JEFFERSON MATH PROJECT REGENTS BY PERFORMANCE INDICATOR: TOPIC

NY Geometry Regents Exam Questions from Fall 2008 to August 2011 Sorted by PI: Topic

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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.

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Geometry Regents Exam Questions by Performance Indicator: Topic

LINEAR EQUATIONS

G.G.62: PARALLEL AND PERPENDICULAR LINES

1 What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?

1 $\frac{1}{3}$

2 $-\frac{1}{3}$

3 3

4 –3

2 What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?

1 $-\frac{3}{2}$

2 $-\frac{2}{3}$

3 $\frac{2}{3}$

4 $\frac{3}{2}$

3 What is the slope of a line perpendicular to the line whose equation is $2y = -6x + 8$?

1 –3

2 $\frac{1}{6}$

3 $\frac{1}{3}$

4 –6

4 What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

1 $\frac{5}{3}$

2 $\frac{3}{5}$

3 $-\frac{3}{5}$

4 $-\frac{5}{3}$

5 What is the slope of a line that is perpendicular to the line whose equation is $3x + 4y = 12$?

1 $\frac{3}{4}$

2 $-\frac{3}{4}$

3 $\frac{4}{3}$

4 $-\frac{4}{3}$

6 What is the slope of a line that is perpendicular to the line whose equation is $3x + 5y = 4$?

1 $-\frac{3}{5}$

2 $\frac{3}{5}$

3 $-\frac{5}{3}$

4 $\frac{5}{3}$

7 What is the slope of a line that is perpendicular to the line represented by the equation $x + 2y = 3$?

1 –2

2 *2*

3 $-\frac{1}{2}$

4 $\frac{1}{2}$

8 Find the slope of a line perpendicular to the line whose equation is $2y - 6x = 4$.

G.G.63: PARALLEL AND PERPENDICULAR LINES

9 Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?
1 $6y = -4x + 12$
2 $2y = 3x + 6$
3 $2y = -3x + 6$
4 $3y = -2x + 12$

10 What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?
1 $x + y = 5$
2 $2x + y = -2$
3 $y - x = -1$
4 $y - 2x = 3$

11 Which equation represents a line parallel to the line whose equation is $2y - 5x = 10$?
1 $5y - 2x = 25$
2 $5y + 2x = 10$
3 $4y - 10x = 12$
4 $2y + 10x = 8$

12 Two lines are represented by the equations $-\frac{1}{2}y = 6x + 10$ and $y = mx$. For which value of m will the lines be parallel?
1 -12
2 -3
3 3
4 12

13 The lines represented by the equations $y + \frac{1}{2}x = 4$ and $3x + 6y = 12$ are
1 the same line
2 parallel
3 perpendicular
4 neither parallel nor perpendicular

14 The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
1 parallel
2 perpendicular
3 the same line
4 neither parallel nor perpendicular

15 The equation of line k is $y = \frac{1}{3}x - 2$. The equation of line m is $-2x + 6y = 18$. Lines k and m are
1 parallel
2 perpendicular
3 the same line
4 neither parallel nor perpendicular

16 The two lines represented by the equations below are graphed on a coordinate plane.

$$x + 6y = 12$$

$$3(x - 2) = -y - 4$$

Which statement best describes the two lines?
1 The lines are parallel.
2 The lines are the same line.
3 The lines are perpendicular.
4 The lines intersect at an angle other than 90°.

G.G.64: PARALLEL AND PERPENDICULAR LINES

17 What is an equation of the line that passes through the point $(-2,5)$ and is perpendicular to the line whose equation is $y = \frac{1}{2}x + 5$?

1 $y = 2x + 1$
2 $y = -2x + 1$
3 $y = 2x + 9$
4 $y = -2x - 9$

18 What is an equation of the line that contains the point $(3,-1)$ and is perpendicular to the line whose equation is $y = -3x + 2$?

1 $y = -3x + 8$
2 $y = -3x$
3 $y = \frac{1}{3}x$
4 $y = \frac{1}{3}x - 2$

19 Find an equation of the line passing through the point $(6,5)$ and perpendicular to the line whose equation is $2y + 3x = 6$.

G.G.65: PARALLEL AND PERPENDICULAR LINES

20 What is the equation of a line that passes through the point $(-3,-11)$ and is parallel to the line whose equation is $2x - y = 4$?

1 $y = 2x + 5$
2 $y = 2x - 5$
3 $y = \frac{1}{2}x + \frac{25}{2}$
4 $y = -\frac{1}{2}x - \frac{25}{2}$

21 What is an equation of the line that passes through the point $(7,3)$ and is parallel to the line $4x + 2y = 10$?

1 $y = \frac{1}{2}x - \frac{1}{2}$
2 $y = -\frac{1}{2}x + \frac{13}{2}$
3 $y = 2x - 11$
4 $y = -2x + 17$

22 What is an equation of the line that passes through the point $(-2,3)$ and is parallel to the line whose equation is $y = \frac{3}{2}x - 4$?

1 $y = \frac{-2}{3}x$
2 $y = \frac{-2}{3}x + \frac{5}{3}$
3 $y = \frac{3}{2}x$
4 $y = \frac{3}{2}x + 6$

23 Which lines is parallel to the line whose equation is $4x + 3y = 7$ and also passes through the point $(-5,2)$?

1 $4x + 3y = -26$
2 $4x + 3y = -14$
3 $3x + 4y = -7$
4 $3x + 4y = 14$

24 Which equation represents the line parallel to the line whose equation is $4x + 2y = 14$ and passing through the point $(2,2)$?

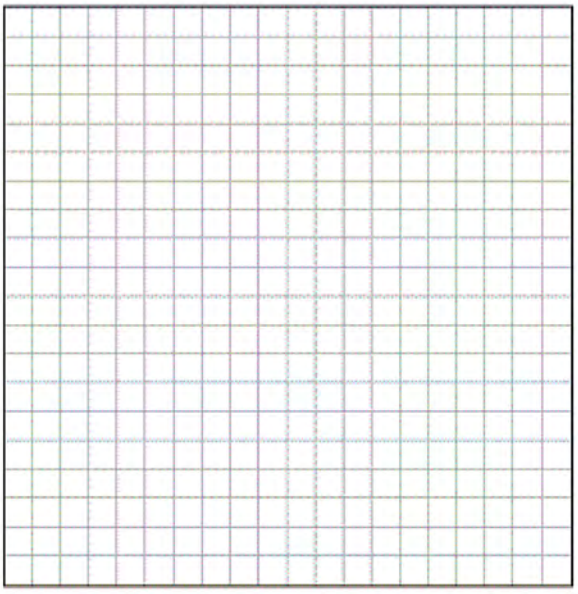
1 $y = -2x$
2 $y = -2x + 6$
3 $y = \frac{1}{2}x$
4 $y = \frac{1}{2}x + 1$

25 Find an equation of the line passing through the point $(5,4)$ and parallel to the line whose equation is $2x + y = 3$.

26 Write an equation of the line that passes through the point $(6,-5)$ and is parallel to the line whose equation is $2x - 3y = 11$.

G.G.68: PERPENDICULAR BISECTOR

27 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]



28 Which equation represents the perpendicular bisector of $\overline{AB}$ whose endpoints are $A(8,2)$ and $B(0,6)$?

1 $y = 2x - 4$

2 $y = -\frac{1}{2}x + 2$

3 $y = -\frac{1}{2}x + 6$

4 $y = 2x - 12$

SYSTEMS

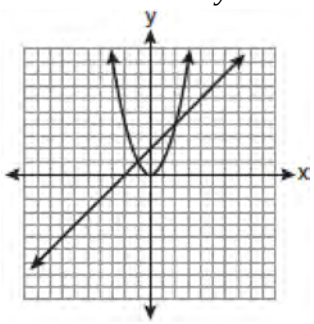
G.G.70: QUADRATIC-LINEAR SYSTEMS

29 Which graph could be used to find the solution to the following system of equations?

$y = -x + 2$

$y = x^2$

1



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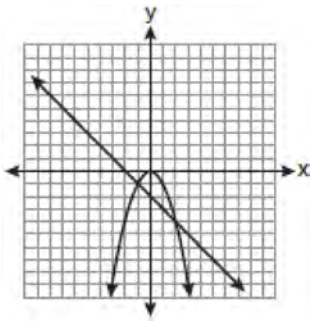

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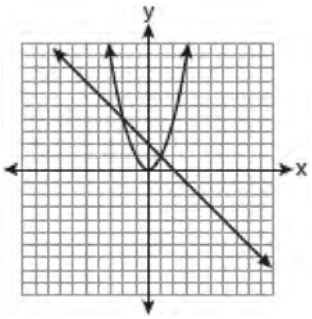

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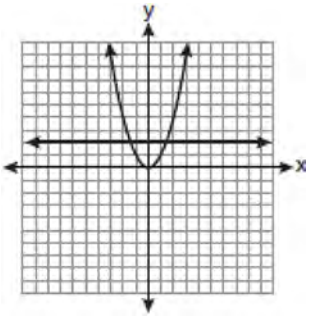


30 Given the system of equations: $y = x^2 - 4x$

$$x = 4$$

The number of points of intersection is

1 1
2 2
3 3
4 0

31 Given the equations: $y = x^2 - 6x + 10$

$$y + x = 4$$

What is the solution to the given system of equations?

1 $(2,3)$
2 $(3,2)$
3 $(2,2)$ and $(1,3)$
4 $(2,2)$ and $(3,1)$

32 Given: $y = \frac{1}{4}x - 3$

$$y = x^2 + 8x + 12$$

In which quadrant will the graphs of the given equations intersect?

1 I
2 II
3 III
4 IV

33 When solved graphically, what is the solution to the following system of equations?

$$y = x^2 - 4x + 6$$

$$y = x + 2$$

1 $(1,4)$
2 $(4,6)$
3 $(1,3)$ and $(4,6)$
4 $(3,1)$ and $(6,4)$

34 What is the solution of the following system of equations?

$$y = (x+3)^2 - 4$$

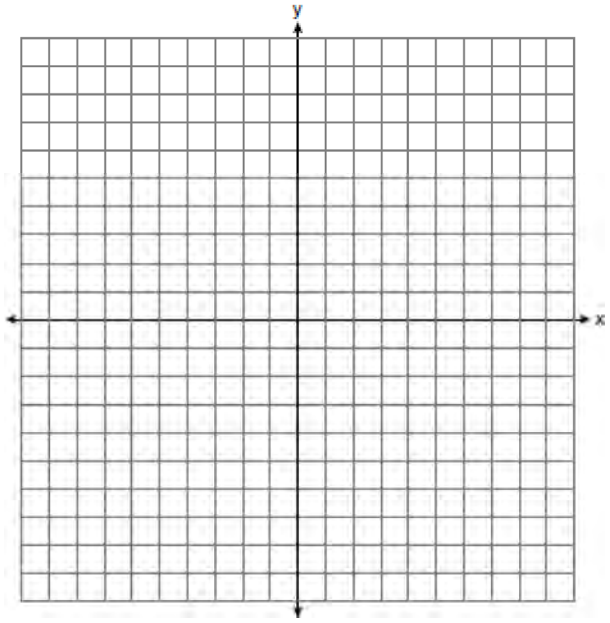
$$y = 2x + 5$$

1 $(0,-4)$
2 $(-4,0)$
3 $(-4,-3)$ and $(0,5)$
4 $(-3,-4)$ and $(5,0)$

35 Solve the following system of equations graphically.

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

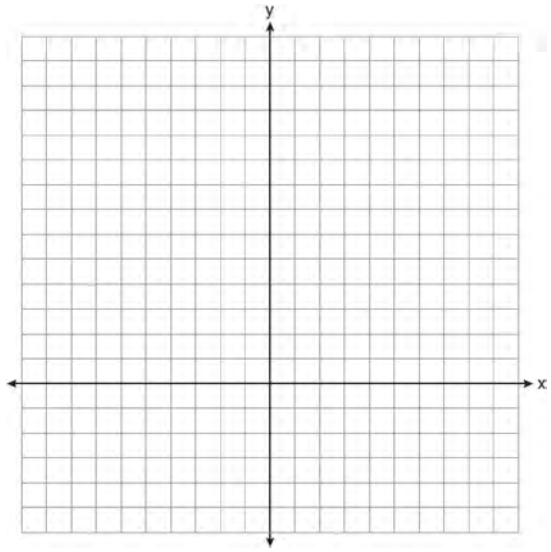
$$x + y = 1$$



36 On the set of axes below, solve the following system of equations graphically for all values of x and y.

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

$$4x + 2y = 14$$



TOOLS OF GEOMETRY

G.G.66: MIDPOINT

37 The endpoints of $\overline{CD}$ are $C(-2,-4)$ and $D(6,2)$. What are the coordinates of the midpoint of $\overline{CD}$?

1 $(2,3)$
2 $(2,-1)$
3 $(4,-2)$
4 $(4,3)$

38 A line segment has endpoints $A(7,-1)$ and $B(-3,3)$. What are the coordinates of the midpoint of $\overline{AB}$?

1 $(1,2)$
2 $\left(2,1\right)$
3 $(-5,2)$
4 $\left(5,-2\right)$

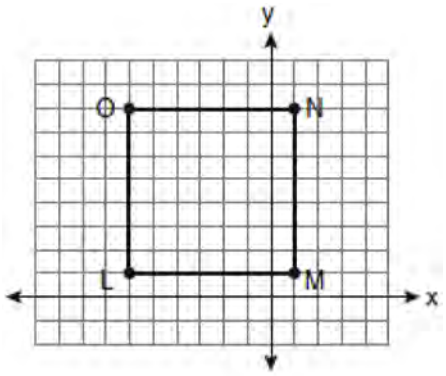
39 Line segment AB has endpoints $A(2,-3)$ and $B(-4,6)$. What are the coordinates of the midpoint of $\overline{AB}$?

1 $(-2,3)$
2 $\left(-1,1\frac{1}{2}\right)$
3 $(-1,3)$
4 $\left(3,4\frac{1}{2}\right)$

40 If a line segment has endpoints $A(3x+5,3y)$ and $B(x-1,-y)$, what are the coordinates of the midpoint of $\overline{AB}$?

1 $(x+3,2y)$
2 $(2x+2,y)$
3 $(2x+3,y)$
4 $(4x+4,2y)$

41 Square *LMNO* is shown in the diagram below.



What are the coordinates of the midpoint of diagonal $\overline{LN}$?

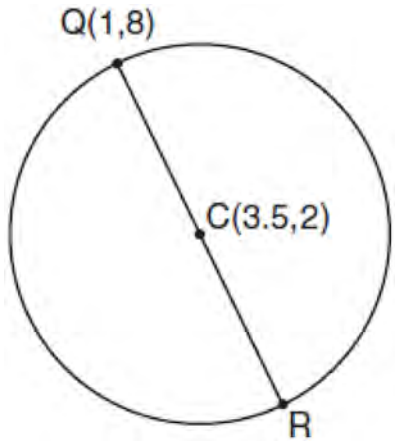
1 $\left(4\frac{1}{2},-2\frac{1}{2}\right)$

2 $\left(-3\frac{1}{2},3\frac{1}{2}\right)$

3 $\left(-2\frac{1}{2},3\frac{1}{2}\right)$

4 $\left(-2\frac{1}{2},4\frac{1}{2}\right)$

42 In the diagram below of circle *C*, $\overline{QR}$ is a diameter, and $Q(1,8)$ and $C(3.5,2)$ are points on a coordinate plane. Find and state the coordinates of point *R*.



43 Segment *AB* is the diameter of circle *M*. The coordinates of *A* are $(-4,3)$. The coordinates of *M* are $(1,5)$. What are the coordinates of *B*?

1 $(6,7)$

2 $(5,8)$

3 $(-3,8)$

4 $(-5,2)$

44 In circle *O*, diameter $\overline{RS}$ has endpoints $R(3a,2b-1)$ and $S(a-6,4b+5)$. Find the coordinates of point *O*, in terms of *a* and *b*. Express your answer in simplest form.

G.G.67: DISTANCE

45 If the endpoints of $\overline{AB}$ are $A(-4,5)$ and $B(2,-5)$, what is the length of $\overline{AB}$?

1 $2\sqrt{34}$

2 2

3 $\sqrt{61}$

4 8

46 What is the distance between the points $(-3,2)$ and $(1,0)$?

1 $2\sqrt{2}$

2 $2\sqrt{3}$

3 $5\sqrt{2}$

4 $2\sqrt{5}$

47 What is the length of the line segment with endpoints $(-6,4)$ and $(2,-5)$?

1 $\sqrt{13}$

2 $\sqrt{17}$

3 $\sqrt{72}$

4 $\sqrt{145}$

48 In circle O, a diameter has endpoints $(-5,4)$ and $(3,-6)$. What is the length of the diameter?
1 $\sqrt{2}$
2 $2\sqrt{2}$
3 $\sqrt{10}$
4 $2\sqrt{41}$

49 What is the length of the line segment whose endpoints are $A(-1,9)$ and $B(7,4)$?
1 $\sqrt{61}$
2 $\sqrt{89}$
3 $\sqrt{205}$
4 $\sqrt{233}$

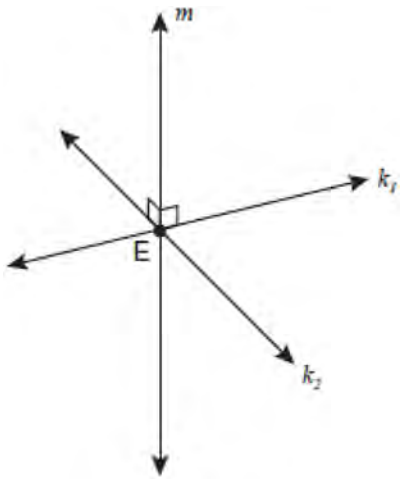
50 What is the length of the line segment whose endpoints are $(1,-4)$ and $(9,2)$?
1 5
2 $2\sqrt{17}$
3 10
4 $2\sqrt{26}$

51 What is the length, to the *nearest tenth*, of the line segment joining the points $(-4,2)$ and $(146,52)$?
1 141.4
2 150.5
3 151.9
4 158.1

52 The endpoints of $\overline{PQ}$ are $P(-3,1)$ and $Q(4,25)$. Find the length of $\overline{PQ}$.

G.G.1: PLANES

53 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?
1 Lines k_1 and k_2 are perpendicular.
2 Line m is parallel to the plane determined by lines k_1 and k_2.
3 Line m is perpendicular to the plane determined by lines k_1 and k_2.
4 Line m is coplanar with lines k_1 and k_2.

54 In plane $\mathcal{P}$, lines m and n intersect at point A. If line k is perpendicular to line m and line n at point A, then line k is
1 contained in plane $\mathcal{P}$
2 parallel to plane $\mathcal{P}$
3 perpendicular to plane $\mathcal{P}$
4 skew to plane $\mathcal{P}$

55 Lines *j* and *k* intersect at point *P*. Line *m* is drawn so that it is perpendicular to lines *j* and *k* at point *P*. Which statement is correct?
1 Lines *j* and *k* are in perpendicular planes.
2 Line *m* is in the same plane as lines *j* and *k*.
3 Line *m* is parallel to the plane containing lines *j* and *k*.
4 Line *m* is perpendicular to the plane containing lines *j* and *k*.

56 Lines *m* and *n* intersect at point *A*. Line *k* is perpendicular to both lines *m* and *n* at point *A*. Which statement *must* be true?
1 Lines *m*, *n*, and *k* are in the same plane.
2 Lines *m* and *n* are in two different planes.
3 Lines *m* and *n* are perpendicular to each other.
4 Line *k* is perpendicular to the plane containing lines *m* and *n*.

G.G.2: PLANES

57 Point *P* is on line *m*. What is the total number of planes that are perpendicular to line *m* and pass through point *P*?
1 1
2 2
3 0
4 infinite

58 Point *P* lies on line *m*. Point *P* is also included in distinct planes $\mathcal{Q}$, $\mathcal{R}$, $\mathcal{S}$, and $\mathcal{T}$. At most, how many of these planes could be perpendicular to line *m*?
1 1
2 2
3 3
4 4

G.G.3: PLANES

59 Through a given point, *P*, on a plane, how many lines can be drawn that are perpendicular to that plane?
1 1
2 2
3 more than 2
4 none

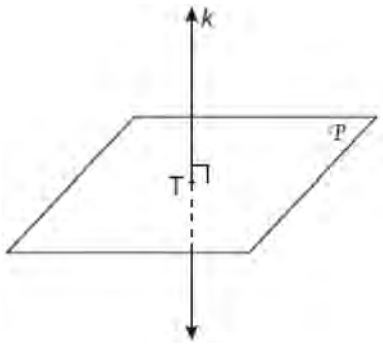
60 Point *A* is not contained in plane $\mathcal{B}$. How many lines can be drawn through point *A* that will be perpendicular to plane $\mathcal{B}$?
1 one
2 two
3 zero
4 infinite

G.G.4: PLANES

61 If two different lines are perpendicular to the same plane, they are
1 collinear
2 coplanar
3 congruent
4 consecutive

G.G.7: PLANES

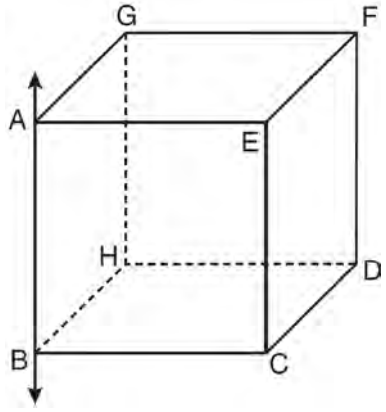
62 In the diagram below, line k is perpendicular to plane $\mathcal{P}$ at point T.



Which statement is true?

1 Any point in plane $\mathcal{P}$ also will be on line k.
2 Only one line in plane $\mathcal{P}$ will intersect line k.
3 All planes that intersect plane $\mathcal{P}$ will pass through T.
4 Any plane containing line k is perpendicular to plane $\mathcal{P}$.

63 In the diagram below, $\overleftrightarrow{AB}$ is perpendicular to plane $AEFG$.



Which plane must be perpendicular to plane $AEFG$?

1 $ABCE$
2 $BCDH$
3 $CDFE$
4 $HDFG$

G.G.8: PLANES

64 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

1 plane
2 point
3 pair of parallel lines
4 pair of intersecting lines

65 Plane $\mathcal{A}$ is parallel to plane $\mathcal{B}$. Plane $\mathcal{C}$ intersects plane $\mathcal{A}$ in line m and intersects plane $\mathcal{B}$ in line n. Lines m and n are

1 intersecting
2 parallel
3 perpendicular
4 skew

G.G.9: PLANES

66 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?
1 Planes P and R are skew.
2 Planes P and R are parallel.
3 Planes P and R are perpendicular.
4 Plane P intersects plane R but is not perpendicular to plane R.

