Geometry Regents Exam 0613
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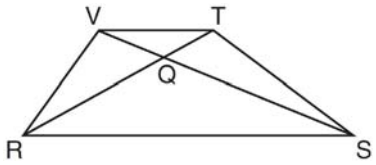
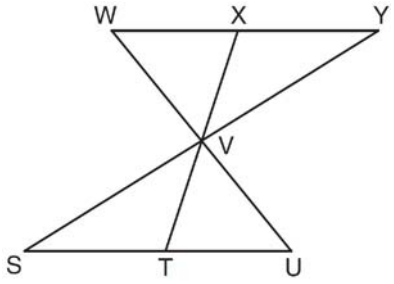
## 0613ge

1 In trapezoid $RSTV$ with bases $\overline{RS}$ and $\overline{VT}$, diagonals $\overline{RT}$ and $\overline{SV}$ intersect at $Q$.




If trapezoid $RSTV$ is *not* isosceles, which triangle is equal in area to $\Delta RSV$?
1) $\Delta RQV$
2) $\Delta RST$
3) $\Delta RVT$
4) $\Delta SVT$

2 In the diagram below, $\Delta XYV \cong \Delta TSV$.

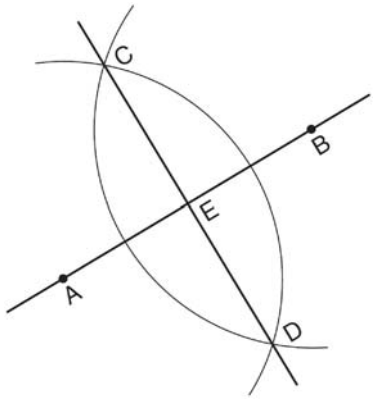



Which statement can *not* be proven?
1) $\angle XVY \cong \angle TVS$
2) $\angle VYX \cong \angle VUT$
3) $\overline{XY} \cong \overline{TS}$
4) $\overline{YV} \cong \overline{SV}$

3 In a park, two straight paths intersect. The city wants to install lampposts that are both equidistant from each path and also 15 feet from the intersection of the paths. How many lampposts are needed?
1) 1
2) 2
3) 3
4) 4

4 What are the coordinates of $A'$, the image of $A(-3,4)$, after a rotation of 180° about the origin?
1) $(4,-3)$
2) $(-4,-3)$
3) $(3,4)$
4) $(3,-4)$

5 Based on the construction below, which conclusion is *not* always true?

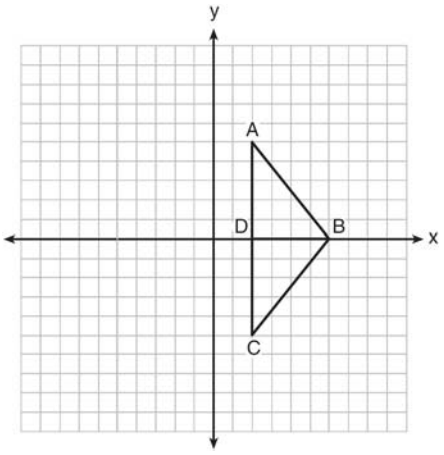



1) $\overline{AB} \perp \overline{CD}$
2) $AB = CD$
3) $AE = EB$
4) $CE = DE$

6 Which equation represents the circle whose center is $(-5, 3)$ and that passes through the point $(-1, 3)$?

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

7 As shown in the diagram below, when right triangle $DAB$ is reflected over the $x$-axis, its image is triangle $DCB$.



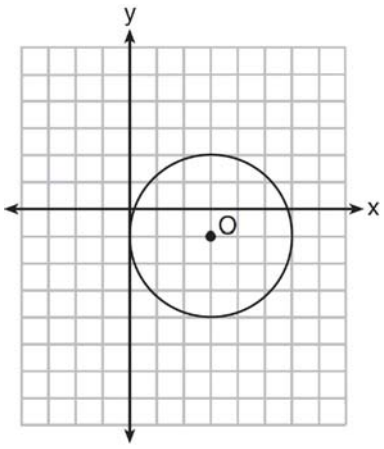

Which statement justifies why $\overline{AB} \cong \overline{CB}$?

