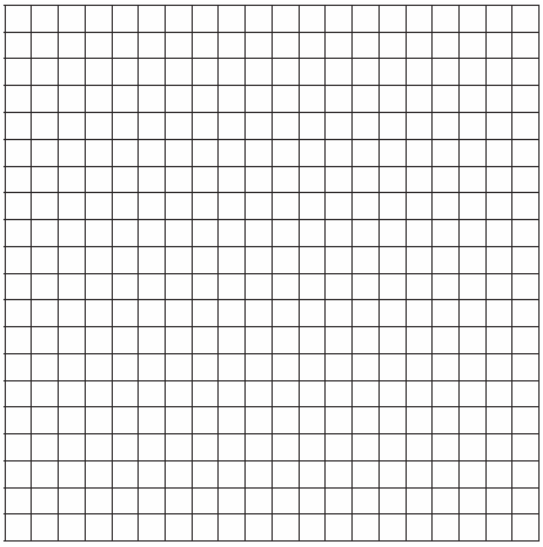
41. 080134b, P.I. G.G.69
Given: *A*(1,6), *B*(7,9), *C*(13,6), and *D*(3,1)
Prove: *ABCD* is a trapezoid. [*The use of the grid is optional.*]



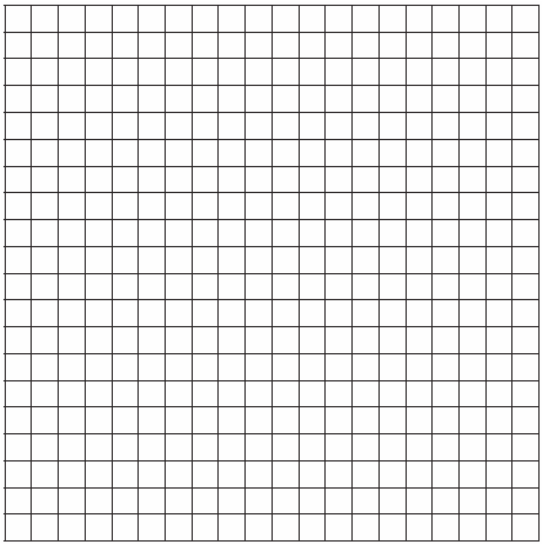
42. 010333b, P.I. G.G.69
Quadrilateral *KATE* has vertices *K*(1,5), *A*(4,7), *T*(7,3), and *E*(1,-1).
a Prove that *KATE* is a trapezoid. [The use of the grid is optional.]
b Prove that *KATE* is *not* an isosceles trapezoid.



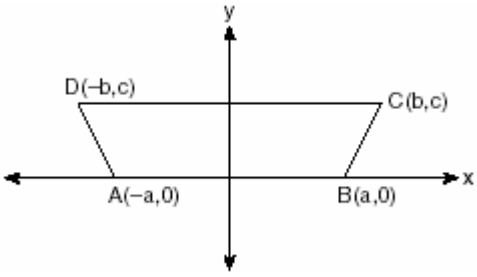
43. 080434b, P.I. G.G.69
The coordinates of quadrilateral *JKLM* are *J*(1,-2), *K*(13,4), *L*(6,8), and *M*(-2,4). Prove that quadrilateral *JKLM* is a trapezoid but not an isosceles trapezoid. [The use of the grid is optional.]



44. 080933b, P.I. G.G.69
Given: T(-l,l), R(3,4), A(7,2), and P(-l,-4)
Prove: *TRAP* is a trapezoid.
TRAP is *not* an isosceles trapezoid.
[The use of the grid is optional.]



45. 080534b, P.I. G.G.69
In the accompanying diagram of *ABCD*, where $a \neq b$, prove *ABCD* is an isosceles trapezoid.



G.G.70: Solve systems of equations involving one linear and one quadratic equation graphically

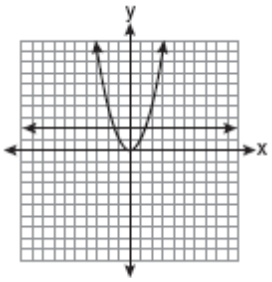
46. 060923ge, P.I. G.G.70
Given the system of equations: $y = x^2 - 4x$, $x = 4$
The number of points of intersection is
[A] 1 [B] 2 [C] 0 [D] 3

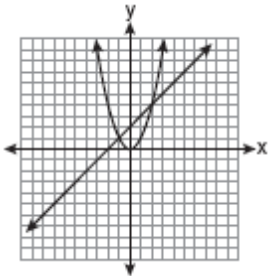
47. 080912ge, P.I. G.G.70
Given the equations: $y = x^2 - 6x + 10$, $y + x = 4$
What is the solution to the given system of equations?

