0115ge
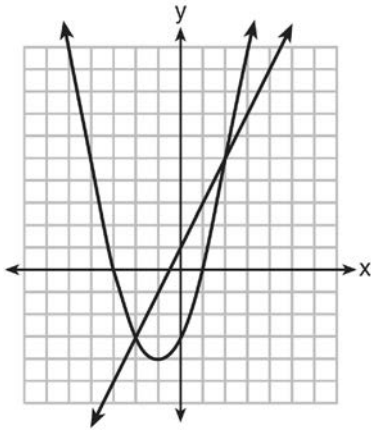
1 What is the solution of the system of equations graphed below?

$$y = 2x + 1$$

$$y = x^2 + 2x - 3$$
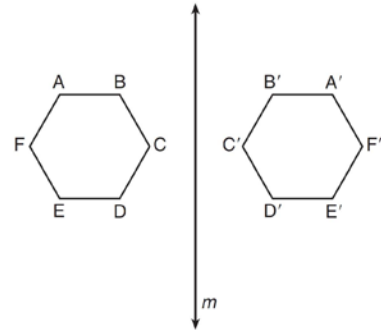

1) $(0, -3)$
2) $(-1, -4)$
3) $(-3, 0)$ and $(1, 0)$
4) $(-2, -3)$ and $(2, 5)$

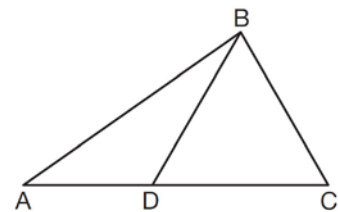2 What are the coordinates of the midpoint of the line segment with endpoints $(2, -5)$ and $(8, 3)$?
1) $(3, -4)$
2) $(3, -1)$
3) $(5, -4)$
4) $(5, -1)$

3 As shown in the diagram below, when hexagon *ABCDEF* is reflected over line *m*, the image is hexagon *A'B'C'D'E'F'*.

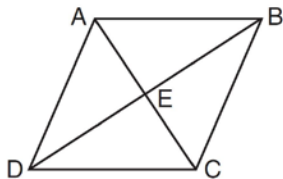
Under this transformation, which property is *not* preserved?
1) area
2) distance
3) orientation
4) angle measure

4 In the diagram of $\triangle ABC$ below, $\overline{BD}$ is drawn to side $\overline{AC}$.

If $m\angle A = 35$, $m\angle ABD = 25$, and $m\angle C = 60$, which type of triangle is $\triangle BCD$?
1) equilateral
2) scalene
3) obtuse
4) right

1

5 In the diagram below of rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.

If $AC = 18$ and $BD = 24$, what is the length of one side of rhombus $ABCD$?
1) 15
2) 18
3) 24
4) 30

6 What are the truth values of the statement "Opposite angles of a trapezoid are always congruent" and its negation?
1) The statement is true and its negation is true.
2) The statement is true and its negation is false.
3) The statement is false and its negation is true.
4) The statement is false and its negation is false.

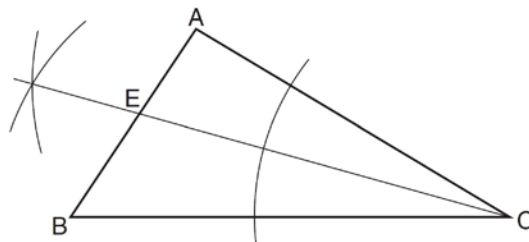7 What is the length of a line segment whose endpoints have coordinates $(5, 3)$ and $(1, 6)$?
1) 5
2) 25
3) $\sqrt{17}$
4) $\sqrt{29}$

8 In the diagram below of isosceles $\triangle ABC$, the measure of vertex angle B is 80°. If $\overline{AC}$ extends to point D, what is m$\angle BCD$?
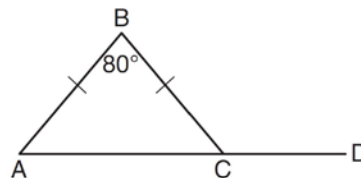
1) 50
2) 80
3) 100
4) 130

9 A student used a compass and a straightedge to construct $\overline{CE}$ in $\triangle ABC$ as shown below.

Which statement must always be true for this construction?
1) $\angle CEA \cong \angle CEB$
2) $\angle ACE \cong \angle BCE$
3) $\overline{AE} \cong \overline{BE}$
4) $\overline{EC} \cong \overline{AC}$