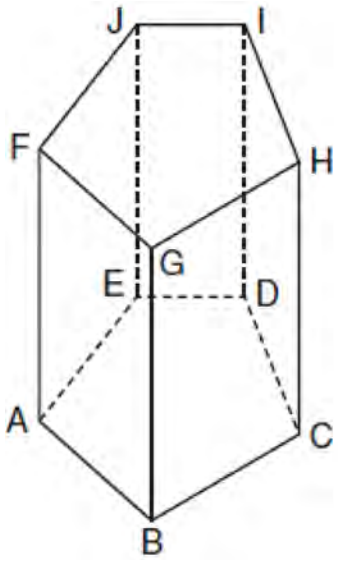
67 Plane $\mathcal{R}$ is perpendicular to line k and plane $\mathcal{D}$ is perpendicular to line k. Which statement is correct?
1 Plane $\mathcal{R}$ is perpendicular to plane $\mathcal{D}$.
2 Plane $\mathcal{R}$ is parallel to plane $\mathcal{D}$.
3 Plane $\mathcal{R}$ intersects plane $\mathcal{D}$.
4 Plane $\mathcal{R}$ bisects plane $\mathcal{D}$.

68 If two distinct planes, $\mathcal{A}$ and $\mathcal{B}$, are perpendicular to line c, then which statement is true?
1 Planes $\mathcal{A}$ and $\mathcal{B}$ are parallel to each other.
2 Planes $\mathcal{A}$ and $\mathcal{B}$ are perpendicular to each other.
3 The intersection of planes $\mathcal{A}$ and $\mathcal{B}$ is a line parallel to line c.
4 The intersection of planes $\mathcal{A}$ and $\mathcal{B}$ is a line perpendicular to line c.

69 A support beam between the floor and ceiling of a house forms a 90º angle with the floor. The builder wants to make sure that the floor and ceiling are parallel. Which angle should the support beam form with the ceiling?
1 45º
2 60º
3 90º
4 180º

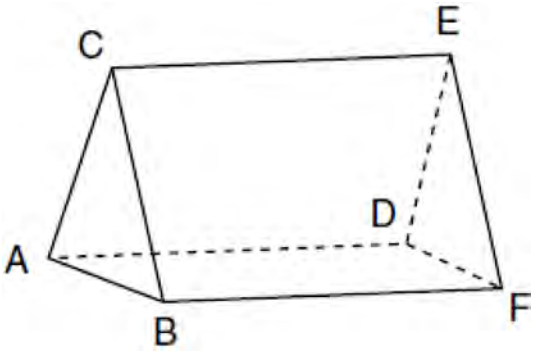
G.G.10: SOLIDS

70 The diagram below shows a right pentagonal prism.



Which statement is always true?
1 $\overline{BC} \parallel \overline{ED}$
2 $\overline{FG} \parallel \overline{CD}$
3 $\overline{FJ} \parallel \overline{IH}$
4 $\overline{GB} \parallel \overline{HC}$

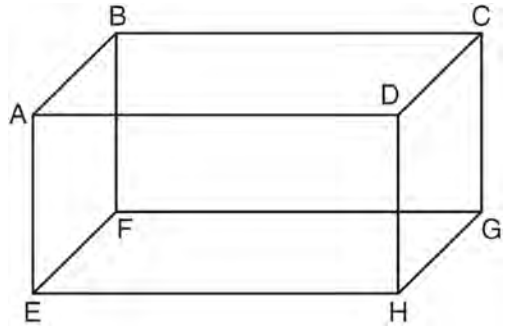
71 The figure in the diagram below is a triangular prism.



Which statement must be true?

1 $\overline{DE} \cong \overline{AB}$
2 $\overline{AD} \cong \overline{BC}$
3 $\overline{AD} \parallel \overline{CE}$
4 $\overline{DE} \parallel \overline{BC}$

72 The diagram below shows a rectangular prism.



Which pair of edges are segments of lines that are coplanar?

1 $\overline{AB}$ and $\overline{DH}$
2 $\overline{AE}$ and $\overline{DC}$
3 $\overline{BC}$ and $\overline{EH}$
4 $\overline{CG}$ and $\overline{EF}$

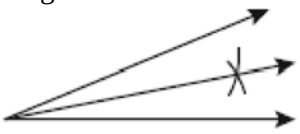
G.G.13: SOLIDS

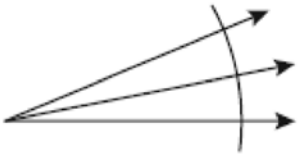
73 The lateral faces of a regular pyramid are composed of

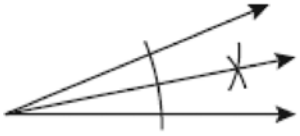
1 squares
2 rectangles
3 congruent right triangles
4 congruent isosceles triangles

G.G.17: CONSTRUCTIONS

74 Which illustration shows the correct construction of an angle bisector?

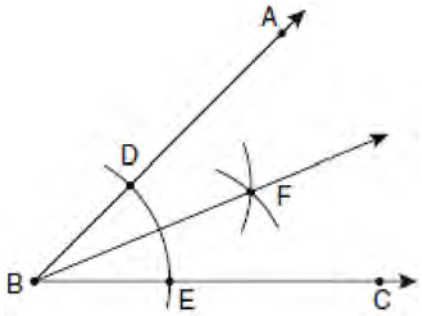
1 

2 

3 

4 

75 The diagram below shows the construction of the bisector of $\angle ABC$.



Which statement is *not* true?

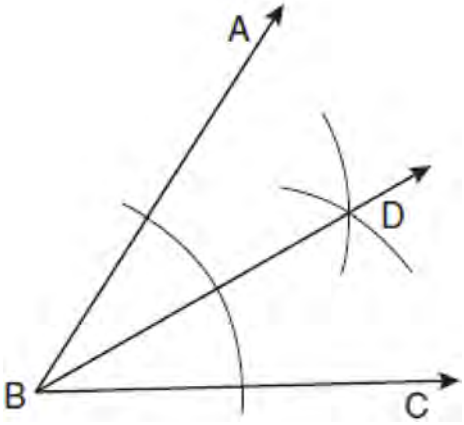
1 $m\angle EBF = \frac{1}{2} m\angle ABC$

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

3 $m\angle EBF = m\angle ABC$

4 $m\angle DBF = m\angle EBF$

76 Based on the construction below, which statement must be true?



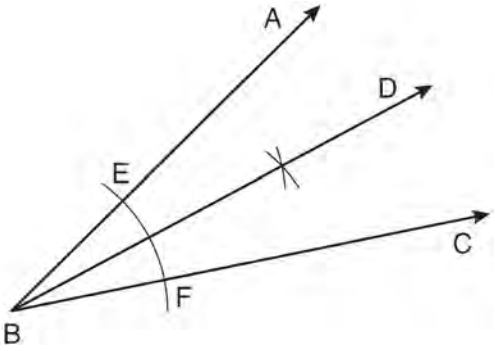
1 $m\angle ABD = \frac{1}{2} m\angle CBD$

2 $m\angle ABD = m\angle CBD$

3 $m\angle ABD = m\angle ABC$

4 $m\angle CBD = \frac{1}{2} m\angle ABD$

77 .A straightedge and compass were used to create the construction below. Arc *EF* was drawn from point *B*, and arcs with equal radii were drawn from *E* and *F*.



Which statement is *false*?

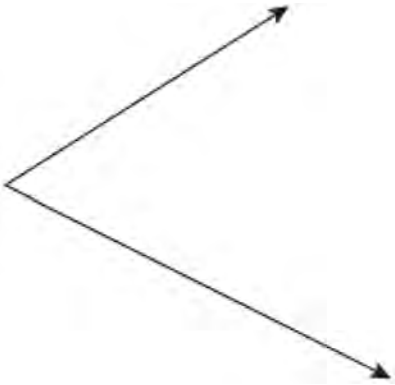
1 $m\angle ABD = m\angle DBC$

2 $\frac{1}{2}(m\angle ABC) = m\angle ABD$

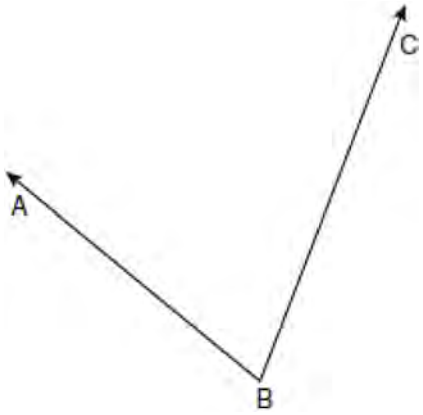
3 $2(m\angle DBC) = m\angle ABC$

4 $2(m\angle ABC) = m\angle CBD$

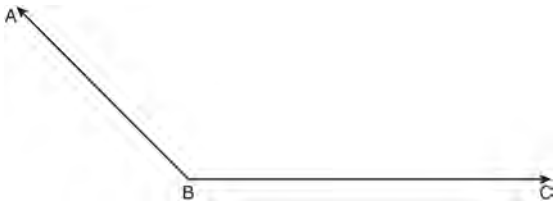
78 Using a compass and straightedge, construct the bisector of the angle shown below. [*Leave all construction marks*.]



79 Using a compass and straightedge, construct the angle bisector of $\angle ABC$ shown below. [Leave all construction marks.]



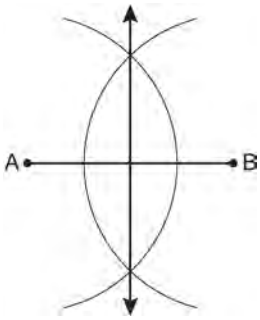
80 On the diagram below, use a compass and straightedge to construct the bisector of $\angle ABC$. [Leave all construction marks.]



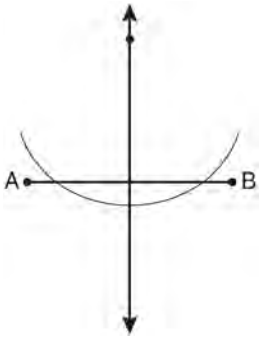
G.G.18: CONSTRUCTIONS

81 Which diagram shows the construction of the perpendicular bisector of $\overline{AB}$?

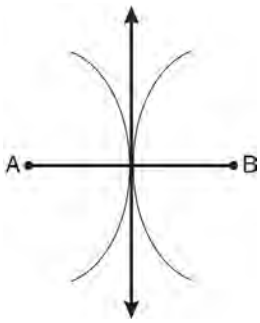
1



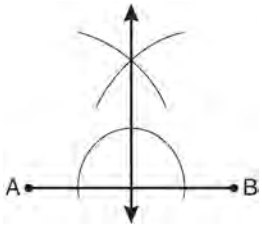
2



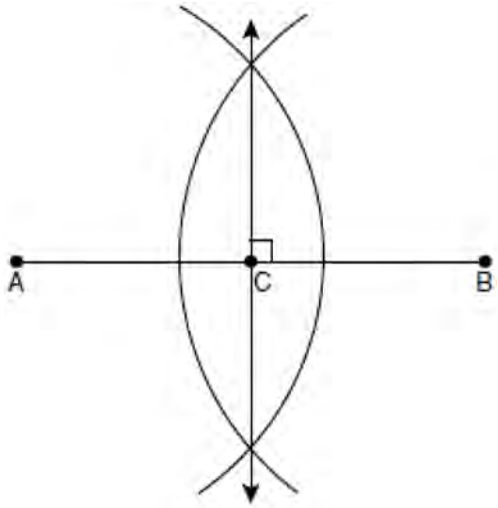
3



4



82 The diagram below shows the construction of the perpendicular bisector of $\overline{AB}$.



Which statement is *not* true?

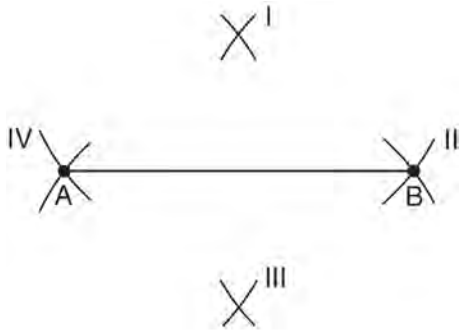
1 $AC = CB$

2 $CB = \frac{1}{2}AB$

3 $AC = 2AB$

4 $AC + CB = AB$

83 Line segment AB is shown in the diagram below.



Which two sets of construction marks, labeled I, II, III, and IV, are part of the construction of the perpendicular bisector of line segment AB?

1 I and II

2 I and III

3 II and III

4 II and IV

84 One step in a construction uses the endpoints of $\overline{AB}$ to create arcs with the same radii. The arcs intersect above and below the segment. What is the relationship of $\overline{AB}$ and the line connecting the points of intersection of these arcs?

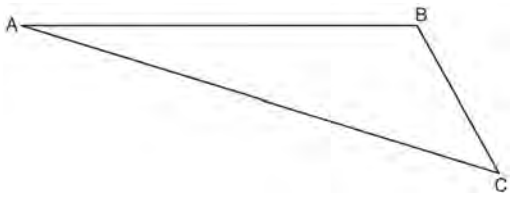
1 collinear

2 congruent

3 parallel

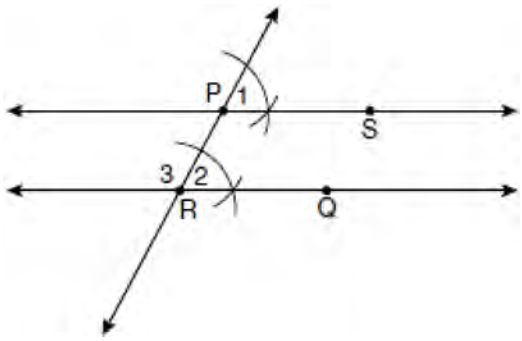
4 perpendicular

85 On the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the perpendicular bisector of $\overline{AC}$. [Leave all construction marks.]



G.G.19: CONSTRUCTIONS

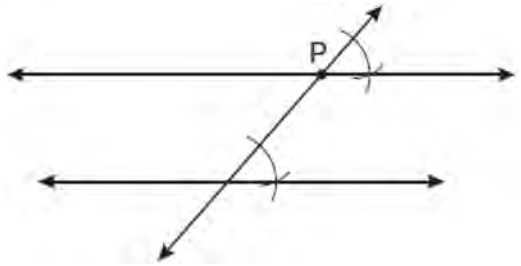
86 The diagram below illustrates the construction of $\overleftrightarrow{PS}$ parallel to $\overleftrightarrow{RQ}$ through point P.



Which statement justifies this construction?

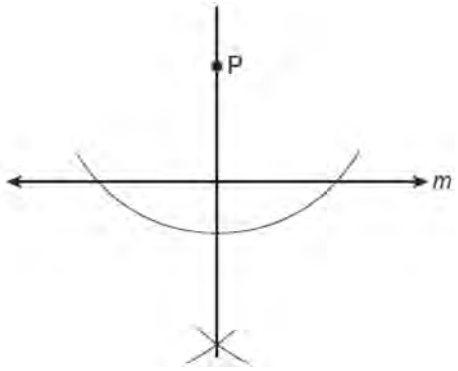
1 $m\angle 1 = m\angle 2$
2 $m\angle 1 = m\angle 3$
3 $\overline{PR} \cong \overline{RQ}$
4 $\overline{PS} \cong \overline{RQ}$

87 Which geometric principle is used to justify the construction below?



1 A line perpendicular to one of two parallel lines is perpendicular to the other.
2 Two lines are perpendicular if they intersect to form congruent adjacent angles.
3 When two lines are intersected by a transversal and alternate interior angles are congruent, the lines are parallel.
4 When two lines are intersected by a transversal and the corresponding angles are congruent, the lines are parallel.

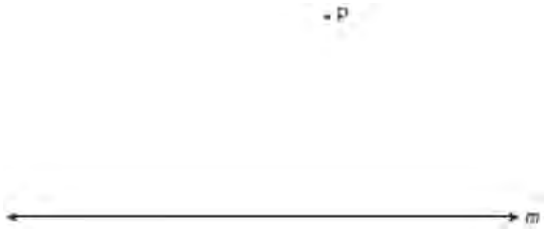
88 The diagram below shows the construction of a line through point P perpendicular to line m.



Which statement is demonstrated by this construction?

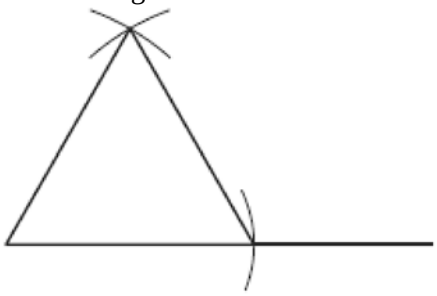
1 If a line is parallel to a line that is perpendicular to a third line, then the line is also perpendicular to the third line.
2 The set of points equidistant from the endpoints of a line segment is the perpendicular bisector of the segment.
3 Two lines are perpendicular if they are equidistant from a given point.
4 Two lines are perpendicular if they intersect to form a vertical line.

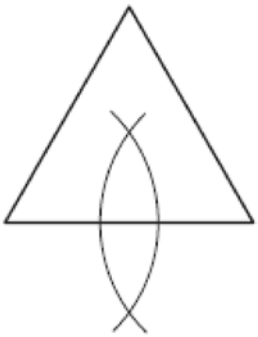
89 Using a compass and straightedge, construct a line that passes through point P and is perpendicular to line m. [Leave all construction marks.]

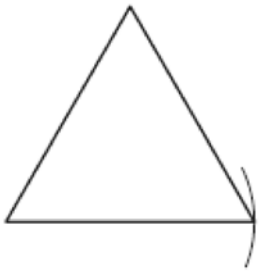


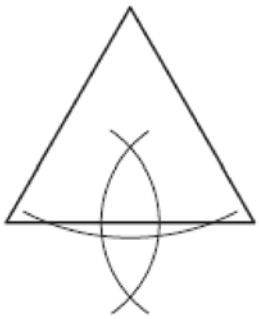
G.G.20: CONSTRUCTIONS

90 Which diagram shows the construction of an equilateral triangle?

1 

2 

3 

4 

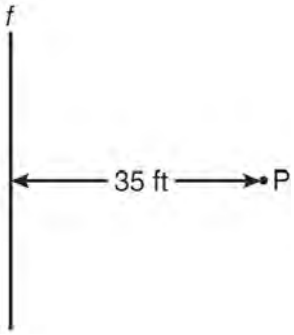
91 Using a compass and straightedge, and $\overline{AB}$ below, construct an equilateral triangle with all sides congruent to $\overline{AB}$. [Leave all construction marks.]

92 On the line segment below, use a compass and straightedge to construct equilateral triangle *ABC*. [Leave all construction marks.]

93 Using a compass and straightedge, on the diagram below of $\overleftrightarrow{RS}$, construct an equilateral triangle with $\overline{RS}$ as one side. [Leave all construction marks.]

G.G.22: LOCUS

94 A man wants to place a new bird bath in his yard so that it is 30 feet from a fence, *f*, and also 10 feet from a light pole, *P*. As shown in the diagram below, the light pole is 35 feet away from the fence.

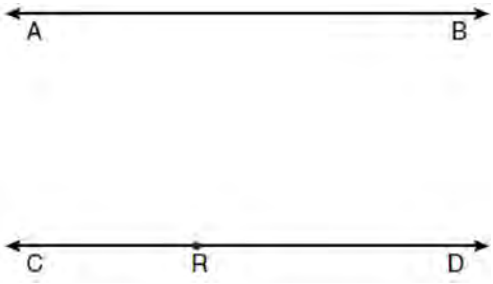


How many locations are possible for the bird bath?
1 1
2 2
3 3
4 0

95 Towns *A* and *B* are 16 miles apart. How many points are 10 miles from town *A* and 12 miles from town *B*?
1 1
2 2
3 3
4 0

96 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.

97 Two lines, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CRD}$, are parallel and 10 inches apart. Sketch the locus of all points that are equidistant from $\overleftrightarrow{AB}$ and $\overleftrightarrow{CRD}$ and 7 inches from point *R*. Label with an **X** each point that satisfies both conditions.



98 In the diagram below, car *A* is parked 7 miles from car *B*. Sketch the points that are 4 miles from car *A* and sketch the points that are 4 miles from car *B*. Label with an **X** all points that satisfy both conditions.

G.G.23: LOCUS

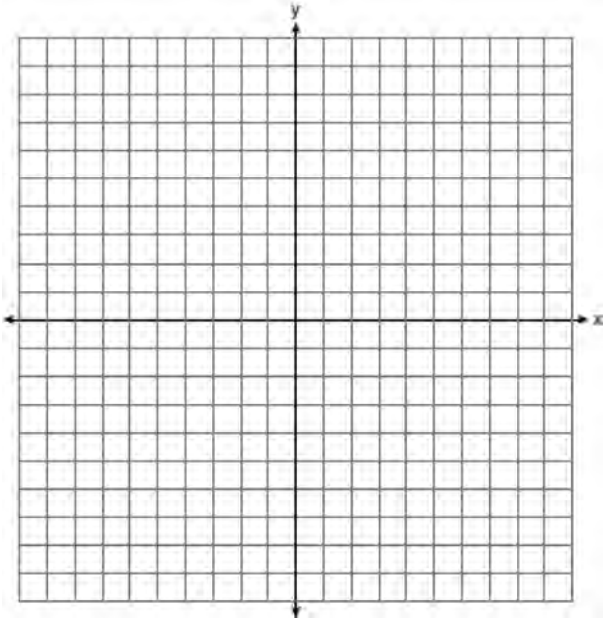
99 How many points are both 4 units from the origin and also 2 units from the line $y = 4$?

1 1
2 2
3 3
4 4

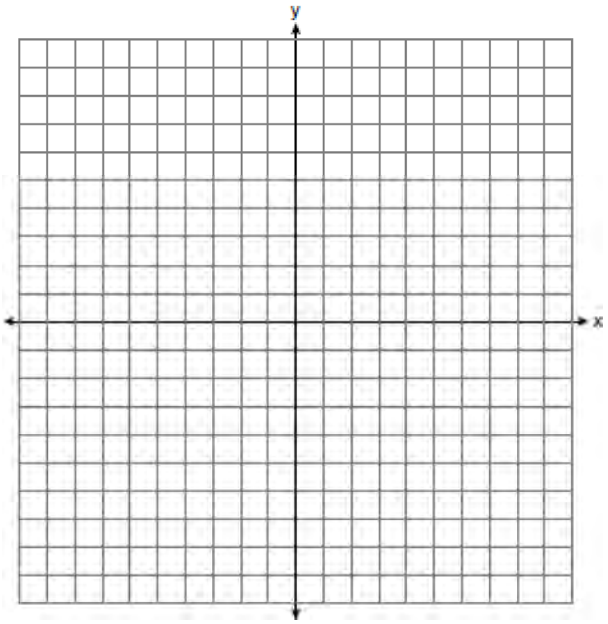
100 In a coordinate plane, how many points are both 5 units from the origin and 2 units from the x-axis?

