Ms. Sneider's 2018 Geometry Review Calendar

All assignments due on date written.

CHECK ANSWERS in back PRIOR TO CLASS! Come to class with questions!

	Monday	Tuesday	Wednesday	Thursday	Friday
April/ May	30 Circles: Lesson 2	1 Circles: Lesson 2 **Let the Review Begin!!!** ☺	2 Circles: Lesson 3 DUE: #1-10 (Compass)	3 Circles: Lesson 4 DUE: #11-17	4 Circles: Lesson 4 DUE: #18-29
May	7 **Formula Quiz #1 (1-25)** Bring a pencil	8 Circles: Lesson 5 DUE: #30-43	9 Circles: Lesson 6 DUE: #44-53	10 Circles: Lesson 8 #238 & #239 DUE: #54-64	11 **Formula Quiz #2 (26-50)** Bring a pencil
May	14 Circles Review DUE: #65-83	15 **TEST** **(Circles & Review Topics)**	16 Lesson: Radians DUE: #84-104	17 Lesson: Arc Length DUE: #105-116	18 **Formula Quiz #3 (51-75)** Bring a pencil
May	21 DUE: #117-130	22 DUE: #131-155	23 DUE: #156-191	24 **Formula Quiz #4 (76-end)** Bring a pencil	25 DUE: #192-216
May/ June	28 Memorial Day No School	29 **TEST** **Practice Regents** Bring a pencil	30 **TEST** **Practice Regents** Bring a pencil	31 DUE: #217-231	1 DUE: #232-237
June	4 DUE: #240-243	5 10th Grade Global Regents (Morning)	6 DUE: June 2017 ALL	7 **TEST** Bring a pencil	8 DUE: August 2017 ALL
June	11 Last Day of Classes!!!	12	13	14	15
	18	19 Geometry Regents 8AM Room_______ Goal Grade: _____			

Just because something is difficult
doesn't mean you shouldn't try.
It means you should try harder!
You CAN do it!!!

Bring to Regents:

- **Calculator**
- Black Pens
- Pencils
- **Compass**
- Straight Edge

Tear Here

High School Math Reference Sheet

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilogram
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian $= \frac{180}{\pi}$ degrees
Degrees	1 degree $= \frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

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JMAP
REGENTS BY COMMON CORE STATE STANDARD: TOPIC

NY Geometry Regents Exam Questions
from Spring 2014 to January 2017 Sorted by CCSS:Topic

www.jmap.org

Regents Format

Part I	all multiple choice	24 questions - 2pts each
Part II	extended Response	7 questions - 2pts each
Part III	extended Response	3 questions - 4pts each
Part IV	extended Response	1 question - 6pts.
	35 Questions	80 Points Total

40 points to Pass

Should be your GOAL!
- 65 points for Mastery (85)
- 70+ points for 90's

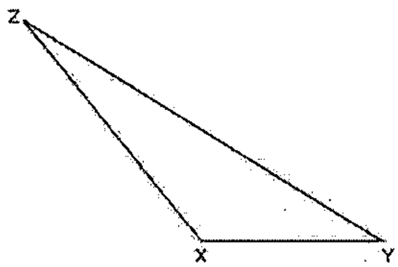
TABLE OF CONTENTS

Geometry Regents Exam Questions by Common Core State Standard: Topic

TOOLS OF GEOMETRY

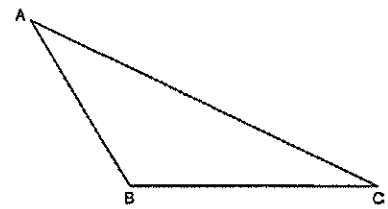
G.CO.D.12-13: CONSTRUCTIONS

1 Triangle XYZ is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle XYZ$.

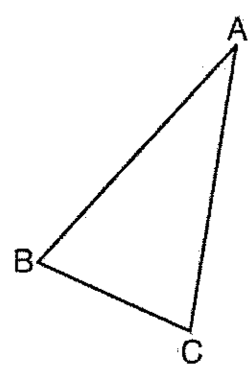


2 Using a compass and straightedge, construct an altitude of triangle ABC below. [Leave all construction marks.]

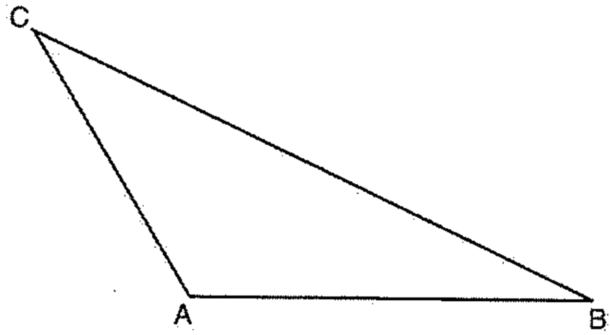
(never on a Regents)



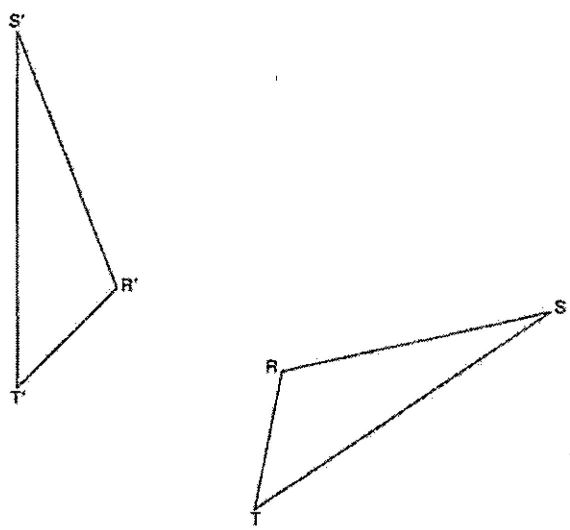
3 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B. [Leave all construction marks.] Describe the relationship between the lengths of $\overline{AC}$ and $\overline{A'C'}$.



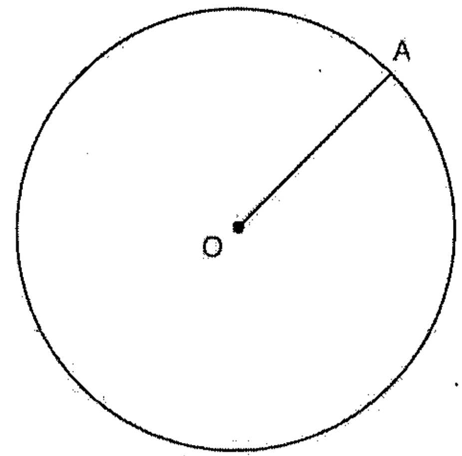
4 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]



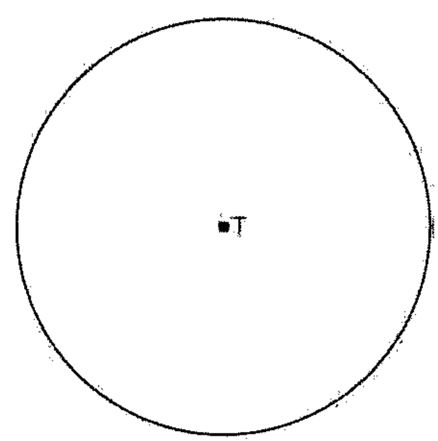
5 Using a compass and straightedge, construct the line of reflection over which triangle RST reflects onto triangle R'S'T'. [Leave all construction marks.]



6 In the diagram below, radius $\overline{OA}$ is drawn in circle O. Using a compass and a straightedge, construct a line tangent to circle O at point A. [Leave all construction marks.]

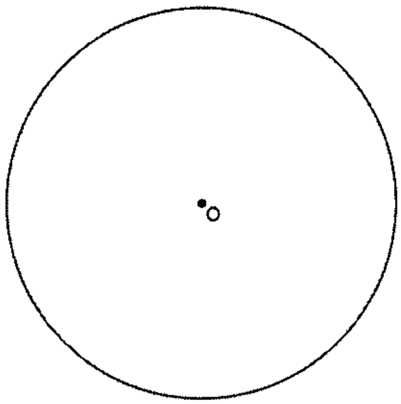


7 Use a compass and straightedge to construct an inscribed square in circle T shown below. [Leave all construction marks.]



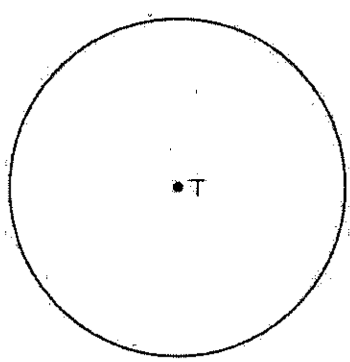
8 Using a straightedge and compass, construct a square inscribed in circle O below. [Leave all construction marks.]

never on a Regents

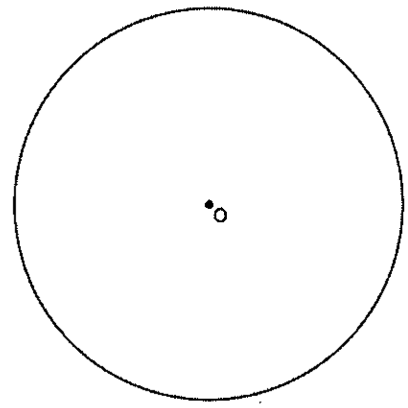


Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

9 Construct an equilateral triangle inscribed in circle T shown below. [Leave all construction marks.]



10 Using a compass and straightedge, construct a regular hexagon inscribed in circle O below. Label it $ABCDEF$. [Leave all construction marks.]



If chords $\overline{FB}$ and $\overline{FC}$ are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

LINES AND ANGLES

G.GPE.B.6: DIRECTED LINE SEGMENTS

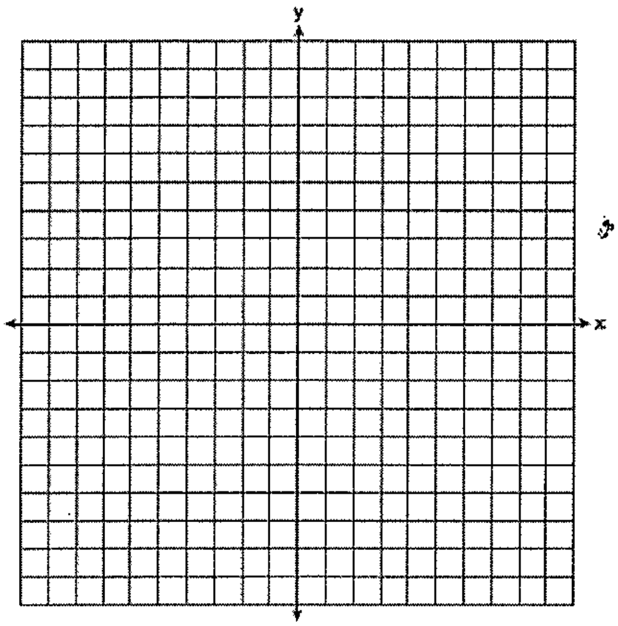
11 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?

1 $(-3,-3)$
2 $(-1,-2)$
3 $\left(0,-\frac{3}{2}\right)$
4 $(1,-1)$

12 The endpoints of $\overline{DEF}$ are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E, if $DE:EF = 2:3$.

13 Point P is on segment AB such that $AP:PB$ is $4:5$. If A has coordinates $(4,2)$, and B has coordinates $(22,2)$, determine and state the coordinates of P.

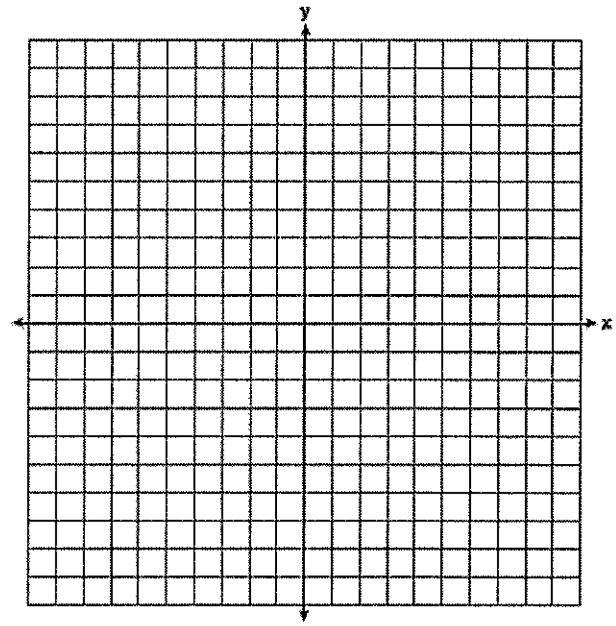
14 The coordinates of the endpoints of $\overline{AB}$ are $A(-6,-5)$ and $B(4,0)$. Point P is on $\overline{AB}$. Determine and state the coordinates of point P, such that $AP:PB$ is $2:3$. [The use of the set of axes below is optional.]



15 Point Q is on $\overline{MN}$ such that $MQ:QN = 2:3$. If M has coordinates $(3,5)$ and N has coordinates $(8,-5)$, the coordinates of Q are

1 $(5,1)$
2 $(5,0)$
3 $(6,-1)$
4 $(6,0)$

16 Directed line segment PT has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point J that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]

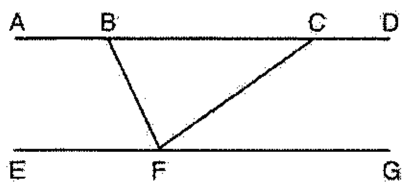


17 Point P is on the directed line segment from point $X(-6,-2)$ to point $Y(6,7)$ and divides the segment in the ratio $1:5$. What are the coordinates of point P?

