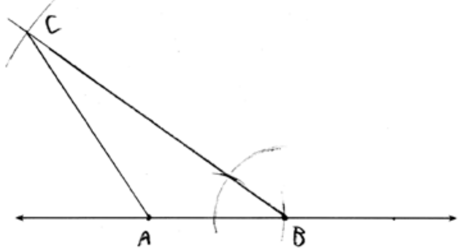
Geometry Regents Exam Questions by Common Core State Standard: Topic
Answer Section

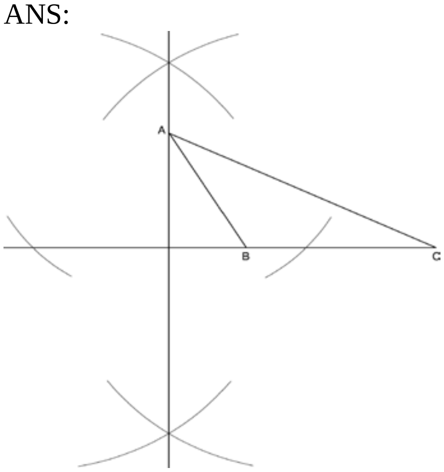
1 ANS:



SAS ≅ SAS

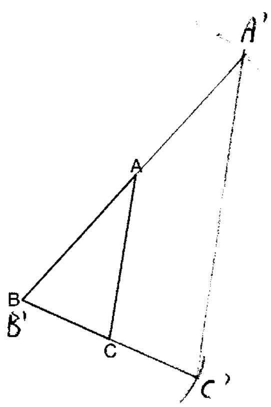
PTS: 4 REF: 011634geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

2 ANS:



PTS: 2 REF: fall1409geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

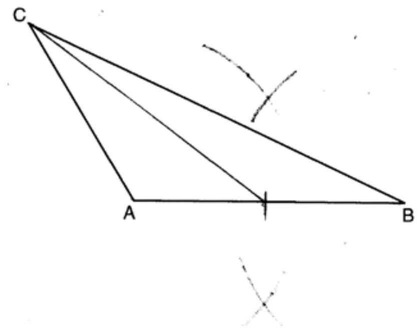
3 ANS:



The length of $\overline{A'C'}$ is twice $\overline{AC}$.

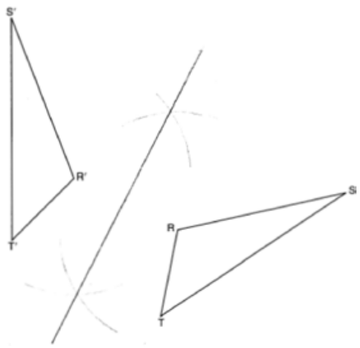
PTS: 4 REF: 081632geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

4 ANS:



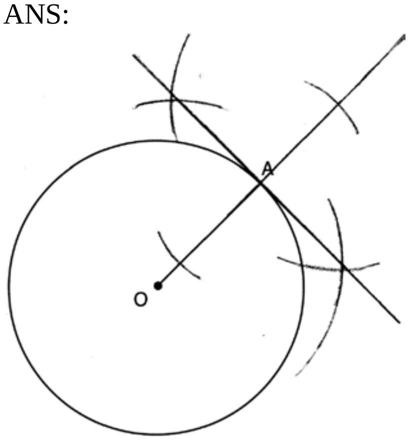
PTS: 2 REF: 081628geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

5 ANS:



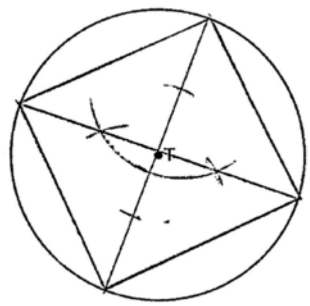
PTS: 2 REF: 011725geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

6 ANS:



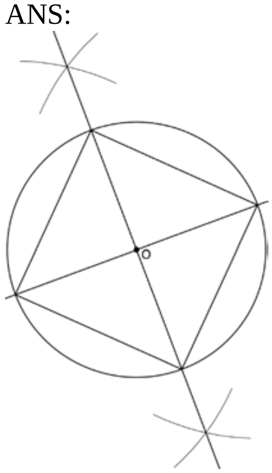
PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

7 ANS:



PTS: 2 REF: 061525geo NAT: G.CO.D.13 TOP: Constructions

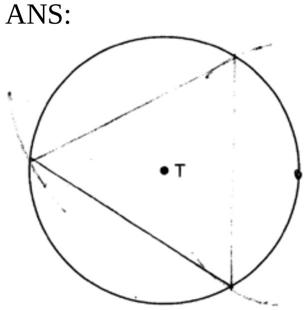
8 ANS:



Since the square is inscribed, each vertex of the square is on the circle and the diagonals of the square are diameters of the circle. Therefore, each angle of the square is an inscribed angle in the circle that intercepts the circle at the endpoints of the diameters. Each angle of the square, which is an inscribed angle, measures 90 degrees. Therefore, the measure of the arc intercepted by two adjacent sides of the square is 180 degrees because it is twice the measure of its inscribed angle.

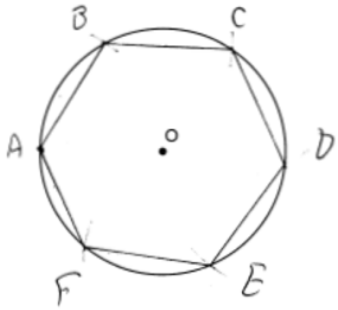
PTS: 4 REF: fall1412geo NAT: G.CO.D.13 TOP: Constructions

9 ANS:



PTS: 2 REF: 081526geo NAT: G.CO.D.13 TOP: Constructions

10 ANS:



Right triangle because $\angle CBF$ is inscribed in a semi-circle.

PTS: 4 REF: 011733geo NAT: G.CO.D.13 TOP: Constructions

11 ANS: 4

$-5+\frac{3}{5}(5--5)$ $-4+\frac{3}{5}(1--4)$

$-5+\frac{3}{5}(10)$ $-4+\frac{3}{5}(5)$

$-5+6$ $-4+3$

1 -1

PTS: 2 REF: spr1401geo NAT: G.GPE.B.6 TOP: Directed Line Segments

12 ANS:

$\frac{2}{5}\cdot(16-1)=6$ $\frac{2}{5}\cdot(14-4)=4$ $(1+6,4+4)=(7,8)$

PTS: 2 REF: 081531geo NAT: G.GPE.B.6 TOP: Directed Line Segments

13 ANS:

$4+\frac{4}{9}(22-4)$ $2+\frac{4}{9}(2-2)$ $(12,2)$

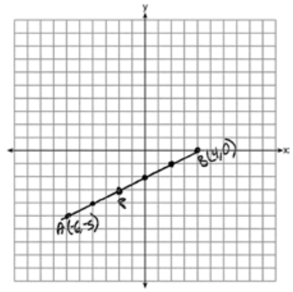
$4+\frac{4}{9}(18)$ $2+\frac{4}{9}(0)$

$4+8$ $2+0$

12 2

PTS: 2 REF: 061626geo NAT: G.GPE.B.6 TOP: Directed Line Segments

14 ANS:



$-6+\frac{2}{5}(4--6)$ $-5+\frac{2}{5}(0--5)$ $(-2,-3)$

$-6+\frac{2}{5}(10)$ $\quad -5+\frac{2}{5}(5)$

$-6+4$ $\quad -5+2$

-2 $\quad -3$

PTS: 2 REF: 061527geo NAT: G.GPE.B.6 TOP: Directed Line Segments

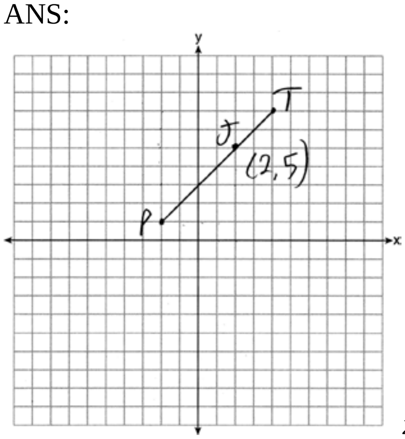
15 ANS: 1

$3+\frac{2}{5}(8-3)=3+\frac{2}{5}(5)=3+2=5$ $\quad 5+\frac{2}{5}(-5-5)=5+\frac{2}{5}(-10)=5-4=1$

1

PTS: 2 REF: 011720geo NAT: G.GPE.B.6 TOP: Directed Line Segments

16 ANS:



$x=\frac{2}{3}(4--2)=4$ $\quad -2+4=2$ $\quad J(2,5)$

$y=\frac{2}{3}(7-1)=4$ $\quad 1+4=5$

PTS: 2 REF: 011627geo NAT: G.GPE.B.6 TOP: Directed Line Segments

17 ANS: 4

$x=-6+\frac{1}{6}(6--6)=-6+2=-4$ $\quad y=-2+\frac{1}{6}(7--2)=-2+\frac{9}{6}=-\frac{1}{2}$

PTS: 2 REF: 081618geo NAT: G.GPE.B.6 TOP: Directed Line Segments

18 ANS: 1
Alternate interior angles

PTS: 2 REF: 061517geo NAT: G.CO.C.9 TOP: Lines and Angles

19 ANS:
Since linear angles are supplementary, $m\angle GIH = 65°$. Since $\overline{GH} \cong \overline{IH}$, $m\angle GHI = 50°$ $(180 - (65 + 65))$. Since $\angle EGB \cong \angle GHI$, the corresponding angles formed by the transversal and lines are congruent and $\overline{AB} \parallel \overline{CD}$.