1 1
2 2
3 3
4 4

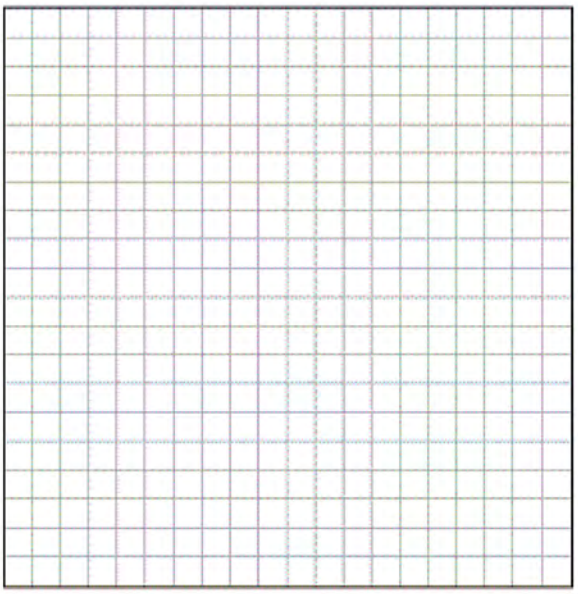
101 A city is planning to build a new park. The park must be equidistant from school A at $(3,3)$ and school B at $(3,-5)$. The park also must be exactly 5 miles from the center of town, which is located at the origin on the coordinate graph. Each unit on the graph represents 1 mile. On the set of axes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



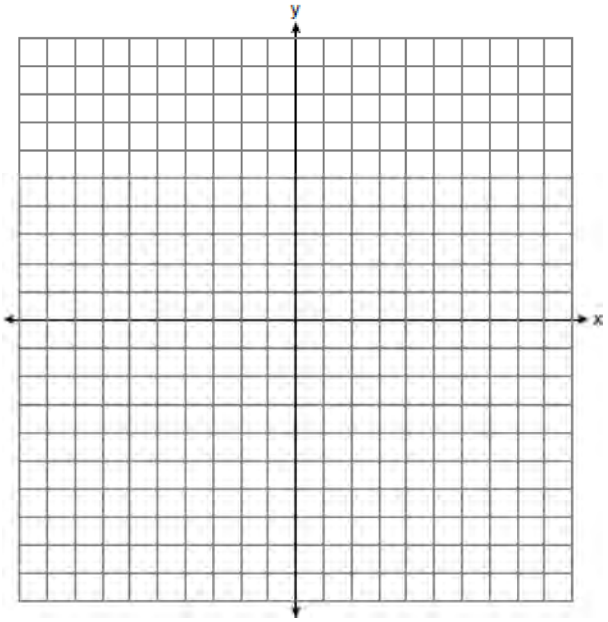
102 On the set of axes below, sketch the points that are 5 units from the origin and sketch the points that are 2 units from the line $y = 3$. Label with an **X** all points that satisfy both conditions.



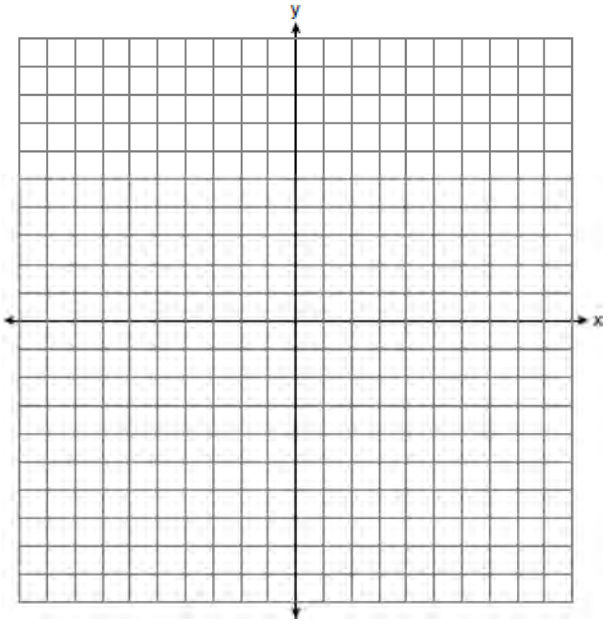
103 On the grid below, graph the points that are equidistant from both the x and y axes and the points that are 5 units from the origin. Label with an **X** all points that satisfy *both* conditions.



104 On the set of axes below, graph the locus of points that are four units from the point $(2,1)$. On the same set of axes, graph the locus of points that are two units from the line $x = 4$. State the coordinates of all points that satisfy both conditions.



105 On the set of coordinate axes below, graph the locus of points that are equidistant from the lines $y = 6$ and $y = 2$ and also graph the locus of points that are 3 units from the y-axis. State the coordinates of *all* points that satisfy *both* conditions.

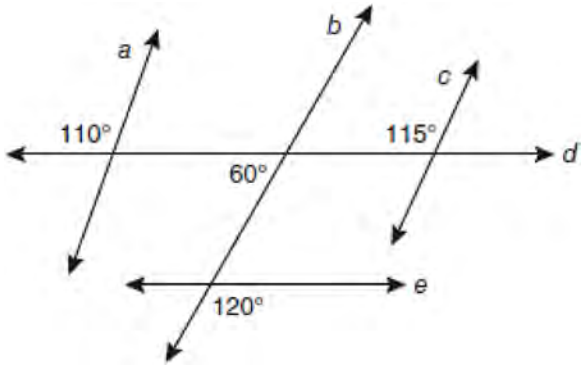


ANGLES

G.G.35: PARALLEL LINES & TRANSVERSALS

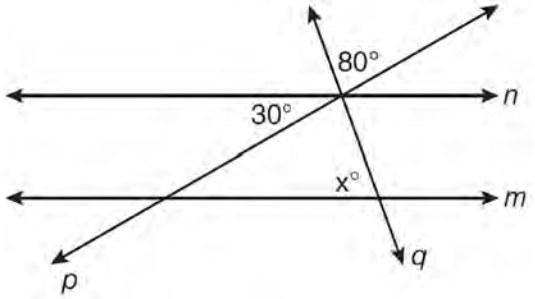
106 A transversal intersects two lines. Which condition would always make the two lines parallel?
1 Vertical angles are congruent.
2 Alternate interior angles are congruent.
3 Corresponding angles are supplementary.
4 Same-side interior angles are complementary.

107 Based on the diagram below, which statement is true?



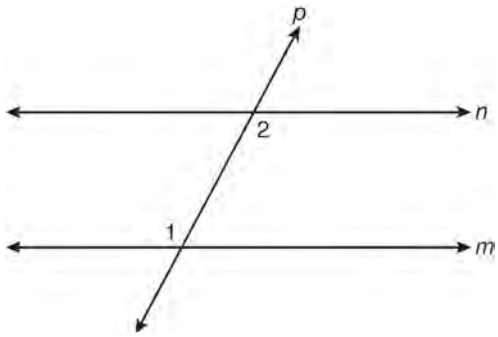
1 $a \parallel b$
2 $a \parallel c$
3 $b \parallel c$
4 $d \parallel e$

108 In the diagram below, lines n and m are cut by transversals p and q.



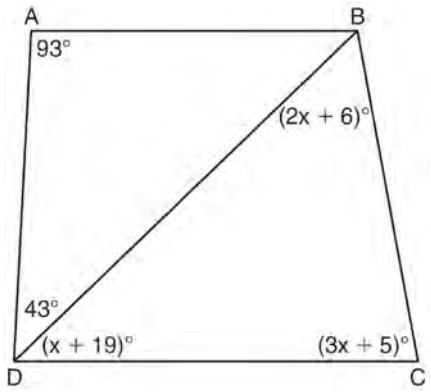
What value of x would make lines n and m parallel?
1 110
2 80
3 70
4 50

109 In the diagram below, line *p* intersects line *m* and line *n*.



If $m\angle 1 = 7x$ and $m\angle 2 = 5x + 30$, lines *m* and *n* are parallel when *x* equals
1 12.5
2 15
3 87.5
4 105

110 In the diagram below of quadrilateral *ABCD* with diagonal $\overline{BD}$, $m\angle A = 93$, $m\angle ADB = 43$, $m\angle C = 3x + 5$, $m\angle BDC = x + 19$, and $m\angle DBC = 2x + 6$. Determine if $\overline{AB}$ is parallel to $\overline{DC}$. Explain your reasoning.

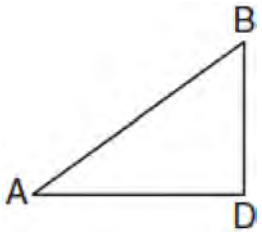


TRIANGLES

G.G.48: PYTHAGOREAN THEOREM

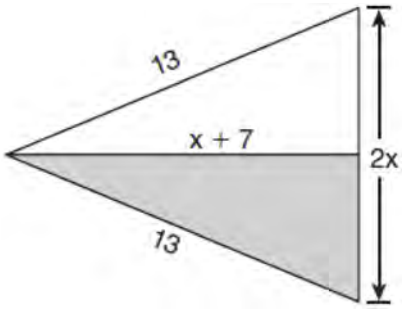
111 Which set of numbers does *not* represent the sides of a right triangle?
1 {6, 8, 10}
2 {8, 15, 17}
3 {8, 24, 25}
4 {15, 36, 39}

112 In the diagram below of $\triangle ADB$, $m\angle BDA = 90$, $AD = 5\sqrt{2}$, and $AB = 2\sqrt{15}$.



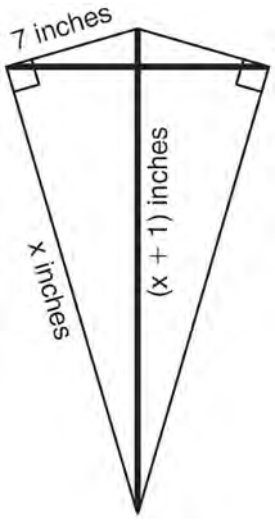
What is the length of $\overline{BD}$?
1 $\sqrt{10}$
2 $\sqrt{20}$
3 $\sqrt{50}$
4 $\sqrt{110}$

113 The diagram below shows a pennant in the shape of an isosceles triangle. The equal sides each measure 13, the altitude is $x + 7$, and the base is $2x$.



What is the length of the base?
1 5
2 10
3 12
4 24

114 As shown in the diagram below, a kite needs a vertical and a horizontal support bar attached at opposite corners. The upper edges of the kite are 7 inches, the side edges are x inches, and the vertical support bar is $(x + 1)$ inches.



What is the measure, in inches, of the vertical support bar?
1 23
2 24
3 25
4 26

G.G.30: INTERIOR AND EXTERIOR ANGLES OF TRIANGLES

115 Juliann plans on drawing $\triangle ABC$, 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 $\angle C$?
1 20° to 40°
2 30° to 50°
3 80° to 90°
4 120° to 130°

116 In an equilateral triangle, what is the difference between the sum of the exterior angles and the sum of the interior angles?
1 180°
2 120°
3 90°
4 60°

117 In $\triangle ABC$, $m\angle A = x$, $m\angle B = 2x + 2$, and $m\angle C = 3x + 4$. What is the value of x?
1 29
2 31
3 59
4 61

118 In $\triangle DEF$, $m\angle D = 3x + 5$, $m\angle E = 4x - 15$, and $m\angle F = 2x + 10$. Which statement is true?
1 $DF = FE$
2 $DE = FE$
3 $m\angle E = m\angle F$
4 $m\angle D = m\angle F$

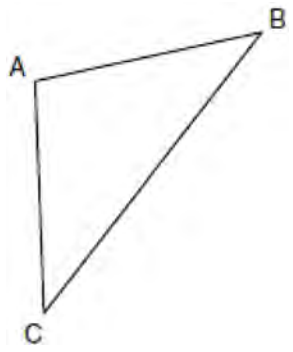
119 Triangle PQR has angles in the ratio of $2:3:5$. Which type of triangle is $\triangle PQR$?
1 acute
2 isosceles
3 obtuse
4 right

120 The degree measures of the angles of $\triangle ABC$ are represented by x, $3x$, and $5x - 54$. Find the value of x.

121 In right $\triangle DEF$, $m\angle D = 90$ and $m\angle F$ is 12 degrees less than twice $m\angle E$. Find $m\angle E$.

G.G.31: ISOSCELES TRIANGLE THEOREM

122 In the diagram of $\triangle ABC$ below, $\overline{AB} \cong \overline{AC}$. The measure of $\angle B$ is 40°.



What is the measure of $\angle A$?
1 40°
2 50°
3 70°
4 100°

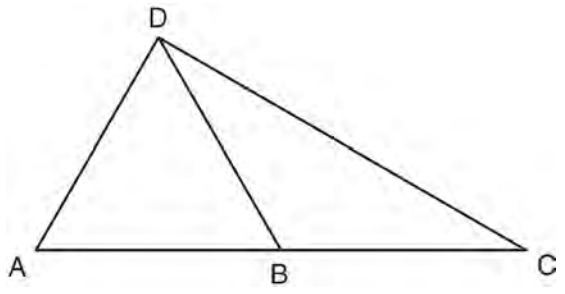
123 In $\triangle ABC$, $\overline{AB} \cong \overline{BC}$. An altitude is drawn from B to $\overline{AC}$ and intersects $\overline{AC}$ at D. Which conclusion is *not* always true?
1 $\angle ABD \cong \angle CBD$
2 $\angle BDA \cong \angle BDC$
3 $\overline{AD} \cong \overline{BD}$
4 $\overline{AD} \cong \overline{DC}$

124 In isosceles triangle ABC, $AB = BC$. Which statement will always be true?
1 $m\angle B = m\angle A$
2 $m\angle A > m\angle B$
3 $m\angle A = m\angle C$
4 $m\angle C < m\angle B$

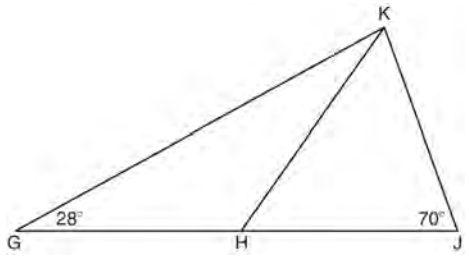
125 If the vertex angles of two isosceles triangles are congruent, then the triangles must be
1 acute
2 congruent
3 right
4 similar

126 In $\triangle RST$, $m\angle RST = 46$ and $\overline{RS} \cong \overline{ST}$. Find $m\angle STR$.

127 In the diagram below of $\triangle ACD$, B is a point on $\overline{AC}$ such that $\triangle ADB$ is an equilateral triangle, and $\triangle DBC$ is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find $m\angle C$.

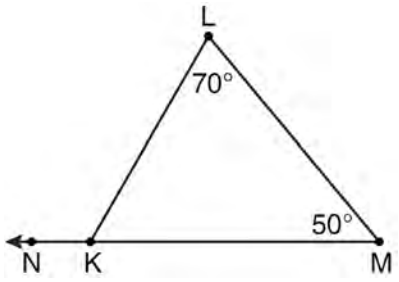


128 In the diagram below of $\triangle GJK$, H is a point on $\overline{GJ}$, $\overline{HJ} \cong \overline{JK}$, $m\angle G = 28$, and $m\angle GJK = 70$. Determine whether $\triangle GHK$ is an isosceles triangle and justify your answer.



G.G.32: EXTERIOR ANGLE THEOREM

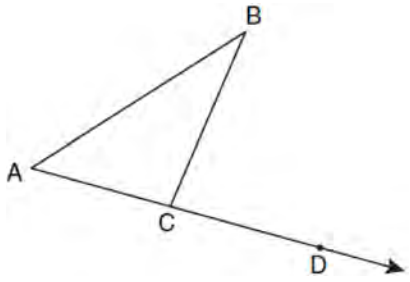
129 In the diagram of $\triangle KLM$ below, $m\angle L = 70$, $m\angle M = 50$, and $\overline{MK}$ is extended through N.



What is the measure of $\angle LKN$?

1 60°
2 120°
3 180°
4 300°

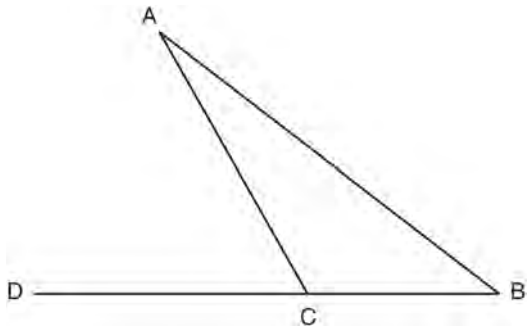
130 In the diagram below, $\triangle ABC$ is shown with $\overline{AC}$ extended through point D.



If $m\angle BCD = 6x + 2$, $m\angle BAC = 3x + 15$, and $m\angle ABC = 2x - 1$, what is the value of x?

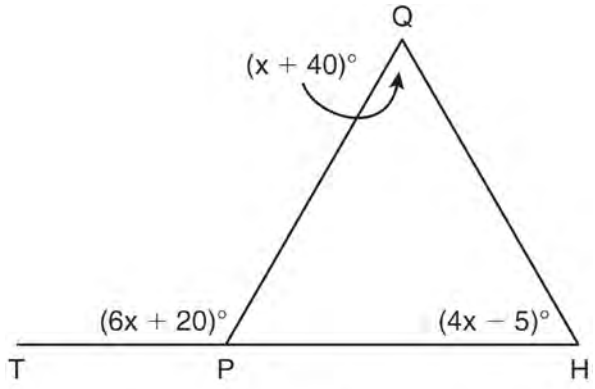
1 12
2 $14\frac{10}{11}$
3 16
4 $18\frac{1}{9}$

131 In the diagram below of $\triangle ABC$, side $\overline{BC}$ is extended to point D, $m\angle A = x$, $m\angle B = 2x + 15$, and $m\angle ACD = 5x + 5$.



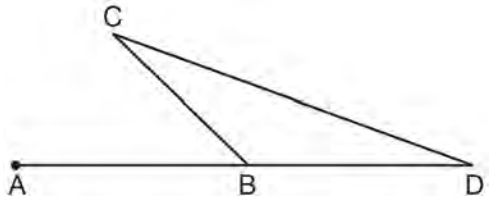
What is $m\angle B$?
1 5
2 20
3 25
4 55

132 In the diagram below of $\triangle HQP$, side $\overline{HP}$ is extended through P to T, $m\angle QPT = 6x + 20$, $m\angle HQP = x + 40$, and $m\angle PHQ = 4x - 5$. Find $m\angle QPT$.



(Not drawn to scale)

133 In the diagram below of $\triangle BCD$, side $\overline{DB}$ is extended to point A.



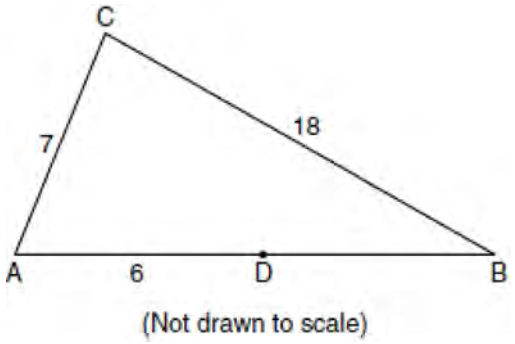
Which statement must be true?
1 $m\angle C > m\angle D$
2 $m\angle ABC < m\angle D$
3 $m\angle ABC > m\angle C$
4 $m\angle ABC > m\angle C + m\angle D$

134 Side $\overline{PQ}$ of $\triangle PQR$ is extended through Q to point T. Which statement is *not* always true?
1 $m\angle RQT > m\angle R$
2 $m\angle RQT > m\angle P$
3 $m\angle RQT = m\angle P + m\angle R$
4 $m\angle RQT > m\angle PQR$

G.G.33: TRIANGLE INEQUALITY THEOREM

135 Which set of numbers represents the lengths of the sides of a triangle?
1 {5, 18, 13}
2 {6, 17, 22}
3 {16, 24, 7}
4 {26, 8, 15}

136 In the diagram below of $\triangle ABC$, 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
1 5
2 12
3 19
4 25

G.G.34: ANGLE SIDE RELATIONSHIP

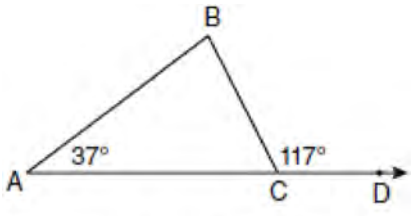
137 In $\triangle ABC$, $m\angle A = 95$, $m\angle B = 50$, and $m\angle C = 35$. Which expression correctly relates the lengths of the sides of this triangle?
1 $AB < BC < CA$
2 $AB < AC < BC$
3 $AC < BC < AB$
4 $BC < AC < AB$

138 In scalene triangle ABC, $m\angle B = 45$ and $m\angle C = 55$. What is the order of the sides in length, from longest to shortest?
1 $\overline{AB}, \overline{BC}, \overline{AC}$
2 $\overline{BC}, \overline{AC}, \overline{AB}$
3 $\overline{AC}, \overline{BC}, \overline{AB}$
4 $\overline{BC}, \overline{AB}, \overline{AC}$

139 In $\triangle PQR$, $PQ = 8$, $QR = 12$, and $RP = 13$. Which statement about the angles of $\triangle PQR$ must be true?
1 $m\angle Q > m\angle P > m\angle R$
2 $m\angle Q > m\angle R > m\angle P$
3 $m\angle R > m\angle P > m\angle Q$
4 $m\angle P > m\angle R > m\angle Q$

140 In $\triangle ABC$, $AB = 7$, $BC = 8$, and $AC = 9$. Which list has the angles of $\triangle ABC$ in order from smallest to largest?
1 $\angle A, \angle B, \angle C$
2 $\angle B, \angle A, \angle C$
3 $\angle C, \angle B, \angle A$
4 $\angle C, \angle A, \angle B$

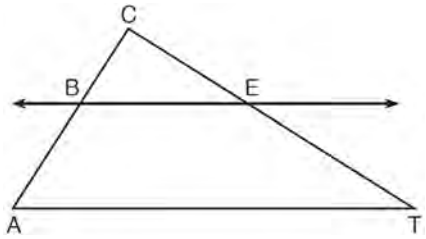
141 In the diagram below of $\triangle ABC$ with side $\overline{AC}$ extended through D, $m\angle A = 37$ and $m\angle BCD = 117$. Which side of $\triangle ABC$ is the longest side? Justify your answer.



(Not drawn to scale)

G.G.46: SIDE SPLITTER THEOREM

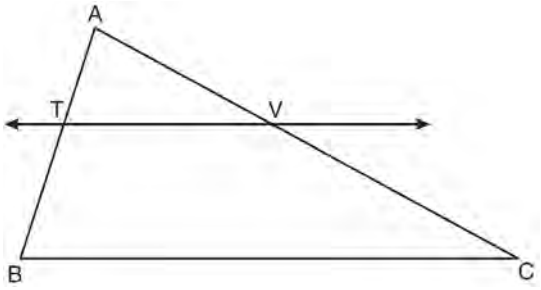
142 In the diagram below of $\triangle ACT$, $\overleftrightarrow{BE} \parallel \overline{AT}$.



If $CB = 3$, $CA = 10$, and $CE = 6$, what is the length of $\overline{ET}$?

1 5
2 14
3 20
4 26

143 In the diagram below of $\triangle ABC$, $\overleftrightarrow{TV} \parallel \overline{BC}$, $AT = 5$, $TB = 7$, and $AV = 10$.



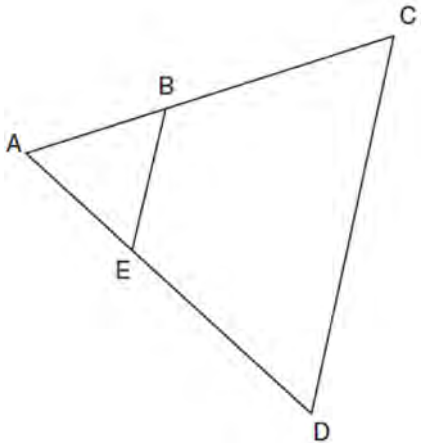
What is the length of $\overline{VC}$?