10 In $\triangle ABC$, $AB = 4$, $BC = 7$, and $AC = 10$. Which statement is true?
1) m$\angle B$ > m$\angle C$ > m$\angle A$
2) m$\angle B$ > m$\angle A$ > m$\angle C$
3) m$\angle C$ > m$\angle B$ > m$\angle A$
4) m$\angle C$ > m$\angle A$ > m$\angle B$

2

11 A circle whose center has coordinates $(-3, 4)$ passes through the origin. What is the equation of the circle?

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

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

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

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

12 Point W is located in plane $\mathcal{R}$. How many distinct lines passing through point W are perpendicular to plane $\mathcal{R}$?

1) one

2) two

3) zero

4) infinite

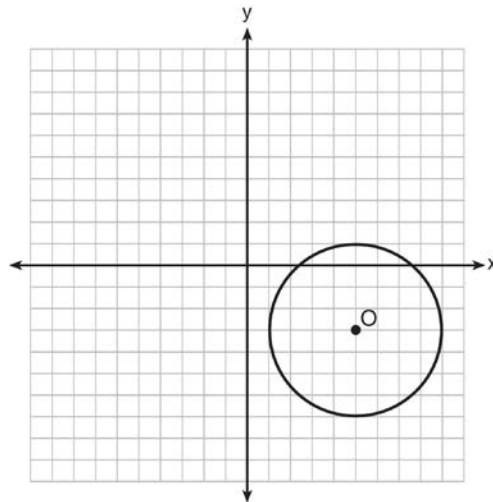13 In the diagram below, line ℓ is parallel to line m, and line w is a transversal.
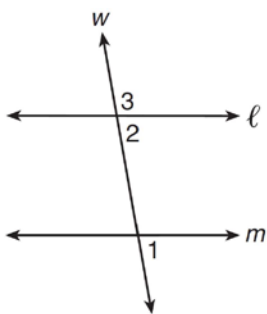
(Not drawn to scale)

If m$\angle 2 = 3x + 17$ and m$\angle 3 = 5x - 21$, what is m$\angle 1$?

1) 19

2) 23

3) 74

4) 86
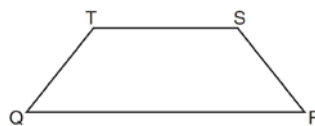
14 The diagram below is a graph of circle O.

Which equation represents circle O?

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

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

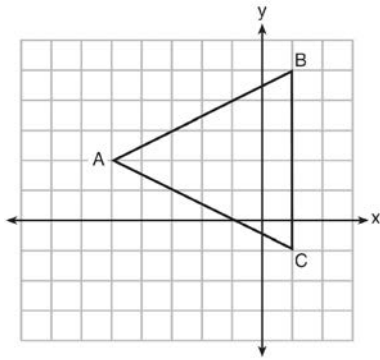3) $(x - 5)^2 + (y + 3)^2 = 16$

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

15 In isosceles trapezoid $QRST$ shown below, $\overline{QR}$ and $\overline{TS}$ are bases.

If m$\angle Q = 5x + 3$ and m$\angle R = 7x - 15$, what is m$\angle Q$?

1) 83

2) 48

3) 16

4) 9

3

16 Triangle *ABC* is graphed on the set of axes below.


What are the coordinates of the point of intersection of the medians of △*ABC*?
1) $(-1,2)$
2) $(-3,2)$
3) $(0,2)$
4) $(1,2)$

17 Given the statement, "If a number has exactly two factors, it is a prime number," what is the contrapositive of this statement?
1) If a number does not have exactly two factors, then it is not a prime number.
2) If a number is not a prime number, then it does not have exactly two factors.
3) If a number is a prime number, then it has exactly two factors.
4) A number is a prime number if it has exactly two factors.

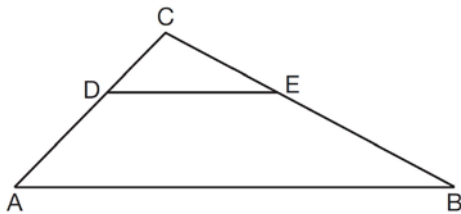18 Which graph represents a circle whose equation is $(x-2)^2 + (y+4)^2 = 4$?

