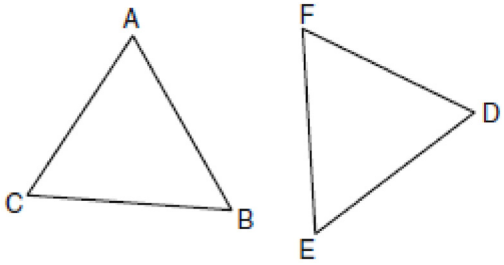
Geometry Regents Exam 0609
www.jmap.org

0609ge

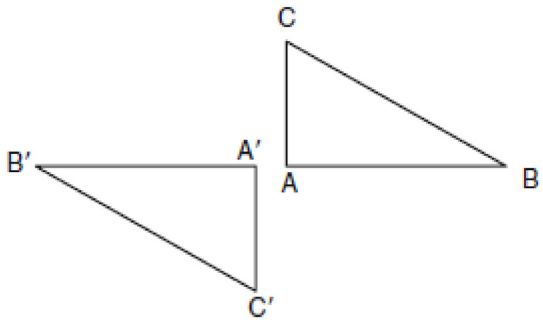
1 Juliann plans on drawing $\triangle ABC$, where the measure of $\angle A$ can range from 50° to 60° and the measure of $\angle B$ can range from 90° to 100°. Given these conditions, what is the correct range of measures possible for $\angle C$?
1) 20° to 40°
2) 30° to 50°
3) 80° to 90°
4) 120° to 130°

2 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

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

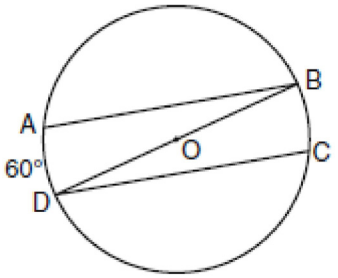


1) rotation
2) dilation
3) translation
4) glide reflection

4 The lateral faces of a regular pyramid are composed of
1) squares
2) rectangles
3) congruent right triangles
4) congruent isosceles triangles

5 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) $(7,-4)$

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



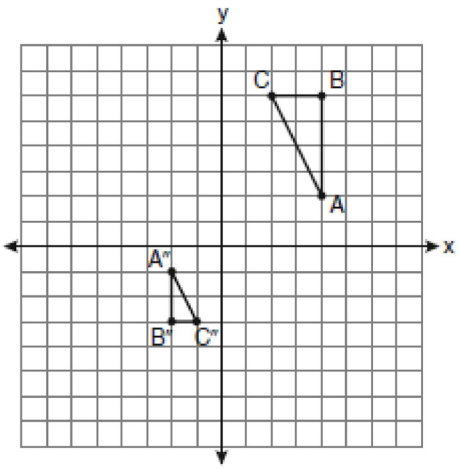
If $m\overset{\frown}{AD} = 60$, what is $m\angle CDB$?

1) 20
2) 30
3) 60
4) 120

7 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) $y = -2x - 9$

8 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) $R_{180°} \circ D_2$
2) $R_{90°} \circ D_2$
3) $D_{\frac{1}{2}} \circ R_{180°}$
4) $D_{\frac{1}{2}} \circ R_{90°}$

9 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°

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

11 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) $BC < AC < AB$

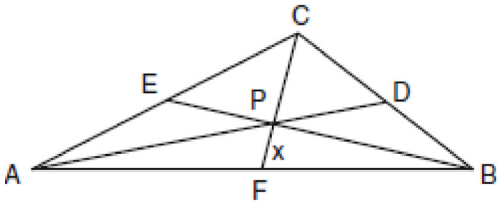
12 In a coordinate plane, how many points are both 5 units from the origin and 2 units from the x-axis?

1) 1
2) 2
3) 3
4) 4

13 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.