1) Distance is preserved under reflection.
2) Orientation is preserved under reflection.
3) Points on the line of reflection remain invariant.
4) Right angles remain congruent under reflection.

8 In $\Delta ABC$, $m\angle A = 3x + 1$, $m\angle B = 4x - 17$, and $m\angle C = 5x - 20$. Which type of triangle is $\Delta ABC$?

1) right
2) scalene
3) isosceles
4) equilateral

9 What is the equation for circle $O$ shown in the graph below?

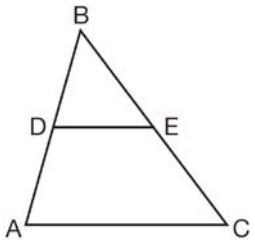



1) $(x-3)^2 + (y+1)^2 = 6$
2) $(x+3)^2 + (y-1)^2 = 6$
3) $(x-3)^2 + (y+1)^2 = 9$
4) $(x+3)^2 + (y-1)^2 = 9$

10 Point $A$ is on line $m$. How many distinct planes will be perpendicular to line $m$ and pass through point $A$?

1) one
2) two
3) zero
4) infinite

11 In $\Delta ABC$, $D$ is the midpoint of $\overline{AB}$ and $E$ is the midpoint of $\overline{BC}$. If $AC = 3x - 15$ and $DE = 6$, what is the value of $x$?



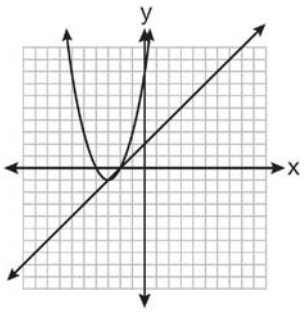

1) 6
2) 7
3) 9
4) 12

12 What are the coordinates of the center of a circle if the endpoints of its diameter are $A(8,-4)$ and $B(-3,2)$?

1) $(2.5,1)$
2) $(2.5,-1)$
3) $(5.5,-3)$
4) $(5.5,3)$

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

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

1)
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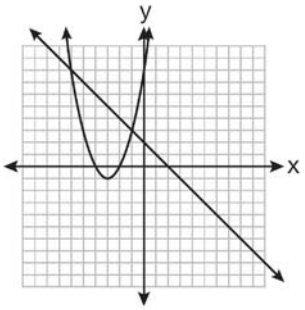
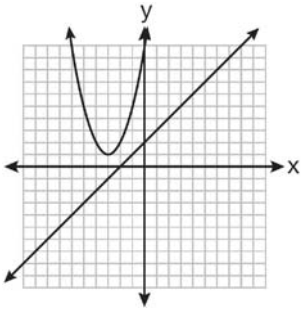
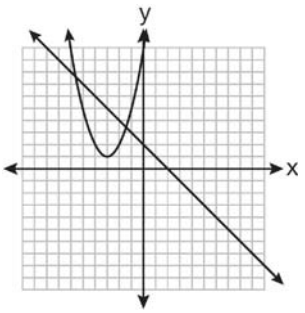


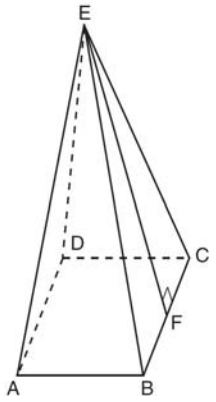

3)



4)


14 What is the converse of "If an angle measures 90 degrees, then it is a right angle"?

1) If an angle is a right angle, then it measures 90 degrees.
2) An angle is a right angle if it measures 90 degrees.
3) If an angle is not a right angle, then it does not measure 90 degrees.
4) If an angle does not measure 90 degrees, then it is not a right angle.

15 As shown in the diagram below, a right pyramid has a square base, $ABCD$, and $\overline{EF}$ is the slant height.




Which statement is *not* true?

1) $\overline{EA} \cong \overline{EC}$
2) $\overline{EB} \cong \overline{EF}$
3) $\Delta AEB \cong \Delta BEC$
4) $\Delta CED$ is isosceles

16 What is the equation of a line passing through the point $(6, 1)$ and parallel to the line whose equation is $3x = 2y + 4$?