1)

2)

3)

4)
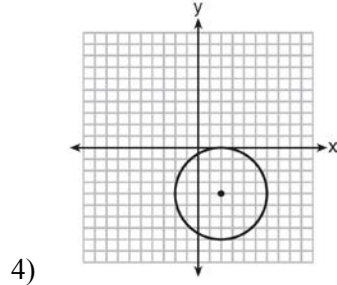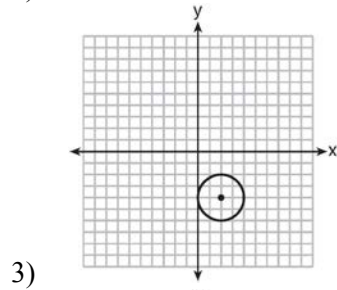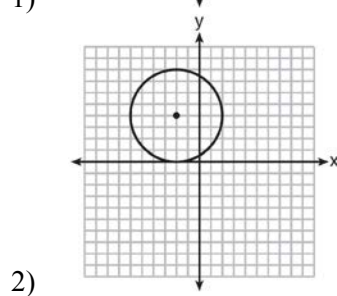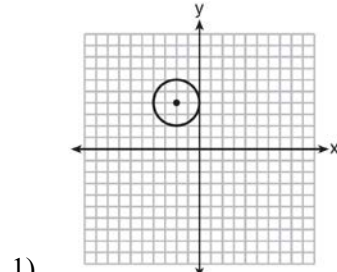
19 If two sides of a triangle have lengths of 4 and 10, the third side could be
1) 8
2) 2
3) 16
4) 4

20 The lines represented by the equations $4x + 6y = 6$ and $y = \frac{2}{3}x - 1$ are
1) parallel
2) the same line
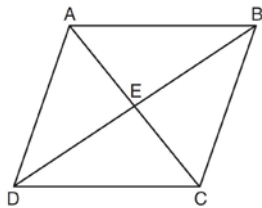3) perpendicular
4) intersecting, but *not* perpendicular

21 In the diagram of $\triangle ABC$ below, $\overline{DE} \parallel \overline{AB}$.

If $CD = 4$, $CA = 10$, $CE = x + 2$, and $EB = 4x - 7$, what is the length of $\overline{CE}$?
1) 10
2) 8
3) 6
4) 4

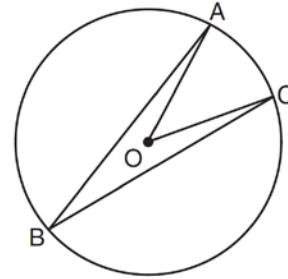22 Parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E is shown below.

Which statement must be true?
1) $\overline{BE} \cong \overline{CE}$
2) $\angle BAE \cong \angle DCE$
3) $\overline{AB} \cong \overline{BC}$
4) $\angle DAE \cong \angle CBE$
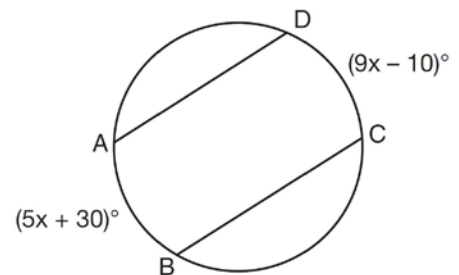
23 In the diagram below of circle O, m$\angle ABC = 24$.

What is the m$\angle AOC$?
1) 12
2) 24
3) 48
4) 60

24 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation of 2. Which statement is true?
1) $AB = A'B'$
2) $BC = 2(B'C')$
3) $m\angle B = m\angle B'$
4) $m\angle A = \frac{1}{2}(m\angle A')$

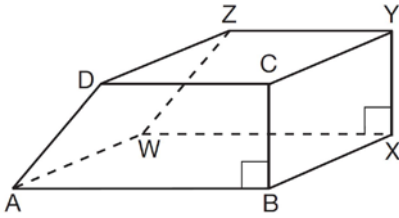25 In the diagram of the circle below, $\overline{AD} \parallel \overline{BC}$, $\overarc{AB} = (5x + 30)°$, and $\overarc{CD} = (9x - 10)°$.
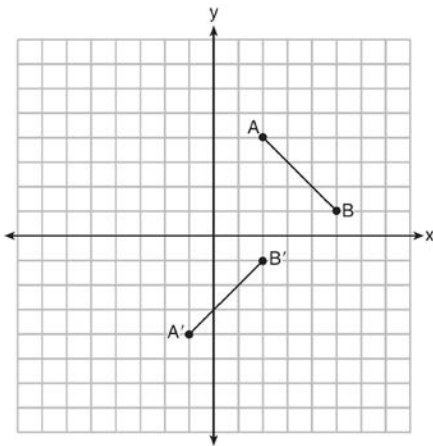