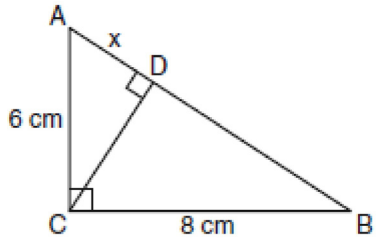
14 In the diagram of $\triangle ABC$ below, Jose found centroid P by constructing the three medians. He measured $\overline{CF}$ and found it to be 6 inches.



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

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

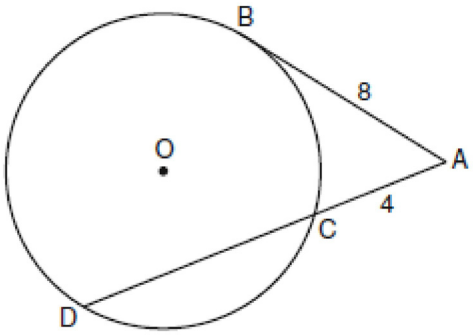
15 In the diagram below, the length of the legs $\overline{AC}$ and $\overline{BC}$ of right triangle ABC are 6 cm and 8 cm, respectively. Altitude $\overline{CD}$ is drawn to the hypotenuse of $\triangle ABC$.



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

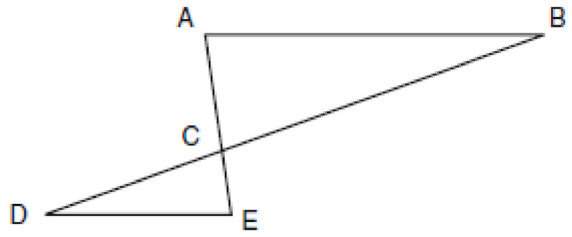
16 In the diagram below, tangent $\overline{AB}$ and secant $\overline{ACD}$ are drawn to circle O from an external point A, $AB = 8$, and $AC = 4$.



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

1) 16
2) 13
3) 12
4) 10

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



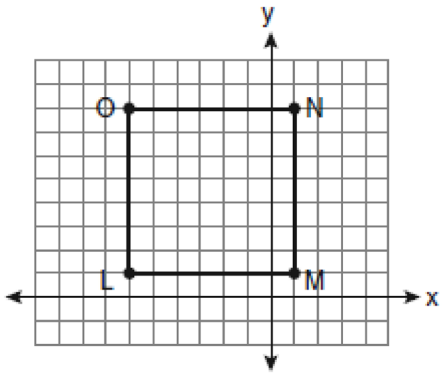
Which method can be used to show that $\triangle ABC$ must be similar to $\triangle EDC$?

1) SAS
2) AA
3) SSS
4) HL

18 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

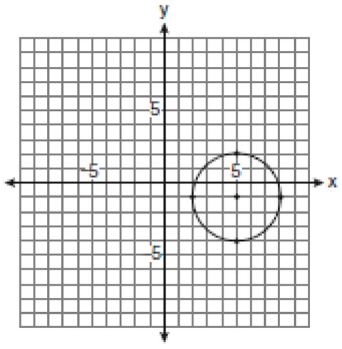
19 Square $LMNO$ is shown in the diagram below.

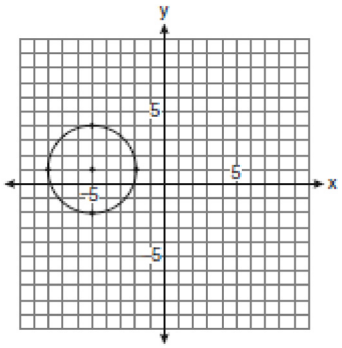


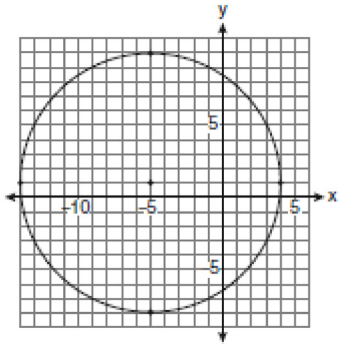
What are the coordinates of the midpoint of diagonal $\overline{LN}$?