1) $y = -\frac{2}{3}x + 5$
2) $y = -\frac{2}{3}x - 3$
3) $y = \frac{3}{2}x - 8$
4) $y = \frac{3}{2}x - 5$

17 The volume of a sphere is approximately 44.6022 cubic centimeters. What is the radius of the sphere, to the *nearest tenth of a centimeter*?

1) 2.2
2) 3.3
3) 4.4
4) 4.7

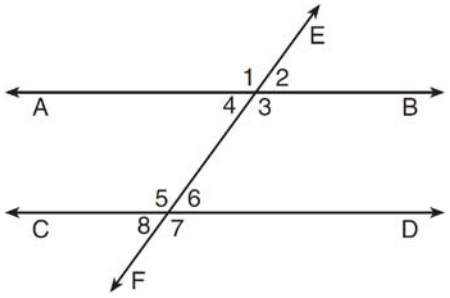
18 Points $A(5, 3)$ and $B(7, 6)$ lie on $\overleftrightarrow{AB}$. Points $C(6, 4)$ and $D(9, 0)$ lie on $\overleftrightarrow{CD}$. Which statement is true?

1) $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$
2) $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$
3) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are the same line.
4) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect, but are not perpendicular.

19 Which set of equations represents two circles that have the same center?

1) $x^2 + (y+4)^2 = 16$ and $(x+4)^2 + y^2 = 16$
2) $(x+3)^2 + (y-3)^2 = 16$ and $(x-3)^2 + (y+3)^2 = 25$
3) $(x-7)^2 + (y-2)^2 = 16$ and $(x+7)^2 + (y+2)^2 = 25$
4) $(x-2)^2 + (y-5)^2 = 16$ and $(x-2)^2 + (y-5)^2 = 25$

20 Transversal $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$, as shown in the diagram below.



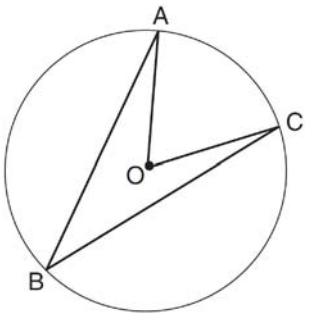

Which statement could always be used to prove $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$?

1) $\angle 2 \cong \angle 4$
2) $\angle 7 \cong \angle 8$
3) $\angle 3$ and $\angle 6$ are supplementary
4) $\angle 1$ and $\angle 5$ are supplementary

21 In $\Delta ABC$, $m\angle A = 60$, $m\angle B = 80$, and $m\angle C = 40$. Which inequality is true?

1) $AB > BC$
2) $AC > BC$
3) $AC < BA$
4) $BC < BA$

22 Circle $O$ with $\angle AOC$ and $\angle ABC$ is shown in the diagram below.




What is the ratio of $m\angle AOC$ to $m\angle ABC$?

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

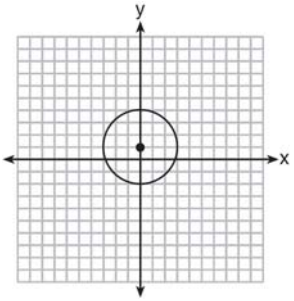
23 A rectangular prism has a base with a length of 25, a width of 9, and a height of 12. A second prism has a square base with a side of 15. If the volumes of the two prisms are equal, what is the height of the second prism?

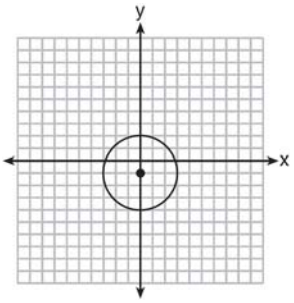
1) 6
2) 8
3) 12
4) 15

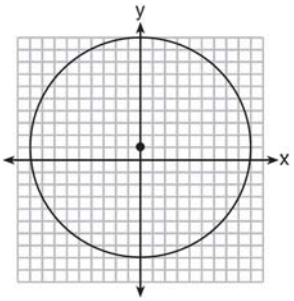
24 In triangles $ABC$ and $DEF$, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\Delta ABC \sim \Delta DEF$?