1 $\left(4,5\frac{1}{2}\right)$
2 $\left(-\frac{1}{2},-4\right)$
3 $\left(-4\frac{1}{2},0\right)$
4 $\left(-4,-\frac{1}{2}\right)$

G.CO.C.9: LINES & ANGLES

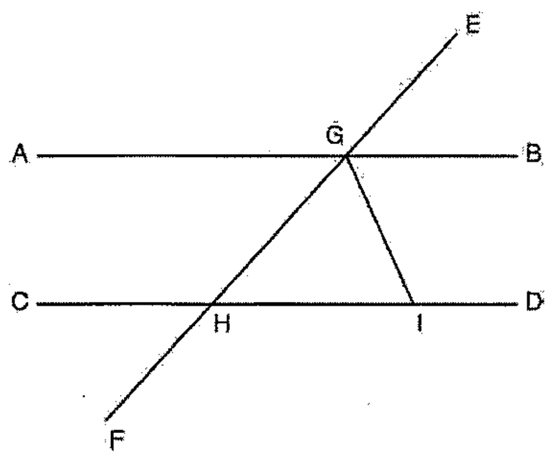
18 Steve drew line segments $ABCD$, EFG, BF, and CF as shown in the diagram below. Scalene $\triangle BFC$ is formed.



Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?

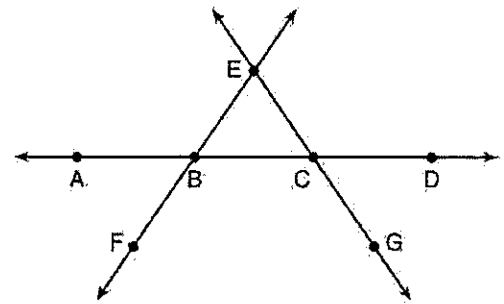
1 $\angle CFG \cong \angle FCB$
2 $\angle ABF \cong \angle BFC$
3 $\angle EFB \cong \angle CFB$
4 $\angle CBF \cong \angle GFC$

19 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at G and H, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.



If $m\angle EGB = 50°$ and $m\angle DIG = 115°$, explain why $\overline{AB} \parallel \overline{CD}$.

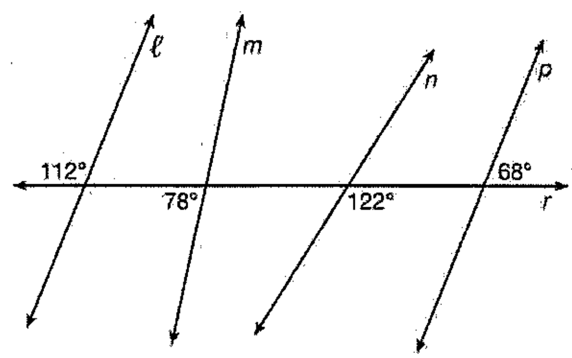
20 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at B, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at C.



Which statement is always true?

1 $\overline{AB} \cong \overline{DC}$
2 $\overline{FB} \cong \overline{EB}$
3 $\overleftrightarrow{BD}$ bisects $\overline{GE}$ at C.
4 $\overleftrightarrow{AC}$ bisects $\overline{FE}$ at B.

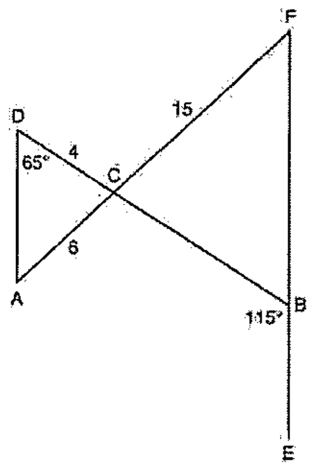
21 In the diagram below, lines ℓ, m, n, and p intersect line r.



Which statement is true?

1 $\ell \parallel n$
2 $\ell \parallel p$
3 $m \parallel p$
4 $m \parallel n$

22 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point C, and $\overline{AD}$ and $\overline{FBE}$ are drawn.



If $AC = 6$, $DC = 4$, $FC = 15$, $m\angle D = 65°$, and $m\angle CBE = 115°$, what is the length of $\overline{CB}$?

1 10
2 12
3 17
4 22.5

23 Segment CD is the perpendicular bisector of $\overline{AB}$ at E. Which pair of segments does *not* have to be congruent?

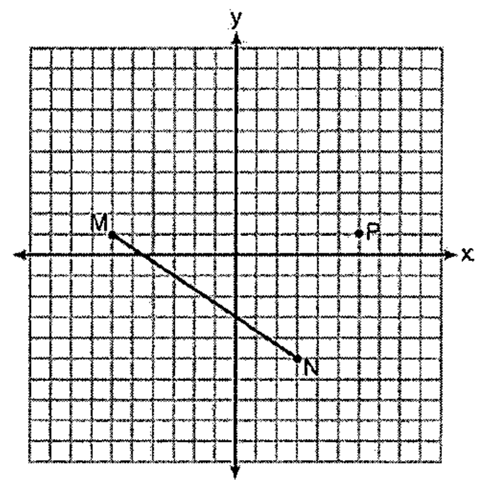
1 $\overline{AD},\overline{BD}$
2 $\overline{AC},\overline{BC}$
3 $\overline{AE},\overline{BE}$
4 $\overline{DE},\overline{CE}$

G.GPE.B.5: PARALLEL AND PERPENDICULAR LINES

24 Which equation represents a line that is perpendicular to the line represented by $2x - y = 7$?

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

25 Given $\overline{MN}$ shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to $\overline{MN}$?



1 $y = -\frac{2}{3}x + 5$
2 $y = -\frac{2}{3}x - 3$
3 $y = \frac{3}{2}x + 7$
4 $y = \frac{3}{2}x - 8$

26 An equation of a line perpendicular to the line represented by the equation $y = -\frac{1}{2}x - 5$ and passing through $(6,-4)$ is

1 $y = -\frac{1}{2}x + 4$
2 $y = -\frac{1}{2}x - 1$
3 $y = 2x + 14$
4 $y = 2x - 16$

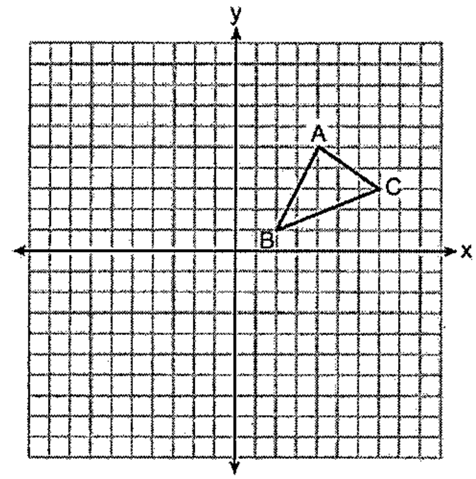
27 Line segment NY has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of $\overline{NY}$?

1 $y + 1 = \frac{4}{3}(x + 3)$
2 $y + 1 = -\frac{3}{4}(x + 3)$
3 $y - 6 = \frac{4}{3}(x - 8)$
4 $y - 6 = -\frac{3}{4}(x - 8)$

28 Which equation represents the line that passes through the point $(-2,2)$ and is parallel to $y = \frac{1}{2}x + 8$?

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

29 In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.



What is the slope of the altitude drawn from A to $\overline{BC}$?

1 $\frac{2}{5}$
2 $\frac{3}{2}$
3 $-\frac{1}{2}$
4 $-\frac{5}{2}$

TRIANGLES

G.SRT.C.8: PYTHAGOREAN THEOREM, 30-60-90 TRIANGLES

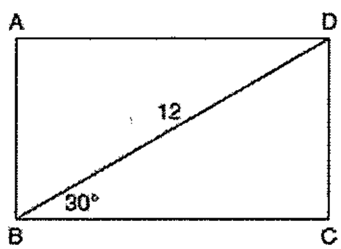
30 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region. To the *nearest tenth of an inch*, the largest possible length of a side of the square is

1 3.5
2 4.9
3 5.0
4 6.9

31 The aspect ratio (the ratio of screen width to height) of a rectangular flat-screen television is 16:9. The length of the diagonal of the screen is the television's screen size. Determine and state, to the *nearest inch*, the screen size (diagonal) of this flat-screen television with a screen height of 20.6 inches.

32 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?
1 10.0
2 11.5
3 17.3
4 23.1

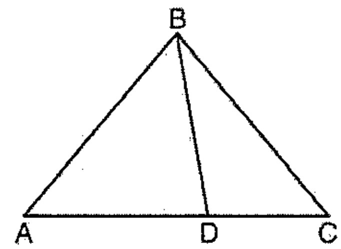
33 The diagram shows rectangle $ABCD$, with diagonal $\overline{BD}$.



What is the perimeter of rectangle $ABCD$, to the *nearest tenth*?
1 28.4
2 32.8
3 48.0
4 62.4

G.CO.C.10: INTERIOR AND EXTERIOR ANGLES OF TRIAGLES

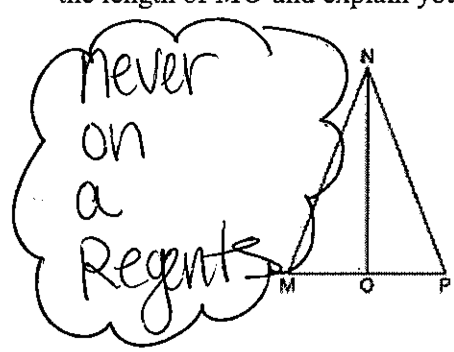
34 In the diagram below, $m\angle BDC = 100°$, $m\angle A = 50°$, and $m\angle DBC = 30°$.



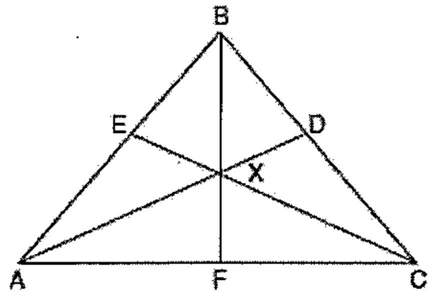
Which statement is true?
1 ΔABD is obtuse.
2 ΔABC is isosceles.
3 $m\angle ABD = 80°$
4 ΔABD is scalene.

G.SRT.B.5: ISOSCELES TRIANGLE THEOREM

35 In isosceles ΔMNP, line segment NO bisects vertex $\angle MNP$, as shown below. If $MP = 16$, find the length of $\overline{MO}$ and explain your answer.

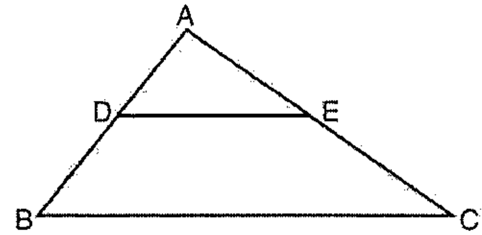


36 In the diagram below of isosceles triangle ABC, $\overline{AB} \cong \overline{CB}$ and angle bisectors $\overline{AD}$, $\overline{BF}$, and $\overline{CE}$ are drawn and intersect at X.



If $m\angle BAC = 50°$, find $m\angle AXC$.

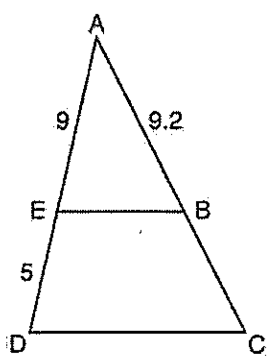
38 In the diagram below, $\triangle ABC \sim \triangle ADE$.



Which measurements are justified by this similarity?
1 $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2 $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3 $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4 $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

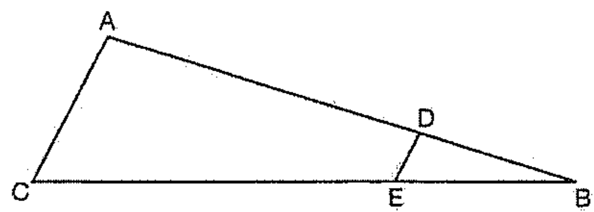
G.SRT.B.5: SIDE SPLITTER THEOREM

37 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.



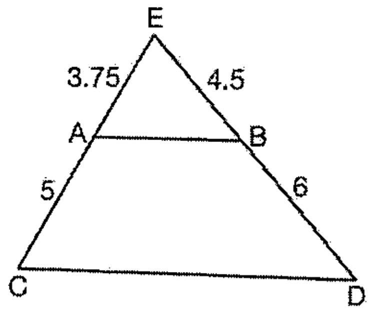
What is the length of $\overline{AC}$, to the *nearest tenth*?
1 5.1
2 5.2
3 14.3
4 14.4

39 In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.



If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?
1 8
2 12
3 16
4 72

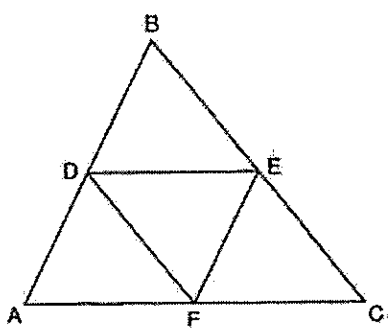
40 In $\triangle CED$ as shown below, points A and B are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment AB is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.



Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

G.CO.C.11: MIDSEGMENTS

41 In the diagram below, $\overline{DE}$, $\overline{DF}$, and $\overline{EF}$ are midsegments of $\triangle ABC$.

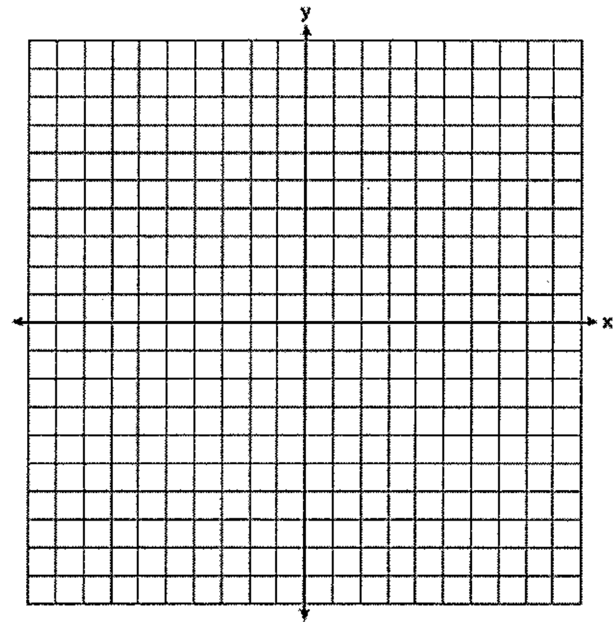


The perimeter of quadrilateral $ADEF$ is equivalent to

1 $AB + BC + AC$
2 $\frac{1}{2}AB + \frac{1}{2}AC$
3 $2AB + 2AC$
4 $AB + AC$

G.GPE.B.4: TRIANGLES IN THE COORDINATE PLANE

42 Triangle ABC has vertices with $A(x,3)$, $B(-3,-1)$, and $C(-1,-4)$. Determine and state a value of x that would make triangle ABC a right triangle. Justify why $\triangle ABC$ is a right triangle. [The use of the set of axes below is optional.]