PTS: 4 REF: 061532geo NAT: G.CO.C.9 TOP: Lines and Angles

20 ANS: 1 PTS: 2 REF: 011606geo NAT: G.CO.C.9
TOP: Lines and Angles

21 ANS: 2 PTS: 2 REF: 081601geo NAT: G.CO.C.9
TOP: Lines and Angles

22 ANS: 1

$$\frac{f}{4} = \frac{15}{6}$$

$$f = 10$$

PTS: 2 REF: 061617geo NAT: G.CO.C.9 TOP: Lines and Angles

23 ANS: 4 PTS: 2 REF: 081611geo NAT: G.CO.C.9
TOP: Lines and Angles

24 ANS: 1

$$m = \frac{-A}{B} = \frac{-2}{-1} = 2$$

$$m_{\perp} = -\frac{1}{2}$$

PTS: 2 REF: 061509geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

25 ANS: 1

$$m = -\frac{2}{3} \quad 1 = \left(-\frac{2}{3}\right)6 + b$$

$$1 = -4 + b$$

$$5 = b$$

PTS: 2 REF: 081510geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

26 ANS: 4

$$m = -\frac{1}{2} \quad -4 = 2(6) + b$$

$$m_{\perp} = 2 \quad -4 = 12 + b$$

$$-16 = b$$

PTS: 2 REF: 011602geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

27 ANS: 1

$m = \left(\frac{-11+5}{2}, \frac{5+-7}{2} \right) = (-3,-1)$ $m = \frac{5--7}{-11-5} = \frac{12}{-16} = -\frac{3}{4}$ $m_{\perp} = \frac{4}{3}$

PTS: 2 REF: 061612geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

28 ANS: 3

$y = mx + b$

$2 = \frac{1}{2}(-2) + b$

$3 = b$

PTS: 2 REF: 011701geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

29 ANS: 4

The slope of $\overline{BC}$ is $\frac{2}{5}$. Altitude is perpendicular, so its slope is $-\frac{5}{2}$.

PTS: 2 REF: 061614geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: find slope of perpendicular line

30 ANS: 2

$s^2 + s^2 = 7^2$

$2s^2 = 49$

$s^2 = 24.5$

$s \approx 4.9$

PTS: 2 REF: 081511geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem

31 ANS:

$\frac{16}{9} = \frac{x}{20.6}$ $D = \sqrt{36.6^2 + 20.6^2} \approx 42$

$x \approx 36.6$

PTS: 4 REF: 011632geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem
KEY: without graphics

32 ANS: 3

$\sqrt{20^2 - 10^2} \approx 17.3$

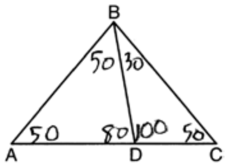
PTS: 2 REF: 081608geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem
KEY: without graphics

33 ANS: 2

$6 + 6\sqrt{3} + 6 + 6\sqrt{3} \approx 32.8$

PTS: 2 REF: 011709geo NAT: G.SRT.C.8 TOP: 30-60-90 Triangles

34 ANS: 2



PTS: 2 REF: 081604geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

35 ANS:
$\triangle MNO$ is congruent to $\triangle PNO$ by SAS. Since $\triangle MNO \cong \triangle PNO$, then $\overline{MO} \cong \overline{PO}$ by CPCTC. So $\overline{NO}$ must divide $\overline{MP}$ in half, and $MO = 8$.

PTS: 2 REF: fall1405geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

36 ANS:
$180 - 2(25) = 130$

PTS: 2 REF: 011730geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

37 ANS: 3
$\frac{9}{5} = \frac{9.2}{x}$ $5.1 + 9.2 = 14.3$

$9x = 46$

$x \approx 5.1$

PTS: 2 REF: 061511geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

38 ANS: 4
$\frac{2}{6} = \frac{5}{15}$

PTS: 2 REF: 081517geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

39 ANS: 2
$\frac{12}{4} = \frac{36}{x}$

$12x = 144$

$x = 12$

PTS: 2 REF: 061621geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

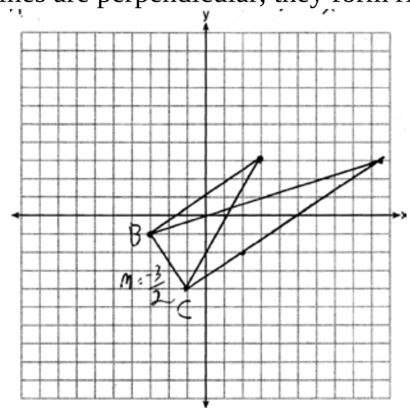
40 ANS:
$\frac{3.75}{5} = \frac{4.5}{6}$ $\overline{AB}$ is parallel to $\overline{CD}$ because $\overline{AB}$ divides the sides proportionately.

$39.375 = 39.375$

PTS: 2 REF: 061627geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

41 ANS: 4 PTS: 2 REF: 011704geo NAT: G.CO.C.10
TOP: Midsegments

42 ANS:
The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles



and a right triangle. $m_{\overline{BC}} = -\frac{3}{2}$ $-1 = \frac{2}{3}(-3) + b$ or $-4 = \frac{2}{3}(-1) + b$

$$m_{\perp} = \frac{2}{3} \quad -1 = -2 + b \quad \frac{-12}{3} = \frac{-2}{3} + b$$

$$1 = b \quad -\frac{10}{3} = b$$

$$3 = \frac{2}{3}x + 1 \quad 3 = \frac{2}{3}x - \frac{10}{3}$$

$$2 = \frac{2}{3}x \quad 9 = 2x - 10$$

$$3 = x \quad 19 = 2x$$

$$9.5 = x$$

PTS: 4 REF: 081533geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

43 ANS: 1
$m_{\overline{RT}} = \frac{5 - -3}{4 - -2} = \frac{8}{6} = \frac{4}{3}$ $m_{\overline{ST}} = \frac{5-2}{4-8} = \frac{3}{-4} = -\frac{3}{4}$ Slopes are opposite reciprocals, so lines form a right angle.

PTS: 2 REF: 011618geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

44 ANS: 4 PTS: 2 REF: 061513geo NAT: G.CO.C.11
TOP: Parallelograms

45 ANS:
Opposite angles in a parallelogram are congruent, so $m\angle O = 118°$. The interior angles of a triangle equal 180°.
$180 - (118 + 22) = 40$.

PTS: 2 REF: 061526geo NAT: G.CO.C.11 TOP: Parallelograms

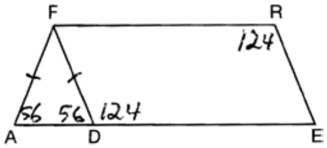
46 ANS: 1
$180 - (68 \cdot 2)$

PTS: 2 REF: 081624geo NAT: G.CO.C.11 TOP: Parallelograms

47 ANS: 3
(3) Could be a trapezoid.

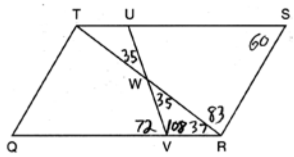
PTS: 2 REF: 081607geo NAT: G.CO.C.11 TOP: Parallelograms

48 ANS: 3



PTS: 2 REF: 081508geo NAT: G.CO.C.11 TOP: Parallelograms

49 ANS: 3



PTS: 2 REF: 011603geo NAT: G.CO.C.11 TOP: Parallelograms

50 ANS: 2 PTS: 2 REF: 081501geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

51 ANS: 1 PTS: 2 REF: 011716geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

52 ANS: 1
1) opposite sides; 2) adjacent sides; 3) perpendicular diagonals; 4) diagonal bisects angle

PTS: 2 REF: 061609geo NAT: G.CO.C.11 TOP: Special Quadrilaterals

53 ANS: 4 PTS: 2 REF: 011705geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

54 ANS:
$M\left(\frac{4+0}{2},\frac{6-1}{2}\right)=M\left(2,\frac{5}{2}\right)$ $m=\frac{6--1}{4-0}=\frac{7}{4}$ $m_{\perp}=-\frac{4}{7}$ $y-2.5=-\frac{4}{7}(x-2)$ The diagonals, $\overline{MT}$ and $\overline{AH}$, of rhombus *MATH* are perpendicular bisectors of each other.