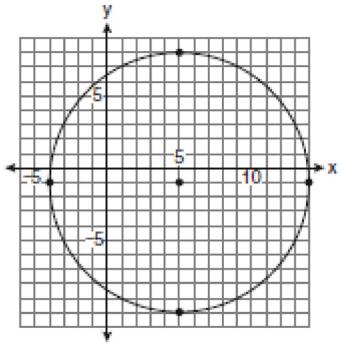
1) $\left(4\frac{1}{2}, -2\frac{1}{2}\right)$
2) $\left(-3\frac{1}{2}, 3\frac{1}{2}\right)$
3) $\left(-2\frac{1}{2}, 3\frac{1}{2}\right)$
4) $\left(-2\frac{1}{2}, 4\frac{1}{2}\right)$

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

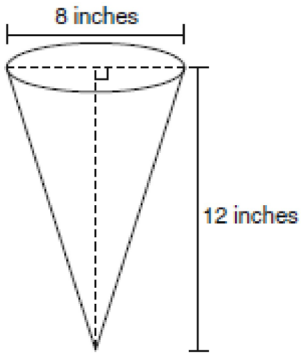
1) 

2) 

3) 

4) 

21 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

22 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 $\sqrt{13}$

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

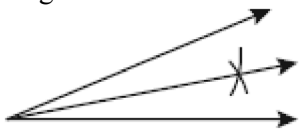
$x=4$

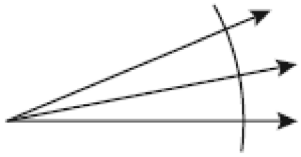
The number of points of intersection is

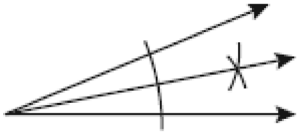
1) 1
2) 2
3) 3
4) 0

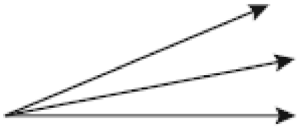
24 Side $\overline{PQ}$ of $\triangle PQR$ is extended through Q to point T. Which statement is *not* always true?
1) $m\angle RQT > m\angle R$
2) $m\angle RQT > m\angle P$
3) $m\angle RQT = m\angle P + m\angle R$
4) $m\angle RQT > m\angle PQR$

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

1) 

2) 

3) 

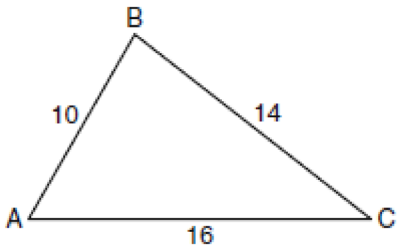
4) 

26 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) $3y = -2x + 12$

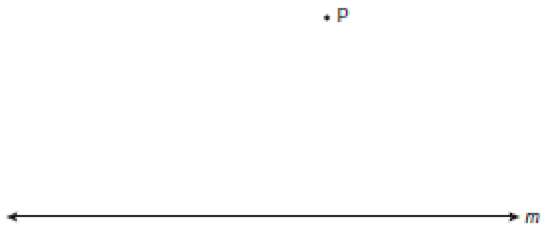
27 In $\triangle ABC$, point D is on $\overline{AB}$, and point E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If $DB = 2$, $DA = 7$, and $DE = 3$, what is the length of $\overline{AC}$?
1) 8
2) 9
3) 10.5
4) 13.5

28 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

29 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 $\triangle ABC$.