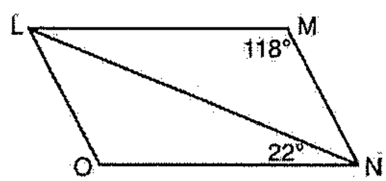
43 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?

1 right
2 acute
3 obtuse
4 equiangular

POLYGONS
G.CO.C.11: PARALLELOGRAMS

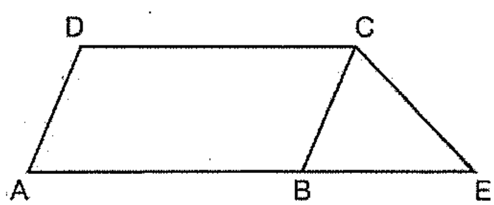
44 Quadrilateral $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove $ABCD$ is a parallelogram?
1 $\overline{AC}$ and $\overline{BD}$ bisect each other.
2 $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3 $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4 $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

45 The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$.



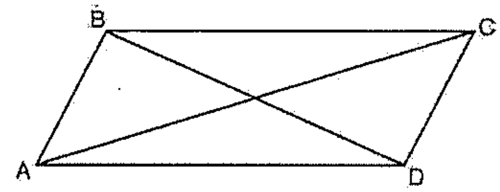
Explain why $m\angle NLO$ is 40 degrees.

46 In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through B to E, and $\overline{CE}$ is drawn.



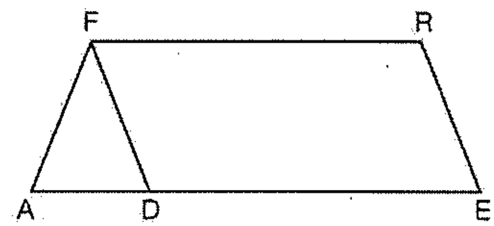
If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112°$, what is $m\angle E$?
1 44°
2 56°
3 68°
4 112°

47 Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.



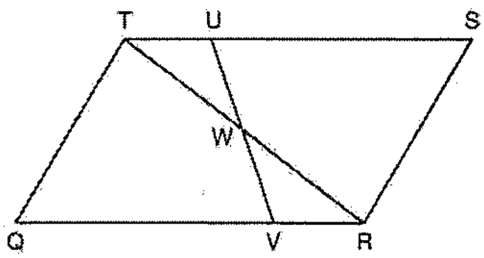
Which information is *not* enough to prove $ABCD$ is a parallelogram?
1 $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$
2 $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$
3 $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4 $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$

48 In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to A, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.



If $m\angle R = 124°$, what is $m\angle AFD$?
1 124°
2 112°
3 68°
4 56°

49 In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.



If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?

1 37°
2 60°
3 72°
4 83°

G.CO.C.11: SPECIAL QUADRILATERALS

50 A parallelogram must be a rectangle when its

1 diagonals are perpendicular
2 diagonals are congruent
3 opposite sides are parallel
4 opposite sides are congruent

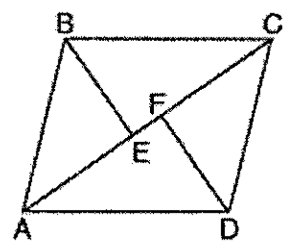
51 A parallelogram is always a rectangle if

1 the diagonals are congruent
2 the diagonals bisect each other
3 the diagonals intersect at right angles
4 the opposite angles are congruent

52 In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement does *not* prove parallelogram $ABCD$ is a rhombus?

1 $\overline{AC} \cong \overline{DB}$
2 $\overline{AB} \cong \overline{BC}$
3 $\overline{AC} \perp \overline{DB}$
4 $\overline{AC}$ bisects $\angle DCB$

53 In the diagram below, if $\triangle ABE \cong \triangle CDF$ and $\overline{AEFC}$ is drawn, then it could be proven that quadrilateral $ABCD$ is a



1 square
2 rhombus
3 rectangle
4 parallelogram

G.GPE.B.4: QUADRILATERALS IN THE COORDINATE PLANE

54 In rhombus $MATH$, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.

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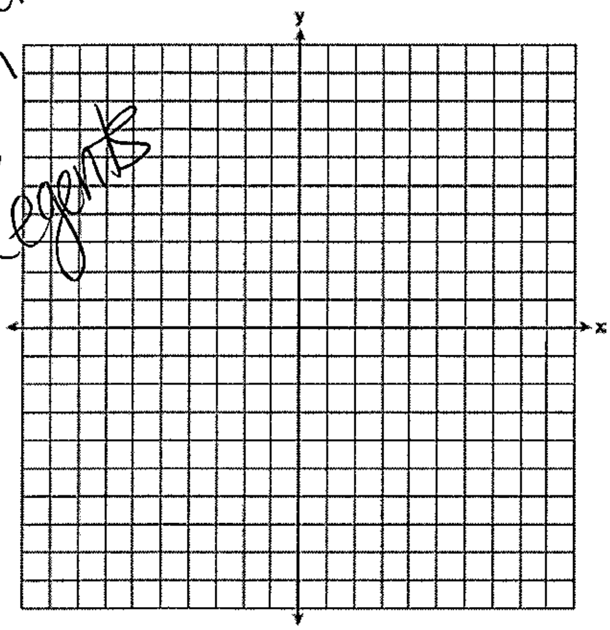


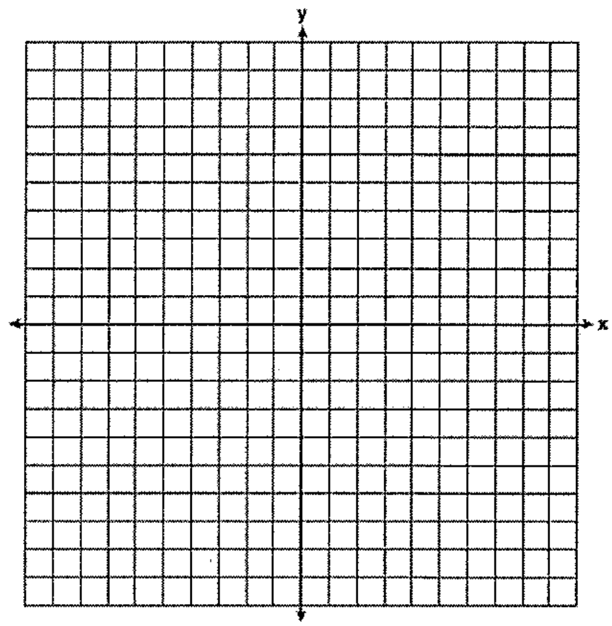
55 Parallelogram $ABCD$ has coordinates $A(0,7)$ and $C(2,1)$. Which statement would prove that $ABCD$ is a rhombus?

1 The midpoint of $\overline{AC}$ is $(1,4)$.
2 The length of $\overline{BD}$ is $\sqrt{40}$.
3 The slope of $\overline{BD}$ is $\frac{1}{3}$.
4 The slope of $\overline{AB}$ is $\frac{1}{3}$.

56 A quadrilateral has vertices with coordinates $(-3,1)$, $(0,3)$, $(5,2)$, and $(-1,-2)$. Which type of quadrilateral is this?

1 rhombus
2 rectangle
3 square
4 trapezoid

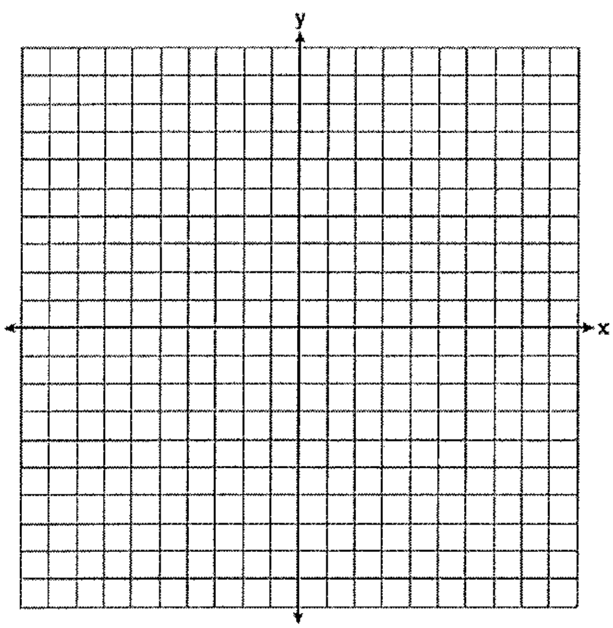
57 In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point P such that quadrilateral $RSTP$ is a rectangle. Prove that your quadrilateral $RSTP$ is a rectangle. [The use of the set of axes below is optional.]



58 The diagonals of rhombus $TEAM$ intersect at $P(2,1)$. If the equation of the line that contains diagonal $\overline{TA}$ is $y=-x+3$, what is the equation of a line that contains diagonal EM?

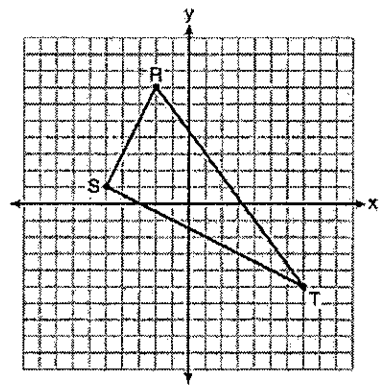
1 $y=x-1$
2 $y=x-3$
3 $y=-x-1$
4 $y=-x-3$

59 In square $GEOM$, the coordinates of G are $(2,-2)$ and the coordinates of O are $(-4,2)$. Determine and state the coordinates of vertices E and M. [The use of the set of axes below is optional.]



G.GPE.B.7: POLYGONS IN THE COORDINATE PLANE

60 Triangle RST is graphed on the set of axes below.



How many square units are in the area of $\triangle RST$?

1 $9\sqrt{3}+15$
2 $9\sqrt{5}+15$
3 45
4 90

61 The coordinates of vertices A and B of $\triangle ABC$ are $A(3,4)$ and $B(3,12)$. If the area of $\triangle ABC$ is 24 square units, what could be the coordinates of point C?

1 $(3,6)$
2 $(8,-3)$
3 $(-3,8)$
4 $(6,3)$

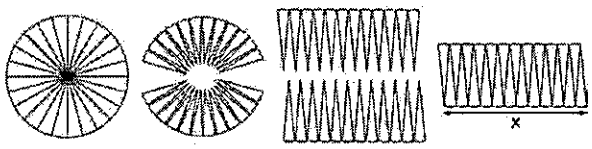
62 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?

1 $\sqrt{10}$
2 $5\sqrt{10}$
3 $5\sqrt{2}$
4 $25\sqrt{2}$

CONICS

G.GMD.A.1: CIRCUMFERENCE

63 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.



To the *nearest integer*, the value of x is
1 31
2 16
3 12
4 10

64 A designer needs to create perfectly circular necklaces. The necklaces each need to have a radius of 10 cm. What is the largest number of necklaces that can be made from 1000 cm of wire?
1 15
2 16
3 31
4 32

G.C.B.5: ARC LENGTH

65 In the diagram below, the circle shown has radius 10. Angle B intercepts an arc with a length of 2π.

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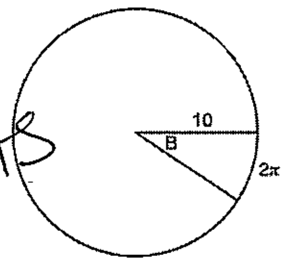
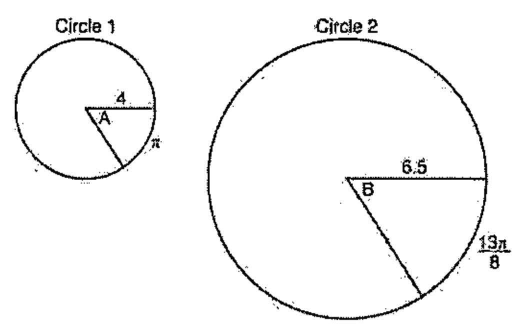


What is the measure of angle B, in radians?
1 $10+2\pi$
2 20π
3 $\frac{\pi}{5}$
4 $\frac{5}{\pi}$

66 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\frac{13\pi}{8}$.



Dominic thinks that angles A and B have the same radian measure. State whether Dominic is correct or not. Explain why.

G.C.B.5: SECTORS

67 In the diagram below of circle O, diameter $\overline{AB}$ and radii $\overline{OC}$ and $\overline{OD}$ are drawn. The length of $\overline{AB}$ is 12 and the measure of $\angle COD$ is 20 degrees.

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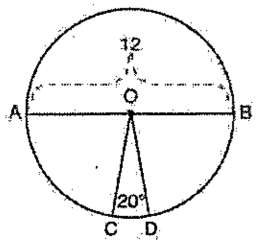
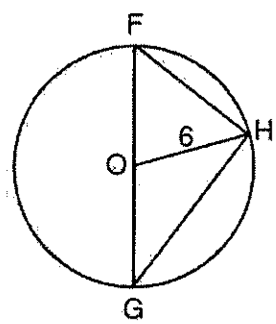


If $\overset{\frown}{AC} \cong \overset{\frown}{BD}$, find the area of sector BOD in terms of π.

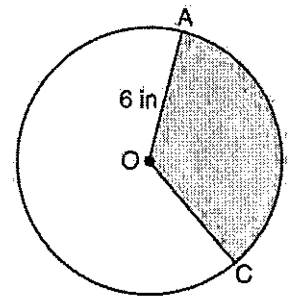
68 Triangle FGH is inscribed in circle O, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.