PTS: 4 REF: fall1411geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

55 ANS: 3
$\frac{7-1}{0-2}=\frac{6}{-2}=-3$ The diagonals of a rhombus are perpendicular.

PTS: 2 REF: 011719geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

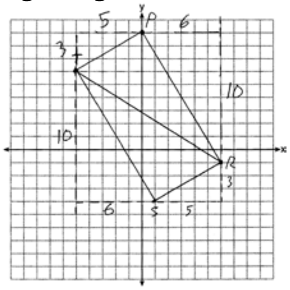
56 ANS: 4
$\frac{-2-1}{-1--3}=\frac{-3}{2}$ $\frac{3-2}{0-5}=\frac{1}{-5}$ $\frac{3-1}{0--3}=\frac{2}{3}$ $\frac{2--2}{5--1}=\frac{4}{6}=\frac{2}{3}$

PTS: 2 REF: 081522geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: general

57 ANS:

$m_{\overline{TS}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{SR}} = \frac{3}{5}$ Since the slopes of $\overline{TS}$ and $\overline{SR}$ are opposite reciprocals, they are perpendicular and form a right angle. $\triangle RST$ is a right triangle because $\angle S$ is a right angle. $P(0,9)$ $m_{\overline{RP}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{PT}} = \frac{3}{5}$

Since the slopes of all four adjacent sides ($\overline{TS}$ and $\overline{SR}$, $\overline{SR}$ and $\overline{RP}$, $\overline{PT}$ and $\overline{TS}$, $\overline{RP}$ and $\overline{PT}$) are opposite reciprocals, they are perpendicular and form right angles. Quadrilateral $RSTP$ is a rectangle because it has four right angles.



PTS: 2 REF: 061536geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

58 ANS: 1

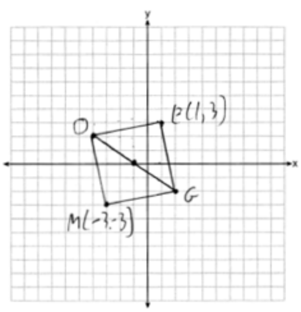
$m_{\overline{TA}} = -1$ $y = mx + b$

$m_{\overline{EM}} = 1$ $1 = 1(2) + b$

$-1 = b$

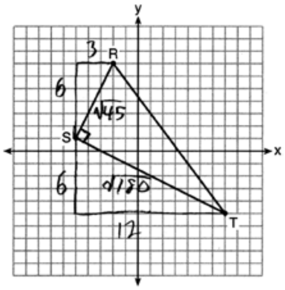
PTS: 2 REF: 081614geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: general

59 ANS:



PTS: 2 REF: 011731geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

60 ANS: 3



$\sqrt{45} = 3\sqrt{5}$ $a = \frac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right) = \frac{1}{2}(18)(5) = 45$

$\sqrt{180} = 6\sqrt{5}$

PTS: 2 REF: 061622geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

61 ANS: 3

$A = \frac{1}{2}ab$ $3 - 6 = -3 = x$

$24 = \frac{1}{2}a(8)$ $\frac{4+12}{2} = 8 = y$

$a = 6$

PTS: 2 REF: 081615geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

62 ANS: 2

$\sqrt{(-1-2)^2 + (4-3)^2} = \sqrt{10}$

PTS: 2 REF: 011615geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

63 ANS: 2

x is $\frac{1}{2}$ the circumference. $\frac{C}{2} = \frac{10\pi}{2} \approx 16$

PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Circumference

64 ANS: 1

$\frac{1000}{20\pi} \approx 15.9$

PTS: 2 REF: 011623geo NAT: G.GMD.A.1 TOP: Circumference

65 ANS: 3

$\theta = \frac{s}{r} = \frac{2\pi}{10} = \frac{\pi}{5}$

PTS: 2 REF: fall1404geo NAT: G.C.B.5 TOP: Arc Length
KEY: angle

66 ANS:

$s=\theta\cdot r \qquad s=\theta\cdot r$ Yes, both angles are equal.

$\pi = A\cdot 4 \quad \frac{13\pi}{8} = B\cdot 6.5$

$\frac{\pi}{4} = A \qquad \frac{\pi}{4} = B$

PTS: 2 REF: 061629geo NAT: G.C.B.5 TOP: Arc Length
KEY: arc length

67 ANS:

$$\frac{\left(\frac{180-20}{2}\right)}{360}\times\pi(6)^2 = \frac{80}{360}\times 36\pi = 8\pi$$

PTS: 4 REF: spr1410geo NAT: G.C.B.5 TOP: Sectors

68 ANS: 3

$$\frac{60}{360}\cdot 6^2\pi = 6\pi$$

PTS: 2 REF: 081518geo NAT: G.C.B.5 TOP: Sectors

69 ANS:

$A = 6^2\pi = 36\pi \quad 36\pi\cdot\frac{x}{360} = 12\pi$

$x = 360\cdot\frac{12}{36}$

$x = 120$

PTS: 2 REF: 061529geo NAT: G.C.B.5 TOP: Sectors

70 ANS: 3

$\frac{x}{360}\cdot 3^2\pi = 2\pi \quad 180-80=100$

$x = 80 \quad \frac{180-100}{2} = 40$

PTS: 2 REF: 011612geo NAT: G.C.B.5 TOP: Sectors

71 ANS: 3

$$\frac{60}{360}\cdot 8^2\pi = \frac{1}{6}\cdot 64\pi = \frac{32\pi}{3}$$

PTS: 2 REF: 061624geo NAT: G.C.B.5 TOP: Sectors

72 ANS: 2 PTS: 2 REF: 081619geo NAT: G.C.B.5
TOP: Sectors

73 ANS: 4

$$\frac{300}{360}\cdot 8^2\pi=\frac{160\pi}{3}$$

PTS: 2 REF: 011721geo NAT: G.C.B.5 TOP: Sectors

74 ANS: 3

$$5\cdot\frac{10}{4}=\frac{50}{4}=12.5$$

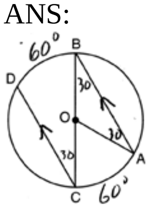
PTS: 2 REF: 081512geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: common tangents

75 ANS: 1 PTS: 2 REF: 061508geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

76 ANS: 1 PTS: 2 REF: 061520geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: mixed

77 ANS: 3 PTS: 2 REF: 011621geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

78 ANS:



$180-2(30)=120$

PTS: 2 REF: 011626geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: parallel lines

79 ANS: 2 PTS: 2 REF: 061610geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

80 ANS: 2

$$8(x+8)=6(x+18)$$
$$8x+64=6x+108$$
$$2x=44$$
$$x=22$$

PTS: 2 REF: 011715geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

81 ANS:

$$\frac{3}{8}\cdot 56=21$$

PTS: 2 REF: 081625geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: common tangents

82 ANS: 1
The other statements are true only if $\overline{AD} \perp \overline{BC}$.

PTS: 2 REF: 081623geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: inscribed

83 ANS:
$$\frac{152-56}{2}=48$$

PTS: 2 REF: 011728geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

84 ANS: 3 PTS: 2 REF: 081515geo NAT: G.C.A.3
TOP: Inscribed Quadrilaterals

85 ANS: 2
$$x^2+y^2+6y+9=7+9$$
$$x^2+(y+3)^2=16$$

PTS: 2 REF: 061514geo NAT: G.GPE.A.1 TOP: Equations of Circles

86 ANS: 3
$$x^2+4x+4+y^2-6y+9=12+4+9$$
$$(x+2)^2+(y-3)^2=25$$

PTS: 2 REF: 081509geo NAT: G.GPE.A.1 TOP: Equations of Circles

87 ANS: 4
$$x^2+6x+9+y^2-4y+4=23+9+4$$
$$(x+3)^2+(y-2)^2=36$$

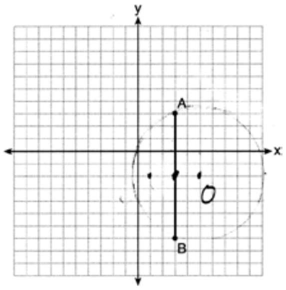
PTS: 2 REF: 011617geo NAT: G.GPE.A.1 TOP: Equations of Circles

88 ANS: 1
$$x^2-4x+4+y^2+8y+16=-11+4+16$$
$$(x-2)^2+(y+4)^2=9$$

PTS: 2 REF: 081616geo NAT: G.GPE.A.1 TOP: Equations of Circles

89 ANS: 2 PTS: 2 REF: 061603geo NAT: G.GPE.A.1
TOP: Equations of Circles

90 ANS: 1



Since the midpoint of $\overline{AB}$ is $(3,-2)$, the center must be either $(5,-2)$ or $(1,-2)$.