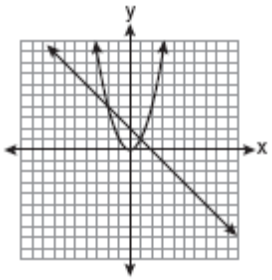
[A] (2,2) and (1,3) [B] (2,3)
[C] (2,2) and (3,1) [D] (3,2)

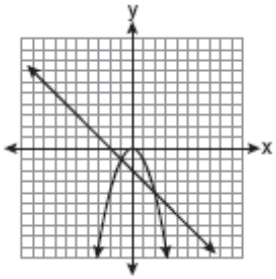
48. fall0805ge, P.I. G.G.70
Which graph could be used to find the solution to the following system of equations?

$$y = -x + 2$$
$$y = x^2$$

[A]


[B]


[C]


[D]


G.G.71: Write the equation of a circle, given its center and radius or given the endpoints of a diameter

49. 060008a, P.I. G.G.71
Which equation represents a circle whose center is (3, -2)?

[A] $(x-3)^2 + (y+2)^2 = 4$

[B] $(x+3)^2 + (y-2)^2 = 4$

[C] $(x-2)^2 + (y+3)^2 = 4$

[D] $(x+2)^2 + (y-3)^2 = 4$

50. 010514b, P.I. G.G.71
What is the equation of a circle with center $(-3,1)$ and radius 7?

[A] $(x+3)^2 + (y-1)^2 = 49$

[B] $(x+3)^2 + (y-1)^2 = 7$

[C] $(x-3)^2 + (y+1)^2 = 49$

[D] $(x-3)^2 + (y+1)^2 = 7$

51. 060910ge, P.I. G.G.71
What is an equation of a circle with its center at (-3,5) and a radius of 4?

[A] $(x+3)^2 + (y-5)^2 = 16$

[B] $(x-3)^2 + (y+5)^2 = 16$

[C] $(x+3)^2 + (y-5)^2 = 4$

[D] $(x-3)^2 + (y+5)^2 = 4$

52. 060110b, P.I. G.G.71
The center of a circular sunflower with a diameter of 4 centimeters is $(-2,1)$. Which equation represents the sunflower?

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

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

[C] $(x-2)^2+(y+1)^2=2$

[D] $(x+2)^2+(y-1)^2=2$

53. 010912b, P.I. G.G.71
A graphic designer is drawing a pattern of four concentric circles on the coordinate plane. The center of the circles is located at $(-2,1)$. The smallest circle has a radius of 1 unit. If the radius of each of the circles is one unit greater than the largest circle within it, what would be the equation of the fourth circle?

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

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

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

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

54. fall0820ge, P.I. G.G.71
The diameter of a circle has endpoints at $(-2,3)$ and $(6,3)$. What is an equation of the circle?

[A] $(x+2)^2+(y+3)^2=4$

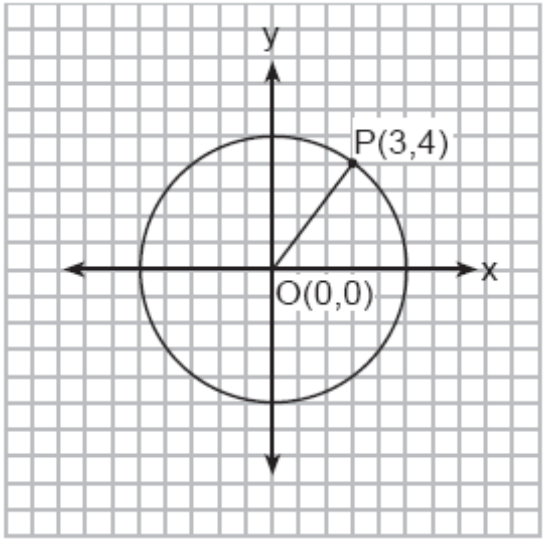
[B] $(x-2)^2+(y-3)^2=4$

[C] $(x+2)^2+(y+3)^2=16$

[D] $(x-2)^2+(y-3)^2=16$

G.G.72: Write the equation of a circle, given its graph Note: The center is an ordered pair of integers and the radius is an integer