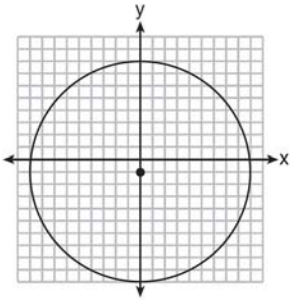
1) AA
2) SAS
3) SSS
4) ASA

25 Which graph represents a circle whose equation is $x^2 + (y-1)^2 = 9$?

1) 

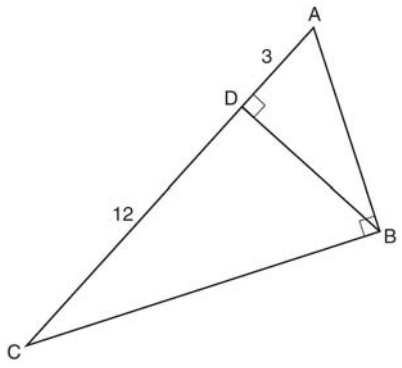

2) 


3) 


4) 


26 What is the perimeter of a rhombus whose diagonals are 16 and 30?
1) 92
2) 68
3) 60
4) 17

27 In right triangle $ABC$ shown in the diagram below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $CD = 12$, and $AD = 3$.




What is the length of $\overline{AB}$?
1) $5\sqrt{3}$
2) 6
3) $3\sqrt{5}$
4) 9

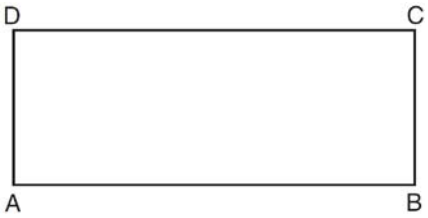
28 Secants $\overline{JKL}$ and $\overline{JMN}$ are drawn to circle $O$ from an external point, $J$. If $JK = 8$, $LK = 4$, and $JM = 6$, what is the length of $\overline{JN}$?
1) 16
2) 12
3) 10
4) 8

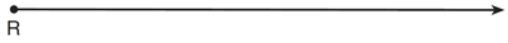
29 A right circular cylinder has a height of 7 inches and the base has a diameter of 6 inches. Determine the lateral area, in square inches, of the cylinder in terms of $\pi$.

30 Determine, in degrees, the measure of each interior angle of a regular octagon.

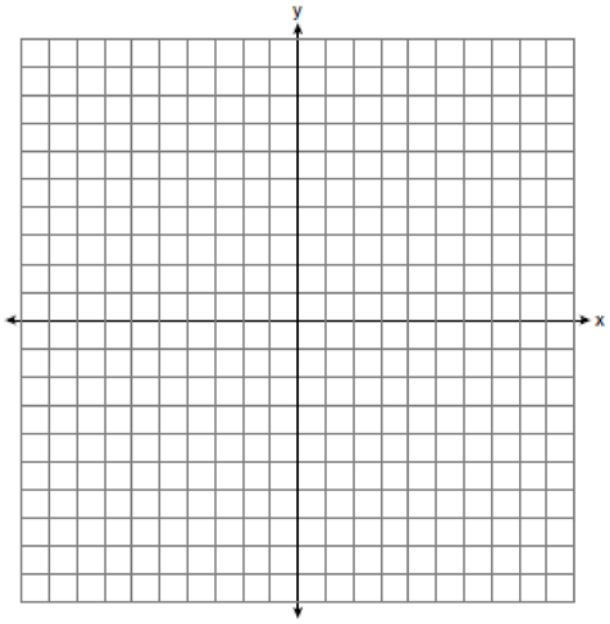
31 Triangle $ABC$ has vertices at $A(3,0)$, $B(9,-5)$, and $C(7,-8)$. Find the length of $\overline{AC}$ in simplest radical form.

32 On the ray drawn below, using a compass and straightedge, construct an equilateral triangle with a vertex at $R$. The length of a side of the triangle must be equal to a length of the diagonal of rectangle $ABCD$.