1 $3\frac{1}{2}$
2 $7\frac{1}{7}$
3 14
4 24

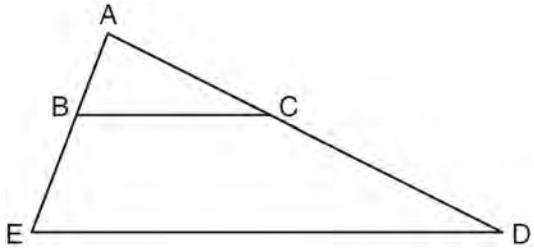
144 In $\triangle ABC$, point D is on $\overline{AB}$, and point E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If $DB = 2$, $DA = 7$, and $DE = 3$, what is the length of $\overline{AC}$?

1 8
2 9
3 10.5
4 13.5

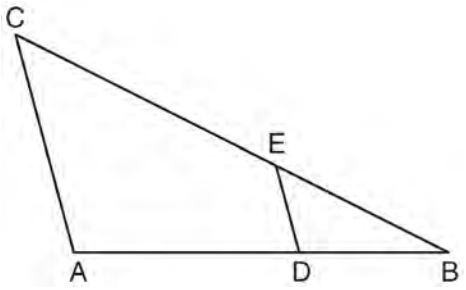
145 In the diagram below of $\triangle ACD$, E is a point on $\overline{AD}$ and B is a point on $\overline{AC}$, such that $\overline{EB} \parallel \overline{DC}$. If $AE = 3$, $ED = 6$, and $DC = 15$, find the length of $\overline{EB}$.



146 In the diagram below of $\triangle ADE$, B is a point on $\overline{AE}$ and C is a point on $\overline{AD}$ such that $\overline{BC} \parallel \overline{ED}$, $AC = x - 3$, $BE = 20$, $AB = 16$, and $AD = 2x + 2$. Find the length of $\overline{AC}$.

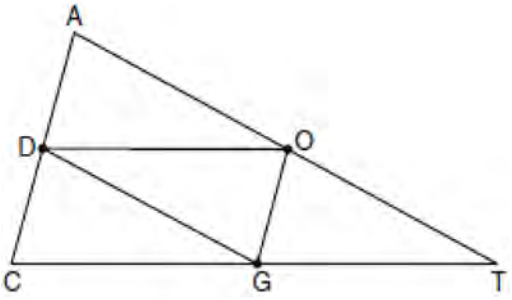


147 In the diagram below of $\triangle ABC$, D is a point on $\overline{AB}$, E is a point on $\overline{BC}$, $\overline{AC} \parallel \overline{DE}$, $CE = 25$ inches, $AD = 18$ inches, and $DB = 12$ inches. Find, to the *nearest tenth of an inch*, the length of $\overline{EB}$.



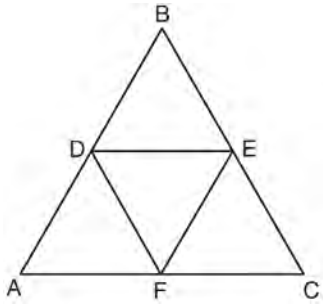
G.G.42: MIDSEGMENTS

148 In the diagram below of $\triangle ACT$, D is the midpoint of $\overline{AC}$, O is the midpoint of $\overline{AT}$, and G is the midpoint of $\overline{CT}$.



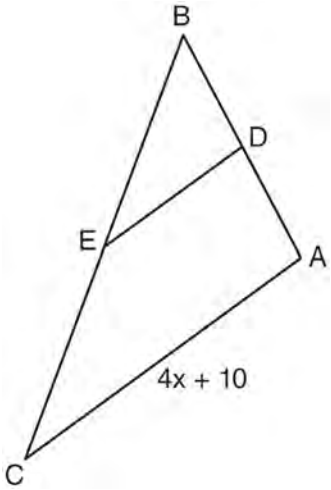
If $AC = 10$, $AT = 18$, and $CT = 22$, what is the perimeter of parallelogram $CDOG$?
1 21
2 25
3 32
4 40

149 In the diagram below, the vertices of $\triangle DEF$ are the midpoints of the sides of equilateral triangle ABC, and the perimeter of $\triangle ABC$ is 36 cm.



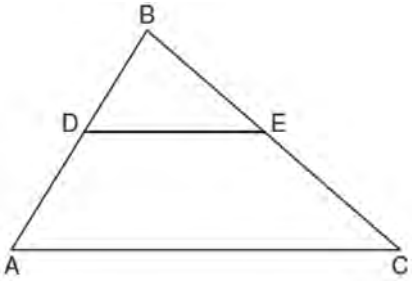
What is the length, in centimeters, of $\overline{EF}$?
1 6
2 12
3 18
4 4

150 In the diagram below of $\triangle ABC$, D is the midpoint of $\overline{AB}$, and E is the midpoint of $\overline{BC}$.

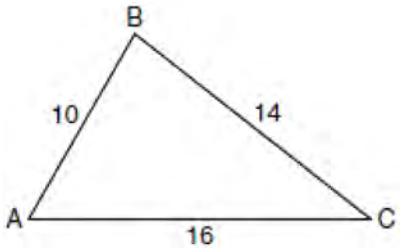


If $AC = 4x + 10$, which expression represents DE?
1 $x + 2.5$
2 $2x + 5$
3 $2x + 10$
4 $8x + 20$

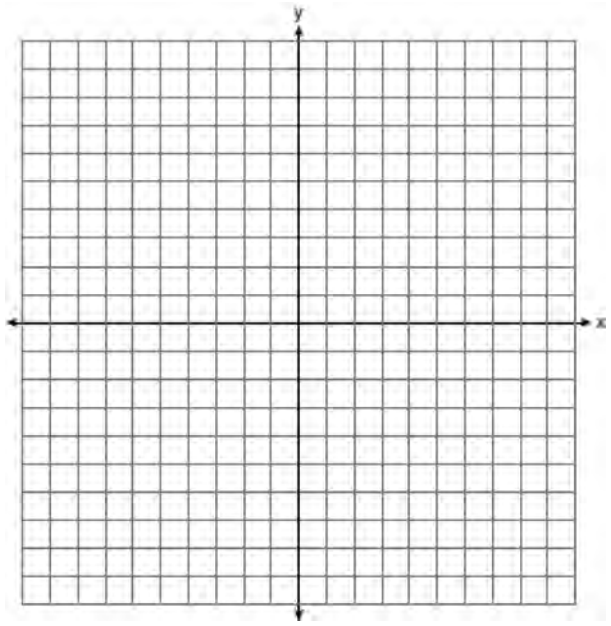
151 In the diagram below of $\triangle ABC$, $\overline{DE}$ is a midsegment of $\triangle ABC$, $DE = 7$, $AB = 10$, and $BC = 13$. Find the perimeter of $\triangle ABC$.



152 In the diagram of $\triangle ABC$ below, $AB = 10$, $BC = 14$, and $AC = 16$. Find the perimeter of the triangle formed by connecting the midpoints of the sides of $\triangle ABC$.



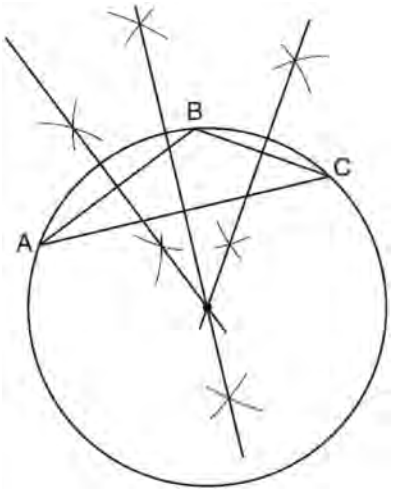
153 On the set of axes below, graph and label $\triangle DEF$ with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$. If G is the midpoint of $\overline{EF}$ and H is the midpoint of $\overline{DF}$, state the coordinates of G and H and label each point on your graph. Explain why $\overline{GH} \parallel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



G.G.21: CENTROID, ORTHOCENTER, INCENTER AND CIRCUMCENTER

154 In which triangle do the three altitudes intersect outside the triangle?
1 a right triangle
2 an acute triangle
3 an obtuse triangle
4 an equilateral triangle

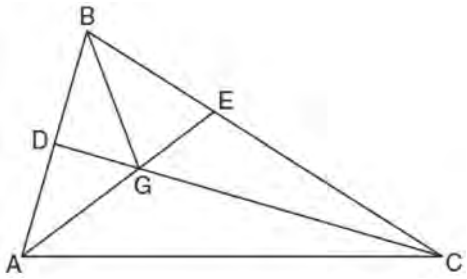
155 The diagram below shows the construction of the center of the circle circumscribed about $\triangle ABC$.



This construction represents how to find the intersection of

1 the angle bisectors of $\triangle ABC$
2 the medians to the sides of $\triangle ABC$
3 the altitudes to the sides of $\triangle ABC$
4 the perpendicular bisectors of the sides of $\triangle ABC$

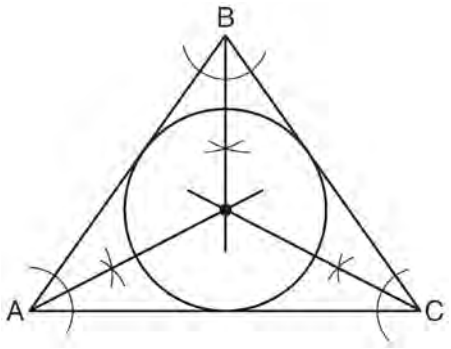
156 In the diagram below of $\triangle ABC$, $\overline{CD}$ is the bisector of $\angle BCA$, $\overline{AE}$ is the bisector of $\angle CAB$, and $\overline{BG}$ is drawn.



Which statement must be true?

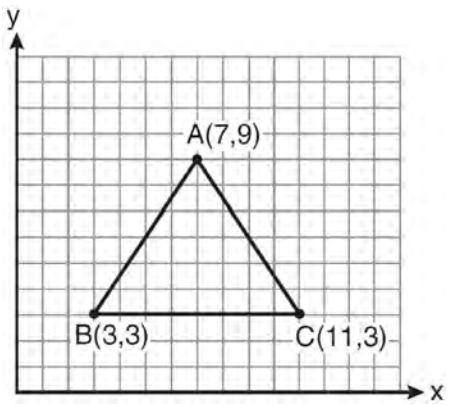
1 $DG = EG$
2 $AG = BG$
3 $\angle AEB \cong \angle AEC$
4 $\angle DBG \cong \angle EBG$

157 Which geometric principle is used in the construction shown below?



1 The intersection of the angle bisectors of a triangle is the center of the inscribed circle.
2 The intersection of the angle bisectors of a triangle is the center of the circumscribed circle.
3 The intersection of the perpendicular bisectors of the sides of a triangle is the center of the inscribed circle.
4 The intersection of the perpendicular bisectors of the sides of a triangle is the center of the circumscribed circle.

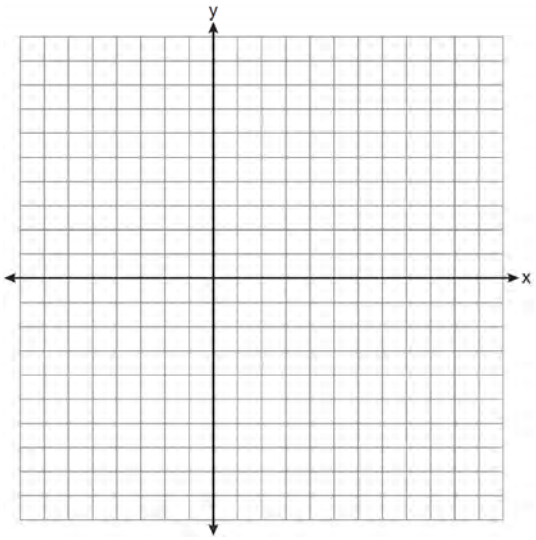
158 The vertices of the triangle in the diagram below are $A(7,9)$, $B(3,3)$, and $C(11,3)$.



What are the coordinates of the centroid of $\triangle ABC$?

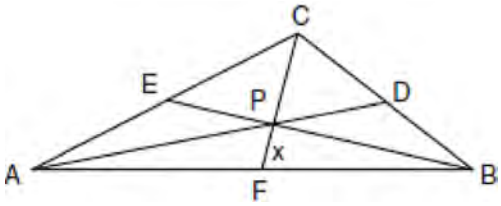
1 $(5,6)$
2 $(7,3)$
3 $(7,5)$
4 $(9,6)$

159 Triangle ABC has vertices $A(3,3)$, $B(7,9)$, and $C(11,3)$. Determine the point of intersection of the medians, and state its coordinates. [The use of the set of axes below is optional.]



G.G.43: CENTROID

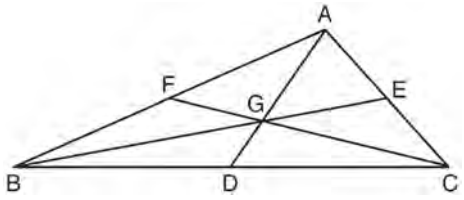
160 In the diagram of $\triangle ABC$ below, Jose found centroid P by constructing the three medians. He measured $\overline{CF}$ and found it to be 6 inches.



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

1 $x + x = 6$
2 $2x + x = 6$
3 $3x + 2x = 6$
4 $x + \frac{2}{3}x = 6$

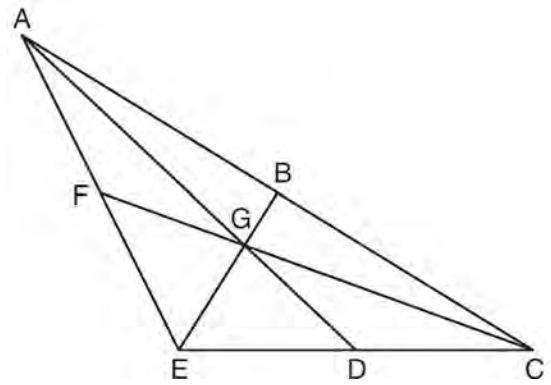
161 In the diagram below of $\triangle ABC$, medians $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ intersect at G.



If $CF = 24$, what is the length of $\overline{FG}$?

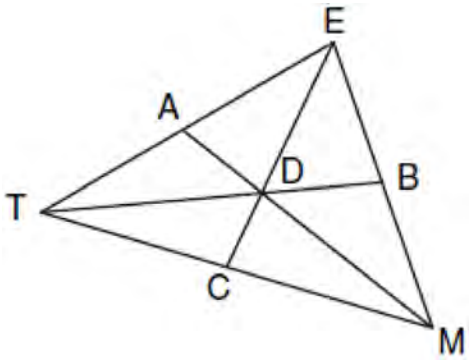
1 8
2 10
3 12
4 16

162 In the diagram below of $\triangle ACE$, medians $\overline{AD}$, $\overline{EB}$, and $\overline{CF}$ intersect at G. The length of $\overline{FG}$ is 12 cm.



What is the length, in centimeters, of $\overline{GC}$?
1 24
2 12
3 6
4 4

163 In the diagram below of $\triangle TEM$, medians $\overline{TB}$, $\overline{EC}$, and $\overline{MA}$ intersect at D, and $TB = 9$. Find the length of $\overline{TD}$.

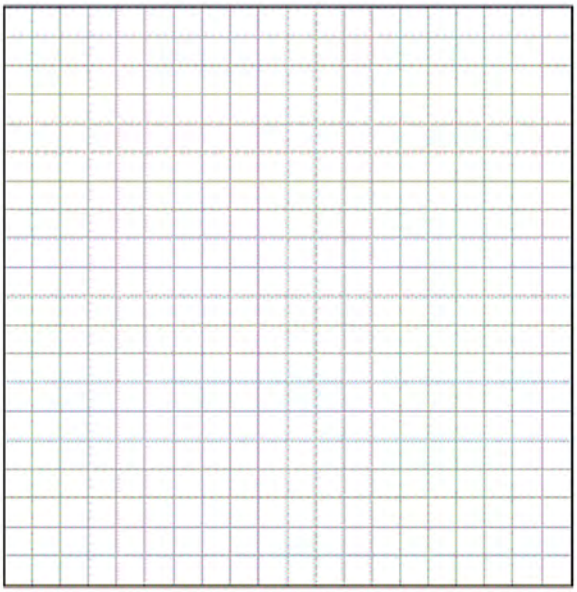


G.G.69: TRIANGLES IN THE COORDINATE PLANE

164 The vertices of $\triangle ABC$ are $A(-1,-2)$, $B(-1,2)$ and $C(6,0)$. Which conclusion can be made about the angles of $\triangle ABC$?
1 $m\angle A = m\angle B$
2 $m\angle A = m\angle C$
3 $m\angle ACB = 90$
4 $m\angle ABC = 60$

165 Triangle ABC has vertices $A(0,0)$, $B(3,2)$, and $C(0,4)$. The triangle may be classified as
1 equilateral
2 isosceles
3 right
4 scalene

166 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.]

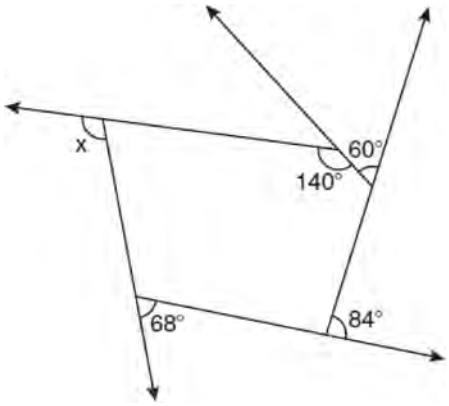


Geometry Regents Exam Questions by Performance Indicator: Topic

POLYGONS

G.G.36: INTERIOR AND EXTERIOR ANGLES OF POLYGONS

167 The pentagon in the diagram below is formed by five rays.



What is the degree measure of angle *x*?
1 72
2 96
3 108
4 112

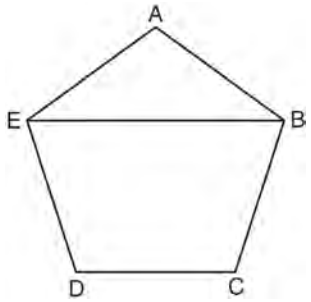
168 In which polygon does the sum of the measures of the interior angles equal the sum of the measures of the exterior angles?
1 triangle
2 hexagon
3 octagon
4 quadrilateral

G.G.37: INTERIOR AND EXTERIOR ANGLES OF POLYGONS

169 What is the measure of an interior angle of a regular octagon?
1 45º
2 60º
3 120º
4 135º

170 What is the measure of each interior angle of a regular hexagon?
1 60°
2 120°
3 135°
4 270°

171 In the diagram below of regular pentagon *ABCDE*, $\overline{EB}$ is drawn.

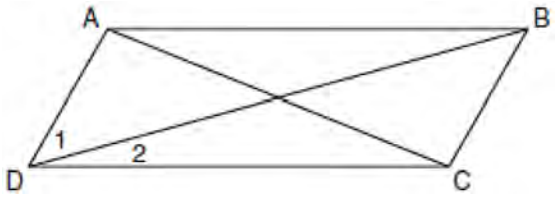


What is the measure of $\angle AEB$?
1 36º
2 54º
3 72º
4 108º

172 Find, in degrees, the measures of both an interior angle and an exterior angle of a regular pentagon.

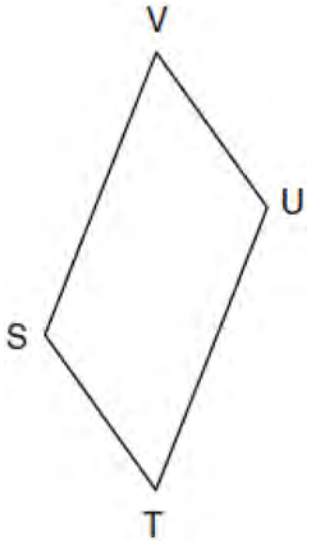
G.G.38: PARALLELOGRAMS

173 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 $\angle 2$?
1 15°
2 30°
3 45°
4 60°

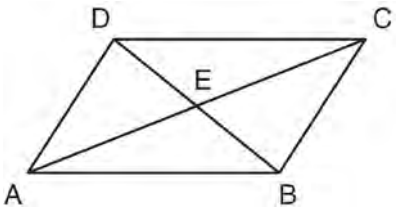
174 In the diagram below of parallelogram *STUV*, $SV = x + 3$, $VU = 2x - 1$, and $TU = 4x - 3$.



What is the length of $\overline{SV}$?
1 5
2 2
3 7
4 4

175 Which statement is true about every parallelogram?
1 All four sides are congruent.
2 The interior angles are all congruent.
3 Two pairs of opposite sides are congruent.
4 The diagonals are perpendicular to each other.

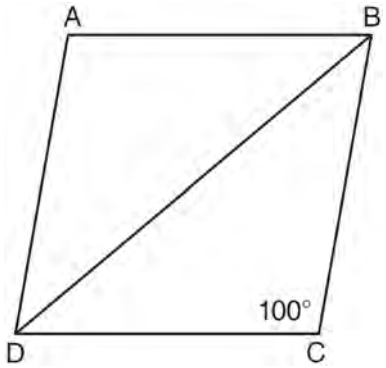
176 In the diagram below, parallelogram *ABCD* has diagonals $\overline{AC}$ and $\overline{BD}$ that intersect at point *E*.



Which expression is *not* always true?
1 $\angle DAE \cong \angle BCE$
2 $\angle DEC \cong \angle BEA$
3 $\overline{AC} \cong \overline{DB}$
4 $\overline{DE} \cong \overline{EB}$

G.G.39: PARALLELOGRAMS

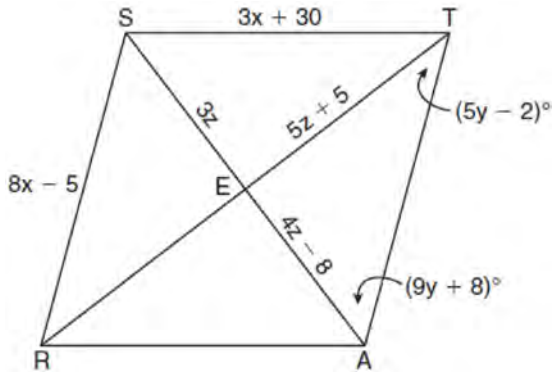
177 In the diagram below of rhombus *ABCD*, $m\angle C = 100$.



What is $m\angle DBC$?
1 40
2 45
3 50
4 80

178 In rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. If $AE = 5$ and $BE = 12$, what is the length of $\overline{AB}$?
1 7
2 10
3 13
4 17

179 In the diagram below, quadrilateral $STAR$ is a rhombus with diagonals $\overline{SA}$ and $\overline{TR}$ intersecting at E. $ST = 3x + 30$, $SR = 8x - 5$, $SE = 3z$, $TE = 5z + 5$, $AE = 4z - 8$, $m\angle RTA = 5y - 2$, and $m\angle TAS = 9y + 8$. Find SR, RT, and $m\angle TAS$.