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

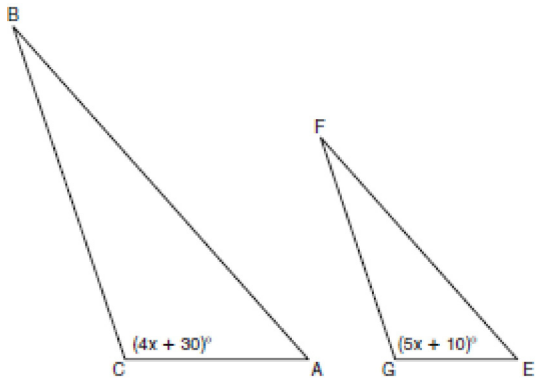


31 Find an equation of the line passing through the point (5,4) and parallel to the line whose equation is $2x + y = 3$.

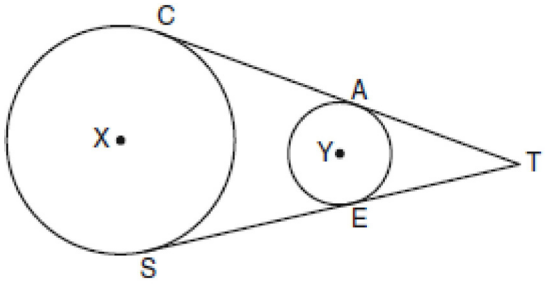
32 The length of $\overline{AB}$ is 3 inches. On the diagram below, sketch the points that are equidistant from A and B and sketch the points that are 2 inches from A. Label with an **X** all points that satisfy both conditions.

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

34 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.

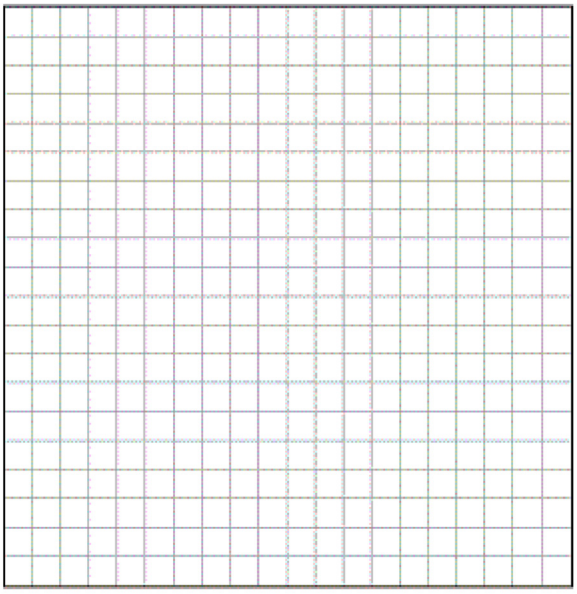


35 In the diagram below, circles X and Y have two tangents drawn to them from external point T. The points of tangency are C, A, S, and E. The ratio of TA to AC is $1:3$. If $TS = 24$, find the length of $\overline{SE}$.

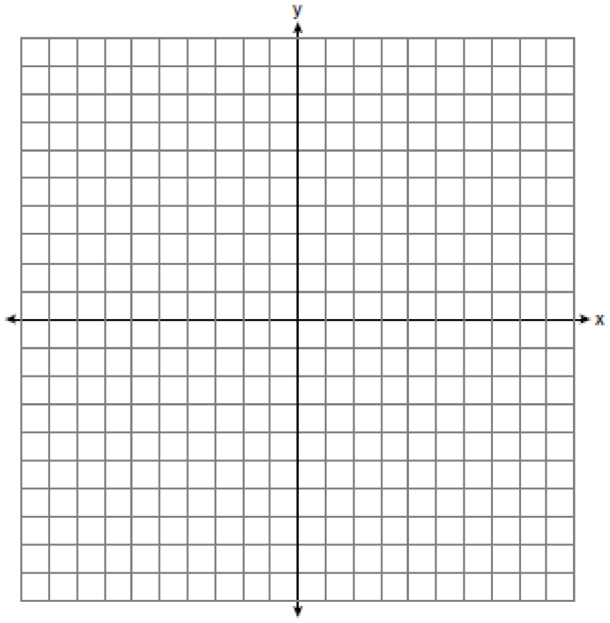


(Not drawn to scale)

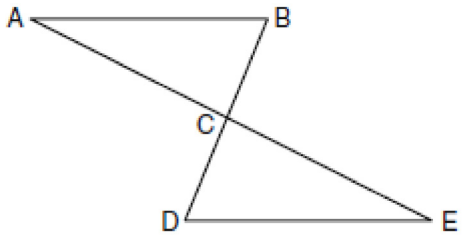
36 Triangle ABC has coordinates $A(-6,2)$, $B(-3,6)$, and $C(5,0)$. Find the perimeter of the triangle. Express your answer in simplest radical form. [The use of the grid below is optional.]