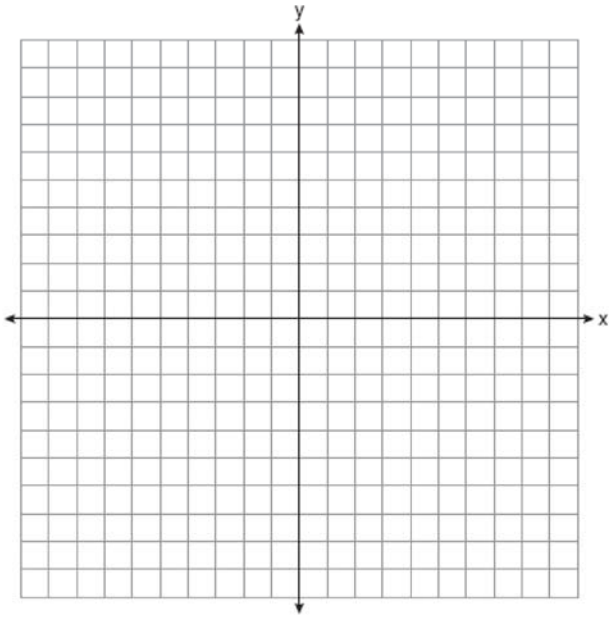




33 On the set of axes below, graph the locus of points 4 units from the $x$-axis and equidistant from the points whose coordinates are $(-2,0)$ and $(8,0)$. Mark with an **X** all points that satisfy *both* conditions.

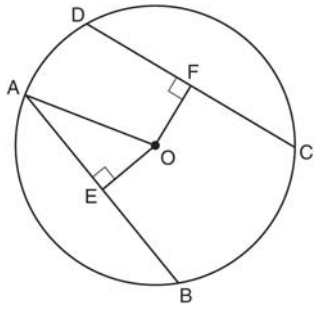



34 The coordinates of two vertices of square $ABCD$ are $A(2,1)$ and $B(4,4)$. Determine the slope of side $\overline{BC}$.

35 The coordinates of the vertices of parallelogram $SWAN$ are $S(2,-2)$, $W(-2,-4)$, $A(-4,6)$, and $N(0,8)$. State and label the coordinates of parallelogram $S''W''A''N''$, the image of $SWAN$ after the transformation $T_{4,-2} \circ D_{\frac{1}{2}}$. [The use of the set of axes below is optional.]



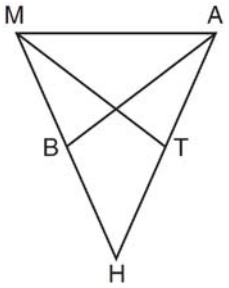

36 In circle $O$ shown below, chords $\overline{AB}$ and $\overline{CD}$ and radius $\overline{OA}$ are drawn, such that $\overline{AB} \cong \overline{CD}$, $\overline{OE} \perp \overline{AB}$, $\overline{OF} \perp \overline{CD}$, $OF = 16$, $CF = y + 10$, and $CD = 4y - 20$.




Determine the length of $\overline{DF}$. Determine the length of $\overline{OA}$.

37 If $\triangle RST \sim \triangle ABC$, $m\angle A = x^2 - 8x$, $m\angle C = 4x - 5$, and $m\angle R = 5x + 30$, find $m\angle C$. [Only an algebraic solution can receive full credit.]

38 In the diagram of $\triangle MAH$ below, $\overline{MH} \cong \overline{AH}$ and medians $\overline{AB}$ and $\overline{MT}$ are drawn.
Prove: $\angle MBA \cong \angle ATM$



# 0613ge
## Answer Section

1 ANS: 2

Isosceles or not, $\Delta RSV$ and $\Delta RST$ have a common base, and since $\overline{RS}$ and $\overline{VT}$ are bases, congruent altitudes.

PTS: 2 REF: 061301ge STA: G.G.40 TOP: Trapezoids

2 ANS: 2

(1) is true because of vertical angles. (3) and (4) are true because CPCTC.