$r = \sqrt{2^2 + 5^2} = \sqrt{29}$

PTS: 2 REF: 061623geo NAT: G.GPE.A.1 TOP: Equations of Circles

91 ANS: 1

$x^2 + y^2 - 6y + 9 = -1 + 9$

$x^2 + (y-3)^2 = 8$

PTS: 2 REF: 011718geo NAT: G.GPE.A.1 TOP: Equations of Circles

92 ANS: 3

$r = \sqrt{(7-3)^2 + (1--2)^2} = \sqrt{16+9} = 5$

PTS: 2 REF: 061503geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

93 ANS:

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

$(3.4-1)^2 + (1.2+2)^2 = 16$

$5.76 + 10.24 = 16$

$16 = 16$

PTS: 2 REF: 081630geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

94 ANS: 3

$\sqrt{(-5)^2 + 12^2} = \sqrt{169}$ $\sqrt{11^2 + (2\sqrt{12})^2} = \sqrt{121+48} = \sqrt{169}$

PTS: 2 REF: 011722geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

95 ANS: 1

$\frac{64}{4} = 16$ $16^2 = 256$ $\begin{aligned}2w + 2(w+2) &= 64\\ w &= 15\end{aligned}$ $15 \times 17 = 255$ $\begin{aligned}2w + 2(w+4) &= 64\\ w &= 14\end{aligned}$ $14 \times 18 = 252$ $\begin{aligned}2w + 2(w+6) &= 64\\ w &= 13\end{aligned}$

$13 \times 19 = 247$

PTS: 2 REF: 011708geo NAT: G.MG.A.3 TOP: Area

96 ANS: 2

$SA = 6 \cdot 12^2 = 864$

$\frac{864}{450} = 1.92$

PTS: 2 REF: 061519geo NAT: G.MG.A.3 TOP: Surface Area

97 ANS: 4 PTS: 2 REF: 081503geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

98 ANS: 3 PTS: 2 REF: 061601geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

99 ANS: 4 PTS: 2 REF: 061501geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

100 ANS: 1 PTS: 2 REF: 081603geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

101 ANS: 3 PTS: 2 REF: 081613geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

102 ANS: 4 PTS: 2 REF: 011723geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

103 ANS: 2 PTS: 2 REF: 061506geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

104 ANS: 1 PTS: 2 REF: 011601geo NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

105 ANS:

Each quarter in both stacks has the same base area. Therefore, each corresponding cross-section of the stacks will have the same area. Since the two stacks of quarters have the same height of 23 quarters, the two volumes must be the same.

PTS: 2 REF: spr1405geo NAT: G.GMD.A.1 TOP: Volume

106 ANS:

$\frac{\pi \cdot 11.25^2 \cdot 33.5}{231} \approx 57.7$

PTS: 4 REF: 061632geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

107 ANS: 4

$2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5$

$230 \approx s$

PTS: 2 REF: 081521geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

108 ANS: 2

$14 \times 16 \times 10 = 2240$ $\frac{2240 - 1680}{2240} = 0.25$

PTS: 2 REF: 011604geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

109 ANS: 2

$V = \frac{1}{3} \cdot 6^2 \cdot 12 = 144$

PTS: 2 REF: 011607geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

110 ANS: 3

$$\frac{\frac{4}{3}\pi\left(\frac{9.5}{2}\right)^3}{\frac{4}{3}\pi\left(\frac{2.5}{2}\right)^3} \approx 55$$

PTS: 2 REF: 011614geo NAT: G.GMD.A.3 TOP: Volume
KEY: spheres

111 ANS: 4 PTS: 2 REF: 061606geo NAT: G.GMD.A.3
TOP: Volume KEY: compositions

112 ANS:

Similar triangles are required to model and solve a proportion. $\frac{x+5}{1.5} = \frac{x}{1}$ $\frac{1}{3}\pi(1.5)^2(15) - \frac{1}{3}\pi(1)^2(10) \approx 24.9$

$$x + 5 = 1.5x$$
$$5 = .5x$$
$$10 = x$$
$$10 + 5 = 15$$

PTS: 6 REF: 061636geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

113 ANS: 4

$V = \pi\left(\frac{6.7}{2}\right)^2 (4 \cdot 6.7) \approx 945$

PTS: 2 REF: 081620geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders

114 ANS: 2

$4 \times 4 \times 6 - \pi(1)^2(6) \approx 77$

PTS: 2 REF: 011711geo NAT: G.GMD.A.3 TOP: Volume
KEY: compositions

115 ANS: 1

$V=\frac{1}{3}\pi\left(\frac{1.5}{2}\right)^2\left(\frac{4}{2}\right)\approx 1.2$

PTS: 2 REF: 011724geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

116 ANS:

$C=2\pi r \quad V=\frac{1}{3}\pi\cdot 5^2\cdot 13\approx 340$

$31.416=2\pi r$

$5\approx r$

PTS: 4 REF: 011734geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

117 ANS:

$r=25\text{ cm}\left(\frac{1\text{ m}}{100\text{ cm}}\right)=0.25\text{ m} \quad V=\pi(0.25\text{ m})^2(10\text{ m})=0.625\pi\text{ m}^3 \quad W=0.625\pi\text{ m}^3\left(\frac{380\text{ K}}{1\text{ m}^3}\right)\approx 746.1\,K$

$n=\frac{\$50,000}{\left(\frac{\$4.75}{\text{K}}\right)(746.1\text{ K})}=14.1 \quad 15\text{ trees}$

PTS: 4 REF: spr1412geo NAT: G.MG.A.2 TOP: Density

118 ANS:

No, the weight of the bricks is greater than 900 kg. $500\times(5.1\text{ cm}\times 10.2\text{ cm}\times 20.3\text{ cm})=528,003\text{ cm}^3$.

$528,003\text{ cm}^3\times\frac{1\text{ m}^3}{100\text{ cm}^3}=0.528003\text{ m}^3$. $\frac{1920\text{ kg}}{\text{m}^3}\times 0.528003\text{ m}^3\approx 1013\text{ kg}$.

PTS: 2 REF: fall1406geo NAT: G.MG.A.2 TOP: Density

119 ANS: 3

$V=12\cdot 8.5\cdot 4=408$

$W=408\cdot 0.25=102$

PTS: 2 REF: 061507geo NAT: G.MG.A.2 TOP: Density

120 ANS:

$\tan 47=\frac{x}{8.5}$ Cone: $V=\frac{1}{3}\pi(8.5)^2(9.115)\approx 689.6$ Cylinder: $V=\pi(8.5)^2(25)\approx 5674.5$ Hemisphere:

$x\approx 9.115$

$V=\frac{1}{2}\left(\frac{4}{3}\pi(8.5)^3\right)\approx 1286.3 \quad 689.6+5674.5+1286.3\approx 7650$ No, because $7650\cdot 62.4=477,360$

$477,360\cdot .85=405,756$, which is greater than 400,000.