37 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.]



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

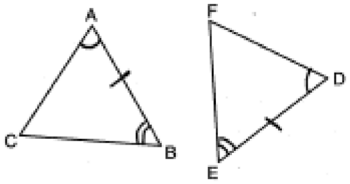


0609ge
Answer Section

1 ANS: 1
If $\angle A$ is at minimum (50°) and $\angle B$ is at minimum (90°), $\angle C$ is at maximum of 40° (180° - (50° + 90°)). If $\angle A$ is at maximum (60°) and $\angle B$ is at maximum (100°), $\angle C$ is at minimum of 20° (180° - (60° + 100°)).

PTS: 2 REF: 060901ge STA: G.G.30 TOP: Interior and Exterior Angles of Triangles

2 ANS: 3



PTS: 2 REF: 060902ge STA: G.G.28 TOP: Triangle Congruency

3 ANS: 1 PTS: 2 REF: 060903ge STA: G.G.56
TOP: Identifying Transformations

4 ANS: 4 PTS: 2 REF: 060904ge STA: G.G.13
TOP: Solids

5 ANS: 3 PTS: 2 REF: 060905ge STA: G.G.54
TOP: Reflections KEY: basic

6 ANS: 2

Parallel chords intercept congruent arcs. $\text{m}\overset{\frown}{AD} = \text{m}\overset{\frown}{BC} = 60$. $\text{m}\angle CDB = \frac{1}{2}\text{m}\overset{\frown}{BC} = 30$.

PTS: 2 REF: 060906ge STA: G.G.52 TOP: Chords

7 ANS: 2

The slope of $y = \frac{1}{2}x + 5$ is $\frac{1}{2}$. The slope of a perpendicular line is –2. $y = mx + b$.

$$5 = (-2)(-2) + b$$
$$b = 1$$

PTS: 2 REF: 060907ge STA: G.G.64 TOP: Parallel and Perpendicular Lines

8 ANS: 3 PTS: 2 REF: 060908ge STA: G.G.60
TOP: Identifying Transformations

9 ANS: 1
In an equilateral triangle, each interior angle is 60° and each exterior angle is 120° (180° - 120°). The sum of the three interior angles is 180° and the sum of the three exterior angles is 360°.

PTS: 2 REF: 060909ge STA: G.G.30 TOP: Interior and Exterior Angles of Triangles

10 ANS: 2 PTS: 2 REF: 060910ge STA: G.G.71
TOP: Equations of Circles

11 ANS: 2
Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

PTS: 2 REF: 060911ge STA: G.G.34 TOP: Angle Side Relationship

12 ANS: 4 PTS: 2 REF: 060912ge STA: G.G.23
TOP: Locus
13 ANS: 4 PTS: 2 REF: 060913ge STA: G.G.26
TOP: Conditional Statements
14 ANS: 2
The centroid divides each median into segments whose lengths are in the ratio 2 : 1.

PTS: 2 REF: 060914ge STA: G.G.43 TOP: Centroid
15 ANS: 1
$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle. $6^2 = 10x$

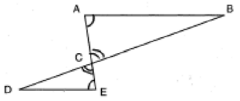
$3.6 = x$

PTS: 2 REF: 060915ge STA: G.G.47 TOP: Similarity
KEY: leg
16 ANS: 3
$4(x+4) = 8^2$

$4x + 16 = 64$

$x = 12$

PTS: 2 REF: 060916ge STA: G.G.53 TOP: Segments Intercepted by Circle
KEY: tangent and secant
17 ANS: 2

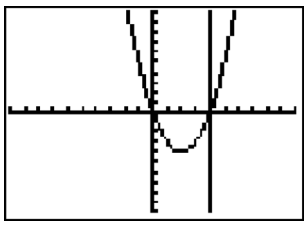
$\angle ACB$ and $\angle ECD$ are congruent vertical angles and $\angle CAB \cong \angle CED$. 