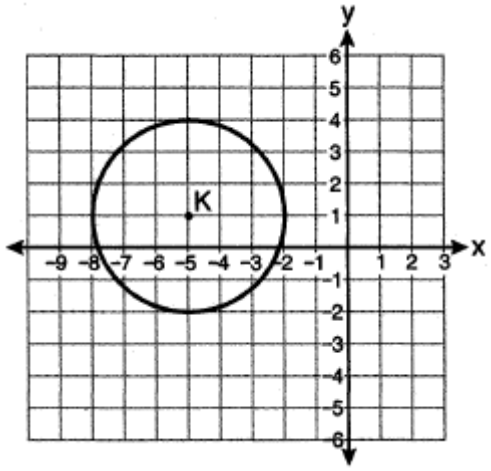
55. 080823a, P.I. G.G.72
In the accompanying diagram, the center of circle O is (0,0), and the coordinates of point P are (3,4). If $\overline{OP}$ is a radius, what is the equation of the circle?



[A] $x^2+y^2=25$ [B] $x^2+y^2=16$

[C] $x^2+y^2=5$ [D] $x^2+y^2=9$

56. 080921ge, P.I. G.G.72
Which equation represents circle *K* shown in the graph below?



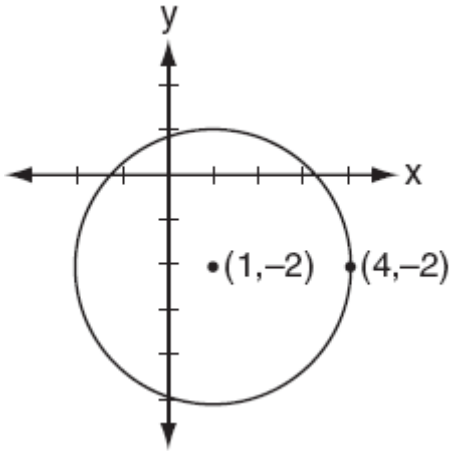
[A] $(x-5)^2+(y+1)^2=3$

[B] $(x+5)^2+(y-1)^2=9$

[C] $(x+5)^2+(y-1)^2=3$

[D] $(x-5)^2+(y+1)^2=9$

57. 010716b, P.I. G.G.72
Which equation represents the circle shown in the accompanying graph?



[A] $(x+1)^2-(y-2)^2=9$

[B] $(x+1)^2+(y-2)^2=9$

[C] $(x-1)^2-(y+2)^2=9$

[D] $(x-1)^2+(y+2)^2=9$

G.G.73: Find the equation of a circle, given the equation of the circle in center-radius form

58. 060506b, P.I. G.G.73
What are the coordinates of the center of the circle represented by the equation $(x+3)^2+(y-4)^2=25$?

[A] (-3,-4) [B] (-3,4)

[C] (3,4) [D] (3,-4)

59. 080404b, P.I. G.G.73
A circle has the equation $(x+1)^2+(y-3)^2=16$. What are the coordinates of its center and the length of its radius?

[A] (1,-3) and 16 [B] (-1,3) and 16

[C] (1,-3) and 4 [D] (-1,3) and 4

60. 080911ge, P.I. G.G.73
What are the center and the radius of the circle whose equation is $(x-3)^2+(y+3)^2=36$?

[A] center = $(-3,3)$; radius = 36

[B] center = $(3,-3)$; radius = 36

[C] center = $(3,-3)$; radius = 6

[D] center = $(-3,3)$; radius = 6

61. fall9917b, P.I. G.G.73
The center and radius of the given circle $(x-3)^2+(y+8)^2=39$ are:

[A] (-3, -8), $r=\sqrt{39}$ [B] (3, -8), $r=39$

[C] (3, -8), $r=\sqrt{39}$ [D] (-3, 8), $r=\sqrt{39}$

62. 060922ge, P.I. G.G.73
A circle is represented by the equation $x^2+(y+3)^2=13$. What are the coordinates of the center of the circle and the length of the radius?