PTS: 2 REF: 061302ge STA: G.G.24 TOP: Statements

3 ANS: 4 PTS: 2 REF: 061303ge STA: G.G.22
TOP: Locus

4 ANS: 4

$(x, y) \rightarrow (-x, -y)$

PTS: 2 REF: 061304ge STA: G.G.54 TOP: Rotations

5 ANS: 2 PTS: 2 REF: 061305ge STA: G.G.18
TOP: Constructions

6 ANS: 3 PTS: 2 REF: 061306ge STA: G.G.71
TOP: Equations of Circles

7 ANS: 1 PTS: 2 REF: 061307ge STA: G.G.55
TOP: Properties of Transformations

8 ANS: 3

$3x + 1 + 4x - 17 + 5x - 20 = 180$. $3(18) + 1 = 55$

$12x - 36 = 180$ $4(18) - 17 = 55$

$12x = 216$ $5(18) - 20 = 70$

$x = 18$

PTS: 2 REF: 061308ge STA: G.G.30 TOP: Interior and Exterior Angles of Triangles

9 ANS: 3 PTS: 2 REF: 061309ge STA: G.G.72
TOP: Equations of Circles

10 ANS: 1 PTS: 2 REF: 061310ge STA: G.G.2
TOP: Planes

11 ANS: 3

$3x - 15 = 2(6)$

$3x = 27$

$x = 9$

PTS: 2 REF: 061311ge STA: G.G.42 TOP: Midsegments

12 ANS: 2

$M_x = \frac{8 + (-3)}{2} = 2.5$. $M_Y = \frac{-4 + 2}{2} = -1$.

PTS: 2 REF: 061312ge STA: G.G.66 TOP: Midpoint

13 ANS: 2 PTS: 2 REF: 061313ge STA: G.G.70
TOP: Quadratic-Linear Systems
14 ANS: 1 PTS: 2 REF: 061314ge STA: G.G.26
TOP: Converse and Biconditional
15 ANS: 2 PTS: 2 REF: 061315ge STA: G.G.13
TOP: Classifying Solids
16 ANS: 3

$2y = 3x - 4$. $1 = \frac{3}{2}(6) + b$

$y = \frac{3}{2}x - 2$ $1 = 9 + b$

$-8 = b$

PTS: 2 REF: 061316ge STA: G.G.65 TOP: Parallel and Perpendicular Lines
17 ANS: 1

$$V = \frac{4}{3}\pi r^3$$

$$44.6022 = \frac{4}{3}\pi r^3$$

$$10.648 \approx r^3$$

$$2.2 \approx r$$

PTS: 2 REF: 061317ge STA: G.G.16 TOP: Volume and Surface Area
18 ANS: 4

$m_{\overleftrightarrow{AB}} = \frac{6-3}{7-5} = \frac{3}{2}$. $m_{\overleftrightarrow{CD}} = \frac{4-0}{6-9} = \frac{4}{-3}$

PTS: 2 REF: 061318ge STA: G.G.63 TOP: Parallel and Perpendicular Lines
19 ANS: 4 PTS: 2 REF: 061319ge STA: G.G.73
TOP: Equations of Circles
20 ANS: 3 PTS: 2 REF: 061320ge STA: G.G.35
TOP: Parallel Lines and Transversals
21 ANS: 2 PTS: 2 REF: 061321ge STA: G.G.34
TOP: Angle Side Relationship
22 ANS: 2 PTS: 2 REF: 061322ge STA: G.G.51
TOP: Arcs Determined by Angles KEY: inscribed
23 ANS: 3

$25 \times 9 \times 12 = 15^2 h$

$2700 = 15^2 h$

$12 = h$

PTS: 2 REF: 061323ge STA: G.G.11 TOP: Volume
24 ANS: 2 PTS: 2 REF: 061324ge STA: G.G.44
TOP: Similarity Proofs
25 ANS: 1 PTS: 2 REF: 061325ge STA: G.G.74
TOP: Graphing Circles

26 ANS: 2

$\sqrt{8^2 + 15^2} = 17$

PTS: 2 REF: 061326ge STA: G.G.39 TOP: Special Parallelograms

27 ANS: 3

$x^2 = 3 \times 12$. $\sqrt{6^2 + 3^2} = \sqrt{45} = \sqrt{9}\sqrt{5} = 3\sqrt{5}$

$x = 6$

PTS: 2 REF: 061327ge STA: G.G.47 TOP: Similarity
KEY: altitude

28 ANS: 1

$12(8) = x(6)$

$96 = 6x$

$16 = x$

PTS: 2 REF: 061328ge STA: G.G.53 TOP: Segments Intercepted by Circle
KEY: two secants

29 ANS:

$L = 2\pi rh = 2\pi \cdot 3 \cdot 7 = 42\pi$

PTS: 2 REF: 061329ge STA: G.G.14 TOP: Volume

30 ANS:

$(n-2)180 = (8-2)180 = 1080$. $\frac{1080}{8} = 135$.