PTS: 2 REF: 060917ge STA: G.G.44 TOP: Similarity Proofs
18 ANS: 1 PTS: 2 REF: 060918ge STA: G.G.2
TOP: Planes
19 ANS: 4
$M_x = \frac{-6+1}{2} = -\frac{5}{2}$. $M_y = \frac{1+8}{2} = \frac{9}{2}$.

PTS: 2 REF: 060919ge STA: G.G.66 TOP: Midpoint
20 ANS: 1 PTS: 2 REF: 060920ge STA: G.G.74
TOP: Graphing Circles
21 ANS: 1
$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \cdot 4^2 \cdot 12 \approx 201$

PTS: 2 REF: 060921ge STA: G.G.15 TOP: Volume and Lateral Area
22 ANS: 4 PTS: 2 REF: 060922ge STA: G.G.73
TOP: Equations of Circles

23 ANS: 1



$y = x^2 - 4x = (4)^2 - 4(4) = 0$. $(4,0)$ is the only intersection.

PTS: 2 REF: 060923ge STA: G.G.70 TOP: Quadratic-Linear Systems

24 ANS: 4

(4) is not true if $\angle PQR$ is obtuse.

PTS: 2 REF: 060924ge STA: G.G.32 TOP: Exterior Angle Theorem

25 ANS: 3 PTS: 2 REF: 060925ge STA: G.G.17 TOP: Constructions

26 ANS: 2

The slope of $2x + 3y = 12$ is $-\frac{A}{B} = -\frac{2}{3}$. The slope of a perpendicular line is $\frac{3}{2}$. Rewritten in slope intercept form, (2) becomes $y = \frac{3}{2}x + 3$.

PTS: 2 REF: 060926ge STA: G.G.63 TOP: Parallel and Perpendicular Lines

27 ANS: 4

$\triangle ABC \sim \triangle DBE$. $\frac{\overline{AB}}{\overline{DB}} = \frac{\overline{AC}}{\overline{DE}}$

$\frac{9}{2} = \frac{x}{3}$

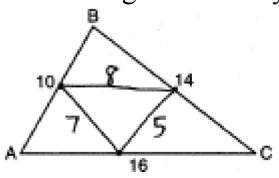
$x = 13.5$

PTS: 2 REF: 060927ge STA: G.G.46 TOP: Side Splitter Theorem

28 ANS: 3 PTS: 2 REF: 060928ge STA: G.G.8 TOP: Planes

29 ANS:

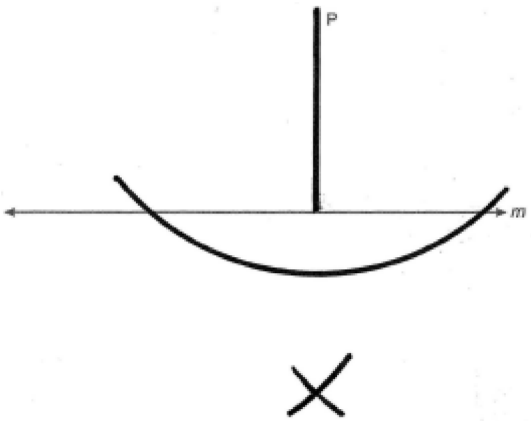
20. The sides of the triangle formed by connecting the midpoints are half the sides of the original triangle.



$5 + 7 + 8 = 20$.