[A] (0,-3) and $\sqrt{13}$ [B] (0,-3) and 13

[C] (0,3) and 13 [D] (0,3) and $\sqrt{13}$

63. fall0814ge, P.I. G.G.73
What are the center and radius of a circle whose equation is $(x-A)^2+(y-B)^2=C$?

[A] center = (A, B); radius = C

[B] center = $(-A, -B)$; radius = $\sqrt{C}$

[C] center = (A, B); radius = $\sqrt{C}$

[D] center = $(-A, -B)$; radius = C

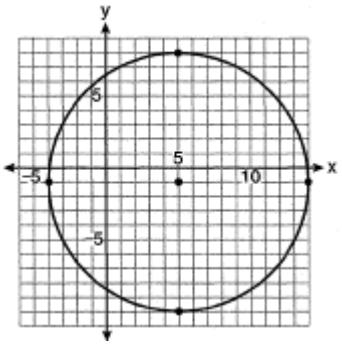
64. 010620b, P.I. G.G.73
The center of a circle represented by the equation $(x-2)^2+(y+3)^2=100$ is located in Quadrant

[A] I [B] IV [C] II [D] III

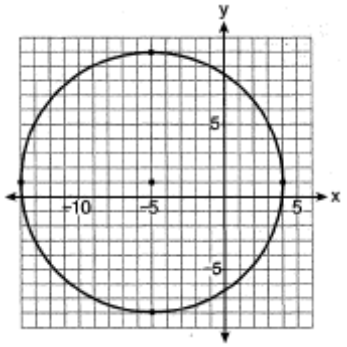
G.G.74: Graph circles of the form $(x-h)^2+(y-k)^2=r^2$

65. 060920ge, P.I. G.G.74
Which graph represents a circle with the equation $(x-5)^2+(y+1)^2=9$?

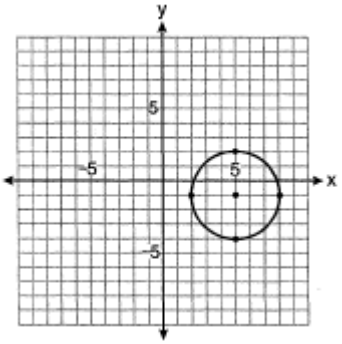
[A]



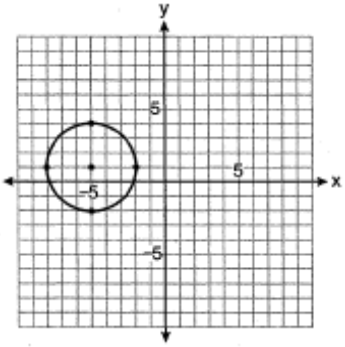
[B]



[C]



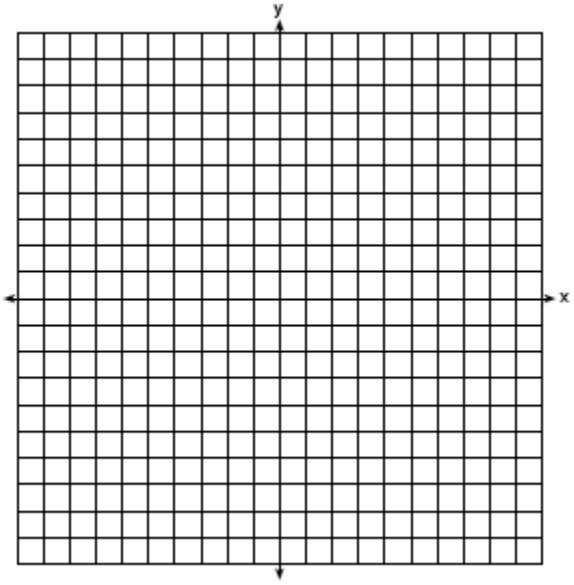
[D]



66. 010133a, P.I. G.G.74

John uses the equation $x^2 + y^2 = 9$ to represent the shape of a garden on graph paper.

a Graph $x^2 + y^2 = 9$ on the accompanying grid.



b What is the area of the garden to the *nearest square unit*?