PTS: 6 REF: 061535geo NAT: G.MG.A.2 TOP: Density

121 ANS: 1

$$V = \frac{\frac{4}{3}\pi\left(\frac{10}{2}\right)^3}{2} \approx 261.8 \cdot 62.4 = 16,336$$

PTS: 2 REF: 081516geo NAT: G.MG.A.2 TOP: Density

122 ANS:

$$\frac{137.8}{6^3} \approx 0.638 \text{ Ash}$$

PTS: 2 REF: 081525geo NAT: G.MG.A.2 TOP: Density

123 ANS: 2

$$\frac{4}{3}\pi \cdot 4^3 + 0.075 \approx 20$$

PTS: 2 REF: 011619geo NAT: G.MG.A.2 TOP: Density

124 ANS:

$$V = \frac{1}{3}\pi\left(\frac{3}{2}\right)^2 \cdot 8 \approx 18.85 \cdot 100 = 1885 \;\; 1885 \cdot 0.52 \cdot 0.10 = 98.02 \;\; 1.95(100) - (37.83 + 98.02) = 59.15$$

PTS: 6 REF: 081536geo NAT: G.MG.A.2 TOP: Density

125 ANS: 2

$$\frac{1\text{ l}}{1.2\text{ oz}}\left(\frac{16\text{ oz}}{1\text{ lb}}\right) = \frac{13.\overline{3}\text{ l}}{\text{lb}} \;\; \frac{13.\overline{3}\text{ l}}{\text{lb}}\left(\frac{1\text{ g}}{3.785\text{ l}}\right) \approx \frac{3.5\text{ g}}{1\text{ lb}}$$

PTS: 2 REF: 061618geo NAT: G.MG.A.2 TOP: Density

126 ANS: 1

$$\frac{1}{2}\left(\frac{4}{3}\right)\pi \cdot 5^3 \cdot 62.4 \approx 16,336$$

PTS: 2 REF: 061620geo NAT: G.MG.A.2 TOP: Density

127 ANS:

$$\frac{40000}{\pi\left(\frac{51}{2}\right)^2} \approx 19.6 \;\; \frac{72000}{\pi\left(\frac{75}{2}\right)^2} \approx 16.3 \text{ Dish } A$$

PTS: 2 REF: 011630geo NAT: G.MG.A.2 TOP: Density

128 ANS: 2

$$C = \pi d \quad V = \pi\left(\frac{2.25}{\pi}\right)^2 \cdot 8 \approx 12.8916 \quad W = 12.8916 \cdot 752 \approx 9694$$

$$4.5 = \pi d$$

$$\frac{4.5}{\pi} = d$$

$$\frac{2.25}{\pi} = r$$

PTS: 2 REF: 081617geo NAT: G.MG.A.2 TOP: Density

129 ANS:

$$V = \frac{1}{3}\pi\left(\frac{8.3}{2}\right)^2(10.2) + \frac{1}{2}\cdot\frac{4}{3}\pi\left(\frac{8.3}{2}\right)^3 \approx 183.961 + 149.693 \approx 333.65\text{ cm}^3 \quad 333.65 \times 50 = 16682.7\text{ cm}^3$$

$$16682.7 \times 0.697 = 11627.8\text{ g} \quad 11.6278 \times 3.83 = \$44.53$$

PTS: 6 REF: 081636geo NAT: G.MG.A.2 TOP: Density

130 ANS:

C: $V = \pi(26.7)^2(750) - \pi(24.2)^2(750) = 95,437.5\pi$

$$95,437.5\pi\ \text{cm}^3\left(\frac{2.7\text{ g}}{\text{cm}^3}\right)\left(\frac{1\text{ kg}}{1000\text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$307.62$$

P: $V = 40^2(750) - 35^2(750) = 281,250$ $\quad\quad \$307.62 - 288.56 = \$19.06$

$$281,250\ \text{cm}^3\left(\frac{2.7\text{ g}}{\text{cm}^3}\right)\left(\frac{1\text{ kg}}{1000\text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$288.56$$

PTS: 6 REF: 011736geo NAT: G.MG.A.2 TOP: Density

131 ANS: 3

$$\frac{AB}{BC} = \frac{DE}{EF}$$

$$\frac{9}{15} = \frac{6}{10}$$

$$90 = 90$$

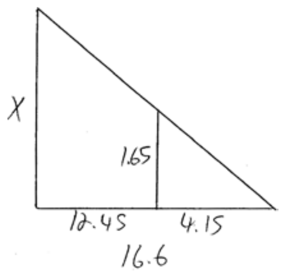
PTS: 2 REF: 061515geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

132 ANS: 4

$$\frac{7}{12} \cdot 30 = 17.5$$

PTS: 2 REF: 061521geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

133 ANS:



$$\frac{1.65}{4.15} = \frac{x}{16.6}$$
$$4.15x = 27.39$$
$$x = 6.6$$

PTS: 2 REF: 061531geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

134 ANS:

$x = \sqrt{.55^2 - .25^2} \cong 0.49$ No, $.49^2 = .25y$ $.9604 + .25 < 1.5$

$.9604 = y$

PTS: 4 REF: 061534geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

135 ANS: 4

$\frac{1}{2} = \frac{x+3}{3x-1}$ $GR = 3(7) - 1 = 20$

$3x - 1 = 2x + 6$

$x = 7$

PTS: 2 REF: 011620geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

136 ANS: 2 PTS: 2 REF: 081519geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

137 ANS:

$\frac{120}{230} = \frac{x}{315}$

$x = 164$

PTS: 2 REF: 081527geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

138 ANS: 3

1) $\frac{12}{9} = \frac{4}{3}$ 2) AA 3) $\frac{32}{16} \neq \frac{8}{2}$ 4) SAS

PTS: 2 REF: 061605geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

139 ANS:

$\frac{6}{14} = \frac{9}{21}$ SAS

$126 = 126$

PTS: 2 REF: 081529geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

140 ANS: 1

$\frac{6}{8} = \frac{9}{12}$

PTS: 2 REF: 011613geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

141 ANS: 2

$\sqrt{3 \cdot 21} = \sqrt{63} = 3\sqrt{7}$

PTS: 2 REF: 011622geo NAT: G.SRT.B.5 TOP: Similarity
KEY: altitude

142 ANS: 3

$\frac{12}{4} = \frac{x}{5}$ $15 - 4 = 11$

$x = 15$

PTS: 2 REF: 011624geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

143 ANS: 2

$h^2 = 30 \cdot 12$

$h^2 = 360$

$h = 6\sqrt{10}$

PTS: 2 REF: 061613geo NAT: G.SRT.B.5 TOP: Similarity
KEY: altitude

144 ANS: 2

$x^2 = 4 \cdot 10$

$x = \sqrt{40}$

$x = 2\sqrt{10}$

PTS: 2 REF: 081610geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

145 ANS: 3

$\frac{x}{10} = \frac{6}{4}$ $\overline{CD} = 15 - 4 = 11$

$x = 15$

PTS: 2 REF: 081612geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

146 ANS: 1 PTS: 2 REF: 061518geo NAT: G.SRT.A.1
TOP: Line Dilations

147 ANS: 2

The given line h, $2x + y = 1$, does not pass through the center of dilation, the origin, because the y-intercept is at $(0,1)$. The slope of the dilated line, m, will remain the same as the slope of line h, 2. All points on line h, such as $(0,1)$, the y-intercept, are dilated by a scale factor of 4; therefore, the y-intercept of the dilated line is $(0,4)$ because the center of dilation is the origin, resulting in the dilated line represented by the equation $y = -2x + 4$.

PTS: 2 REF: spr1403geo NAT: G.SRT.A.1 TOP: Line Dilations

148 ANS: 2

The line $y = 2x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from $y = 2x - 4$. Since a dilation preserves parallelism, the line $y = 2x - 4$ and its image will be parallel, with slopes of 2. To obtain the y-intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y-intercept, $(0,-4)$. Therefore, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2}\right) \to (0,-6)$. So the equation of the dilated line is $y = 2x - 6$.

PTS: 2 REF: fall1403geo NAT: G.SRT.A.1 TOP: Line Dilations

149 ANS: 1

The line $3y = -2x + 8$ does not pass through the center of dilation, so the dilated line will be distinct from $3y = -2x + 8$. Since a dilation preserves parallelism, the line $3y = -2x + 8$ and its image $2x + 3y = 5$ are parallel, with slopes of $-\frac{2}{3}$.

PTS: 2 REF: 061522geo NAT: G.SRT.A.1 TOP: Line Dilations

150 ANS: 4

The line $y = 3x - 1$ passes through the center of dilation, so the dilated line is not distinct.