180 Which quadrilateral has diagonals that always bisect its angles and also bisect each other?
1 rhombus
2 rectangle
3 parallelogram
4 isosceles trapezoid

181 The diagonals of a quadrilateral are congruent but do not bisect each other. This quadrilateral is
1 an isosceles trapezoid
2 a parallelogram
3 a rectangle
4 a rhombus

182 Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals?
1 the rhombus, only
2 the rectangle and the square
3 the rhombus and the square
4 the rectangle, the rhombus, and the square

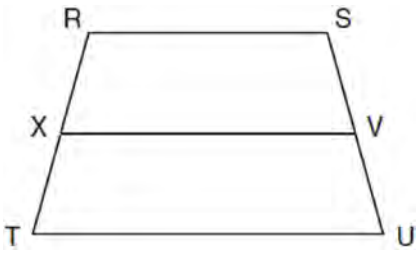
G.G.40: TRAPEZOIDS

183 If the diagonals of a quadrilateral do *not* bisect each other, then the quadrilateral could be a
1 rectangle
2 rhombus
3 square
4 trapezoid

184 Isosceles trapezoid $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. If $AC = 5x + 13$ and $BD = 11x - 5$, what is the value of x?
1 28
2 $10\frac{3}{4}$
3 3
4 $\frac{1}{2}$

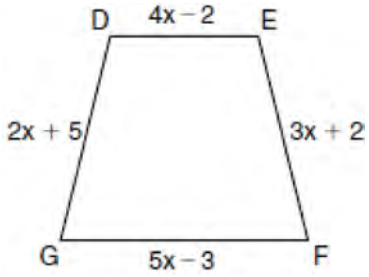
185 In isosceles trapezoid $ABCD$, $\overline{AB} \cong \overline{CD}$. If $BC = 20$, $AD = 36$, and $AB = 17$, what is the length of the altitude of the trapezoid?
1 10
2 12
3 15
4 16

186 In the diagram below of trapezoid $RSUT$, $\overline{RS} \parallel \overline{TU}$, X is the midpoint of $\overline{RT}$, and V is the midpoint of $\overline{SU}$.

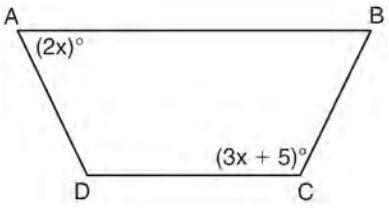


If $RS = 30$ and $XV = 44$, what is the length of $\overline{TU}$?
1 37
2 58
3 74
4 118

187 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.



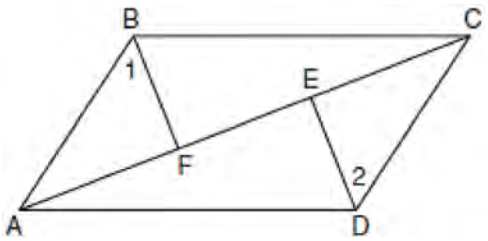
188 The diagram below shows isosceles trapezoid $ABCD$ with $\overline{AB} \parallel \overline{DC}$ and $\overline{AD} \cong \overline{BC}$. If $m\angle BAD = 2x$ and $m\angle BCD = 3x + 5$, find $m\angle BAD$.



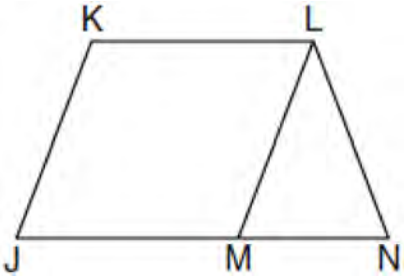
G.G.41: SPECIAL QUADRILATERALS

189 A quadrilateral whose diagonals bisect each other and are perpendicular is a
1 rhombus
2 rectangle
3 trapezoid
4 parallelogram

190 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.



191 Given: $JKLM$ is a parallelogram.
$\overline{JM} \cong \overline{LN}$
$\angle LMN \cong \angle LNM$
Prove: $JKLM$ is a rhombus.

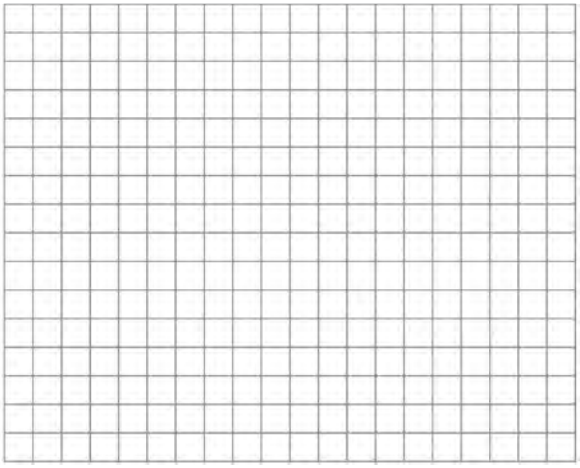


G.G.69: QUADRILATERALS IN THE COORDINATE PLANE

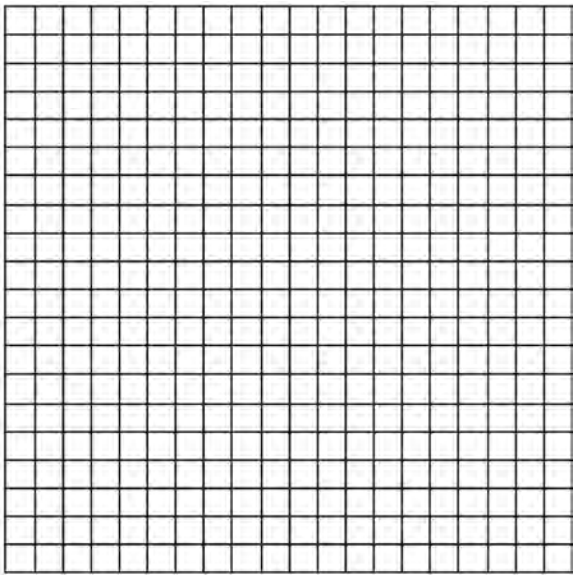
192 The coordinates of the vertices of parallelogram $ABCD$ are $A(-3,2)$, $B(-2,-1)$, $C(4,1)$, and $D(3,4)$. The slopes of which line segments could be calculated to show that $ABCD$ is a rectangle?

1 $\overline{AB}$ and $\overline{DC}$
2 $\overline{AB}$ and $\overline{BC}$
3 $\overline{AD}$ and $\overline{BC}$
4 $\overline{AC}$ and $\overline{BD}$

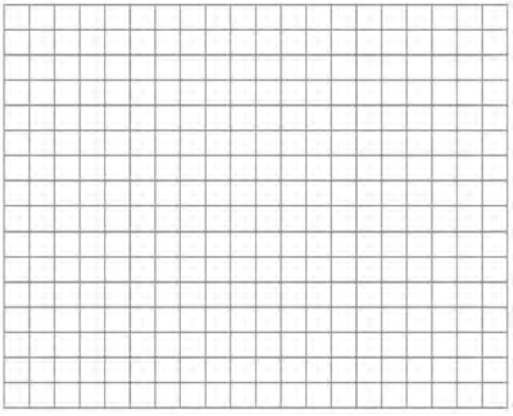
193 Given: Quadrilateral $ABCD$ has vertices $A(-5,6)$, $B(6,6)$, $C(8,-3)$, and $D(-3,-3)$.
Prove: Quadrilateral $ABCD$ is a parallelogram but is neither a rhombus nor a rectangle. [The use of the grid below is optional.]



194 Quadrilateral $MATH$ has coordinates $M(1,1)$, $A(-2,5)$, $T(3,5)$, and $H(6,1)$. Prove that quadrilateral $MATH$ is a rhombus and prove that it is *not* a square. [The use of the grid is optional.]



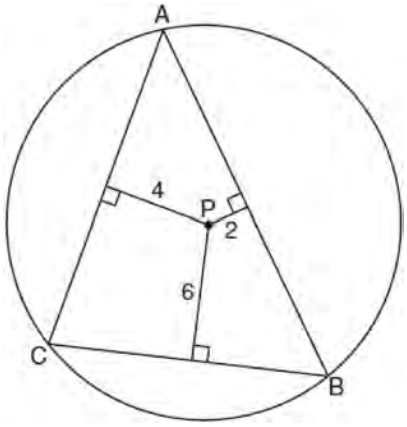
195 Given: $\triangle ABC$ with vertices $A(-6,-2)$, $B(2,8)$, and $C(6,-2)$. $\overline{AB}$ has midpoint D, $\overline{BC}$ has midpoint E, and $\overline{AC}$ has midpoint F.
Prove: $ADEF$ is a parallelogram
$ADEF$ is *not* a rhombus
[The use of the grid is optional.]



CONICS

G.G.49: CHORDS

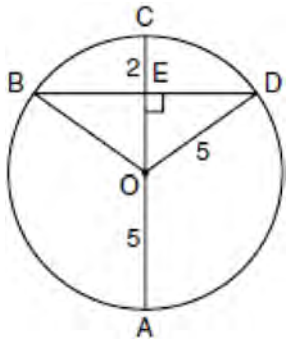
196 In the diagram below, $\triangle ABC$ is inscribed in circle P. The distances from the center of circle P to each side of the triangle are shown.



Which statement about the sides of the triangle is true?

1 $AB > AC > BC$
2 $AB < AC$ and $AC > BC$
3 $AC > AB > BC$
4 $AC = AB$ and $AB > BC$

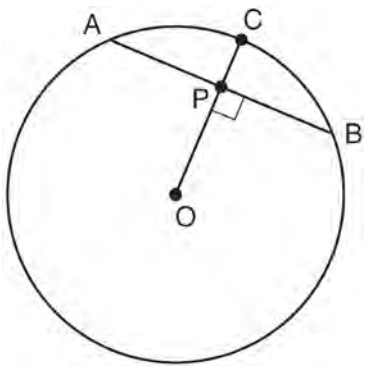
197 In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter $\overline{AC}$ is perpendicular to chord $\overline{BD}$ at E.



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

1 12
2 10
3 8
4 4

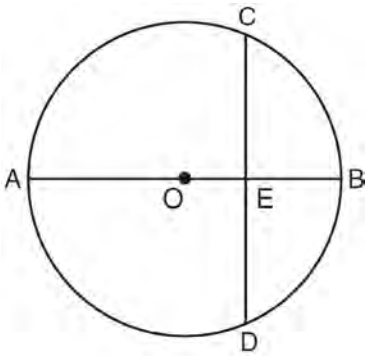
198 In the diagram below of circle O, radius $\overline{OC}$ is 5 cm. Chord $\overline{AB}$ is 8 cm and is perpendicular to $\overline{OC}$ at point P.



What is the length of $\overline{OP}$, in centimeters?

1 8
2 2
3 3
4 4

199 In the diagram below of circle O, diameter $\overline{AOB}$ is perpendicular to chord $\overline{CD}$ at point E, $OA = 6$, and $OE = 2$.

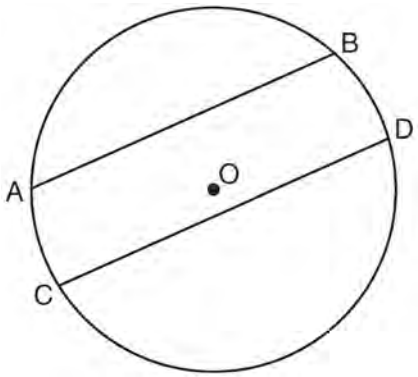


What is the length of $\overline{CE}$?

1 $4\sqrt{3}$
2 $2\sqrt{3}$
3 $8\sqrt{2}$
4 $4\sqrt{2}$

G.G.52: CHORDS

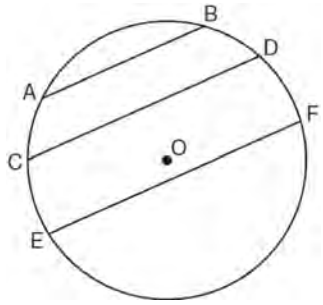
200 In the diagram below of circle O, chord $\overline{AB}$ is parallel to chord $\overline{CD}$.



Which statement must be true?

1 $\overset{\frown}{AC} \cong \overset{\frown}{BD}$
2 $\overset{\frown}{AB} \cong \overset{\frown}{CD}$
3 $\overline{AB} \cong \overline{CD}$
4 $\overset{\frown}{ABD} \cong \overset{\frown}{CDB}$

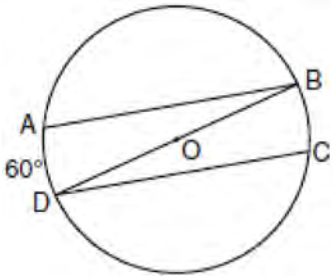
201 In the diagram below of circle O, chord $\overline{AB} \parallel$ chord $\overline{CD}$, and chord $\overline{CD} \parallel$ chord $\overline{EF}$.



Which statement must be true?

1 $\overset{\frown}{CE} \cong \overset{\frown}{DF}$
2 $\overset{\frown}{AC} \cong \overset{\frown}{DF}$
3 $\overset{\frown}{AC} \cong \overset{\frown}{CE}$
4 $\overset{\frown}{EF} \cong \overset{\frown}{CD}$

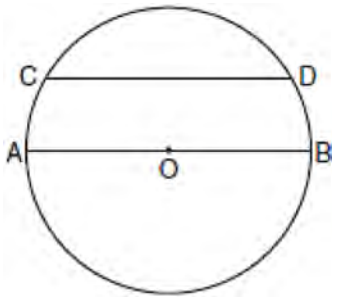
202 In the diagram of circle O below, chords $\overline{AB}$ and $\overline{CD}$ are parallel, and $\overline{BD}$ is a diameter of the circle.



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

1 20
2 30
3 60
4 120

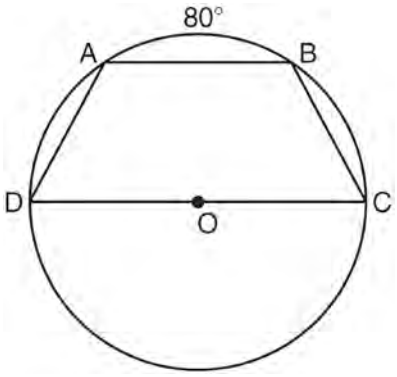
203 In the diagram of circle O below, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{AC} = 30$.



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

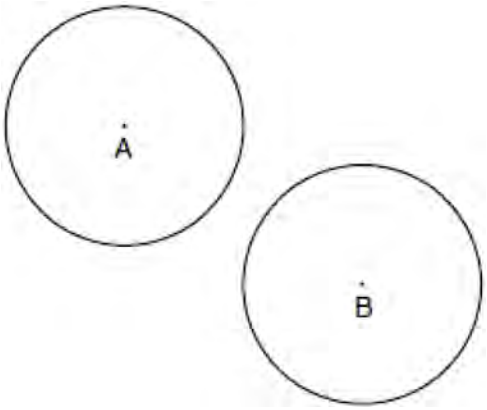
1 150
2 120
3 100
4 60

204 In the diagram below, trapezoid $ABCD$, with bases $\overline{AB}$ and $\overline{DC}$, is inscribed in circle O, with diameter $\overline{DC}$. If $m\overset{\frown}{AB}=80$, find $m\overset{\frown}{BC}$.



G.G.50: TANGENTS

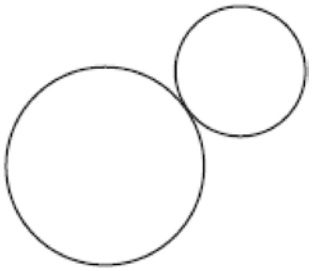
205 In the diagram below, circle A and circle B are shown.



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

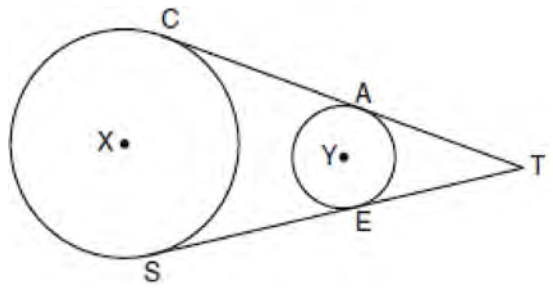
1 1
2 2
3 3
4 4

206 How many common tangent lines can be drawn to the two externally tangent circles shown below?



1 1
2 2
3 3
4 4

207 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)

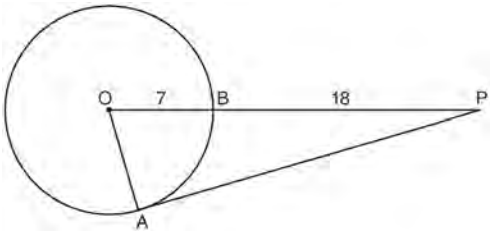
208 Tangents $\overline{PA}$ and $\overline{PB}$ are drawn to circle *O* from an external point, *P*, and radii $\overline{OA}$ and $\overline{OB}$ are drawn. If m∠*APB* = 40, what is the measure of ∠*AOB*?

1 140º
2 100º
3 70º
4 50º

209 Line segment *AB* is tangent to circle *O* at *A*. Which type of triangle is always formed when points *A*, *B*, and *O* are connected?

1 right
2 obtuse
3 scalene
4 isosceles

210 In the diagram below of △*PAO*, $\overline{AP}$ is tangent to circle *O* at point *A*, *OB* = 7, and *BP* = 18.

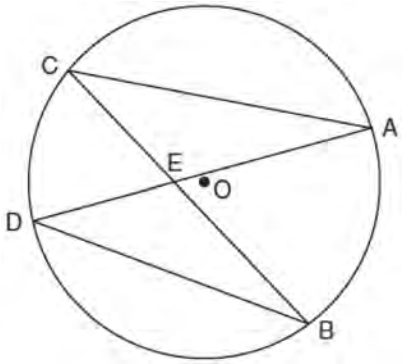


What is the length of $\overline{AP}$?

1 10
2 12
3 17
4 24

G.G.51: ARCS DETERMINED BY ANGLES

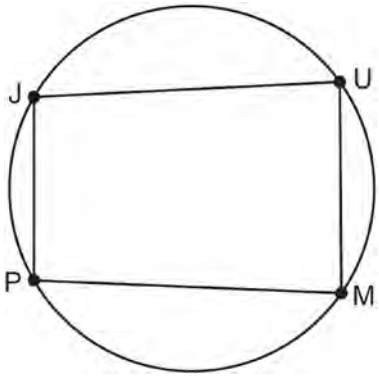
211 In the diagram below of circle *O*, chords $\overline{AD}$ and $\overline{BC}$ intersect at *E*.



Which relationship must be true?

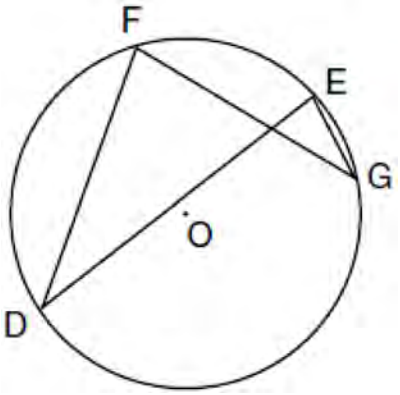
1 △*CAE* ≅ △*DBE*
2 △*AEC* ~ △*BED*
3 ∠*ACB* ≅ ∠*CBD*
4 $\overset{\frown}{CA} \cong \overset{\frown}{DB}$

212 In the diagram below, quadrilateral *JUMP* is inscribed in a circle..

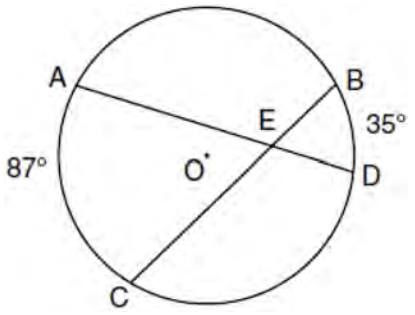


Opposite angles *J* and *M* must be
1 right
2 complementary
3 congruent
4 supplementary

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

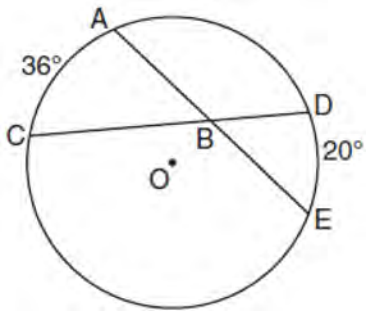


214 In the diagram below of circle *O*, chords $\overline{AD}$ and $\overline{BC}$ intersect at *E*, $m\overset{\frown}{AC} = 87$, and $m\overset{\frown}{BD} = 35$.



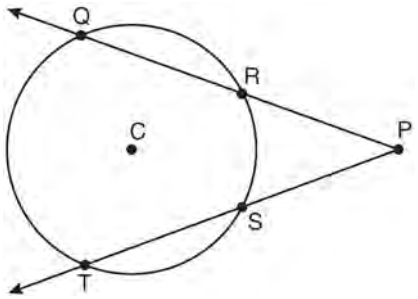
What is the degree measure of $\angle CEA$?
1 87
2 61
3 43.5
4 26

215 In the diagram below of circle *O*, chords $\overline{AE}$ and $\overline{DC}$ intersect at point *B*, such that $m\overset{\frown}{AC} = 36$ and $m\overset{\frown}{DE} = 20$.



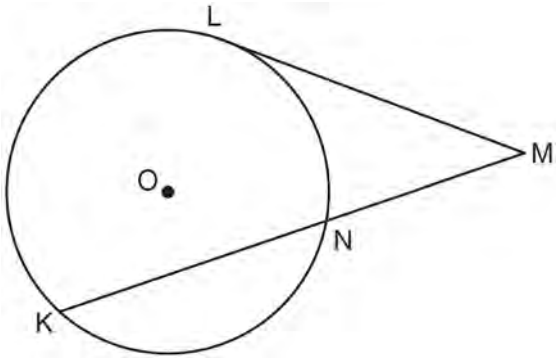
What is $m\angle ABC$?
1 56
2 36
3 28
4 8

216 In the diagram below of circle C, $m\overset{\frown}{QT} = 140$, and $m\angle P = 40$.



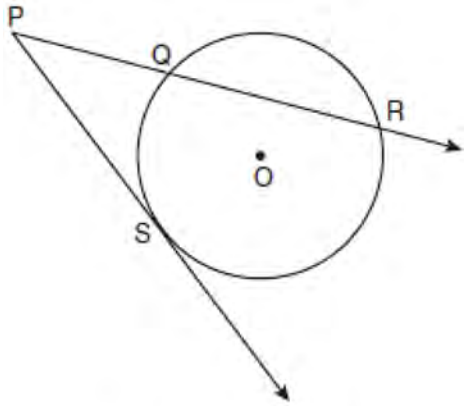
What is $m\overset{\frown}{RS}$?
1 50
2 60
3 90
4 110

217 In the diagram below, tangent $\overline{ML}$ and secant $\overline{MNK}$ are drawn to circle O. The ratio $m\overset{\frown}{LN} : m\overset{\frown}{NK} : m\overset{\frown}{KL}$ is 3:4:5. Find $m\angle LMK$.