What is m$\overarc{AB}$?
1) 5
2) 10
3) 55
4) 80

5

26 The bases of a prism are right trapezoids, as shown in the diagram below.

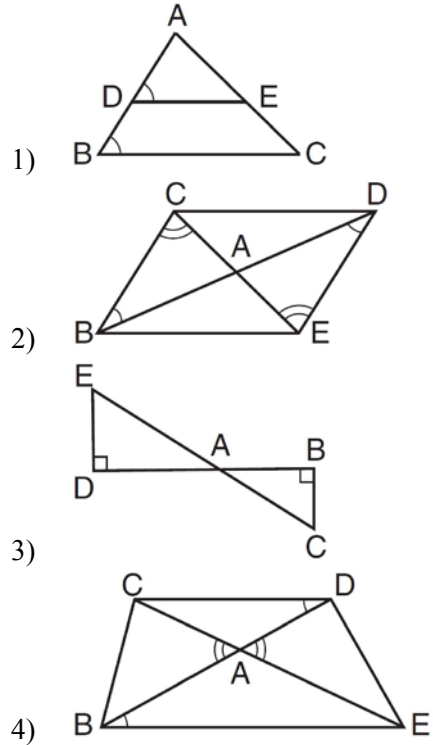Which two edges do *not* lie in the same plane?
1) $\overline{BC}$ and $\overline{WZ}$
2) $\overline{AW}$ and $\overline{CY}$
3) $\overline{DC}$ and $\overline{WX}$
4) $\overline{BX}$ and $\overline{AB}$

27 In the diagram below, $\overline{A'B'}$ is the image of $\overline{AB}$ under which single transformation?

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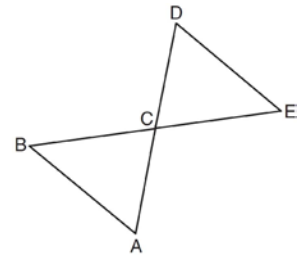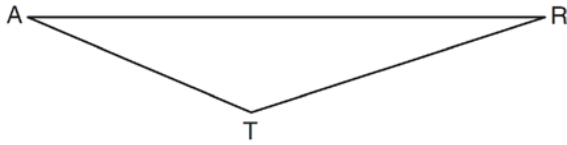2) rotation
3) translation
4) glide reflection

28 For which diagram is the statement $\triangle ABC \sim \triangle ADE$ *not* always true??

1)

2)

3)

4)

29 Given: $\overline{BE}$ and $\overline{AD}$ intersect at point C
$\overline{BC} \cong \overline{EC}$
$\overline{AC} \cong \overline{DC}$
$\overline{AB}$ and $\overline{DE}$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$

6

30 Using a compass and straightedge, construct the perpendicular bisector of side $\overline{AR}$ in $\triangle ART$ shown below. [Leave all construction marks.]


31 Determine and state the measure, in degrees, of an interior angle of a regular decagon.

32 Write an equation of a line that is parallel to the line whose equation is $3y = x + 6$ and that passes through the point $(-3, 4)$.

33 In the diagram below, secants $\overline{PQR}$ and $\overline{PST}$ are drawn to a circle from point P.
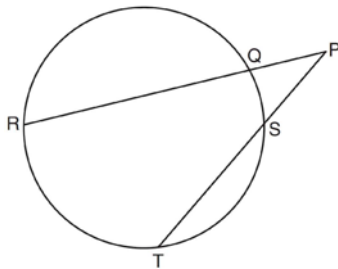
If $PR = 24$, $PQ = 6$, and $PS = 8$, determine and state the length of $\overline{PT}$.

34 The slope of $\overline{QR}$ is $\frac{x-1}{4}$ and the slope of $\overline{ST}$ is $\frac{8}{3}$. If $\overline{QR} \perp \overline{ST}$, determine and state the value of x.