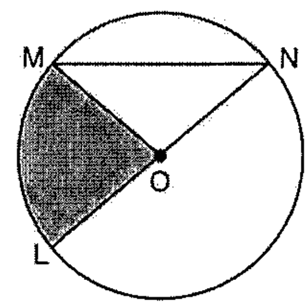
What is the area of the sector formed by angle FOH?

1 2π
2 $\frac{3}{2}\pi$
3 6π
4 24π

69 In the diagram below of circle O, the area of the shaded sector AOC is 12π in^2 and the length of $\overline{OA}$ is 6 inches. Determine and state m$\angle AOC$.



70 In the diagram below of circle O, the area of the shaded sector LOM is 2π cm^2.



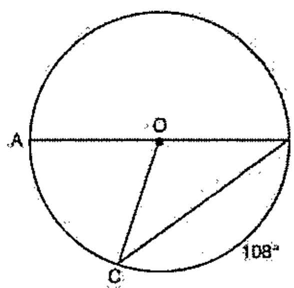
If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?

1 10°
2 20°
3 40°
4 80°

71 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures 60°?

1 $\frac{8\pi}{3}$
2 $\frac{16\pi}{3}$
3 $\frac{32\pi}{3}$
4 $\frac{64\pi}{3}$

72 In circle O, diameter $\overline{AB}$, chord $\overline{BC}$, and radius $\overline{OC}$ are drawn, and the measure of arc BC is 108°.



Some students wrote these formulas to find the area of sector COB:

Amy $\frac{3}{10} \cdot \pi \cdot (BC)^2$

Beth $\frac{108}{360} \cdot \pi \cdot (OC)^2$

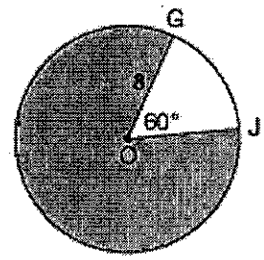
Carl $\frac{3}{10} \cdot \pi \cdot (\frac{1}{2}AB)^2$

Dex $\frac{108}{360} \cdot \pi \cdot \frac{1}{2}(AB)^2$

Which students wrote correct formulas?

1 Amy and Dex
2 Beth and Carl
3 Carl and Amy
4 Dex and Beth

73 In the diagram below of circle O, $GO = 8$ and $m\angle GOJ = 60°$.

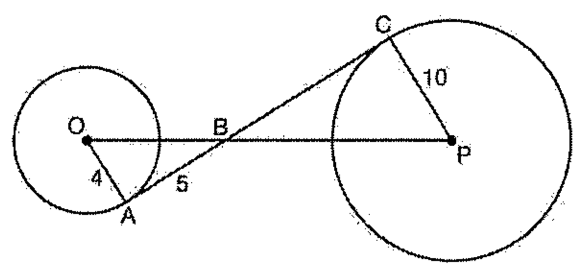


What is the area, in terms of π, of the shaded region?

1 $\frac{4\pi}{3}$
2 $\frac{20\pi}{3}$
3 $\frac{32\pi}{3}$
4 $\frac{160\pi}{3}$

G.C.A.2: CHORDS, SECANTS AND TANGENTS

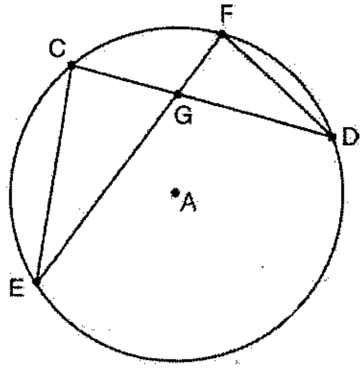
74 In the diagram shown below, $\overline{AC}$ is tangent to circle O at A and to circle P at C, $\overline{OP}$ intersects $\overline{AC}$ at B, $OA = 4$, $AB = 5$, and $PC = 10$.



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

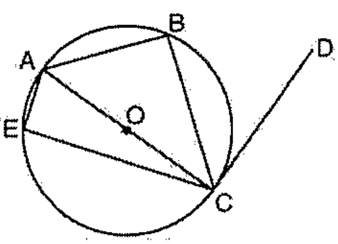
1 6.4
2 8
3 12.5
4 16

75 In the diagram of circle A shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at G, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.



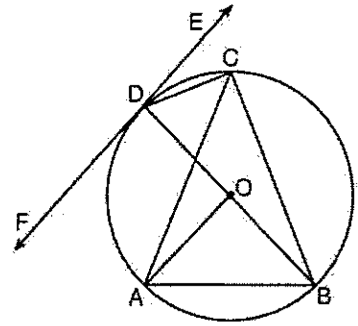
Which statement is *not* always true?
1 $\overline{CG} \cong \overline{FG}$
2 $\angle CEG \cong \angle FDG$
3 $\dfrac{CE}{EG} = \dfrac{FD}{DG}$
4 $\triangle CEG \sim \triangle FDG$

76 In circle O shown below, diameter $\overline{AC}$ is perpendicular to $\overline{CD}$ at point C, and chords $\overline{AB}$, $\overline{BC}$, $\overline{AE}$, and $\overline{CE}$ are drawn.



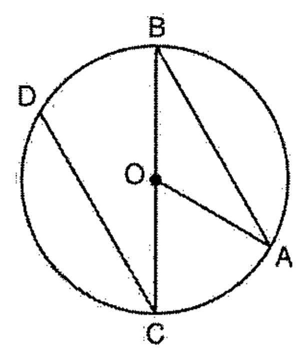
Which statement is *not* always true?
1 $\angle ACB \cong \angle BCD$
2 $\angle ABC \cong \angle ACD$
3 $\angle BAC \cong \angle DCB$
4 $\angle CBA \cong \angle AEC$

77 In the diagram below, $\overline{DC}$, $\overline{AC}$, $\overline{DOB}$, $\overline{CB}$, and $\overline{AB}$ are chords of circle O, $\overleftrightarrow{FDE}$ is tangent at point D, and radius $\overline{AO}$ is drawn. Sam decides to apply this theorem to the diagram: "An angle inscribed in a semi-circle is a right angle."



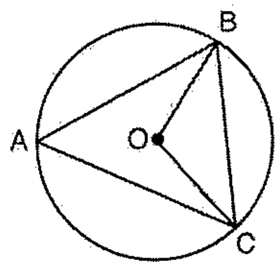
Which angle is Sam referring to?
1 $\angle AOB$
2 $\angle BAC$
3 $\angle DCB$
4 $\angle FDB$

78 In the diagram below of circle O with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.



If $m\angle BCD = 30°$, determine and state $m\angle AOB$.

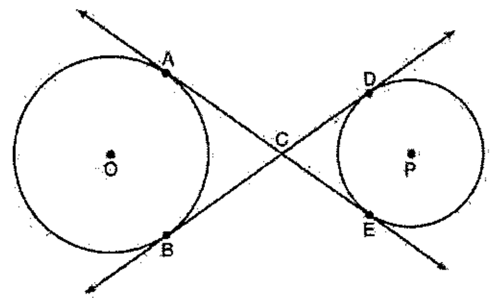
79 In the diagram below of circle O, $\overline{OB}$ and $\overline{OC}$ are radii, and chords $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are drawn.



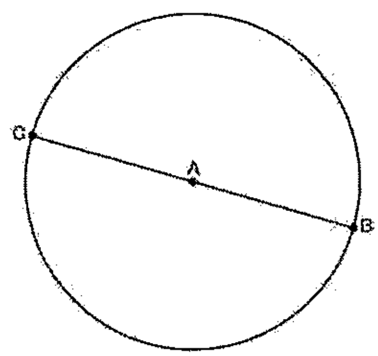
Which statement must always be true?
1 $\angle BAC \cong \angle BOC$
2 $m\angle BAC = \frac{1}{2} m\angle BOC$
3 $\triangle BAC$ and $\triangle BOC$ are isosceles.
4 The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

80 In circle O, secants $\overline{ADB}$ and $\overline{AEC}$ are drawn from external point A such that points D, B, E, and C are on circle O. If $AD = 8$, $AE = 6$, and EC is 12 more than BD, the length of $\overline{BD}$ is
1 6
2 22
3 36
4 48

81 Lines AE and BD are tangent to circles O and P at A, E, B, and D, as shown in the diagram below. If $AC:CE = 5:3$, and $BD = 56$, determine and state the length of $\overline{CD}$.

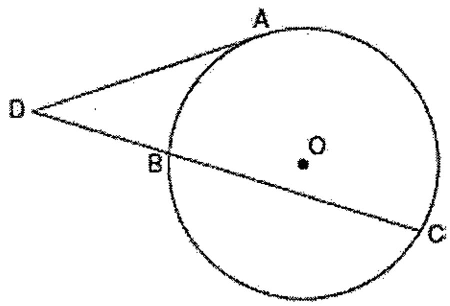


82 In the diagram below, $\overline{BC}$ is the diameter of circle A.



Point D, which is unique from points B and C, is plotted on circle A. Which statement must always be true?
1 $\triangle BCD$ is a right triangle.
2 $\triangle BCD$ is an isosceles triangle.
3 $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4 $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

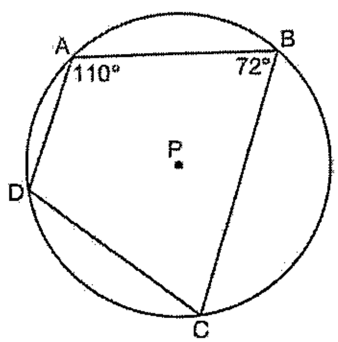
83 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle O from external point D, such that $\overparen{AC} \cong \overparen{BC}$.



If $m\overparen{BC} = 152°$, determine and state $m\angle D$.

G.C.A.3: INSCRIBED QUADRILATERALS

84 In the diagram below, quadrilateral $ABCD$ is inscribed in circle P.



What is $m\angle ADC$?
1 70°
2 72°
3 108°
4 110°

G.GPE.A.1: EQUATIONS OF CIRCLES

85 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
1 center $(0,3)$ and radius 4
2 center $(0,-3)$ and radius 4
3 center $(0,3)$ and radius 16
4 center $(0,-3)$ and radius 16

86 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is
1 25
2 16
3 5
4 4

87 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
1 $(3,-2)$ and 36
2 $(3,-2)$ and 6
3 $(-3,2)$ and 36
4 $(-3,2)$ and 6

88 What are the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x + 8y + 11 = 0$?
1 center $(2,-4)$ and radius 3
2 center $(-2,4)$ and radius 3
3 center $(2,-4)$ and radius 9
4 center $(-2,4)$ and radius 9

89 Kevin's work for deriving the equation of a circle is shown below.

$$x^2 + 4x = -(y^2 - 20)$$

STEP 1 $x^2 + 4x = -y^2 + 20$

STEP 2 $x^2 + 4x + 4 = -y^2 + 20 - 4$

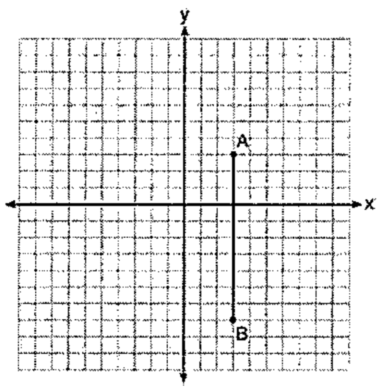
STEP 3 $(x+2)^2 = -y^2 + 20 - 4$

STEP 4 $(x+2)^2 + y^2 = 16$

In which step did he make an error in his work?

1 Step 1
2 Step 2
3 Step 3
4 Step 4

90 The graph below shows $\overline{AB}$, which is a chord of circle O. The coordinates of the endpoints of $\overline{AB}$ are $A(3,3)$ and $B(3,-7)$. The distance from the midpoint of $\overline{AB}$ to the center of circle O is 2 units.



What could be a correct equation for circle O?

1 $(x-1)^2 + (y+2)^2 = 29$
2 $(x+5)^2 + (y-2)^2 = 29$
3 $(x-1)^2 + (y-2)^2 = 25$
4 $(x-5)^2 + (y+2)^2 = 25$

91 The equation of a circle is $x^2 + y^2 - 6y + 1 = 0$. What are the coordinates of the center and the length of the radius of this circle?

1 center $(0,3)$ and radius $= 2\sqrt{2}$
2 center $(0,-3)$ and radius $= 2\sqrt{2}$
3 center $(0,6)$ and radius $= \sqrt{35}$
4 center $(0,-6)$ and radius $= \sqrt{35}$

G.GPE.B.4: CIRCLES IN THE COORDINATE PLANE

92 The center of circle Q has coordinates $(3,-2)$. If circle Q passes through $R(7,1)$, what is the length of its diameter?

1 50
2 25
3 10
4 5

93 A circle has a center at $(1,-2)$ and radius of 4. Does the point $(3.4,1.2)$ lie on the circle? Justify your answer.

94 A circle whose center is the origin passes through the point $(-5,12)$. Which point also lies on this circle?

1 $(10,3)$
2 $(-12,13)$
3 $(11,2\sqrt{12})$
4 $(-8,5\sqrt{21})$

MEASURING IN THE PLANE AND SPACE

G.MG.A.3: AREA AND SURFACE AREA

95 A farmer has 64 feet of fence to enclose a rectangular vegetable garden. Which dimensions would result in the biggest area for this garden?
1 the length and the width are equal
2 the length is 2 more than the width
3 the length is 4 more than the width
4 the length is 6 more than the width

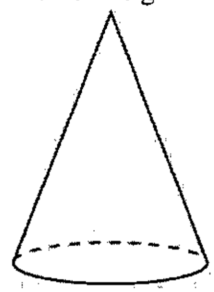
96 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the *least* number of gallons of paint he must buy to paint the cube?
1 1
2 2
3 3
4 4

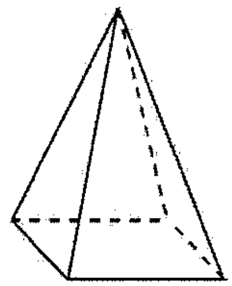
G.GMD.B.4: ROTATIONS OF TWO-DIMENSIONAL OBJECTS

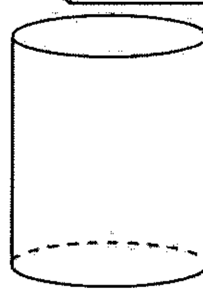
97 If the rectangle below is continuously rotated about side w, which solid figure is formed?