PTS: 2 REF: 081524geo NAT: G.SRT.A.1 TOP: Line Dilations

151 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.A.1
TOP: Line Dilations

152 ANS: 1

B: $(4-3, 3-4) \to (1,-1) \to (2,-2) \to (2+3, -2+4)$

C: $(2-3, 1-4) \to (-1,-3) \to (-2,-6) \to (-2+3, -6+4)$

PTS: 2 REF: 011713geo NAT: G.SRT.A.1 TOP: Line Dilations

153 ANS: 4
$3 \times 6 = 18$

PTS: 2 REF: 061602geo NAT: G.SRT.A.1 TOP: Line Dilations

154 ANS: 4
$\sqrt{(32-8)^2 + (28 - -4)^2} = \sqrt{576 + 1024} = \sqrt{1600} = 40$

PTS: 2 REF: 081621geo NAT: G.SRT.A.1 TOP: Line Dilations

155 ANS:
$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2 REF: 011631geo NAT: G.SRT.A.1 TOP: Line Dilations

156 ANS: 1 PTS: 2 REF: 081605geo NAT: G.CO.A.5
TOP: Rotations KEY: grids

157 ANS:
$ABC -$ point of reflection $\rightarrow (-y, x) +$ point of reflection

$A(2,-3) - (2,-3) = (0,0) \rightarrow (0,0) + (2,-3) = A'(2,-3)$

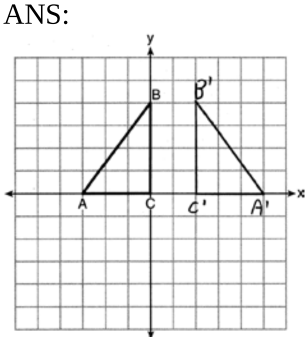
$B(6,-8) - (2,-3) = (4,-5) \rightarrow (5,4) + (2,-3) = B'(7,1)$

$C(2,-9) - (2,-3) = (0,-6) \rightarrow (6,0) + (2,-3) = C'(8,-3)$

$\triangle DEF \cong \triangle A'B'C'$ because $\triangle DEF$ is a reflection of $\triangle A'B'C'$ and reflections preserve distance.

PTS: 4 REF: 081633geo NAT: G.CO.A.5 TOP: Rotations
KEY: grids

158 ANS:



PTS: 2 REF: 011625geo NAT: G.CO.A.5 TOP: Reflections
KEY: grids

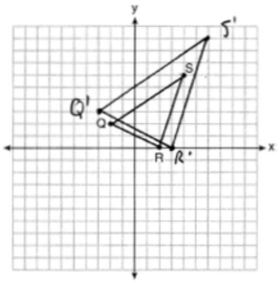
159 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.A.2
TOP: Dilations

160 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.A.2
TOP: Dilations

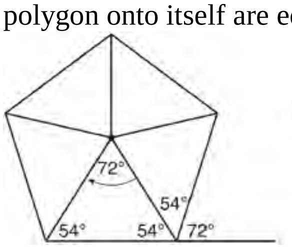
161 ANS: 1
$3^2 = 9$

PTS: 2 REF: 081520geo NAT: G.SRT.A.2 TOP: Dilations

162 ANS: 1
$\frac{4}{6}=\frac{3}{4.5}=\frac{2}{3}$

PTS: 2 REF: 081523geo NAT: G.SRT.A.2 TOP: Dilations
163 ANS:


A dilation preserves slope, so the slopes of $\overline{QR}$ and $\overline{Q'R'}$ are equal. Because the slopes are equal, $Q'R' \parallel QR$.

PTS: 4 REF: 011732geo NAT: G.SRT.A.2 TOP: Dilations
KEY: grids
164 ANS: 2
Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.


$\frac{360}{5}=72.$

PTS: 2 REF: spr1402geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself
165 ANS: 3 PTS: 2 REF: 011710geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
166 ANS: 1 PTS: 2 REF: 081505geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself
167 ANS:
$\frac{360}{6}=60$

PTS: 2 REF: 081627geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself
168 ANS: 4
$\frac{360°}{10}=36°$ 252° is a multiple of 36°

PTS: 2 REF: 011717geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

169 ANS: 1

$\frac{360°}{45°} = 8$

PTS: 2 REF: 061510geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

170 ANS: 4 PTS: 2 REF: 061504geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

171 ANS:

$T_{6,0} \circ r_{x\text{-axis}}$

PTS: 2 REF: 061625geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

172 ANS:

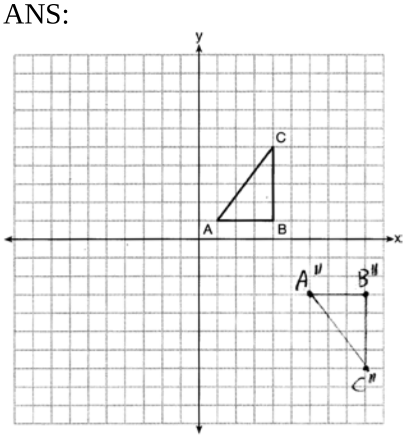
$T_{0,-2} \circ r_{y\text{-axis}}$

PTS: 2 REF: 011726geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

173 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

174 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

175 ANS:



PTS: 2 REF: 081626geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: grids

176 ANS:

Triangle $X'Y'Z'$ is the image of $\triangle XYZ$ after a rotation about point Z such that $\overline{ZX}$ coincides with $\overline{ZU}$. Since rotations preserve angle measure, $\overline{ZY}$ coincides with $\overline{ZV}$, and corresponding angles X and Y, after the rotation, remain congruent, so $\overline{XY} \parallel \overline{UV}$. Then, dilate $\triangle X'Y'Z'$ by a scale factor of $\frac{ZU}{ZX}$ with its center at point Z. Since dilations preserve parallelism, $\overline{XY}$ maps onto $\overline{UV}$. Therefore, $\triangle XYZ \sim \triangle UVZ$.

PTS: 2 REF: spr1406geo NAT: G.SRT.A.2 TOP: Compositions of Transformations
KEY: grids

177 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids
178 ANS: 4 PTS: 2 REF: 061608geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids
179 ANS: 4 PTS: 2 REF: 081609geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids
180 ANS: 2 PTS: 2 REF: 011702geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: basic
181 ANS:
$M = 180 - (47 + 57) = 76$ Rotations do not change angle measurements.

PTS: 2 REF: 081629geo NAT: G.CO.B.6 TOP: Properties of Transformations
182 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.B.6
TOP: Properties of Transformations KEY: graphics
183 ANS: 4
The measures of the angles of a triangle remain the same after all rotations because rotations are rigid motions which preserve angle measure.

PTS: 2 REF: fall1402geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: graphics
184 ANS: 4 PTS: 2 REF: 061502geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic
185 ANS: 2 PTS: 2 REF: 081513geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics
186 ANS: 3 PTS: 2 REF: 081502geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic
187 ANS: 2 PTS: 2 REF: 081602geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic
188 ANS: 1 PTS: 2 REF: 061604geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics
189 ANS: 3 PTS: 2 REF: 061616geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics
190 ANS: 4 PTS: 2 REF: 011706geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic
191 ANS: 3 PTS: 2 REF: 011605geo NAT: G.CO.A.2
TOP: Analytical Representations of Transformations KEY: basic
192 ANS: 4 PTS: 2 REF: 061615geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios
193 ANS: 3 PTS: 2 REF: 011714geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios
194 ANS: 4 PTS: 2 REF: 061512geo NAT: G.SRT.C.7
TOP: Cofunctions
195 ANS: 1 PTS: 2 REF: 081606geo NAT: G.SRT.C.7
TOP: Cofunctions

196 ANS:
The acute angles in a right triangle are always complementary. The sine of any acute angle is equal to the cosine of its complement.

PTS: 2 REF: spr1407geo NAT: G.SRT.C.7 TOP: Cofunctions

197 ANS:
$4x - .07 = 2x + .01$ Sin$A$ is the ratio of the opposite side and the hypotenuse while $\cos B$ is the ratio of the adjacent

$2x = 0.8$

$x = 0.4$

side and the hypotenuse. The side opposite angle A is the same side as the side adjacent to angle B. Therefore, $\sin A = \cos B$.