35 Quadrilateral $HYPE$ has vertices $H(2,3)$, $Y(1,7)$, $P(-2,7)$, and $E(-2,4)$. State and label the coordinates of the vertices of $H''Y''P''E''$ after the composition of transformations $r_{x-axis} \circ T_{5,-3}$. [The use of the set of axes below is optional.]
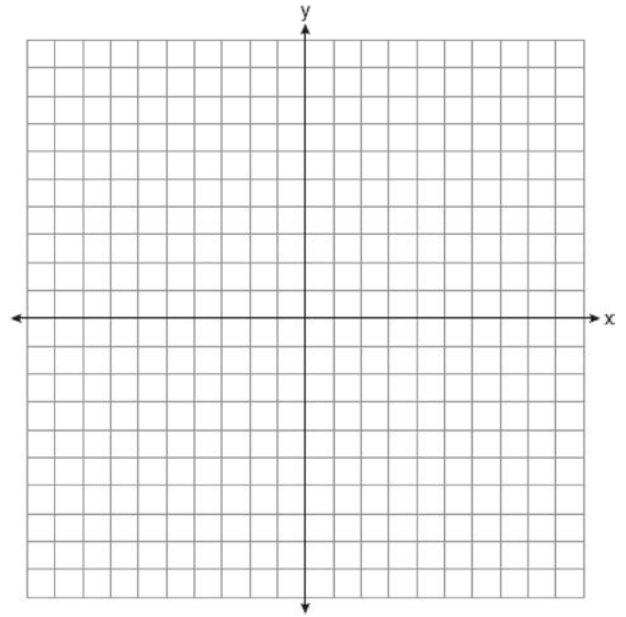
36 On the set of axes below, graph two horizontal lines whose *y*-intercepts are $(0, -2)$ and $(0, 6)$, respectively. Graph the locus of points equidistant from these horizontal lines. Graph the locus of points 3 units from the *y*-axis. State the coordinates of the points that satisfy both loci.
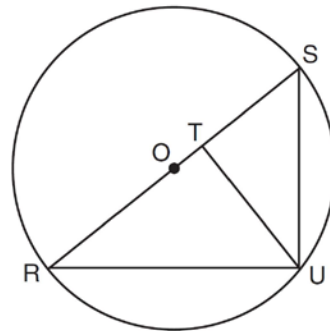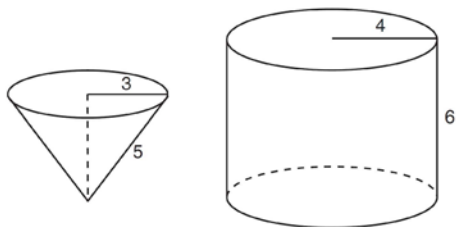

37 In the diagram below, a right circular cone with a radius of 3 inches has a slant height of 5 inches, and a right cylinder with a radius of 4 inches has a height of 6 inches.

Determine and state the number of full cones of water needed to completely fill the cylinder with water.

38 In the diagram below, right triangle *RSU* is inscribed in circle *O*, and $\overline{UT}$ is the altitude drawn to hypotenuse $\overline{RS}$. The length of $\overline{RT}$ is 16 more than the length of $\overline{TS}$ and $TU = 15$. Find the length of $\overline{TS}$. Find, in simplest radical form, the length of $\overline{RU}$.

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Answer Section

1 ANS: 4   PTS: 2   REF: 011501ge   STA: G.G.70
   TOP: Quadratic-Linear Systems
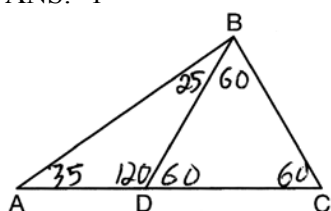2 ANS: 4

$$M_x = \frac{2+8}{2} = 5. \ M_Y = \frac{-5+3}{2} = -1.$$

   PTS: 2   REF: 011502ge   STA: G.G.66   TOP: Midpoint
   KEY: general
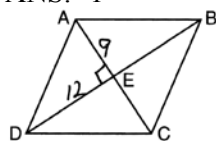3 ANS: 3   PTS: 2   REF: 011503ge   STA: G.G.55
   TOP: Properties of Transformations
4 ANS: 1

   PTS: 2   REF: 011504ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles
5 ANS: 1