1 pyramid
2 rectangular prism
3 cone
4 cylinder

98 A student has a rectangular postcard that he folds in half lengthwise. Next, he rotates it continuously about the folded edge. Which three-dimensional object below is generated by this rotation?


1


2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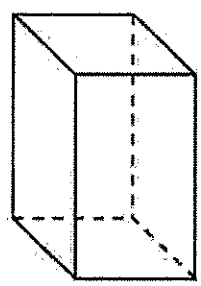
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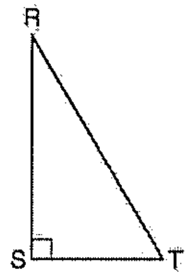
99 Which object is formed when right triangle *RST* shown below is rotated around leg $\overline{RS}$?



1 a pyramid with a square base
2 an isosceles triangle
3 a right triangle
4 a cone

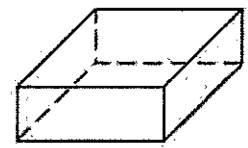
100 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?
1 cone
2 pyramid
3 prism
4 sphere

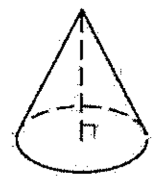
G.GMD.B.4: CROSS-SECTIONS OF THREE-DIMENSIONAL OBJECTS

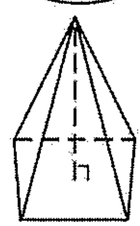
101 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
1 circle
2 square
3 triangle
4 rectangle

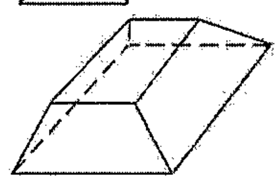
102 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?
1 triangle
2 trapezoid
3 hexagon
4 rectangle

103 Which figure can have the same cross section as a sphere?

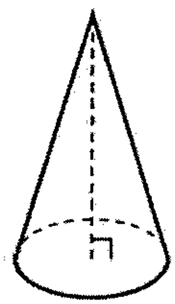
1 

2 

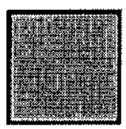
3 

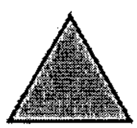
4 

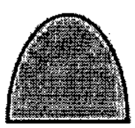
104 William is drawing pictures of cross sections of the right circular cone below.



Which drawing can *not* be a cross section of a cone?

1 

2 

3 

4 

G.GMD.A.1, 3: VOLUME

105 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.

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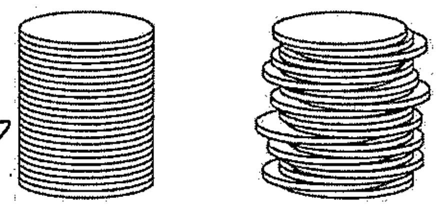


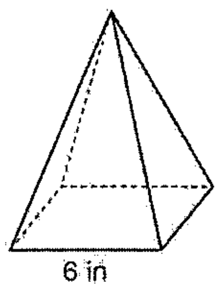
Use Cavelieri's principle to explain why the volumes of these two stacks of quarters are equal.

106 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

107 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the *nearest meter*?
1 73
2 77
3 133
4 230

108 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?
1 10
2 25
3 50
4 75

109 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.



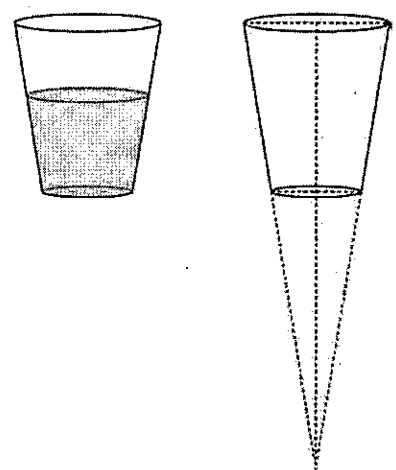
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1 72
2 144
3 288
4 432

110 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?
1 3591
2 65
3 55
4 4

111 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?
1 $(8.5)^3 - \pi(8)^2(8)$
2 $(8.5)^3 - \pi(4)^2(8)$
3 $(8.5)^3 - \frac{1}{3}\pi(8)^2(8)$
4 $(8.5)^3 - \frac{1}{3}\pi(4)^2(8)$

112 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.

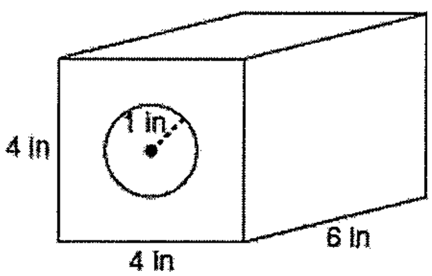
Former Part IV



The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the *nearest tenth of a cubic inch*, the volume of the water glass.

113 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the *nearest cubic centimeter*, what is the minimum volume of the can that holds a stack of 4 tennis balls?
1 236
2 282
3 564
4 945

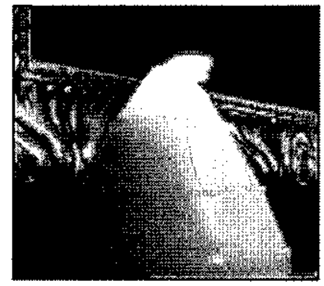
114 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.



What is the approximate volume of the remaining solid, in cubic inches?
1 19
2 77
3 93
4 96

115 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the *nearest tenth of a cubic inch*, when the cup is filled to half its height?
1 1.2
2 3.5
3 4.7
4 14.1

116 A candle maker uses a mold to make candles like the one shown below.



The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

G.MG.A.2: DENSITY

117 Trees that are cut down and stripped of their branches for timber are approximately cylindrical. A timber company specializes in a certain type of tree that has a typical diameter of 50 cm and a typical height of about 10 meters. The density of the wood is 380 kilograms per cubic meter, and the wood can be sold by mass at a rate of $4.75 per kilogram. Determine and state the minimum number of whole trees that must be sold to raise at least $50,000.

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118 A contractor needs to purchase 500 bricks. The dimensions of each brick are 5.1 cm by 10.2 cm by 20.3 cm, and the density of each brick is $1920\ \text{kg}/\text{m}^3$. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

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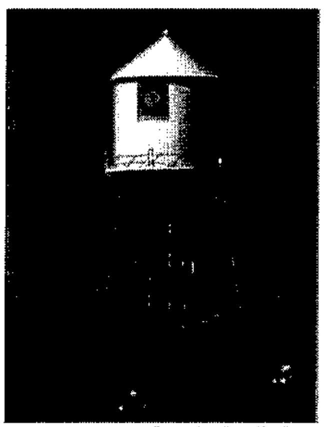
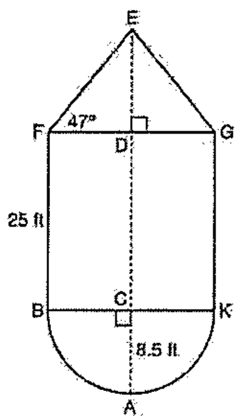
119 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?
1 1,632
2 408
3 102
4 92

Former Part IV

120 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let C be the center of the hemisphere and let D be the center of the base of the cone.



Source: http://en.wikipedia.org



If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47°$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85% of its volume and *not* exceed the weight limit? Justify your answer.

121 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?
1 16,336
2 32,673
3 130,690
4 261,381

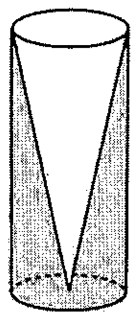
122 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm^3)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

123 Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the *nearest pound*?
1 34
2 20
3 15
4 4

124 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?

Former Part IV

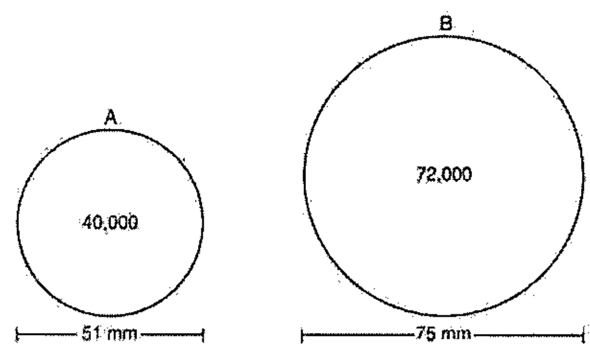


Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is Walter's profit after selling 100 candles?

125 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the *nearest tenth of a gallon*, would contain 1 pound of salt?
1 3.3
2 3.5
3 4.7
4 13.3

126 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?
1 16,336
2 32,673
3 130,690
4 261,381

127 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish A has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish B has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.

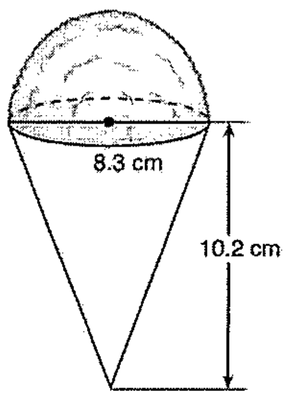


Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

128 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?
1 13
2 9694
3 13,536
4 30,456

129 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.

Former Part IV



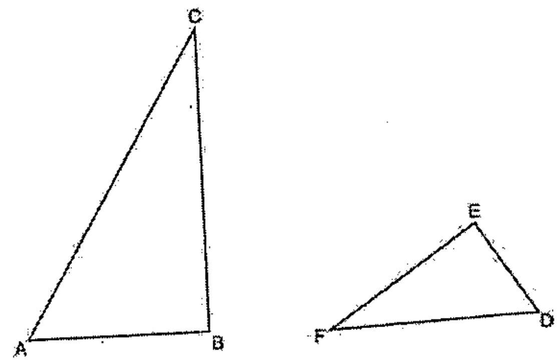
The desired density of the shaved ice is $0.697\ \text{g/cm}^3$, and the cost, per kilogram, of ice is \$3.83. Determine and state the cost of the ice needed to make 50 snow cones.

130 New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 2.5 cm thick, and an outer diameter of 53.4 cm. The rectangular-prism posts have a hollow core, with aluminum 2.5 cm thick, and a square base that measures 40 cm on each side. The density of aluminum is 2.7 g/cm3, and the cost of aluminum is \$0.38 per kilogram. If all posts must be the same shape, which post design will cost the town less? How much money will be saved per streetlight post with the less expensive design?

Former Part IV

G.SRT.B.5: SIMILARITY

131 Triangles ABC and DEF are drawn below.



If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

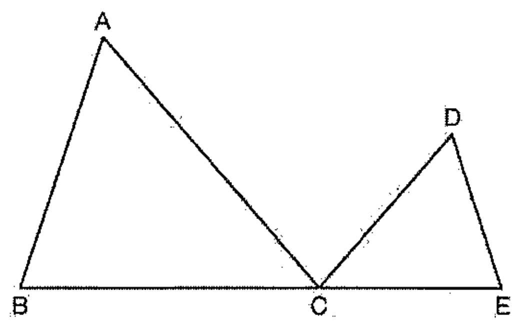
1 $\angle CAB \cong \angle DEF$

2 $\dfrac{AB}{CB} = \dfrac{FE}{DE}$

3 $\triangle ABC \sim \triangle DEF$

4 $\dfrac{AB}{DE} = \dfrac{FE}{CB}$

132 In the diagram below, $\triangle ABC \sim \triangle DEC$.



If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?

1 12.5

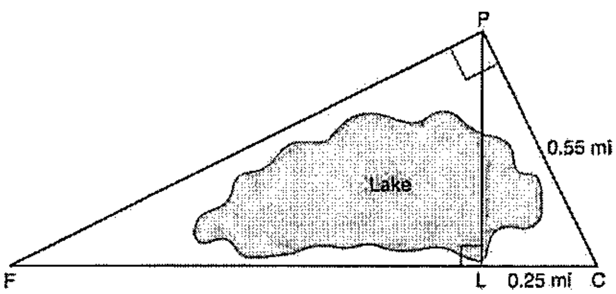
2 14.0

3 14.8

4 17.5

133 A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the end of Tim's shadow meets the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

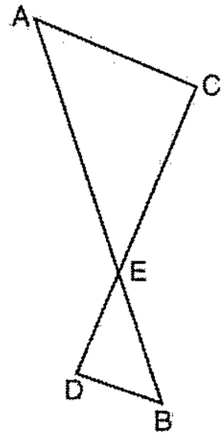
134 In the diagram below, the line of sight from the park ranger station, P, to the lifeguard chair, L, on the beach of a lake is perpendicular to the path joining the campground, C, and the first aid station, F. The campground is 0.25 mile from the lifeguard chair. The straight paths from both the campground and first aid station to the park ranger station are perpendicular.



If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is Gerald correct? Justify your answer.

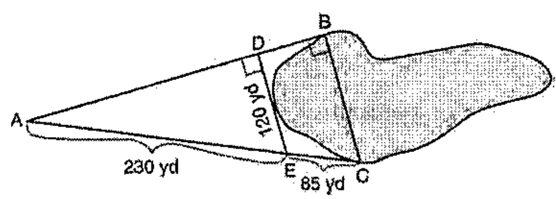
135 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is 1:2. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $\overline{GR}$ is
1 5
2 7
3 10
4 20

136 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.



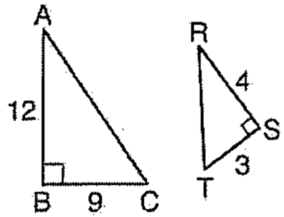
Given $\triangle AEC \sim \triangle BED$, which equation is true?
1 $\dfrac{CE}{DE} = \dfrac{EB}{EA}$
2 $\dfrac{AE}{BE} = \dfrac{AC}{BD}$
3 $\dfrac{EC}{AE} = \dfrac{BE}{ED}$
4 $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

137 To find the distance across a pond from point B to point C, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.

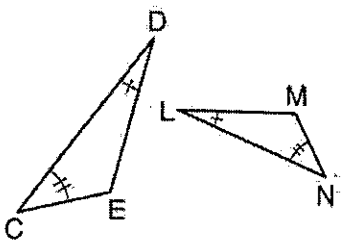


Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

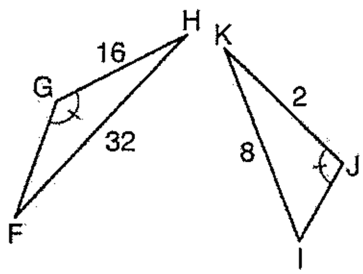
138 Using the information given below, which set of triangles can *not* be proven similar?