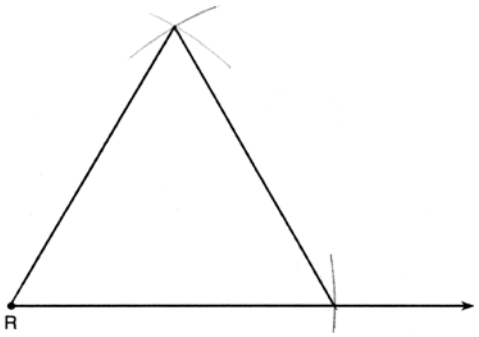
PTS: 2 REF: 061330ge STA: G.G.37 TOP: Interior and Exterior Angles of Polygons

31 ANS:

$\sqrt{(7-3)^2 + (-8-0)^2} = \sqrt{16+64} = \sqrt{80} = 4\sqrt{5}$

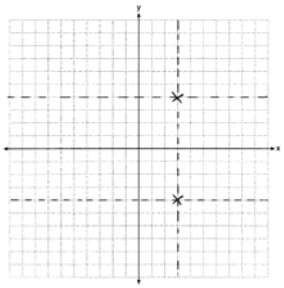
PTS: 2 REF: 061331ge STA: G.G.69 TOP: Triangles in the Coordinate Plane

32 ANS:




PTS: 2 REF: 061332ge STA: G.G.20 TOP: Constructions

33 ANS:



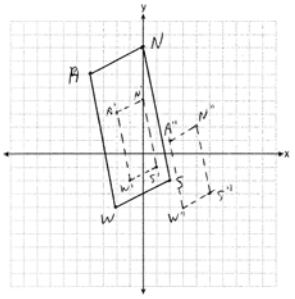
PTS: 2 REF: 061333ge STA: G.G.23 TOP: Locus

34 ANS:

$m_{\overline{AB}} = \frac{4-1}{4-2} = \frac{3}{2}$. $m_{\overline{BC}} = -\frac{2}{3}$

PTS: 4 REF: 061334ge STA: G.G.69 TOP: Quadrilaterals in the Coordinate Plane

35 ANS:



$S''(5,-3)$, $W''(3,-4)$, $A''(2,1)$, and $N''(4,2)$

PTS: 4 REF: 061335ge STA: G.G.58 TOP: Compositions of Transformations
KEY: grids

36 ANS:

$2(y+10) = 4y - 20$. $\overline{DF} = y + 10 = 20 + 10 = 30$. $\overline{OA} = \overline{OD} = \sqrt{16^2 + 30^2} = 34$

$2y + 20 = 4y - 20$

$40 = 2y$

$20 = y$

PTS: 4 REF: 061336ge STA: G.G.49 TOP: Chords

37 ANS:

$x^2 - 8x = 5x + 30$. $m\angle C = 4(15) - 5 = 55$

$x^2 - 13x - 30 = 0$

$(x-15)(x+2) = 0$

$x = 15$

PTS: 4 REF: 061337ge STA: G.G.45 TOP: Similarity
KEY: basic

38 ANS:

$\Delta MAH$, $\overline{MH} \cong \overline{AH}$ and medians $\overline{AB}$ and $\overline{MT}$ are given. $\overline{MA} \cong \overline{AM}$ (reflexive property). $\Delta MAH$ is an isosceles triangle (definition of isosceles triangle). $\angle AMB \cong \angle MAT$ (isosceles triangle theorem). $B$ is the midpoint of $\overline{MH}$ and $T$ is the midpoint of $\overline{AH}$ (definition of median). $\text{m}\overline{MB} = \frac{1}{2}\,\text{m}\overline{MH}$ and $\text{m}\overline{AT} = \frac{1}{2}\,\text{m}\overline{AH}$ (definition of midpoint). $\overline{MB} \cong \overline{AT}$ (multiplication postulate). $\Delta MBA \cong \Delta ATM$ (SAS). $\angle MBA \cong \angle ATM$ (CPCTC).

PTS: 6 REF: 061338ge STA: G.G.27 TOP: Triangle Proofs