PTS: 2 REF: fall1407geo NAT: G.SRT.C.7 TOP: Cofunctions

198 ANS: 1 PTS: 2 REF: 081504geo NAT: G.SRT.C.7
TOP: Cofunctions

199 ANS: 4 PTS: 2 REF: 011609geo NAT: G.SRT.C.7
TOP: Cofunctions

200 ANS:
$73 + R = 90$ Equal cofunctions are complementary.

$R = 17$

PTS: 2 REF: 061628geo NAT: G.SRT.C.7 TOP: Cofunctions

201 ANS:
Yes, because 28º and 62º angles are complementary. The sine of an angle equals the cosine of its complement.

PTS: 2 REF: 011727geo NAT: G.SRT.C.7 TOP: Cofunctions

202 ANS: 3

$\tan 34 = \dfrac{T}{20}$

$T \approx 13.5$

PTS: 2 REF: 061505geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

203 ANS:
x represents the distance between the lighthouse and the canoe at 5:00; y represents the distance between the lighthouse and the canoe at 5:05. $\tan 6 = \dfrac{112 - 1.5}{x}$ $\tan(49 + 6) = \dfrac{112 - 1.5}{y}$ $\dfrac{1051.3 - 77.4}{5} \approx 195$

$x \approx 1051.3$ $y \approx 77.4$

PTS: 4 REF: spr1409geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

204 ANS:

$$\tan 52.8 = \frac{h}{x}$$

$$h = x\tan 52.8$$

$$\tan 34.9 = \frac{h}{x+8}$$

$$h = (x+8)\tan 34.9$$

$$x\tan 52.8 = x\tan 34.9 + 8\tan 34.9$$

$$x\tan 52.8 - x\tan 34.9 = 8\tan 34.9$$

$$x(\tan 52.8 - \tan 34.9) = 8\tan 34.9$$

$$x = \frac{8\tan 34.9}{\tan 52.8 - \tan 34.9}$$

$$x \approx 9$$

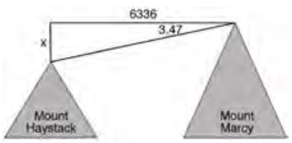
$$\tan 52.8 \approx \frac{h}{9}$$

$$x \approx 11.86$$

$$11.86 + 1.7 \approx 13.6$$

PTS: 6 REF: 011636geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

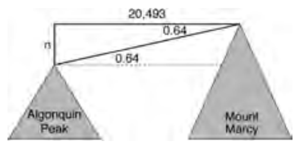
205 ANS:



$$\tan 3.47 = \frac{M}{6336}$$

$$M \approx 384$$

$$4960 + 384 = 5344$$



$$\tan 0.64 = \frac{A}{20,493}$$

$$A \approx 229$$

$$5344 - 229 = 5115$$

PTS: 6 REF: fall1413geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

206 ANS:

$$\tan 7 = \frac{125}{x} \quad \tan 16 = \frac{125}{y} \quad 1018 - 436 \approx 582$$

$$x \approx 1018 \qquad y \approx 436$$

PTS: 4 REF: 081532geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

207 ANS:

$$\sin 70 = \frac{30}{L}$$

$$L \approx 32$$

PTS: 2 REF: 011629geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

208 ANS: 4

$$\sin 70 = \frac{x}{20}$$

$$x \approx 18.8$$

PTS: 2 REF: 061611geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: without graphics

209 ANS:

$$\sin 75 = \frac{15}{x}$$

$$x = \frac{15}{\sin 75}$$

$$x \approx 15.5$$

PTS: 2 REF: 081631geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

210 ANS: 2

$$\tan\theta = \frac{2.4}{x}$$

$$\frac{3}{7} = \frac{2.4}{x}$$

$$x = 5.6$$

PTS: 2 REF: 011707geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

211 ANS: 3

$$\cos 40 = \frac{14}{x}$$

$$x \approx 18$$

PTS: 2 REF: 011712geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

212 ANS: 1

The man's height, 69 inches, is opposite to the angle of elevation, and the shadow length, 102 inches, is adjacent to the angle of elevation. Therefore, tangent must be used to find the angle of elevation. $\tan x = \frac{69}{102}$

$$x \approx 34.1$$

PTS: 2 REF: fall1401geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

213 ANS:

$$\tan x = \frac{10}{4}$$

$$x \approx 68$$

PTS: 2 REF: 061630geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

214 ANS:

$$\sin x = \frac{4.5}{11.75}$$

$$x \approx 23$$

PTS: 2 REF: 061528geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

215 ANS: 3

$\cos A = \dfrac{9}{14}$

$A \approx 50°$

PTS: 2 REF: 011616geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

216 ANS:

$\tan x = \dfrac{12}{75}$ $\tan y = \dfrac{72}{75}$ $43.83 - 9.09 \approx 34.7$

$x \approx 9.09$ $y \approx 43.83$

PTS: 4 REF: 081634geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

217 ANS: 3 PTS: 2 REF: 061524geo NAT: G.CO.B.7
TOP: Triangle Congruency

218 ANS:

Reflections are rigid motions that preserve distance.

PTS: 2 REF: 061530geo NAT: G.CO.B.7 TOP: Triangle Congruency

219 ANS: 1 PTS: 2 REF: 011703geo NAT: G.SRT.B.5
TOP: Triangle Congruency

220 ANS:

It is given that point D is the image of point A after a reflection in line CH. It is given that $\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$ at point C. Since a bisector divides a segment into two congruent segments at its midpoint, $\overline{BC} \cong \overline{EC}$. Point E is the image of point B after a reflection over the line CH, since points B and E are equidistant from point C and it is given that $\overleftrightarrow{CH}$ is perpendicular to $\overline{BE}$. Point C is on $\overleftrightarrow{CH}$, and therefore, point C maps to itself after the reflection over $\overleftrightarrow{CH}$. Since all three vertices of triangle ABC map to all three vertices of triangle DEC under the same line reflection, then $\triangle ABC \cong \triangle DEC$ because a line reflection is a rigid motion and triangles are congruent when one can be mapped onto the other using a sequence of rigid motions.

PTS: 6 REF: spr1414geo NAT: G.CO.B.8 TOP: Triangle Congruency

221 ANS:

Translate $\triangle ABC$ along $\overline{CF}$ such that point C maps onto point F, resulting in image $\triangle A'B'C'$. Then reflect $\triangle A'B'C'$ over $\overline{DF}$ such that $\triangle A'B'C'$ maps onto $\triangle DEF$.

or

Reflect $\triangle ABC$ over the perpendicular bisector of $\overline{EB}$ such that $\triangle ABC$ maps onto $\triangle DEF$.

PTS: 2 REF: fall1408geo NAT: G.CO.B.8 TOP: Triangle Congruency

222 ANS:

The transformation is a rotation, which is a rigid motion.

PTS: 2 REF: 081530geo NAT: G.CO.B.8 TOP: Triangle Congruency

223 ANS:
Translations preserve distance. If point D is mapped onto point A, point F would map onto point C. $\triangle DEF \cong \triangle ABC$ as $\overline{AC} \cong \overline{DF}$ and points are collinear on line ℓ and a reflection preserves distance.

PTS: 4 REF: 081534geo NAT: G.CO.B.8 TOP: Triangle Congruency

224 ANS:
Yes. The sequence of transformations consists of a reflection and a translation, which are isometries which preserve distance and congruency.

PTS: 2 REF: 011628geo NAT: G.CO.B.8 TOP: Triangle Congruency

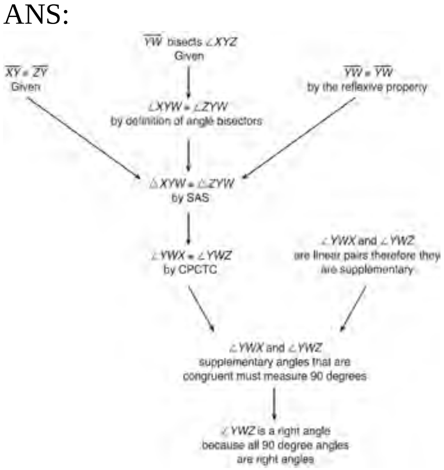
225 ANS: 3 PTS: 2 REF: 081622geo NAT: G.CO.B.8
TOP: Triangle Congruency

226 ANS:
(2) Euclid's Parallel Postulate; (3) Alternate interior angles formed by parallel lines and a transversal are congruent; (4) Angles forming a line are supplementary; (5) Substitution

PTS: 4 REF: 011633geo NAT: G.CO.C.10 TOP: Triangle Proofs

227 ANS:
$\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$ (Given). $\angle LCA$ and $\angle DCN$ are right angles (Definition of perpendicular lines). $\triangle LAC$ and $\triangle DNC$ are right triangles (Definition of a right triangle). $\triangle LAC \cong \triangle DNC$ (HL). $\triangle LAC$ will map onto $\triangle DNC$ after rotating $\triangle LAC$ counterclockwise 90º about point C such that point L maps onto point D.

PTS: 4 REF: spr1408geo NAT: G.SRT.B.4 TOP: Triangle Proofs

228 ANS:


$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$ (Given). $\triangle XYZ$ is isosceles (Definition of isosceles triangle). $\overline{YW}$ is an altitude of $\triangle XYZ$ (The angle bisector of the vertex of an isosceles triangle is also the altitude of that triangle). $\overline{YW} \perp \overline{XZ}$ (Definition of altitude). $\angle YWZ$ is a right angle (Definition of perpendicular lines).