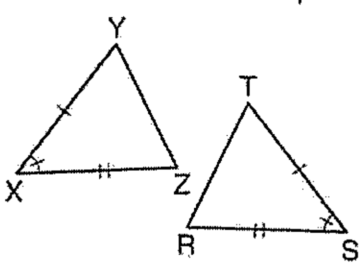
1



2

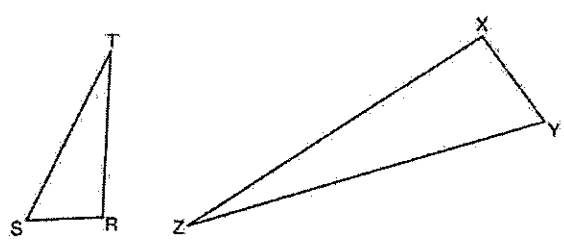


3

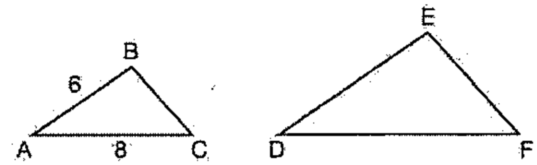


4

139 Triangles RST and XYZ are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.



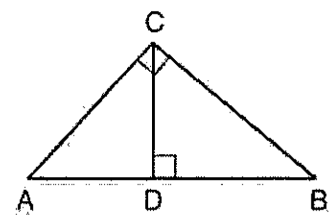
140 In the diagram below, $\triangle ABC \sim \triangle DEF$.



If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?

1 $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2 $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3 $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4 $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

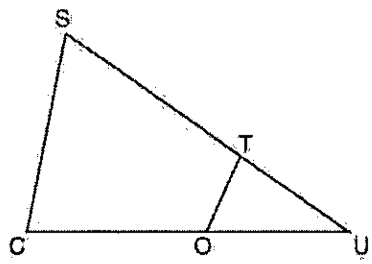
141 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle ABC.



Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?

1 $AD = 2$ and $DB = 36$
2 $AD = 3$ and $AB = 24$
3 $AD = 6$ and $DB = 12$
4 $AD = 8$ and $AB = 17$

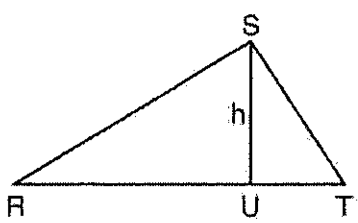
142 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?

1 5.6
2 8.75
3 11
4 15

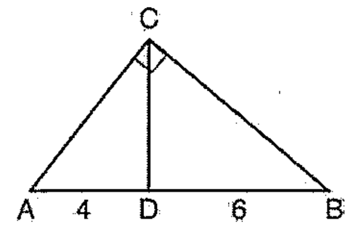
143 In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.



If $SU = h$, $UT = 12$, and $RT = 42$, which value of h will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

1 $6\sqrt{3}$
2 $6\sqrt{10}$
3 $6\sqrt{14}$
4 $6\sqrt{35}$

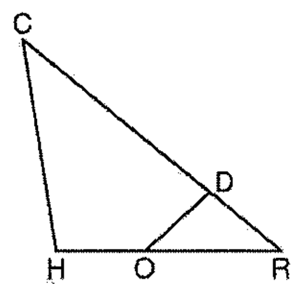
144 In the diagram of right triangle ABC, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at D.



If $AD = 4$ and $DB = 6$, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?

1 $2\sqrt{6}$
2 $2\sqrt{10}$
3 $2\sqrt{15}$
4 $4\sqrt{2}$

145 In triangle CHR, O is on $\overline{HR}$, and D is on $\overline{CR}$ so that $\angle H \cong RDO$.

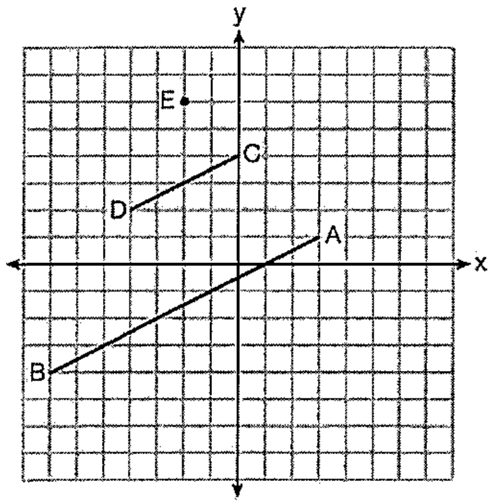


If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?

1 $2\frac{2}{3}$
2 $6\frac{2}{3}$
3 11
4 15

TRANSFORMATIONS
G.SRT.A.1: LINE DILATIONS

146 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.



Which ratio is equal to the scale factor k of the dilation?
1 $\frac{EC}{EA}$
2 $\frac{BA}{EA}$
3 $\frac{EA}{BA}$
4 $\frac{EA}{EC}$

147 The equation of line h is $2x + y = 1$. Line m is the image of line h after a dilation of scale factor 4 with respect to the origin. What is the equation of the line m?
1 $y = -2x + 1$
2 $y = -2x + 4$
3 $y = 2x + 4$
4 $y = 2x + 1$

148 The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1 $y = 2x - 4$
2 $y = 2x - 6$
3 $y = 3x - 4$
4 $y = 3x - 6$

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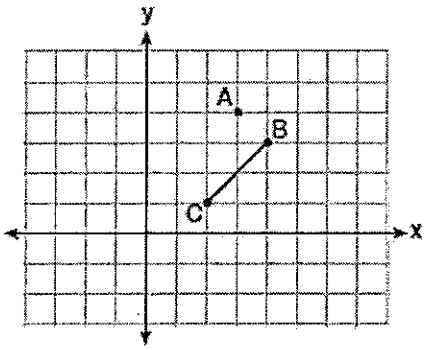
149 The line $3y = -2x + 8$ is transformed by a dilation centered at the origin. Which linear equation could be its image?
1 $2x + 3y = 5$
2 $2x - 3y = 5$
3 $3x + 2y = 5$
4 $3x - 2y = 5$

150 Line $y = 3x - 1$ is transformed by a dilation with a scale factor of 2 and centered at $(3,8)$. The line's image is
1 $y = 3x - 8$
2 $y = 3x - 4$
3 $y = 3x - 2$
4 $y = 3x - 1$

151 A line that passes through the points whose coordinates are $(1,1)$ and $(5,7)$ is dilated by a scale factor of 3 and centered at the origin. The image of the line
1 is perpendicular to the original line
2 is parallel to the original line
3 passes through the origin
4 is the original line

152 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.



What are the coordinates of B' and C' after $\overline{BC}$ undergoes a dilation centered at point A with a scale factor of 2?

1 $B'(5,2)$ and $C'(1,-2)$
2 $B'(6,1)$ and $C'(0,-1)$
3 $B'(5,0)$ and $C'(1,-2)$
4 $B'(5,2)$ and $C'(3,0)$

153 A three-inch line segment is dilated by a scale factor of 6 and centered at its midpoint. What is the length of its image?

1 9 inches
2 2 inches
3 15 inches
4 18 inches

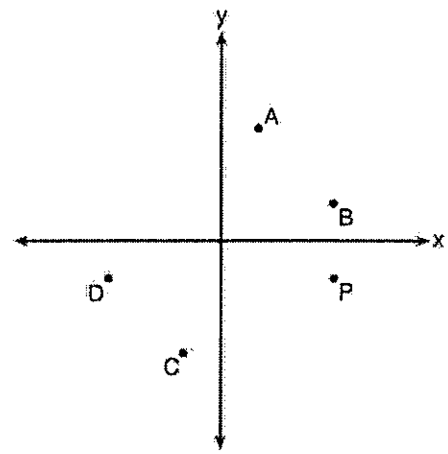
154 Line segment $A'B'$, whose endpoints are $(4,-2)$ and $(16,14)$, is the image of $\overline{AB}$ after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of $\overline{AB}$?

1 5
2 10
3 20
4 40

155 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.

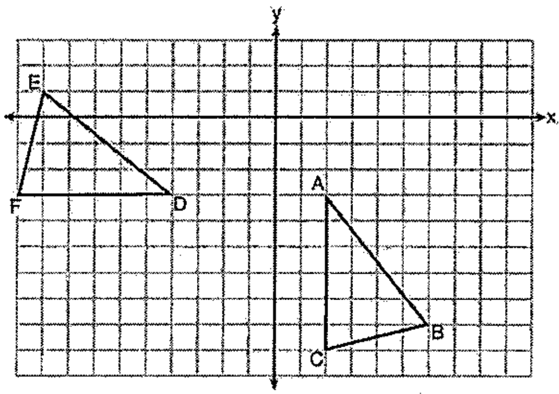
G.CO.A.5: ROTATIONS

156 Which point shown in the graph below is the image of point P after a counterclockwise rotation of 90° about the origin?



1 A
2 B
3 C
4 D

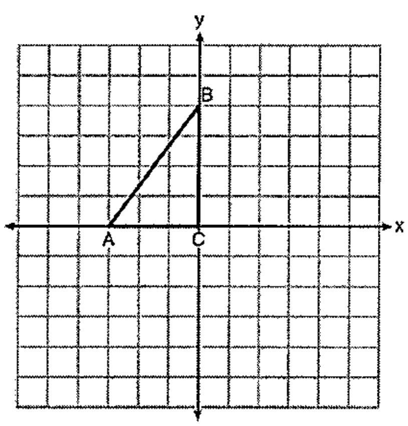
157 The grid below shows $\triangle ABC$ and $\triangle DEF$.



Let $\triangle A'B'C'$ be the image of $\triangle ABC$ after a rotation about point A. Determine and state the location of B' if the location of point C' is $(8,-3)$. Explain your answer. Is $\triangle DEF$ congruent to $\triangle A'B'C'$? Explain your answer.

G.CO.A.5: REFLECTIONS

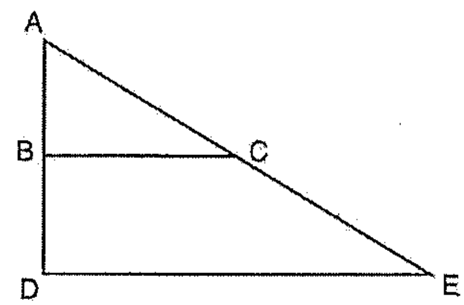
158 Triangle ABC is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.



G.SRT.A.2: DILATIONS

159 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?
1 $3A'B' = AB$
2 $B'C' = 3BC$
3 $m\angle A' = 3(m\angle A)$
4 $3(m\angle C') = m\angle C$

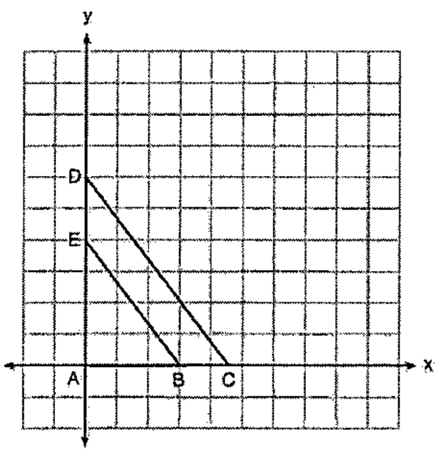
160 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.



Which statement is always true?
1 $2AB = AD$
2 $\overline{AD} \perp \overline{DE}$
3 $AC = CE$
4 $\overline{BC} \parallel \overline{DE}$

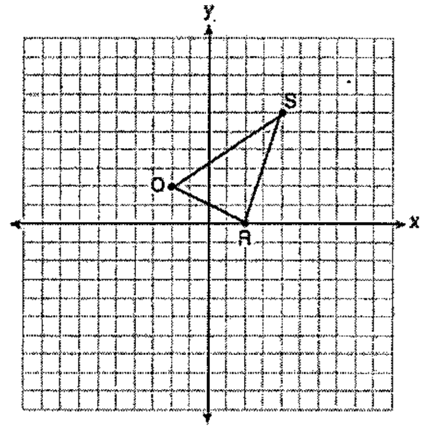
161 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
1 The area of the image is nine times the area of the original triangle.
2 The perimeter of the image is nine times the perimeter of the original triangle.
3 The slope of any side of the image is three times the slope of the corresponding side of the original triangle.
4 The measure of each angle in the image is three times the measure of the corresponding angle of the original triangle.

162 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.



The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1 $\frac{2}{3}$
2 $\frac{3}{2}$
3 $\frac{3}{4}$
4 $\frac{4}{3}$

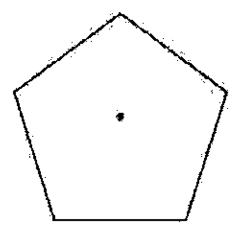
163 Triangle QRS is graphed on the set of axes below.



On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\frac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

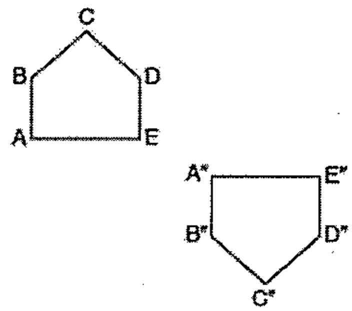
G.CO.A.3: MAPPING A POLYGON ONTO ITSELF

164 A regular pentagon is shown in the diagram below.



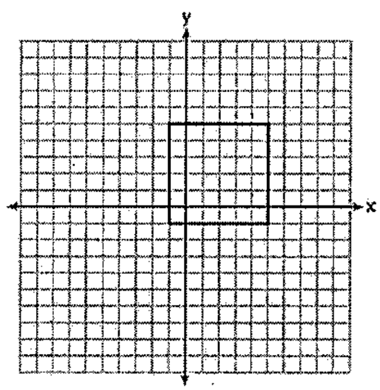
If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is
1 54°
2 72°
3 108°
4 360°

165 Identify which sequence of transformations could map pentagon $ABCDE$ onto pentagon $A''B''C''D''E''$, as shown below.