   $\sqrt{9^2 + 12^2} = 15$

   PTS: 2   REF: 011505ge   STA: G.G.39   TOP: Special Parallelograms
6 ANS: 3   PTS: 2   REF: 011506ge   STA: G.G.24
   TOP: Negations
7 ANS: 1

$$d = \sqrt{(5-1)^2 + (3-6)^2} = \sqrt{16+9} = \sqrt{25} = 5$$

   PTS: 2   REF: 011507ge   STA: G.G.67   TOP: Distance
   KEY: general
8 ANS: 4

$$180 - \frac{180-80}{2} = 130$$

   PTS: 2   REF: 011508ge   STA: G.G.31   TOP: Isosceles Triangle Theorem
9 ANS: 2   PTS: 2   REF: 011509ge   STA: G.G.17
   TOP: Constructions
10 ANS: 2   PTS: 2   REF: 011510ge   STA: G.G.34
   TOP: Angle Side Relationship
11 ANS: 2   PTS: 2   REF: 011511ge   STA: G.G.71
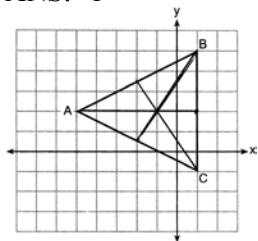   TOP: Equations of Circles

12 ANS: 1   PTS: 2   REF: 011512ge   STA: G.G.3
   TOP: Planes
13 ANS: 4
   $3x + 17 + 5x - 21 = 180$ $m\angle 1 = 3(23) + 17 = 86$
   $\qquad\quad 8x - 4 = 180$
   $\qquad\qquad 8x = 184$
   $\qquad\qquad\ x = 23$

   PTS: 2   REF: 011513ge   STA: G.G.35   TOP: Parallel Lines and Transversals
14 ANS: 3   PTS: 2   REF: 011514ge   STA: G.G.72
   TOP: Equations of Circles
15 ANS: 2
   $5x + 3 = 7x - 15$ $5(9) + 3 = 48$
   $\quad 18 = 2x$
   $\qquad 9 = x$

   PTS: 2   REF: 011515ge   STA: G.G.40   TOP: Trapezoids
16 ANS: 1

   PTS: 2   REF: 011516ge   STA: G.G.21
   TOP: Centroid, Orthocenter, Incenter and Circumcenter
17 ANS: 2   PTS: 2   REF: 011517ge   STA: G.G.26
   TOP: Contrapositive
18 ANS: 3   PTS: 2   REF: 011518ge   STA: G.G.74
   TOP: Graphing Circles
19 ANS: 1
   $10 - 4 < s < 10 + 4$
   $\qquad 6 < s < 14$

   PTS: 2   REF: 011519ge   STA: G.G.33   TOP: Triangle Inequality Theorem
20 ANS: 4
   $m = \dfrac{-A}{B} = \dfrac{-4}{6} = -\dfrac{2}{3}$

   PTS: 2   REF: 011520ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

21 ANS: 3

$$\frac{4}{6} = \frac{x+2}{4x-7}$$

$$16x - 28 = 6x + 12$$

$$10x = 40$$

$$x = 4$$

PTS: 2 REF: 011521ge STA: G.G.46 TOP: Side Splitter Theorem

22 ANS: 2 PTS: 2 REF: 011522ge STA: G.G.38
TOP: Parallelograms

23 ANS: 3 PTS: 2 REF: 011523ge STA: G.G.51
TOP: Arcs Determined by Angles KEY: inscribed

24 ANS: 3 PTS: 2 REF: 011524ge STA: G.G.58
TOP: Dilations

25 ANS: 4

$9x - 10 = 5x + 30$ $5(10) + 30 = 80$

$$4x = 40$$

$$x = 10$$

PTS: 2 REF: 011525ge STA: G.G.52 TOP: Chords

26 ANS: 1 PTS: 2 REF: 011526ge STA: G.G.10
TOP: Solids

27 ANS: 4
(2) rotation is also a correct response

PTS: 2 REF: 011527ge STA: G.G.56 TOP: Identifying Transformations
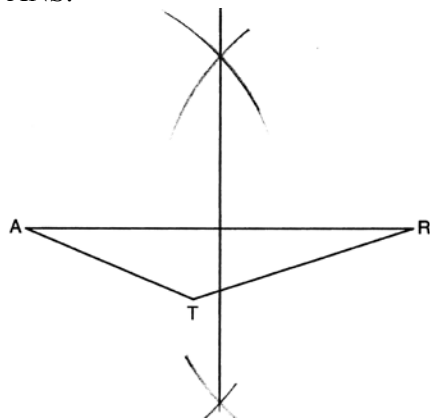
28 ANS: 4 PTS: 2 REF: 011528ge STA: G.G.44
TOP: Similarity Proofs