G.G.53: SEGMENTS INTERCEPTED BY CIRCLE

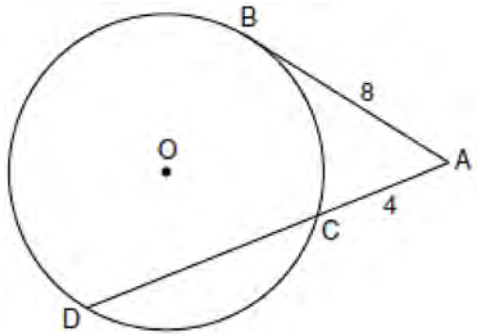
218 In the diagram below, $\overline{PS}$ is a tangent to circle O at point S, $\overline{PQR}$ is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.



(Not drawn to scale)

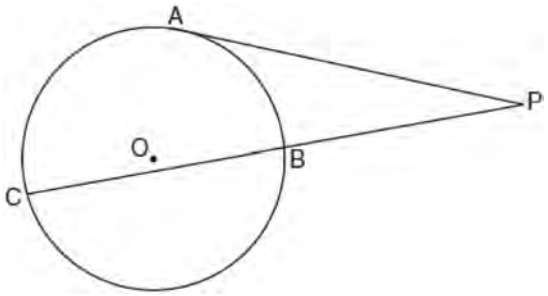
What is the length of $\overline{PS}$?
1 6
2 9
3 3
4 27

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



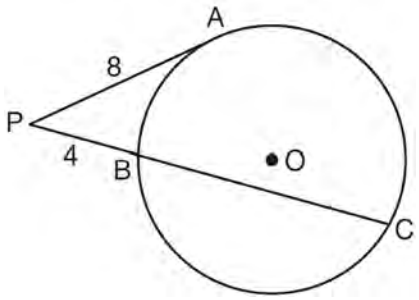
What is the length of $\overline{CD}$?
1 16
2 13
3 12
4 10

220 In the diagram below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle O from external point P.



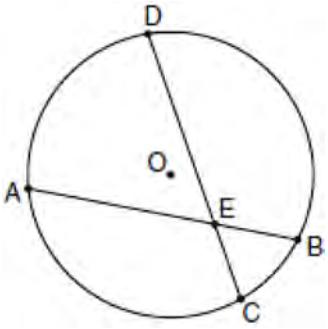
If $PB = 4$ and $BC = 5$, what is the length of $\overline{PA}$?
1 20
2 9
3 8
4 6

221 In the diagram below of circle O, $\overline{PA}$ is tangent to circle O at A, and $\overline{PBC}$ is a secant with points B and C on the circle.



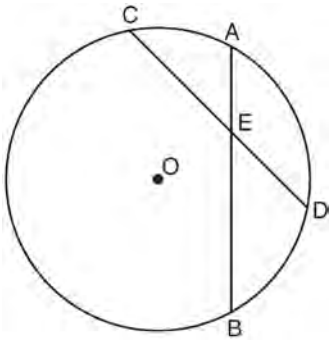
If $PA = 8$ and $PB = 4$, what is the length of $\overline{BC}$?
1 20
2 16
3 15
4 12

222 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?
1 1
2 3.6
3 5
4 10.25

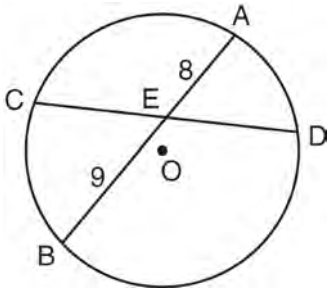
223 In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E.



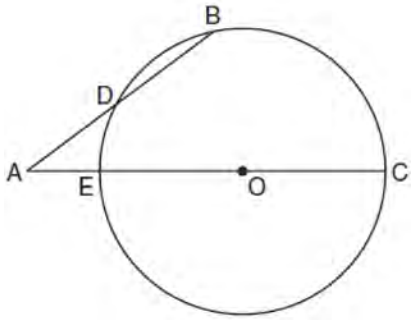
If $CE = 10$, $ED = 6$, and $AE = 4$, what is the length of $\overline{EB}$?

1 15
2 12
3 6.7
4 2.4

224 In the diagram below of circle O, chord $\overline{AB}$ bisects chord $\overline{CD}$ at E. If $AE = 8$ and $BE = 9$, find the length of $\overline{CE}$ in simplest radical form.



225 In the diagram below of circle O, secant $\overline{AB}$ intersects circle O at D, secant $\overline{AOC}$ intersects circle O at E, $AE = 4$, $AB = 12$, and $DB = 6$.

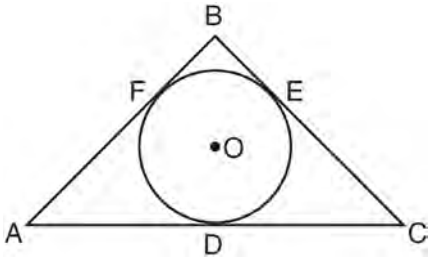


(Not drawn to scale)

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

1 4.5
2 7
3 9
4 14

226 In the diagram below, $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are tangents to circle O at points F, E, and D, respectively, $AF = 6$, $CD = 5$, and $BE = 4$.



What is the perimeter of $\triangle ABC$?

1 15
2 25
3 30
4 60

G.G.71: EQUATIONS OF CIRCLES

227 What is an equation of a circle with its center at $(-3,5)$ and a radius of 4?

1 $(x-3)^2+(y+5)^2=16$

2 $(x+3)^2+(y-5)^2=16$

3 $(x-3)^2+(y+5)^2=4$

4 $(x+3)^2+(y-5)^2=4$

228 Which equation represents the circle whose center is $(-2,3)$ and whose radius is 5?

1 $(x-2)^2+(y+3)^2=5$

2 $(x+2)^2+(y-3)^2=5$

3 $(x+2)^2+(y-3)^2=25$

4 $(x-2)^2+(y+3)^2=25$

229 What is an equation of a circle with center $(7,-3)$ and radius 4?

1 $(x-7)^2+(y+3)^2=4$

2 $(x+7)^2+(y-3)^2=4$

3 $(x-7)^2+(y+3)^2=16$

4 $(x+7)^2+(y-3)^2=16$

230 What is an equation of the circle with a radius of 5 and center at $(1,-4)$?

1 $(x+1)^2+(y-4)^2=5$

2 $(x-1)^2+(y+4)^2=5$

3 $(x+1)^2+(y-4)^2=25$

4 $(x-1)^2+(y+4)^2=25$

231 The diameter of a circle has endpoints at $(-2,3)$ and $(6,3)$. What is an equation of the circle?

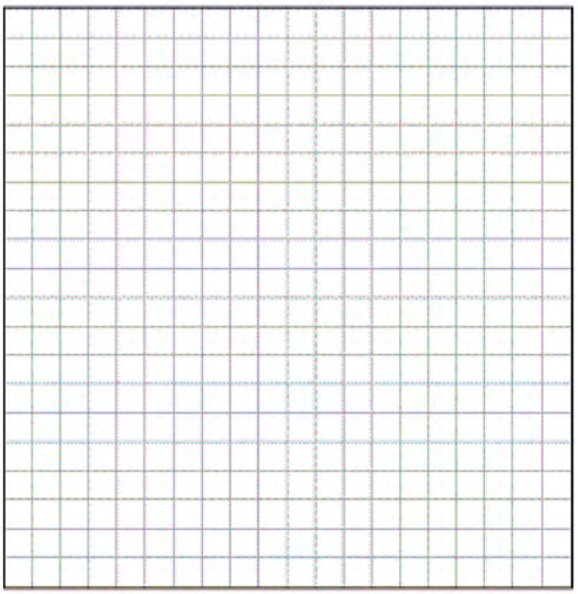
1 $(x-2)^2+(y-3)^2=16$

2 $(x-2)^2+(y-3)^2=4$

3 $(x+2)^2+(y+3)^2=16$

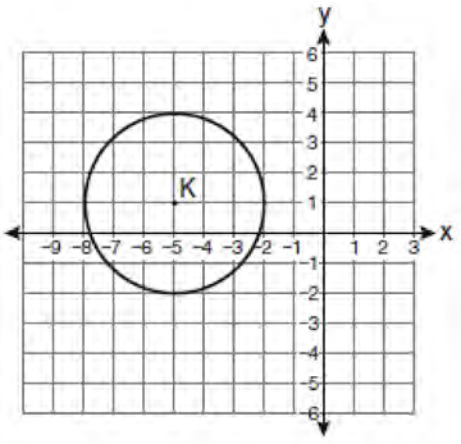
4 $(x+2)^2+(y+3)^2=4$

232 Write an equation of the circle whose diameter $\overline{AB}$ has endpoints $A(-4,2)$ and $B(4,-4)$. [The use of the grid below is optional.]



G.G.72: EQUATIONS OF CIRCLES

233 Which equation represents circle K shown in the graph below?



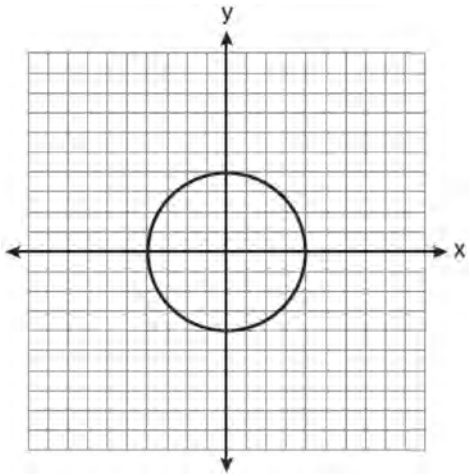
1 $(x+5)^2+(y-1)^2=3$

2 $(x+5)^2+(y-1)^2=9$

3 $(x-5)^2+(y+1)^2=3$

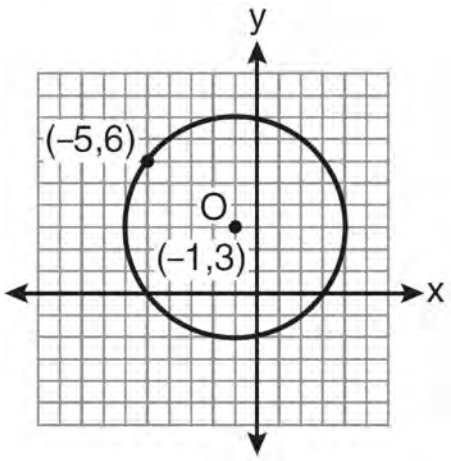
4 $(x-5)^2+(y+1)^2=9$

234 What is an equation for the circle shown in the graph below?



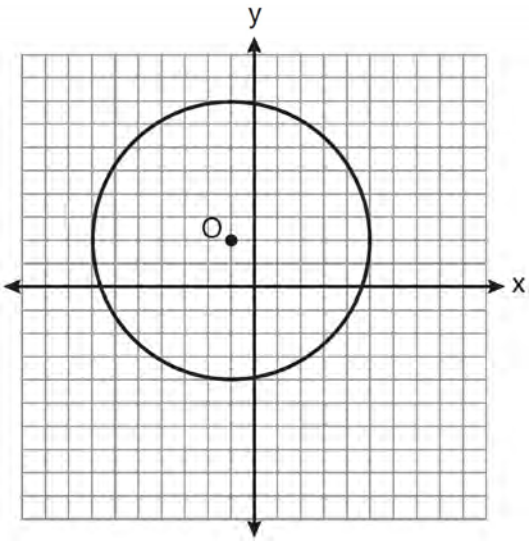
1 $x^2 + y^2 = 2$
2 $x^2 + y^2 = 4$
3 $x^2 + y^2 = 8$
4 $x^2 + y^2 = 16$

235 What is an equation of circle *O* shown in the graph below?

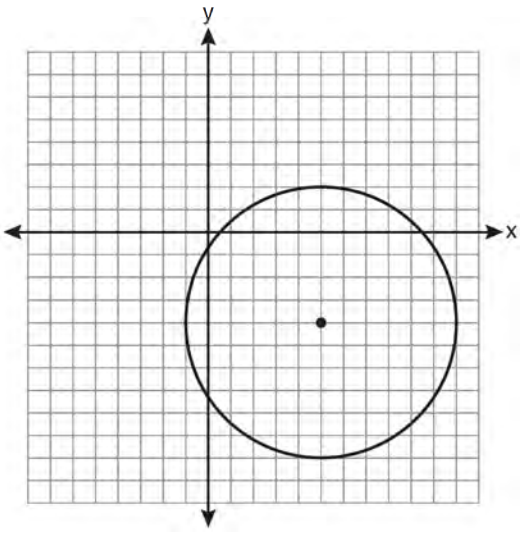


1 $(x+1)^2 + (y-3)^2 = 25$
2 $(x-1)^2 + (y+3)^2 = 25$
3 $(x-5)^2 + (y+6)^2 = 25$
4 $(x+5)^2 + (y-6)^2 = 25$

236 Write an equation for circle *O* shown on the graph below.



237 Write an equation of the circle graphed in the diagram below.



G.G.73: EQUATIONS OF CIRCLES

238 What are the center and the radius of the circle whose equation is $(x-3)^2+(y+3)^2=36$

1 center = $(3,-3)$; radius = 6
2 center = $(-3,3)$; radius = 6
3 center = $(3,-3)$; radius = 36
4 center = $(-3,3)$; radius = 36

239 What are the center and the radius of the circle whose equation is $(x-5)^2+(y+3)^2=16$?

1 $(-5,3)$ and 16
2 $(5,-3)$ and 16
3 $(-5,3)$ and 4
4 $(5,-3)$ and 4

240 The equation of a circle is $x^2+(y-7)^2=16$. What are the center and radius of the circle?

1 center = $(0,7)$; radius = 4
2 center = $(0,7)$; radius = 16
3 center = $(0,-7)$; radius = 4
4 center = $(0,-7)$; radius = 16

241 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?

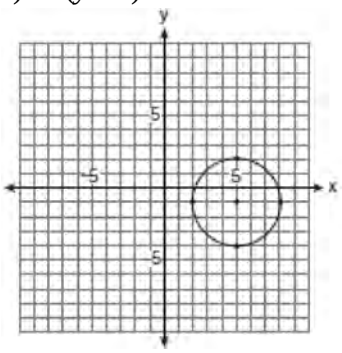
1 $(0,3)$ and 13
2 $(0,3)$ and $\sqrt{13}$
3 $(0,-3)$ and 13
4 $(0,-3)$ and $\sqrt{13}$

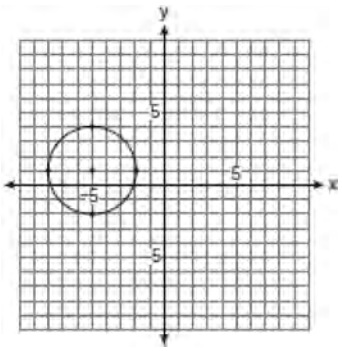
242 What are the center and radius of a circle whose equation is $(x-A)^2+(y-B)^2=C$?

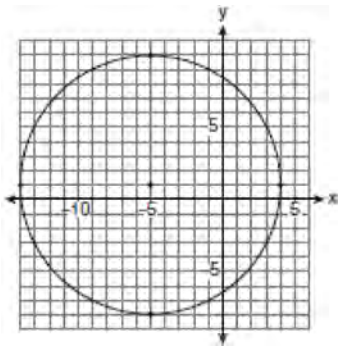
1 center = (A,B); radius = C
2 center = $(-A,-B)$; radius = C
3 center = (A,B); radius = $\sqrt{C}$
4 center = $(-A,-B)$; radius = $\sqrt{C}$

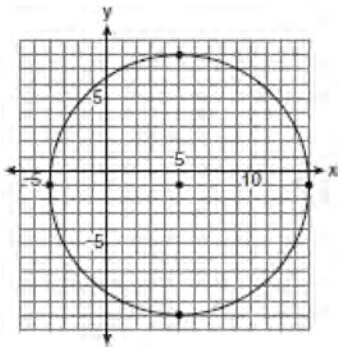
G.G.74: GRAPHING CIRCLES

243 Which graph represents a circle with the equation $(x-5)^2+(y+1)^2=9$?

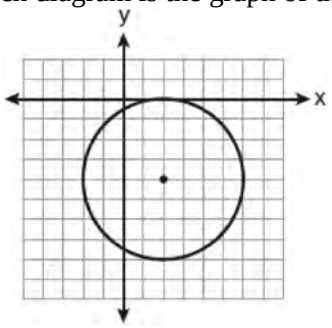
1


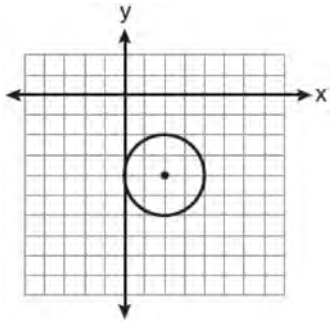
2


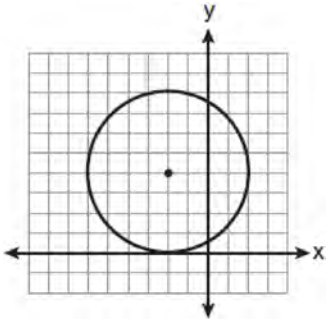
3


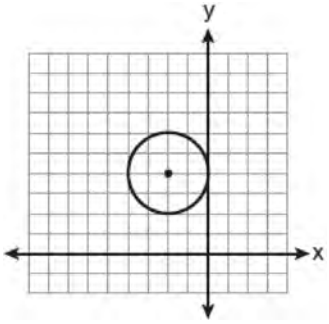
4


244 The equation of a circle is $(x-2)^2+(y+4)^2=4$. Which diagram is the graph of the circle?

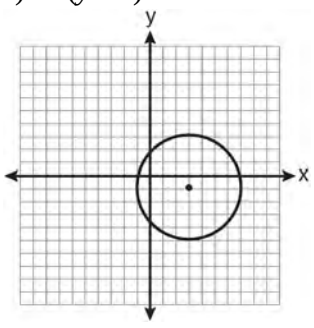
1 

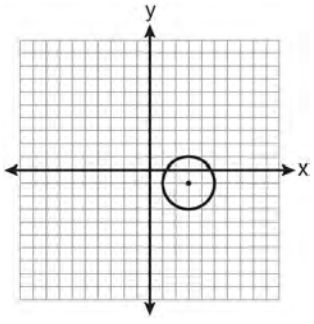
2 

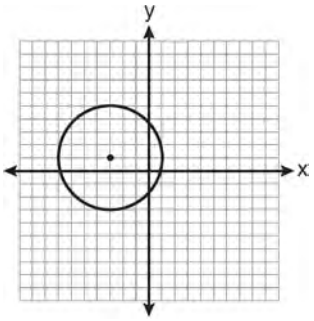
3 

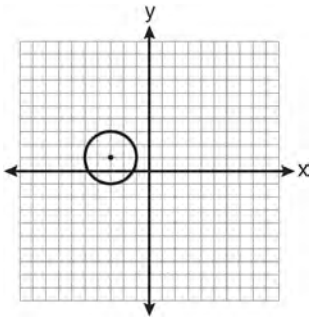
4 

245 Which graph represents a circle with the equation $(x-3)^2+(y+1)^2=4$?

1 

2 

3 

4 

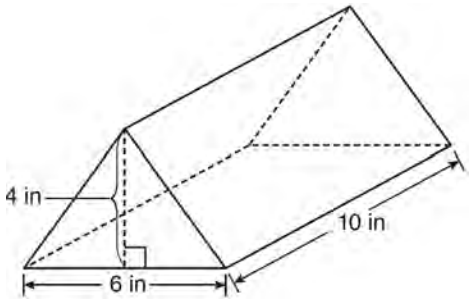
MEASURING IN THE PLANE AND SPACE

G.G.11: VOLUME

246 Tim has a rectangular prism with a length of 10 centimeters, a width of 2 centimeters, and an unknown height. He needs to build another rectangular prism with a length of 5 centimeters and the same height as the original prism. The volume of the two prisms will be the same. Find the width, in centimeters, of the new prism.

G.G.12: VOLUME

247 A packing carton in the shape of a triangular prism is shown in the diagram below.



What is the volume, in cubic inches, of this carton?

1 20
2 60
3 120
4 240

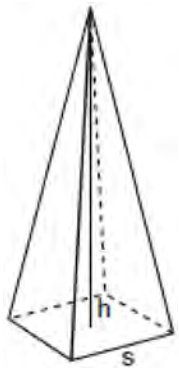
248 A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

1 $x + 4$
2 $x + 2$
3 3
4 $x^2 + 6x + 8$

249 The Parkside Packing Company needs a rectangular shipping box. The box must have a length of 11 inches and a width of 8 inches. Find, to the *nearest tenth of an inch*, the minimum height of the box such that the volume is *at least* 800 cubic inches.

G.G.13: VOLUME

250 A regular pyramid with a square base is shown in the diagram below.

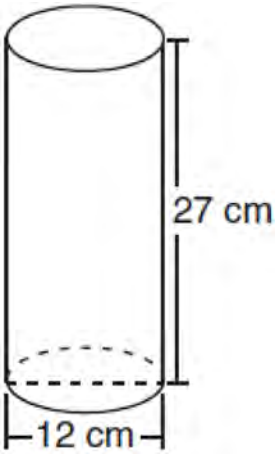


A side, *s*, of the base of the pyramid is 12 meters, and the height, *h*, is 42 meters. What is the volume of the pyramid in cubic meters?

251 The base of a pyramid is a rectangle with a width of 6 cm and a length of 8 cm. Find, in centimeters, the height of the pyramid if the volume is $288\ \text{cm}^3$.

G.G.14: VOLUME AND LATERAL AREA

252 Which expression represents the volume, in cubic centimeters, of the cylinder represented in the diagram below?



1 162π
2 324π
3 972π
4 $3,888\pi$

253 What is the volume, in cubic centimeters, of a cylinder that has a height of 15 cm and a diameter of 12 cm?
1 180π
2 540π
3 675π
4 $2,160\pi$

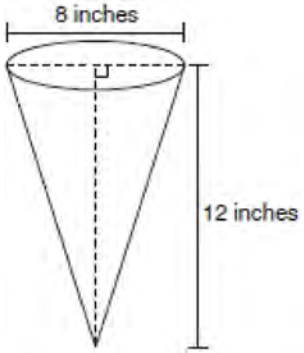
254 A right circular cylinder has a volume of 1,000 cubic inches and a height of 8 inches. What is the radius of the cylinder to the *nearest tenth of an inch*?
1 6.3
2 11.2
3 19.8
4 39.8

255 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*.

256 A right circular cylinder has an altitude of 11 feet and a radius of 5 feet. What is the lateral area, in square feet, of the cylinder, to the *nearest tenth*?
1 172.7
2 172.8
3 345.4
4 345.6

G.G.15: VOLUME AND LATERAL AREA

257 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*?
1 201
2 481
3 603
4 804

258 A right circular cone has a base with a radius of 15 cm, a vertical height of 20 cm, and a slant height of 25 cm. Find, in terms of' π, the number of square centimeters in the lateral area of the cone.

G.G.16: VOLUME AND SURFACE AREA

259 The volume, in cubic centimeters, of a sphere whose diameter is 6 centimeters is
1 12π
2 36π
3 48π
4 288π

260 If the surface area of a sphere is represented by 144π, what is the volume in terms of π?
1 36π
2 48π
3 216π
4 288π

261 A sphere has a diameter of 18 meters. Find the volume of the sphere, in cubic meters, in terms of π.

262 Tim is going to paint a wooden sphere that has a diameter of 12 inches. Find the surface area of the sphere, to the *nearest square inch*.