1 dilation followed by a rotation
2 translation followed by a rotation
3 line reflection followed by a translation
4 line reflection followed by a line reflection

166 In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?
1 $x = 5$
2 $y = 2$
3 $y = x$
4 $x + y = 4$

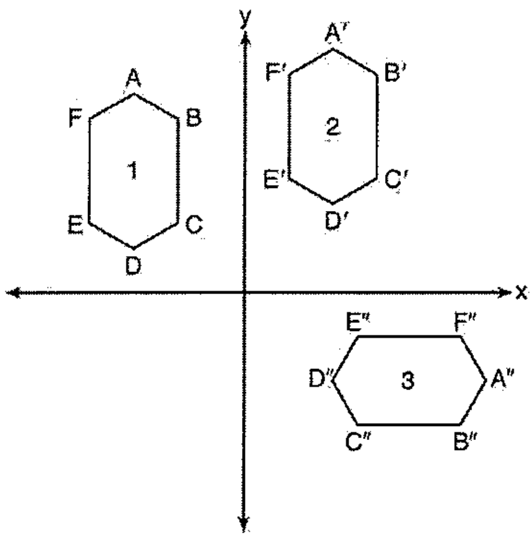
167 A regular hexagon is rotated in a counterclockwise direction about its center. Determine and state the minimum number of degrees in the rotation such that the hexagon will coincide with itself.

168 Which rotation about its center will carry a regular decagon onto itself?
1 54°
2 162°
3 198°
4 252°

169 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?
1 octagon
2 decagon
3 hexagon
4 pentagon

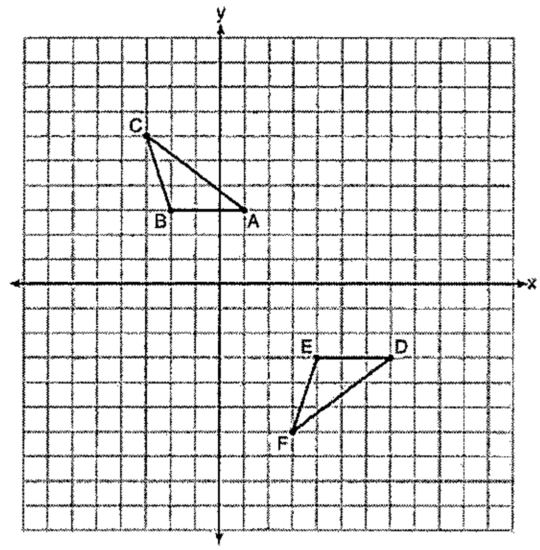
G.CO.A.5, G.SRT.A.2: COMPOSITIONS OF TRANSFORMATIONS

170 In the diagram below, congruent figures 1, 2, and 3 are drawn.

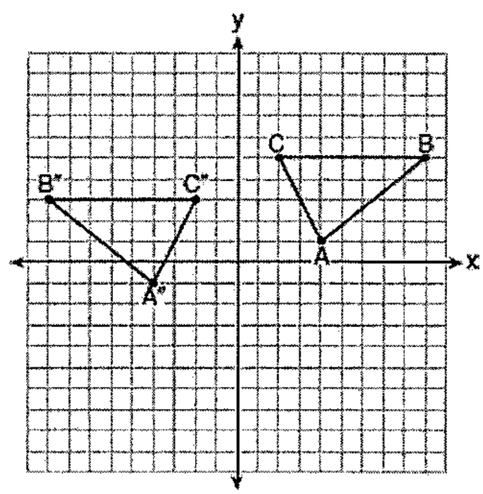


Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?
1 a reflection followed by a translation
2 a rotation followed by a translation
3 a translation followed by a reflection
4 a translation followed by a rotation

171 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.

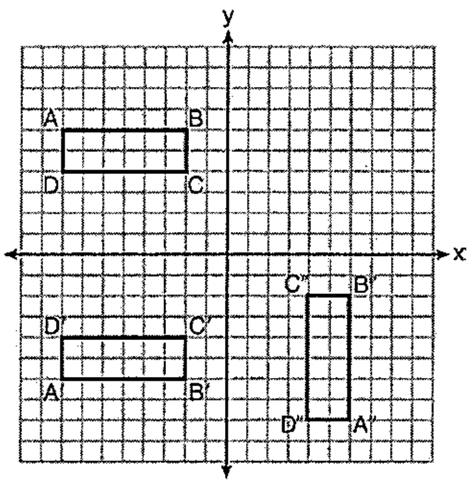


172 The graph below shows $\triangle ABC$ and its image, $\triangle A''B''C''$.



Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

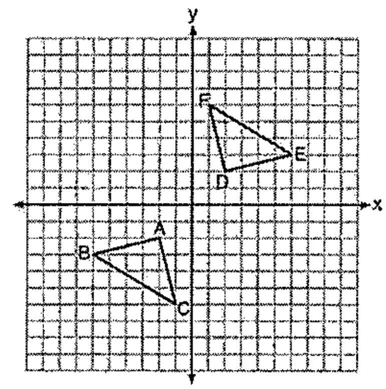
173 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.



Which sequence of transformations maps $ABCD$ onto $A'B'C'D'$ and then maps $A'B'C'D'$ onto $A''B''C''D''$?

1 a reflection followed by a rotation
2 a reflection followed by a translation
3 a translation followed by a rotation
4 a translation followed by a reflection

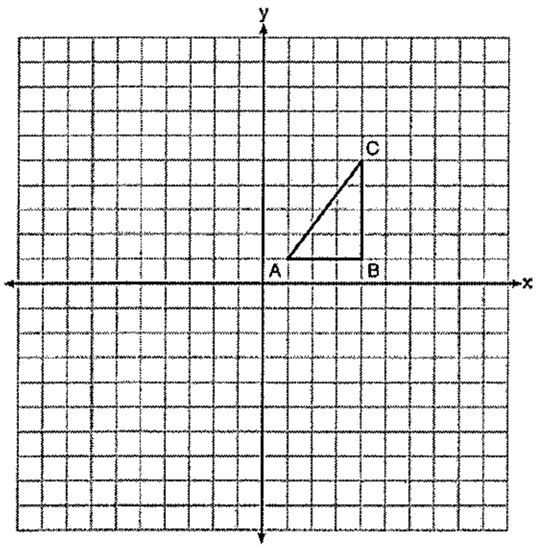
174 Triangle ABC and triangle DEF are graphed on the set of axes below.



Which sequence of transformations maps triangle ABC onto triangle DEF?

1 a reflection over the x-axis followed by a reflection over the y-axis
2 a 180° rotation about the origin followed by a reflection over the line $y = x$
3 a 90° clockwise rotation about the origin followed by a reflection over the y-axis
4 a translation 8 units to the right and 1 unit up followed by a 90° counterclockwise rotation about the origin

175 In the diagram below, $\triangle ABC$ has coordinates $A(1,1)$, $B(4,1)$, and $C(4,5)$. Graph and label $\triangle A''B''C''$, the image of $\triangle ABC$ after the translation five units to the right and two units up followed by the reflection over the line $y = 0$.



176 In the diagram below, triangles XYZ and UVZ are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.

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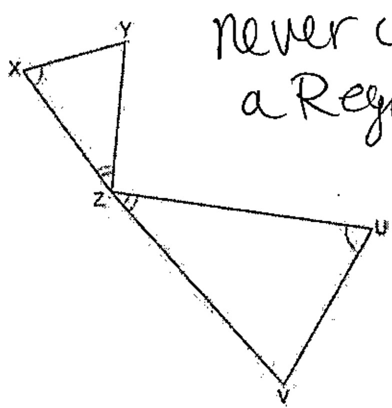
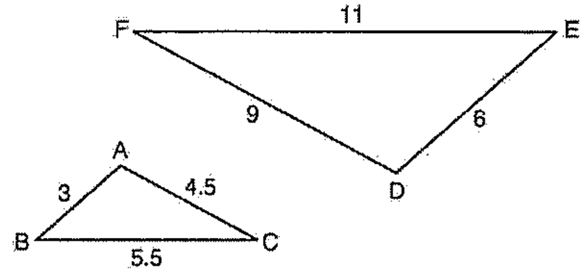


Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

177 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

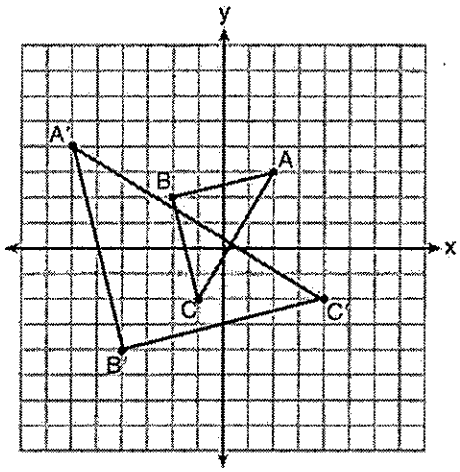
1 $\dfrac{m\angle A}{m\angle D} = \dfrac{1}{2}$

2 $\dfrac{m\angle C}{m\angle F} = \dfrac{2}{1}$

3 $\dfrac{m\angle A}{m\angle C} = \dfrac{m\angle F}{m\angle D}$

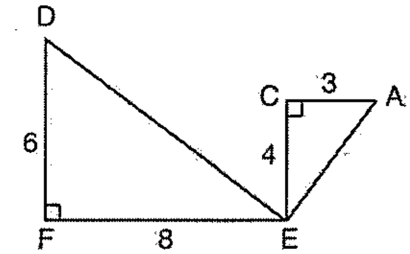
4 $\dfrac{m\angle B}{m\angle E} = \dfrac{m\angle C}{m\angle F}$

178 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?



1 reflection and translation
2 rotation and reflection
3 translation and dilation
4 dilation and rotation

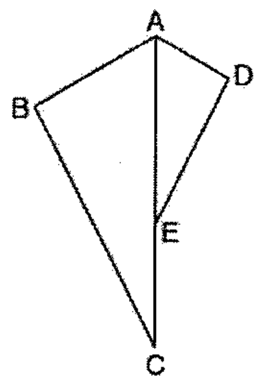
179 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$



What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?

1 a rotation of 180 degrees about point E followed by a horizontal translation
2 a counterclockwise rotation of 90 degrees about point E followed by a horizontal translation
3 a rotation of 180 degrees about point E followed by a dilation with a scale factor of 2 centered at point E
4 a counterclockwise rotation of 90 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

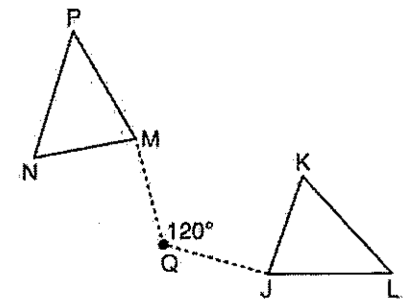
180 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\frac{AE}{AC}$ centered at point A.



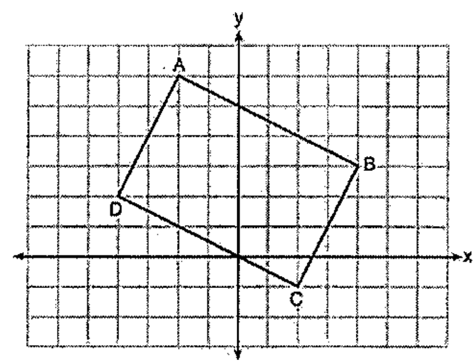
Which statement must be true?
1 $m\angle BAC \cong m\angle AED$
2 $m\angle ABC \cong m\angle ADE$
3 $m\angle DAE \cong \frac{1}{2} m\angle BAC$
4 $m\angle ACB \cong \frac{1}{2} m\angle DAB$

G.CO.B.6: PROPERTIES OF TRANSFORMATIONS

181 Triangle MNP is the image of triangle JKL after a 120° counterclockwise rotation about point Q. If the measure of angle L is 47° and the measure of angle N is 57°, determine the measure of angle M. Explain how you arrived at your answer.



182 Quadrilateral $ABCD$ is graphed on the set of axes below.



When $ABCD$ is rotated 90° in a counterclockwise direction about the origin, its image is quadrilateral $A'B'C'D'$. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?
1 no and $C'(1,2)$
2 no and $D'(2,4)$
3 yes and $A'(6,2)$
4 yes and $B'(-3,4)$

183 The image of $\triangle ABC$ after a rotation of 90° clockwise about the origin is $\triangle DEF$, as shown below.

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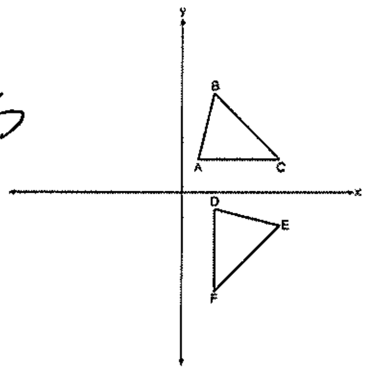


Which statement is true?

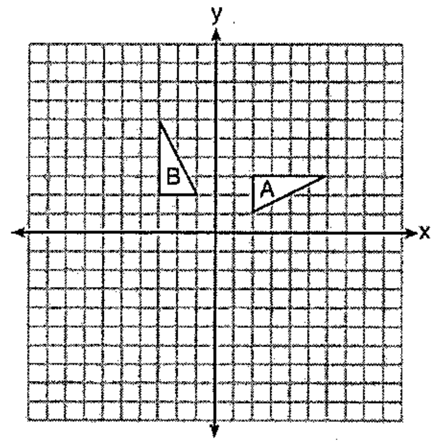
1 $\overline{BC} \cong \overline{DE}$
2 $\overline{AB} \cong \overline{DF}$
3 $\angle C \cong \angle E$
4 $\angle A \cong \angle D$

G.CO.A.2: IDENTIFYING TRANSFORMATIONS

184 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?