PTS: 2 REF: 060929ge STA: G.G.42 TOP: Midsegments

30 ANS:



PTS: 2 REF: 060930ge STA: G.G.19 TOP: Constructions

31 ANS:

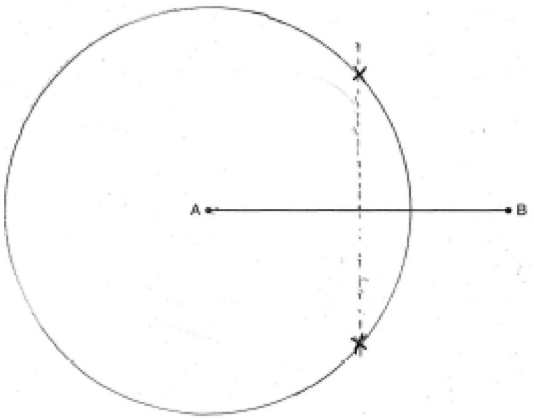
$y = -2x + 14$. The slope of $2x + y = 3$ is $\frac{-A}{B} = \frac{-2}{1} = -2$. $y = mx + b$.

$4 = (-2)(5) + b$

$b = 14$

PTS: 2 REF: 060931ge STA: G.G.65 TOP: Parallel and Perpendicular Lines

32 ANS:



PTS: 2 REF: 060932ge STA: G.G.22 TOP: Locus

33 ANS:

True. The first statement is true and the second statement is false. In a disjunction, if either statement is true, the disjunction is true.

PTS: 2 REF: 060933ge STA: G.G.25 TOP: Compound Statements
KEY: disjunction

34 ANS:
20. $5x + 10 = 4x + 30$

$x = 20$

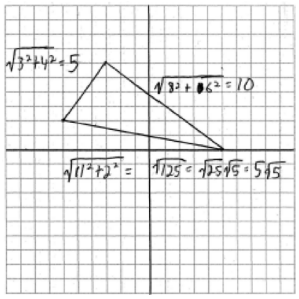
PTS: 2 REF: 060934ge STA: G.G.45 TOP: Similarity
KEY: basic

35 ANS:
18. If the ratio of *TA* to *AC* is 1:3, the ratio of *TE* to *ES* is also 1:3. $x + 3x = 24$. $3(6) = 18$.

$x = 6$

PTS: 4 REF: 060935ge STA: G.G.50 TOP: Tangents
KEY: common tangency

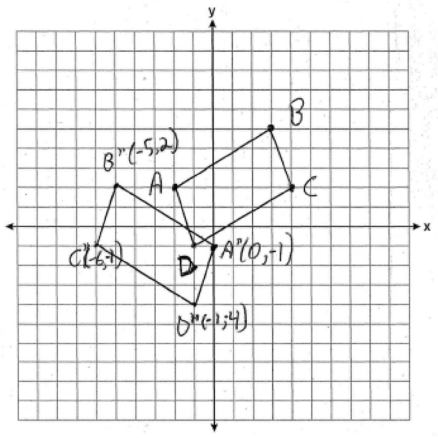
36 ANS:



$15 + 5\sqrt{5}$.

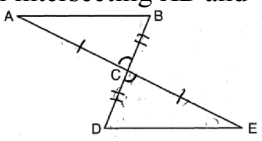
PTS: 4 REF: 060936ge STA: G.G.69 TOP: Triangles in the Coordinate Plane

37 ANS:



PTS: 4 REF: 060937ge STA: G.G.54 TOP: Compositions of Transformations
KEY: grids

38 ANS:
$\overline{AC} \cong \overline{EC}$ and $\overline{DC} \cong \overline{BC}$ because of the definition of midpoint. $\angle ACB \cong \angle ECD$ because of vertical angles. $\triangle ABC \cong \triangle EDC$ because of SAS. $\angle CDE \cong \angle CBA$ because of CPCTC. $\overline{BD}$ is a transversal intersecting $\overline{AB}$ and $\overline{ED}$. Therefore $\overline{AB} \parallel \overline{DE}$ because $\angle CDE$ and $\angle CBA$ are congruent alternate interior angles.



PTS: 6 REF: 060938ge STA: G.G.27 TOP: Triangle Proofs