PTS: 4 REF: spr1411geo NAT: G.CO.C.10 TOP: Triangle Proofs

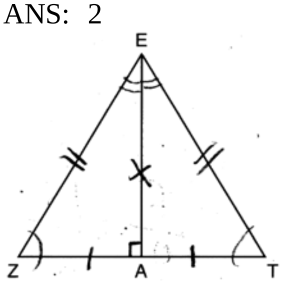
229 ANS:
As the sum of the measures of the angles of a triangle is 180°, $m\angle ABC + m\angle BCA + m\angle CAB = 180°$. Each interior angle of the triangle and its exterior angle form a linear pair. Linear pairs are supplementary, so $m\angle ABC + m\angle FBC = 180°$, $m\angle BCA + m\angle DCA = 180°$, and $m\angle CAB + m\angle EAB = 180°$. By addition, the sum of these linear pairs is 540°. When the angle measures of the triangle are subtracted from this sum, the result is 360°, the sum of the exterior angles of the triangle.

PTS: 4 REF: fall1410geo NAT: G.CO.C.10 TOP: Triangle Proofs

230 ANS: 3
1) only proves AA; 2) need congruent legs for HL; 3) SAS; 4) only proves product of altitude and base is equal

PTS: 2 REF: 061607geo NAT: G.CO.C.10 TOP: Triangle Proofs

231 ANS: 2



PTS: 2 REF: 061619geo NAT: G.SRT.B.4 TOP: Triangle Proofs

232 ANS:
Parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E* (given). $\overline{DC} \parallel \overline{AB}$; $\overline{DA} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel). $\angle ACD \cong \angle CAB$ (alternate interior angles formed by parallel lines and a transversal are congruent).

PTS: 2 REF: 081528geo NAT: G.CO.C.11 TOP: Quadrilateral Proofs

233 ANS:
Parallelogram *ABCD*, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$ (given). $\angle BEC \cong \angle DFC$ (perpendicular lines form right angles, which are congruent). $\angle FCD \cong \angle BCE$ (reflexive property). $\triangle BEC \cong \triangle DFC$ (ASA). $\overline{BC} \cong \overline{CD}$ (CPCTC). *ABCD* is a rhombus (a parallelogram with consecutive congruent sides is a rhombus).

PTS: 6 REF: 081535geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

234 ANS:
Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$ (given); quadrilateral *ABCD* is a parallelogram (the diagonals of a parallelogram bisect each other); $\overline{AB} \parallel \overline{CD}$ (opposite sides of a parallelogram are parallel); $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$ (alternate interior angles are congruent); $\angle 2 \cong \angle 3$ and $\angle 3 \cong \angle 4$ (substitution); $\triangle ACD$ is an isosceles triangle (the base angles of an isosceles triangle are congruent); $\overline{AD} \cong \overline{DC}$ (the sides of an isosceles triangle are congruent); quadrilateral *ABCD* is a rhombus (a rhombus has consecutive congruent sides); $\overline{AE} \perp \overline{BE}$ (the diagonals of a rhombus are perpendicular); $\angle BEA$ is a right angle (perpendicular lines form a right angle); $\triangle AEB$ is a right triangle (a right triangle has a right angle).

PTS: 6 REF: 061635geo NAT: G.CO.C.11 TOP: Quadrilateral Proofs

235 ANS:
Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E (Given). $\overline{AD} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\angle AED \cong \angle CEB$ (Vertical angles are congruent). $\overline{BC} \parallel \overline{DA}$ (Definition of parallelogram). $\angle DBC \cong \angle BDA$ (Alternate interior angles are congruent). $\triangle AED \cong \triangle CEB$ (AAS). 180° rotation of $\triangle AED$ around point E.

PTS: 4 REF: 061533geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

236 ANS:
Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points W and E (Given). $\overline{AN} \cong \overline{RD}$, $\overline{AR} \cong \overline{DN}$ (Opposite sides of a parallelogram are congruent). $AE = \frac{1}{2}AR$, $WD = \frac{1}{2}DN$, so $\overline{AE} \cong \overline{WD}$ (Definition of bisect and division property of equality). $\overline{AR} \parallel \overline{DN}$ (Opposite sides of a parallelogram are parallel). $AWDE$ is a parallelogram (Definition of parallelogram). $RE = \frac{1}{2}AR$, $NW = \frac{1}{2}DN$, so $\overline{RE} \cong \overline{NW}$ (Definition of bisect and division property of equality). $\overline{ED} \cong \overline{AW}$ (Opposite sides of a parallelogram are congruent). $\triangle ANW \cong \triangle DRE$ (SSS).

PTS: 6 REF: 011635geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

237 ANS:
Quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points F and E (given). $\angle AED$ and $\angle CFB$ are right angles (perpendicular lines form right angles). $\angle AED \cong \angle CFB$ (All right angles are congruent). $ABCD$ is a parallelogram (A quadrilateral with one pair of sides congruent and parallel is a parallelogram). $\overline{AD} \parallel \overline{BC}$ (Opposite sides of a parallelogram are parallel). $\angle DAE \cong \angle BCF$ (Parallel lines cut by a transversal form congruent alternate interior angles). $\overline{DA} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\triangle ADE \cong \triangle CBF$ (AAS). $\overline{AE} \cong \overline{CF}$ (CPCTC).

PTS: 6 REF: 011735geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

238 ANS:
Circle O, secant $\overline{ACD}$, tangent $\overline{AB}$ (Given). Chords $\overline{BC}$ and $\overline{BD}$ are drawn (Auxiliary lines). $\angle A \cong \angle A$, $\overset{\frown}{BC} \cong \overset{\frown}{BC}$ (Reflexive property). $\text{m}\angle BDC = \frac{1}{2}\text{m}\overset{\frown}{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $\text{m}\angle CBA = \frac{1}{2}\text{m}\overset{\frown}{BC}$ (The measure of an angle formed by a tangent and a chord is half the measure of the intercepted arc). $\angle BDC \cong \angle CBA$ (Angles equal to half of the same arc are congruent). $\triangle ABC \sim \triangle ADB$ (AA). $\frac{AB}{AC} = \frac{AD}{AB}$ (Corresponding sides of similar triangles are proportional). $AC \cdot AD = AB^2$ (In a proportion, the product of the means equals the product of the extremes).

PTS: 6 REF: spr1413geo NAT: G.SRT.B.5 TOP: Circle Proofs

239 ANS:
Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E (Given); Chords $\overline{CB}$ and $\overline{AD}$ are drawn (auxiliary lines drawn); $\angle CEB \cong \angle AED$ (vertical angles); $\angle C \cong \angle A$ (Inscribed angles that intercept the same arc are congruent); $\triangle BCE \sim \triangle DAE$ (AA); $\dfrac{AE}{CE} = \dfrac{ED}{EB}$ (Corresponding sides of similar triangles are proportional); $AE \cdot EB = CE \cdot ED$ (The product of the means equals the product of the extremes).

PTS: 6 REF: 081635geo NAT: G.SRT.B.5 TOP: Circle Proofs

240 ANS:
Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$ (given); $\angle DFE \cong \angle BFG$ (vertical angles); $\overline{AD} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel); $\angle EDF \cong \angle GBF$ (alternate interior angles are congruent); $\triangle DEF \sim \triangle BGF$ (AA).

PTS: 4 REF: 061633geo NAT: G.SRT.A.3 TOP: Similarity Proofs

241 ANS:
$\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects at A (given); $\angle I \cong \angle N$, $\angle G \cong \angle T$ (paralleling lines cut by a transversal form congruent alternate interior angles); $\triangle GIA \sim \triangle TNA$ (AA).

PTS: 2 REF: 011729geo NAT: G.SRT.A.3 TOP: Similarity Proofs

242 ANS:
A dilation of $\dfrac{5}{2}$ about the origin. Dilations preserve angle measure, so the triangles are similar by AA.

PTS: 4 REF: 061634geo NAT: G.SRT.A.3 TOP: Similarity Proofs

243 ANS:
Circle A can be mapped onto circle B by first translating circle A along vector $\overline{AB}$ such that A maps onto B, and then dilating circle A, centered at A, by a scale factor of $\dfrac{5}{3}$. Since there exists a sequence of transformations that maps circle A onto circle B, circle A is similar to circle B.

PTS: 2 REF: spr1404geo NAT: G.C.A.1 TOP: Similarity Proofs