G.G.45: SIMILARITY

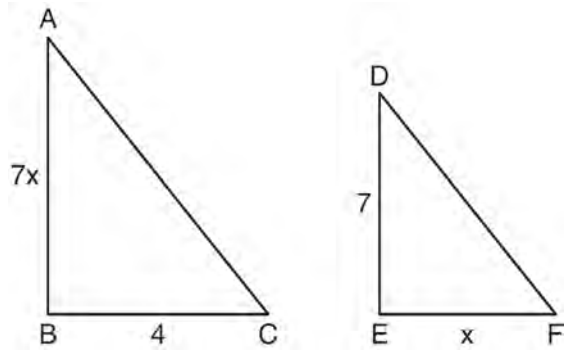
263 Two triangles are similar, and the ratio of each pair of corresponding sides is 2:1. Which statement regarding the two triangles is *not* true?
1 Their areas have a ratio of 4:1.
2 Their altitudes have a ratio of 2:1.
3 Their perimeters have a ratio of 2:1.
4 Their corresponding angles have a ratio of 2:1.

264 $\triangle ABC$ is similar to $\triangle DEF$. The ratio of the length of $\overline{AB}$ to the length of $\overline{DE}$ is 3:1. Which ratio is also equal to 3:1?
1 $\frac{\text{m}\angle A}{\text{m}\angle D}$
2 $\frac{\text{m}\angle B}{\text{m}\angle F}$
3 $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF}$
4 $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$

265 Given $\triangle ABC \sim \triangle DEF$ such that $\frac{AB}{DE} = \frac{3}{2}$. Which statement is *not* true?
1 $\frac{BC}{EF} = \frac{3}{2}$
2 $\frac{\text{m}\angle A}{\text{m}\angle D} = \frac{3}{2}$
3 $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} = \frac{9}{4}$
4 $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \frac{3}{2}$

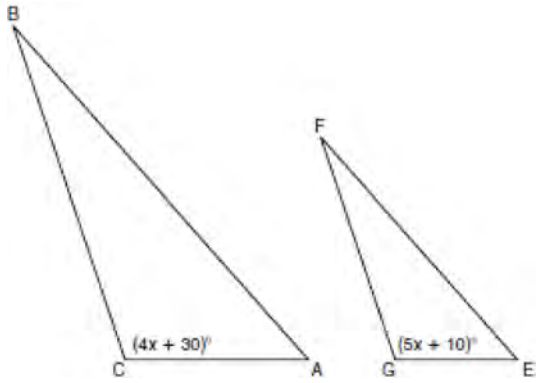
266 If $\triangle ABC \sim \triangle ZXY$, $\text{m}\angle A = 50$, and $\text{m}\angle C = 30$, what is $\text{m}\angle X$?
1 30
2 50
3 80
4 100

267 As shown in the diagram below, $\triangle ABC \sim \triangle DEF$, $AB = 7x$, $BC = 4$, $DE = 7$, and $EF = x$.

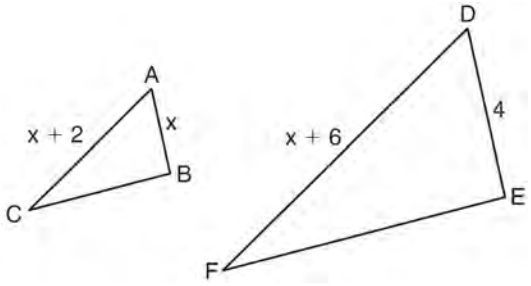


What is the length of $\overline{AB}$?
1 28
2 2
3 14
4 4

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

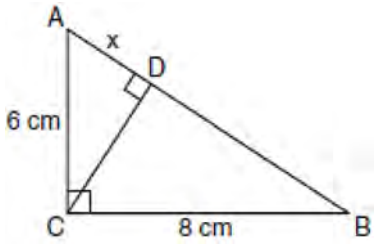


269 In the diagram below, $\triangle ABC \sim \triangle DEF$, $DE = 4$, $AB = x$, $AC = x + 2$, and $DF = x + 6$. Determine the length of $\overline{AB}$. [Only an algebraic solution can receive full credit.]



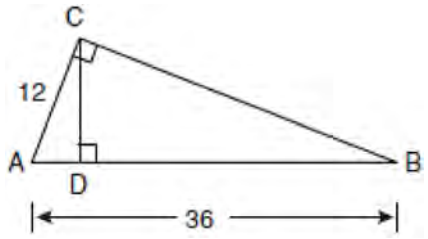
G.G.47: SIMILARITY

270 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 $\triangle ABC$.



What is the length of $\overline{AD}$ to the *nearest tenth of a centimeter*?
1 3.6
2 6.0
3 6.4
4 4.0

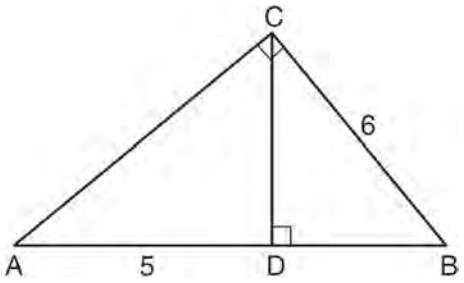
271 In the diagram below of right triangle *ACB*, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.



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

1 32
2 6
3 3
4 4

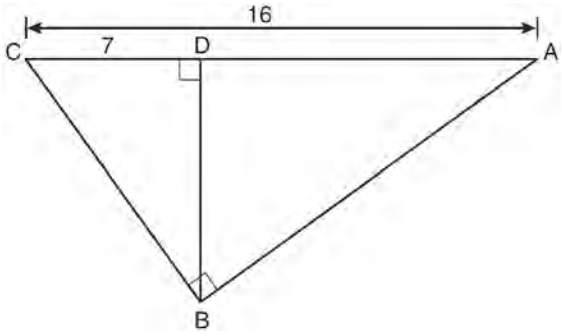
272 In the diagram below of right triangle *ABC*, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$, $CB = 6$, and $AD = 5$.



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

1 5
2 9
3 3
4 4

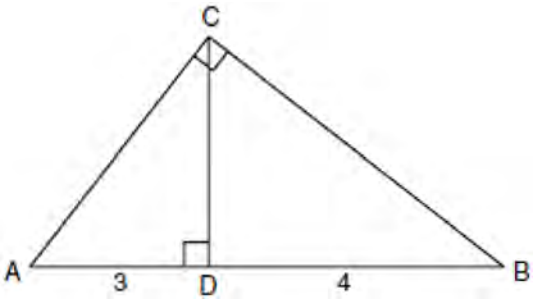
273 In the diagram below of right triangle *ABC*, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $AC = 16$, and $CD = 7$.



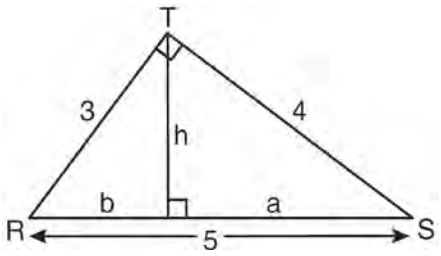
What is the length of $\overline{BD}$?

1 $3\sqrt{7}$
2 $4\sqrt{7}$
3 $7\sqrt{3}$
4 12

274 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.



275 In the diagram below, $\triangle RST$ is a $3-4-5$ right triangle. The altitude, *h*, to the hypotenuse has been drawn. Determine the length of *h*.



TRANSFORMATIONS

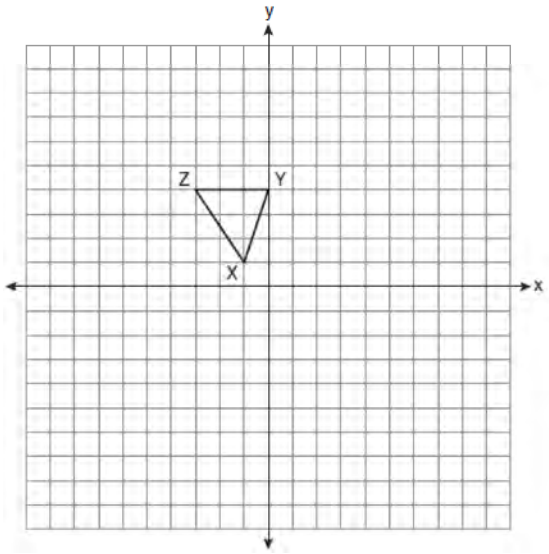
G.G.54: REFLECTIONS

276 Point *A* is located at $(4,-7)$. The point is reflected in the *x*-axis. Its image is located at
1 $(-4,7)$
2 $(-4,-7)$
3 $(4,7)$
4 $(7,-4)$

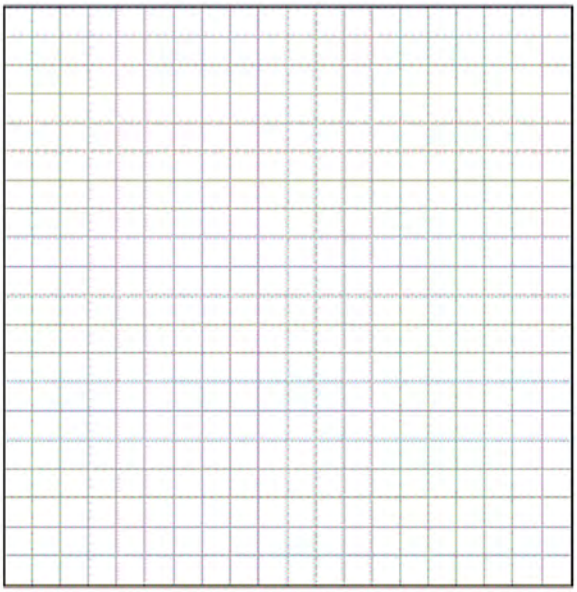
277 What is the image of the point $(2,-3)$ after the transformation $r_{y-\text{axis}}$?
1 $(2,3)$
2 $(-2,-3)$
3 $(-2,3)$
4 $(-3,2)$

278 The coordinates of point *A* are $(-3a,4b)$. If point A' is the image of point *A* reflected over the line $y=x$, the coordinates of A' are
1 $(4b,-3a)$
2 $(3a,4b)$
3 $(-3a,-4b)$
4 $(-4b,-3a)$

279 Triangle *XYZ*, shown in the diagram below, is reflected over the line $x=2$. State the coordinates of $\triangle X'Y'Z'$, the image of $\triangle XYZ$.



280 Triangle *ABC* has vertices $A(-2,2)$, $B(-1,-3)$, and $C(4,0)$. Find the coordinates of the vertices of $\triangle A'B'C'$, the image of $\triangle ABC$ after the transformation $r_{\text{x-axis}}$. [The use of the grid is optional.]



G.G.54: TRANSLATIONS

281 What is the image of the point $(-5,2)$ under the translation $T_{3,-4}$?
1 $(-9,5)$
2 $(-8,6)$
3 $(-2,-2)$
4 $(-15,-8)$

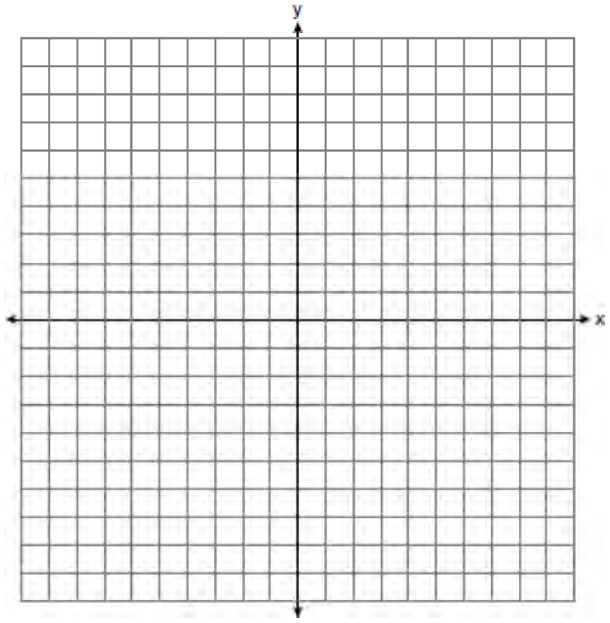
282 Triangle ABC has vertices $A(1,3)$, $B(0,1)$, and $C(4,0)$. Under a translation, A', the image point of A, is located at $(4,4)$. Under this same translation, point C' is located at
1 $(7,1)$
2 $(5,3)$
3 $(3,2)$
4 $(1,-1)$

G.G.54: COMPOSITIONS OF TRANSFORMATIONS

283 What is the image of point $A(4,2)$ after the composition of transformations defined by $R_{90°} \circ r_{y=x}$?
1 $(-4,2)$
2 $(4,-2)$
3 $(-4,-2)$
4 $(2,-4)$

284 The point $(3,-2)$ is rotated 90º about the origin and then dilated by a scale factor of 4. What are the coordinates of the resulting image?
1 $(-12,8)$
2 (12,-8)
3 $(8,12)$
4 $(-8,-12)$

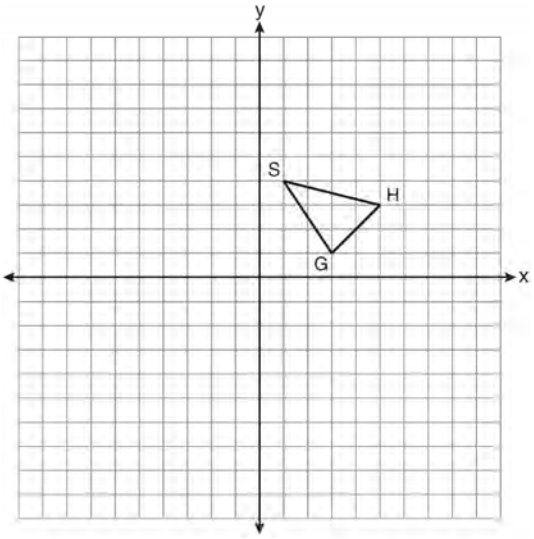
285 The coordinates of the vertices of parallelogram $ABCD$ are $A(-2,2)$, $B(3,5)$, $C(4,2)$, and $D(-1,-1)$. State the coordinates of the vertices of parallelogram $A''B''C''D''$ that result from the transformation $r_{y-\text{axis}} \circ T_{2,-3}$. [The use of the set of axes below is optional.]



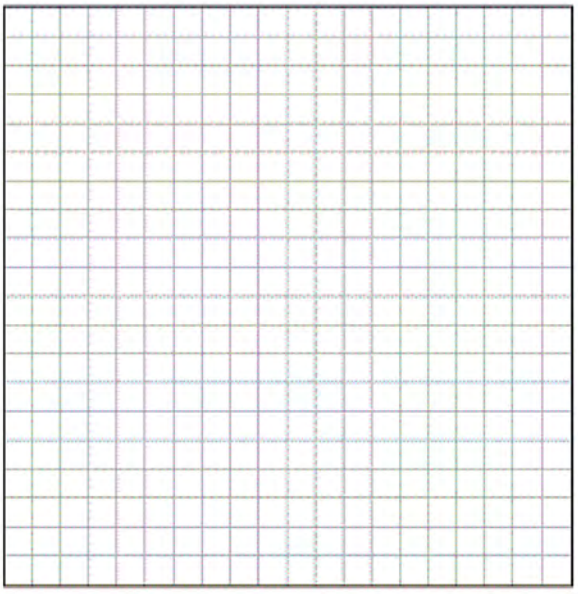
G.G.58: COMPOSITIONS OF TRANSFORMATIONS

286 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''?
1 $A''(-2,10)$ and $B''(6,8)$
2 $A''(-1,5)$ and $B''(3,4)$
3 $A''(2,7)$ and $B''(10,5)$
4 $A''(14,-2)$ and $B''(22,-4)$

287 As shown on the set of axes below, $\triangle GHS$ has vertices $G(3,1)$, $H(5,3)$, and $S(1,4)$. Graph and state the coordinates of $\triangle G''H''S''$, the image of $\triangle GHS$ after the transformation $T_{-3,1} \circ D_2$.

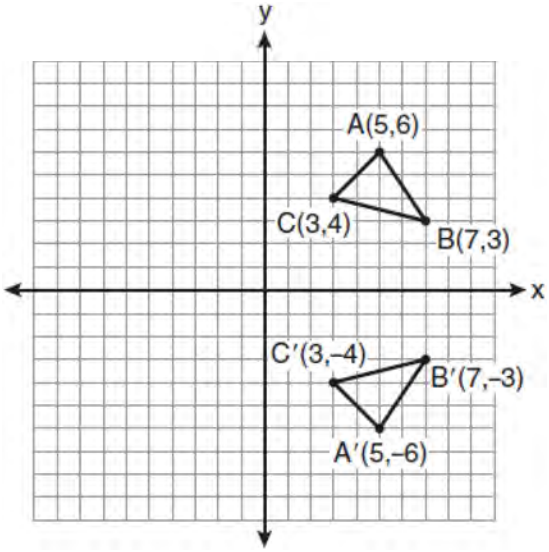


288 The coordinates of the vertices of $\triangle ABC$ $A(1,3)$, $B(-2,2)$ and $C(0,-2)$. On the grid below, graph and label $\triangle A''B''C''$, the result of the composite transformation $D_2 \circ T_{3,-2}$. State the coordinates of A'', B'', and C''.



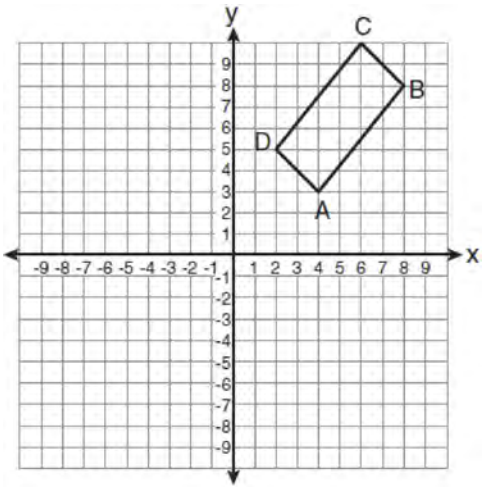
G.G.55: PROPERTIES OF TRANSFORMATIONS

289 Which expression best describes the transformation shown in the diagram below?



1 same orientation; reflection
2 opposite orientation; reflection
3 same orientation; translation
4 opposite orientation; translation

290 The rectangle *ABCD* shown in the diagram below will be reflected across the *x*-axis.



What will *not* be preserved?

1 slope of $\overline{AB}$
2 parallelism of $\overline{AB}$ and $\overline{CD}$
3 length of $\overline{AB}$
4 measure of $\angle A$

291 A transformation of a polygon that always preserves both length and orientation is

1 dilation
2 translation
3 line reflection
4 glide reflection

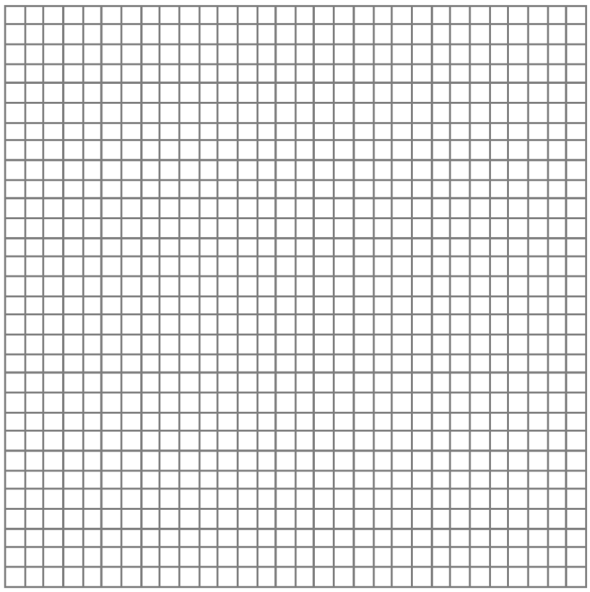
292 Quadrilateral *MNOP* is a trapezoid with $\overline{MN} \parallel \overline{OP}$. If $M'N'O'P'$ is the image of *MNOP* after a reflection over the *x*-axis, which two sides of quadrilateral $M'N'O'P'$ are parallel?

1 $\overline{M'N'}$ and $\overline{O'P'}$
2 $\overline{M'N'}$ and $\overline{N'O'}$
3 $\overline{P'M'}$ and $\overline{O'P'}$
4 $\overline{P'M'}$ and $\overline{N'O'}$

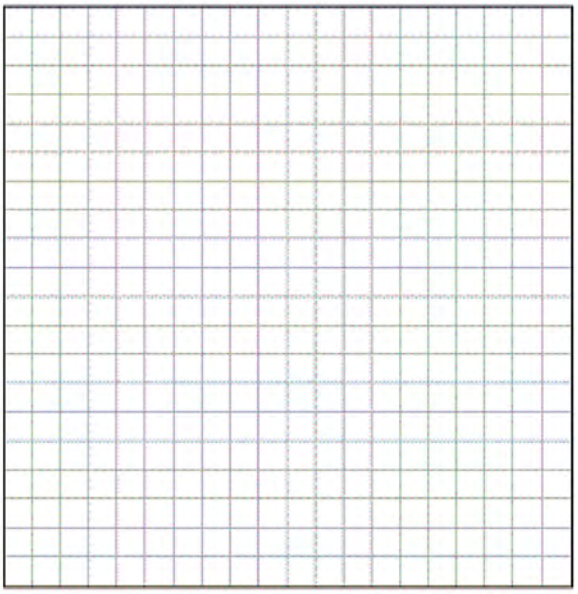
293 Pentagon *PQRST* has $\overline{PQ}$ parallel to $\overline{TS}$. After a translation of $T_{2,-5}$, which line segment is parallel to $\overline{P'Q'}$?

1 $\overline{R'Q'}$
2 $\overline{R'S'}$
3 $\overline{T'S'}$
4 $\overline{T'P'}$

294 The vertices of $\triangle ABC$ are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of $\triangle ABC$ such that its image, $\triangle A'B'C'$, results in $\overline{AB} \parallel \overline{A'B'}$.



295 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 $\triangle D'E'G'$. On the grid below, graph and label $\triangle DEG$ and $\triangle D'E'G'$. State the coordinates of the vertices D', E', and G'. Justify that this transformation preserves distance.



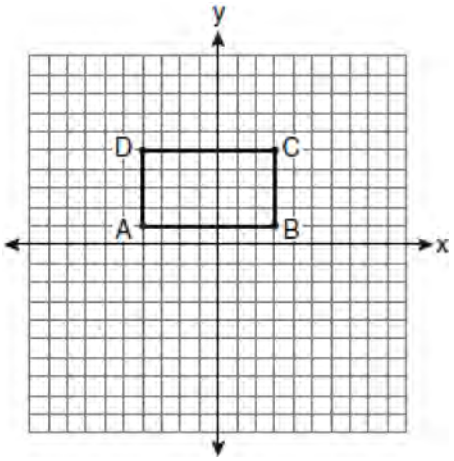
G.G.57: PROPERTIES OF TRANSFORMATIONS

296 Which transformation of the line $x = 3$ results in an image that is perpendicular to the given line?

1 $r_{x\text{-axis}}$
2 $r_{y\text{-axis}}$
3 $r_{y=x}$
4 $r_{x=1}$

G.G.59: PROPERTIES OF TRANSFORMATIONS

297 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?