29 ANS:
$\overline{BE}$ and $\overline{AD}$ intersect at point *C*, $\overline{BC} \cong \overline{EC}$, $\overline{AC} \cong \overline{DC}$, $\overline{AB}$ and $\overline{DE}$ are drawn (Given). $\angle BCA \cong \angle ECD$ (Vertical Angles). $\triangle ABC \cong \triangle DEC$ (SAS).

PTS: 2 REF: 011529ge STA: G.G.27 TOP: Triangle Proofs

30 ANS:

    PTS: 2   REF: 011530ge   STA: G.G.18   TOP: Constructions

31 ANS:

$$\frac{(n-2)180}{n} = \frac{(10-2)180}{10} = 144$$

    PTS: 2   REF: 011531ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

32 ANS:

$$m = \frac{1}{3} \quad 4 = \frac{1}{3}(-3) + b \quad y = \frac{1}{3}x + 5$$
$$4 = -1 + b$$
$$5 = b$$

    PTS: 2   REF: 011532ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

33 ANS:

$$24 \cdot 6 = w \cdot 8$$
$$144 = 8w$$
$$18 = w$$

    PTS: 2   REF: 011533ge   STA: G.G.53   TOP: Segments Intercepted by Circle
    KEY: two secants
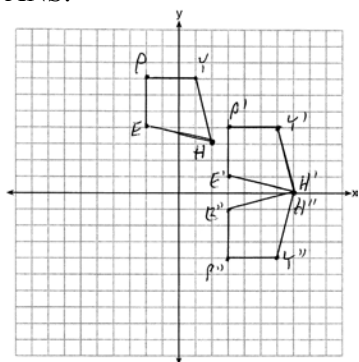
34 ANS:

$$\frac{x-1}{4} = \frac{-3}{8}$$
$$8x - 8 = -12$$
$$8x = -4$$
$$x = -\frac{1}{2}$$

    PTS: 2   REF: 011534ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

35 ANS:

$H'(7,0), Y'(6,4), P'(3,4), E'(3,1)$

$H''(7,0), Y''(6,-4), P''(3,-4), E''(3,-1)$

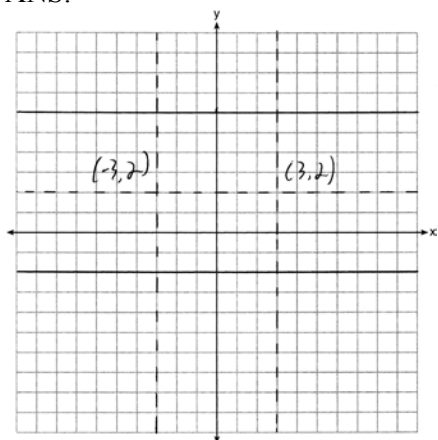PTS: 4   REF: 011535ge   STA: G.G.58   TOP: Compositions of Transformations
KEY: grids

36 ANS:

PTS: 4   REF: 011536ge   STA: G.G.23   TOP: Locus

37 ANS:

$h = \sqrt{5^2 - 3^2} = 4 \quad V = \frac{1}{3}\pi \cdot 3^2 \cdot 4 = 12\pi \quad V = \pi \cdot 4^2 \cdot 6 = 96\pi \quad \frac{96\pi}{12\pi} = 8$
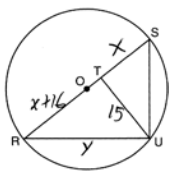
PTS: 4   REF: 011537ge   STA: G.G.15   TOP: Volume and Lateral Area

38 ANS:

$$x(x + 16) = 15^2 \quad 25 \cdot 34 = y^2$$
$$x^2 + 16x - 225 = 0 \quad 5\sqrt{34} = y$$
$$(x + 25)(x - 9) = 0$$
$$x = 9$$

PTS: 6   REF: 011538ge   STA: G.G.47   TOP: Similarity
KEY: leg