1 exactly 28 square units
2 less than 28 square units
3 greater than 28 square units
4 It cannot be determined from the information given.

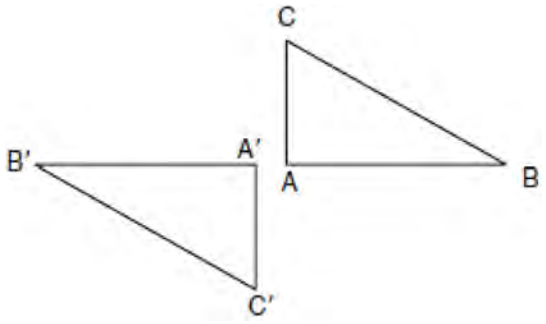
298 When $\triangle ABC$ is dilated by a scale factor of 2, its image is $\triangle A'B'C'$. Which statement is true?

1 $\overline{AC} \cong \overline{A'C'}$
2 $\angle A \cong \angle A'$
3 perimeter of $\triangle ABC$ = perimeter of $\triangle A'B'C'$
4 2(area of $\triangle ABC$) = area of $\triangle A'B'C'$

299 In $\triangle KLM$, $m\angle K = 36$ and $KM = 5$. The transformation D_2 is performed on $\triangle KLM$ to form $\triangle K'L'M'$. Find $m\angle K'$. Justify your answer. Find the length of $\overline{K'M'}$. Justify your answer.

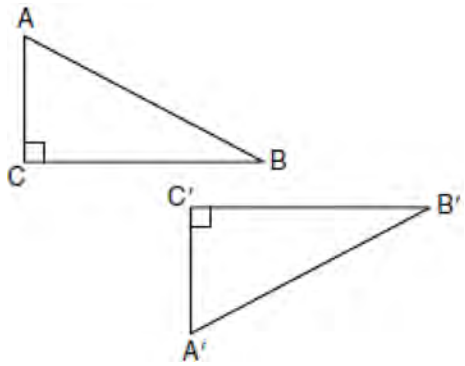
G.G.56: IDENTIFYING TRANSFORMATIONS

300 In the diagram below, under which transformation will $\triangle A'B'C'$ be the image of $\triangle ABC$?



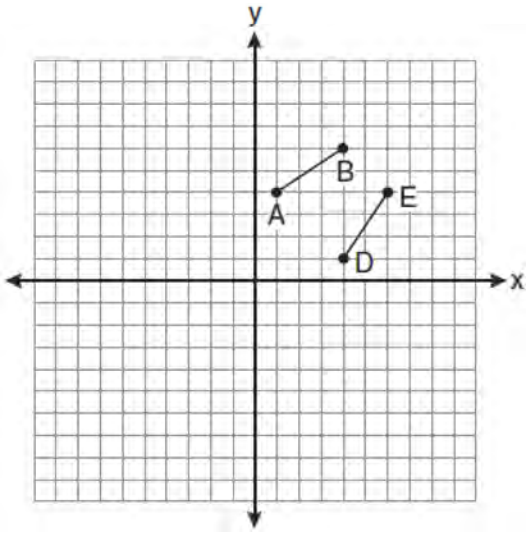
1 rotation
2 dilation
3 translation
4 glide reflection

301 In the diagram below, which transformation was used to map $\triangle ABC$ to $\triangle A'B'C'$?



1 dilation
2 rotation
3 reflection
4 glide reflection

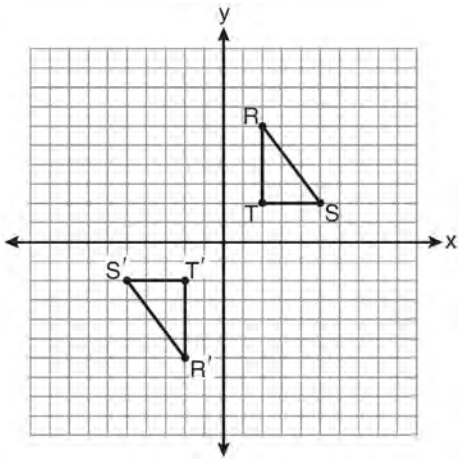
302 The diagram below shows $\overline{AB}$ and $\overline{DE}$.



Which transformation will move $\overline{AB}$ onto $\overline{DE}$ such that point D is the image of point A and point E is the image of point B?

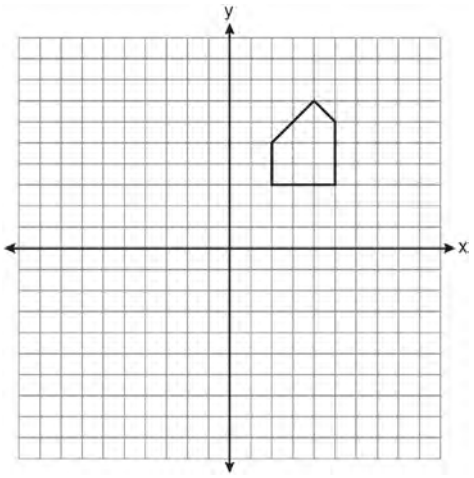
1 $T_{3,-3}$
2 $D_{\frac{1}{2}}$
3 $R_{90°}$
4 $r_{y=x}$

303 As shown on the graph below, $\triangle R'S'T'$ is the image of $\triangle RST$ under a single transformation.



Which transformation does this graph represent?
1 glide reflection
2 line reflection
3 rotation
4 translation

304 A pentagon is drawn on the set of axes below. If the pentagon is reflected over the *y*-axis, determine if this transformation is an isometry. Justify your answer. [The use of the set of axes is optional.]

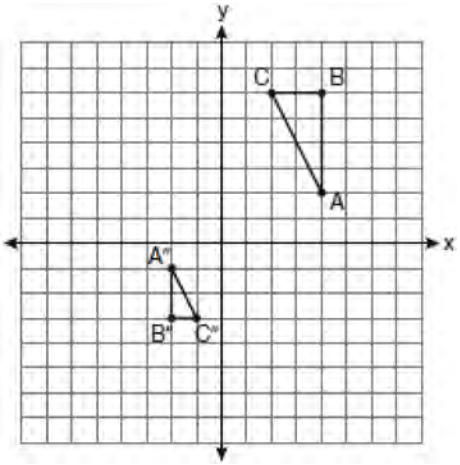


305 Which transformation is *not* always an isometry?
1 rotation
2 dilation
3 reflection
4 translation

306 Which transformation can map the letter **S** onto itself?
1 glide reflection
2 translation
3 line reflection
4 rotation

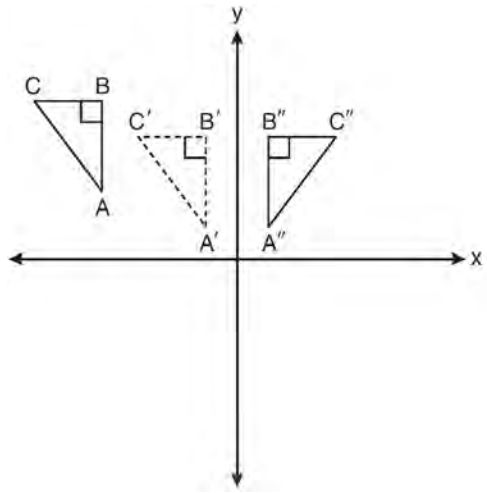
G.G.60: IDENTIFYING TRANSFORMATIONS

307 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?
1 $R_{180^\circ} \circ D_2$
2 $R_{90^\circ} \circ D_2$
3 $D_{\frac{1}{2}} \circ R_{180^\circ}$
4 $D_{\frac{1}{2}} \circ R_{90^\circ}$

308 In the diagram below, $\triangle A'B'C'$ is a transformation of $\triangle ABC$, and $\triangle A''B''C''$ is a transformation of $\triangle A'B'C'$.



The composite transformation of $\triangle ABC$ to $\triangle A''B''C''$ is an example of a
1 reflection followed by a rotation
2 reflection followed by a translation
3 translation followed by a rotation
4 translation followed by a reflection

309 Which transformation produces a figure similar but not congruent to the original figure?
1 $T_{1,3}$
2 $D_{\frac{1}{2}}$
3 $R_{90°}$
4 $r_{y=x}$

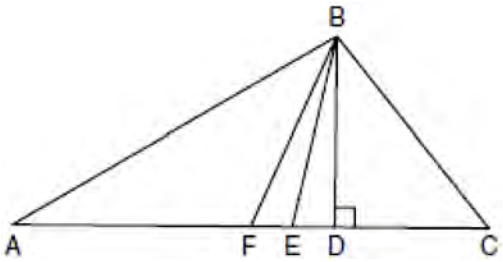
G.G.61: ANALYTICAL REPRESENTATIONS OF TRANSFORMATIONS

310 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?
1 up
2 down
3 left
4 right

LOGIC

G.G.24: STATEMENTS AND NEGATIONS

311 Given $\triangle ABC$ with base $\overline{AFEDC}$, median $\overline{BF}$, altitude $\overline{BD}$, and $\overline{BE}$ bisects $\angle ABC$, which conclusion is valid?



1 $\angle FAB \cong \angle ABF$
2 $\angle ABF \cong \angle CBD$
3 $\overline{CE} \cong \overline{EA}$
4 $\overline{CF} \cong \overline{FA}$

312 What is the negation of the statement "The Sun is shining"?
1 It is cloudy.
2 It is daytime.
3 It is not raining.
4 The Sun is not shining.

313 What is the negation of the statement "Squares are parallelograms"?
1 Parallelograms are squares.
2 Parallelograms are not squares.
3 It is not the case that squares are parallelograms.
4 It is not the case that parallelograms are squares.

314 What is the negation of the statement "I am not going to eat ice cream"?
1 I like ice cream.
2 I am going to eat ice cream.
3 If I eat ice cream, then I like ice cream.
4 If I don't like ice cream, then I don't eat ice cream.

315 Given the true statement, "The medians of a triangle are concurrent," write the negation of the statement and give the truth value for the negation.

G.G.25: COMPOUND STATEMENTS

316 Which compound statement is true?
1 A triangle has three sides and a quadrilateral has five sides.
2 A triangle has three sides if and only if a quadrilateral has five sides.
3 If a triangle has three sides, then a quadrilateral has five sides.
4 A triangle has three sides or a quadrilateral has five sides.

317 The statement "x is a multiple of 3, and x is an even integer" is true when x is equal to
1 9
2 8
3 3
4 6

318 Given: Two is an even integer or three is an even integer.
Determine the truth value of this disjunction.
Justify your answer.

G.G.26: CONDITIONAL STATEMENTS

319 What is the inverse of the statement “If two triangles are not similar, their corresponding angles are not congruent”?
1 If two triangles are similar, their corresponding angles are not congruent.
2 If corresponding angles of two triangles are not congruent, the triangles are not similar.
3 If two triangles are similar, their corresponding angles are congruent.
4 If corresponding angles of two triangles are congruent, the triangles are similar.

320 What is the converse of the statement "If Bob does his homework, then George gets candy"?
1 If George gets candy, then Bob does his homework.
2 Bob does his homework if and only if George gets candy.
3 If George does not get candy, then Bob does not do his homework.
4 If Bob does not do his homework, then George does not get candy.

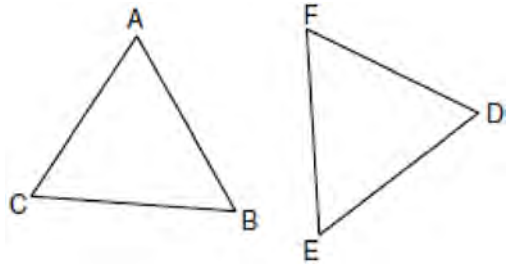
321 What is the contrapositive of the statement, “If I am tall, then I will bump my head”?
1 If I bump my head, then I am tall.
2 If I do not bump my head, then I am tall.
3 If I am tall, then I will not bump my head.
4 If I do not bump my head, then I am not tall.

322 Which statement is logically equivalent to "If it is warm, then I go swimming"
1 If I go swimming, then it is warm.
2 If it is warm, then I do not go swimming.
3 If I do not go swimming, then it is not warm.
4 If it is not warm, then I do not go swimming.

323 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.

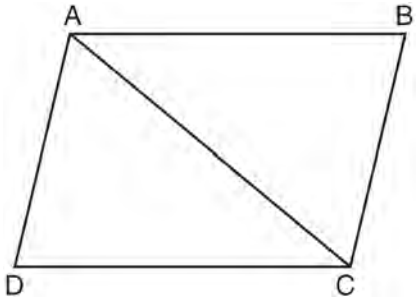
G.G.28: TRIANGLE CONGRUENCY

324 In the diagram of $\triangle ABC$ and $\triangle DEF$ below, $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\angle B \cong \angle E$.



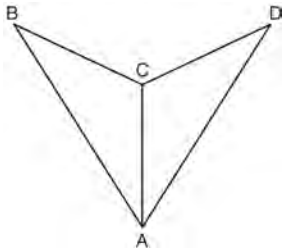
Which method can be used to prove $\triangle ABC \cong \triangle DEF$?
1 SSS
2 SAS
3 ASA
4 HL

325 In the diagram of quadrilateral $ABCD$, $\overline{AB} \parallel \overline{CD}$, $\angle ABC \cong \angle CDA$, and diagonal $\overline{AC}$ is drawn.



Which method can be used to prove $\triangle ABC$ is congruent to $\triangle CDA$?
1 AAS
2 SSA
3 SAS
4 SSS

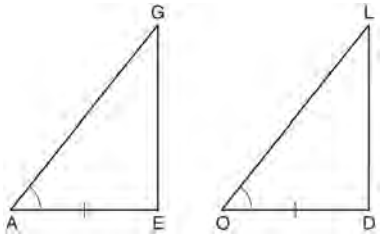
326 As shown in the diagram below, $\overline{AC}$ bisects $\angle BAD$ and $\angle B \cong \angle D$.



Which method could be used to prove $\triangle ABC \cong \triangle ADC$?
1 SSS
2 AAA
3 SAS
4 AAS

327 The diagonal $\overline{AC}$ is drawn in parallelogram $ABCD$. Which method can *not* be used to prove that $\triangle ABC \cong \triangle CDA$?
1 SSS
2 SAS
3 SSA
4 ASA

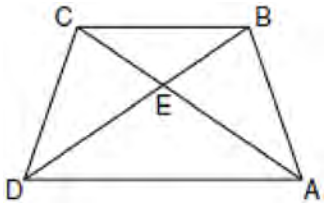
328 In the diagram below of $\triangle AGE$ and $\triangle OLD$, $\angle GAE \cong \angle LOD$, and $\overline{AE} \cong \overline{OD}$.



To prove that $\triangle AGE$ and $\triangle OLD$ are congruent by SAS, what other information is needed?
1 $\overline{GE} \cong \overline{LD}$
2 $\overline{AG} \cong \overline{OL}$
3 $\angle AGE \cong \angle OLD$
4 $\angle AEG \cong \angle ODL$

G.G.29: TRIANGLE CONGRUENCY

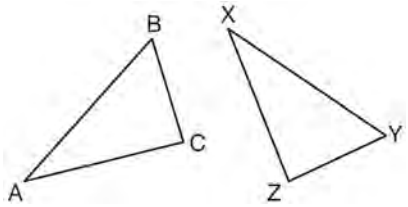
329 In the diagram of trapezoid $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E and $\triangle ABC \cong \triangle DCB$.



Which statement is true based on the given information?

1 $\overline{AC} \cong \overline{BC}$
2 $\overline{CD} \cong \overline{AD}$
3 $\angle CDE \cong \angle BAD$
4 $\angle CDB \cong \angle BAC$

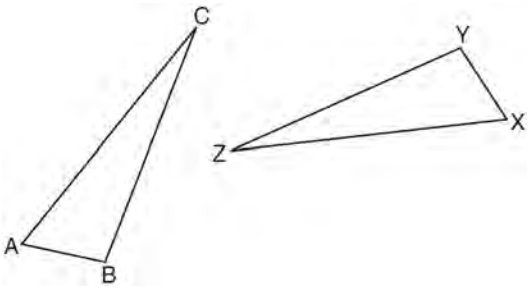
330 In the diagram below, $\triangle ABC \cong \triangle XYZ$.



Which two statements identify corresponding congruent parts for these triangles?

1 $\overline{AB} \cong \overline{XY}$ and $\angle C \cong \angle Y$
2 $\overline{AB} \cong \overline{YZ}$ and $\angle C \cong \angle X$
3 $\overline{BC} \cong \overline{XY}$ and $\angle A \cong \angle Y$
4 $\overline{BC} \cong \overline{YZ}$ and $\angle A \cong \angle X$

331 In the diagram below, $\triangle ABC \cong \triangle XYZ$.



Which statement must be true?

1 $\angle C \cong \angle Y$
2 $\angle A \cong \angle X$
3 $\overline{AC} \cong \overline{YZ}$
4 $\overline{CB} \cong \overline{XZ}$

332 If $\triangle JKL \cong \triangle MNO$, which statement is always true?

1 $\angle KLJ \cong \angle NMO$
2 $\angle KJL \cong \angle MON$
3 $\overline{JL} \cong \overline{MO}$
4 $\overline{JK} \cong \overline{ON}$

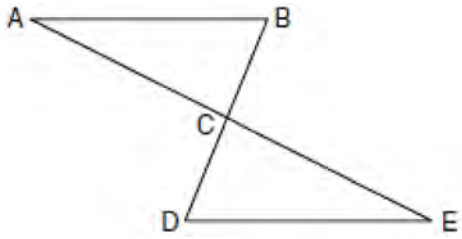
G.G.27: ANGLE PROOFS

333 When writing a geometric proof, which angle relationship could be used alone to justify that two angles are congruent?

1 supplementary angles
2 linear pair of angles
3 adjacent angles
4 vertical angles

G.G.27: TRIANGLE PROOFS

334 Given: $\triangle ABC$ and $\triangle EDC$, C is the midpoint of $\overline{BD}$ and $\overline{AE}$
Prove: $\overline{AB} \parallel \overline{DE}$

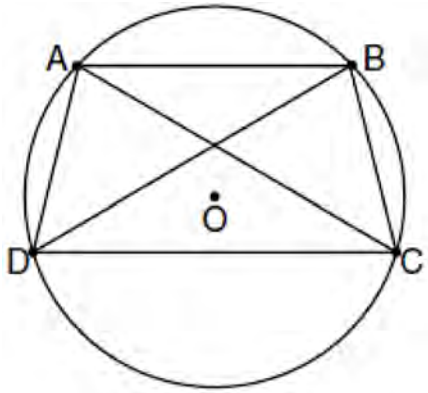


G.G.27: QUADRILATERAL PROOFS

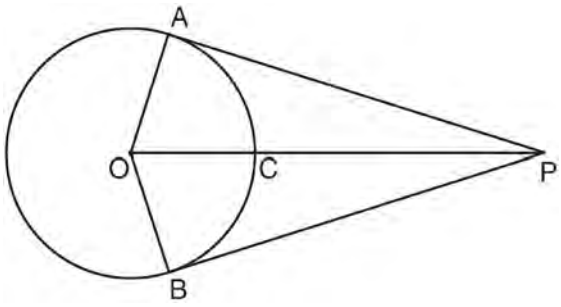
335 Given: Quadrilateral $ABCD$ with $\overline{AB} \cong \overline{CD}$, $\overline{AD} \cong \overline{BC}$, and diagonal $\overline{BD}$ is drawn
Prove: $\angle BDC \cong \angle ABD$

G.G.27: CIRCLE PROOFS

336 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 $\triangle ACD \cong \triangle BDC$.

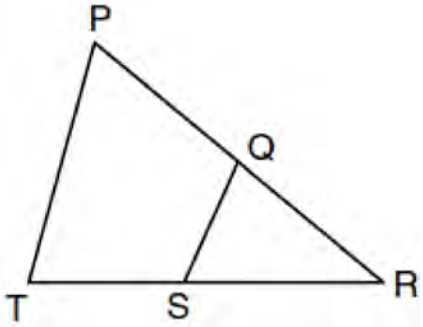


337 In the diagram below, $\overline{PA}$ and $\overline{PB}$ are tangent to circle O, $\overline{OA}$ and $\overline{OB}$ are radii, and $\overline{OP}$ intersects the circle at C. Prove: $\angle AOP \cong \angle BOP$



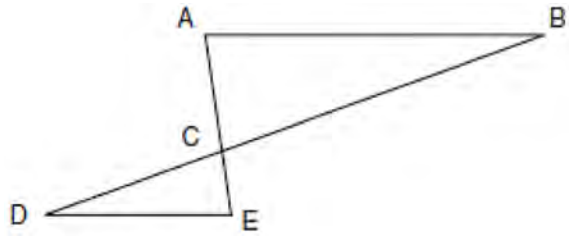
G.G.44: SIMILARITY PROOFS

338 In the diagram below of $\triangle PRT$, 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 $\triangle PRT \sim \triangle SRQ$?
1 AA
2 ASA
3 SAS
4 SSS

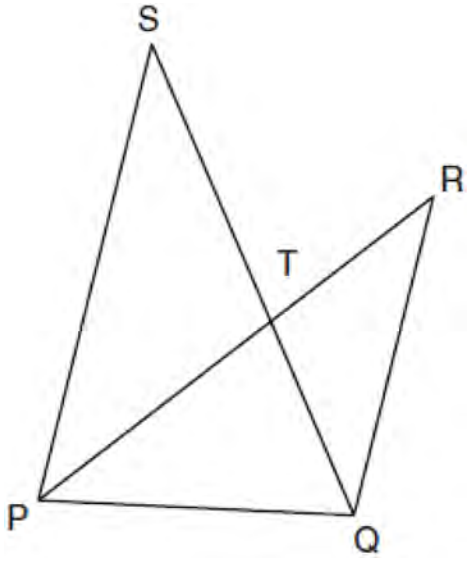
339 In the diagram of $\triangle ABC$ and $\triangle EDC$ below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$.



Which method can be used to show that $\triangle ABC$ must be similar to $\triangle EDC$?

1 SAS
2 AA
3 SSS
4 HL

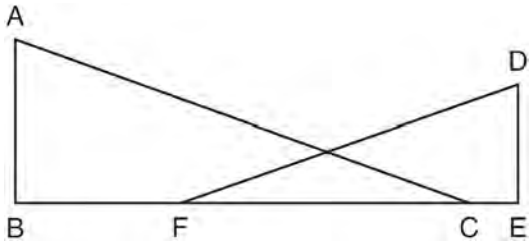
340 In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at T, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$.



What technique can be used to prove that $\triangle PST \sim \triangle RQT$?

1 SAS
2 SSS
3 ASA
4 AA

341 In the diagram below, $\overline{BFCE}$, $\overline{AB} \perp \overline{BE}$, $\overline{DE} \perp \overline{BE}$, and $\angle BFD \cong \angle ECA$. Prove that $\triangle ABC \sim \triangle DEF$.



342 The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. Prove that $\triangle ABC$ is similar to $\triangle ADE$.