1 a translation of two units to the right and two units down
2 a counterclockwise rotation of 180 degrees around the origin
3 a reflection over the x-axis
4 a dilation with a scale factor of 2 and centered at the origin

185 In the diagram below, which single transformation was used to map triangle A onto triangle B?



1 line reflection
2 rotation
3 dilation
4 translation

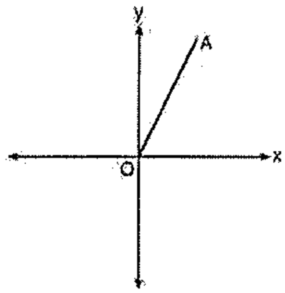
186 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?

1 reflection over the x-axis
2 translation to the left 5 and down 4
3 dilation centered at the origin with scale factor 2
4 rotation of 270° counterclockwise about the origin

187 Which transformation would *not* always produce an image that would be congruent to the original figure?

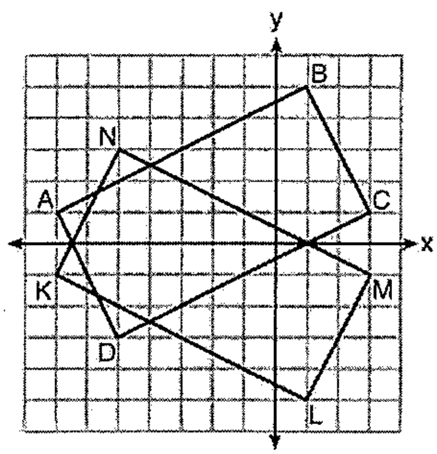
1 translation
2 dilation
3 rotation
4 reflection

188 Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?



1 a translation of two units down
2 a reflection over the x-axis
3 a reflection over the y-axis
4 a clockwise rotation of 90° about the origin

189 On the set of axes below, rectangle $ABCD$ can be proven congruent to rectangle $KLMN$ using which transformation?



1 rotation
2 translation
3 reflection over the x-axis
4 reflection over the y-axis

190 Under which transformation would $\triangle A'B'C'$, the image of $\triangle ABC$, *not* be congruent to $\triangle ABC$?
1 reflection over the y-axis
2 rotation of 90° clockwise about the origin
3 translation of 3 units right and 2 units down
4 dilation with a scale factor of 2 centered at the origin

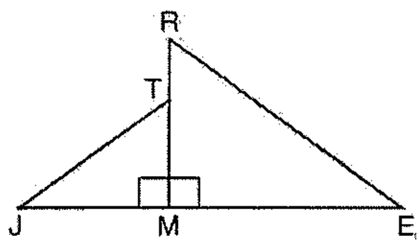
G.CO.A.2: ANALYTICAL REPRESENTATIONS OF TRANSFORMATIONS

191 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?
1 $(x,y) \rightarrow (y,x)$
2 $(x,y) \rightarrow (x,-y)$
3 $(x,y) \rightarrow (4x,4y)$
4 $(x,y) \rightarrow (x+2,y-5)$

TRIGONOMETRY

G.SRT.C.6: TRIGONOMETRIC RATIOS

192 In the diagram below, $\triangle ERM \sim \triangle JTM$.



Which statement is always true?

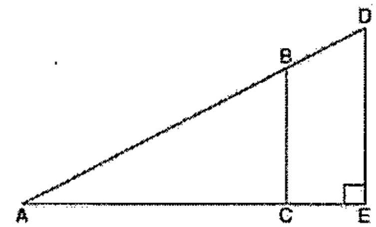
1 $\cos J = \frac{RM}{RE}$

2 $\cos R = \frac{JM}{JT}$

3 $\tan T = \frac{RM}{EM}$

4 $\tan E = \frac{TM}{JM}$

193 In the diagram of right triangle ADE below, $\overline{BC} \parallel \overline{DE}$.



Which ratio is always equivalent to the sine of $\angle A$?

1 $\frac{AD}{DE}$

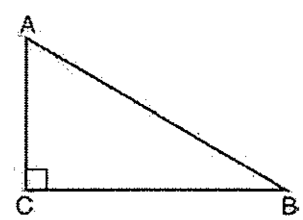
2 $\frac{AE}{AD}$

3 $\frac{BC}{AB}$

4 $\frac{AB}{AC}$

G.SRT.C.7: COFUNCTIONS

194 In scalene triangle ABC shown in the diagram below, $m\angle C = 90°$.



Which equation is always true?

1 $\sin A = \sin B$

2 $\cos A = \cos B$

3 $\cos A = \sin C$

4 $\sin A = \cos B$

195 In ΔABC, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?

1 $\frac{\sqrt{21}}{5}$
2 $\frac{\sqrt{21}}{2}$
3 $\frac{2}{5}$
4 $\frac{5}{\sqrt{21}}$

196 Explain why $\cos(x) = \sin(90 - x)$ for x such that $0 < x < 90$.

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197 In right triangle ABC with the right angle at C, $\sin A = 2x + 0.1$ and $\cos B = 4x - 0.7$. Determine and state the value of x. Explain your answer.

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198 Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?

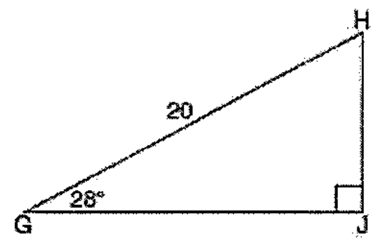
1 $\cos(90° - x)$
2 $\cos(45° - x)$
3 $\cos(2x)$
4 $\cos x$

199 In ΔABC, the complement of $\angle B$ is $\angle A$. Which statement is always true?

1 $\tan\angle A = \tan\angle B$
2 $\sin\angle A = \sin\angle B$
3 $\cos\angle A = \tan\angle B$
4 $\sin\angle A = \cos\angle B$

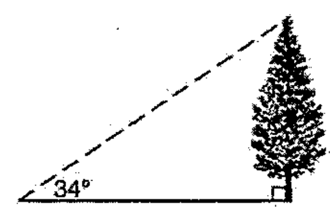
200 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

201 When instructed to find the length of $\overline{HJ}$ in right triangle HJG, Alex wrote the equation $\sin 28° = \frac{HJ}{20}$ while Marlene wrote $\cos 62° = \frac{HJ}{20}$. Are both students' equations correct? Explain why.



G.SRT.C.8: USING TRIGONOMETRY TO FIND A SIDE

202 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.



If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?

1 29.7
2 16.6
3 13.5
4 11.2

203 As shown below, a canoe is approaching a lighthouse on the coastline of a lake. The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.

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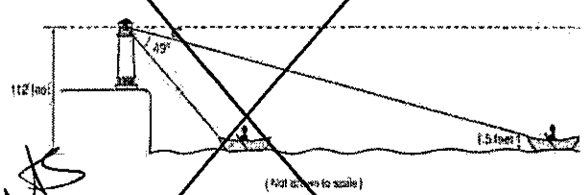
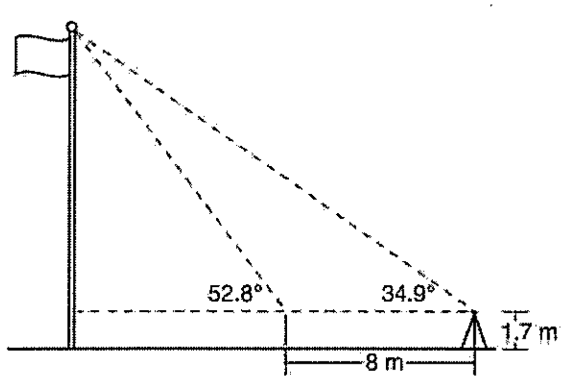


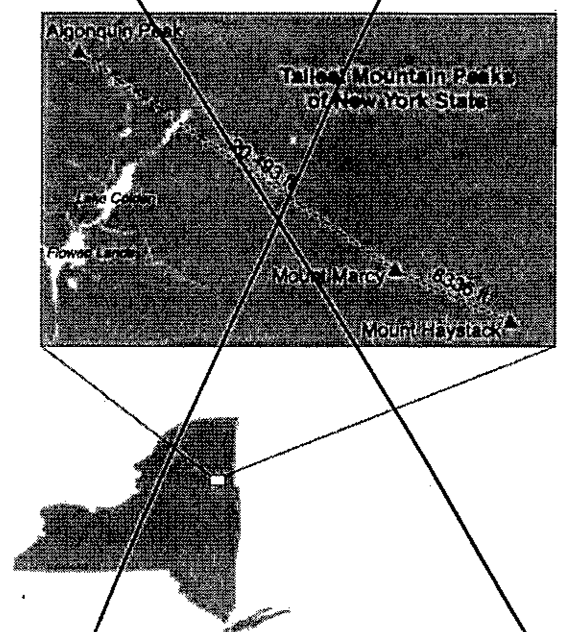
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

204 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. At each measurement, the survey instrument is 1.7 meters above the ground.



Determine and state, to the *nearest tenth of a meter*, the height of the flagpole.

205 The map below shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet.



The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

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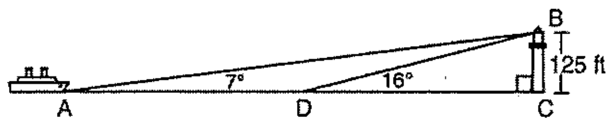
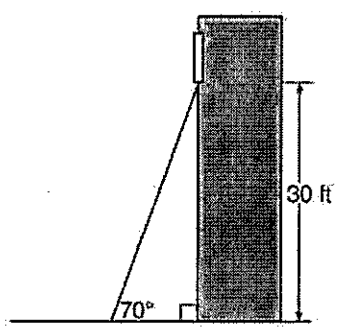
206 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was 7°. A short time later, at point *D*, the angle of elevation was 16°.



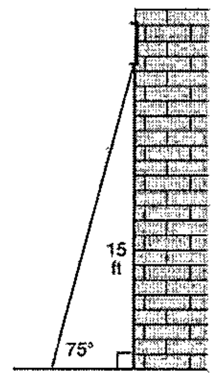
To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

207 A carpenter leans an extension ladder against a house to reach the bottom of a window 30 feet above the ground. As shown in the diagram below, the ladder makes a 70° angle with the ground. To the *nearest foot*, determine and state the length of the ladder.

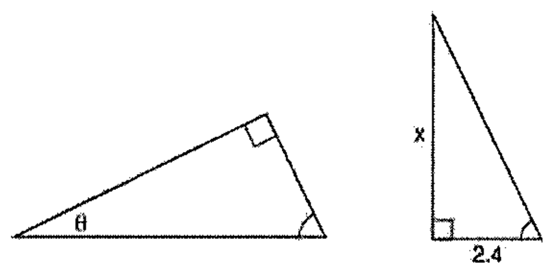


208 A 20-foot support post leans against a wall, making a 70° angle with the ground. To the *nearest tenth of a foot*, how far up the wall will the support post reach?
1 6.8
2 6.9
3 18.7
4 18.8

209 In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.

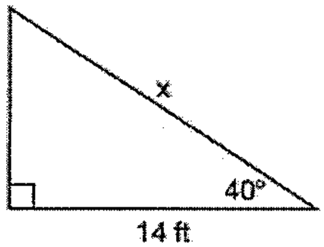


210 The diagram below shows two similar triangles.



If $\tan\theta = \frac{3}{7}$, what is the value of x, to the *nearest tenth*?
1 1.2
2 5.6
3 7.6
4 8.8

211 Given the right triangle in the diagram below, what is the value of x, to the *nearest foot*?



1 11
2 17
3 18
4 22

G.SRT.C.8: USING TRIGONOMETRY TO FIND AN ANGLE

212 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?

1 34.1
2 34.5
3 42.6
4 55.9

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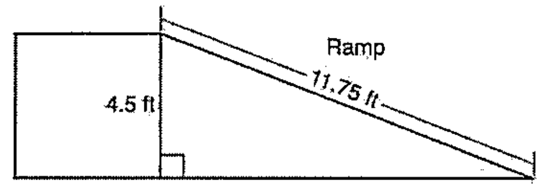
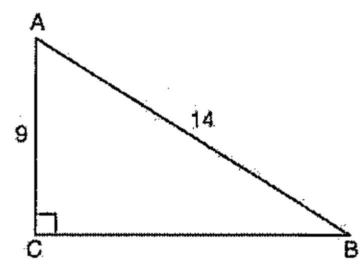
213 A ladder leans against a building. The top of the ladder touches the building 10 feet above the ground. The foot of the ladder is 4 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

214 The diagram below shows a ramp connecting the ground to a loading platform 4.5 feet above the ground. The ramp measures 11.75 feet from the ground to the top of the loading platform.



Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

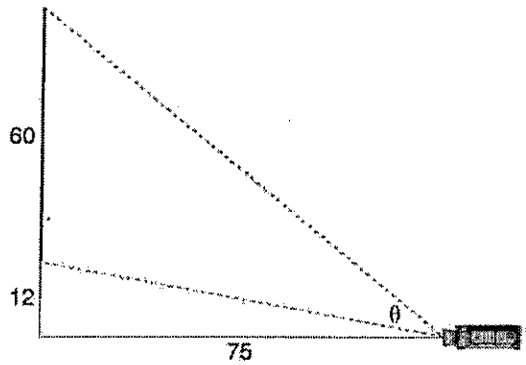
215 In the diagram of right triangle ABC shown below, $AB = 14$ and $AC = 9$.



What is the measure of $\angle A$, to the *nearest degree*?

1 33
2 40
3 50
4 57

216 As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 60-foot-tall screen is 12 feet off the ground. The projector sits on the ground at a horizontal distance of 75 feet from the screen.

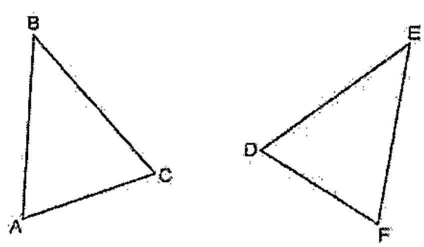


Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

LOGIC

G.CO.B.7-8, G.SRT.B.5: TRIANGLE CONGRUENCY

217 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?



1 $AB = DE$ and $BC = EF$
2 $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3 There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4 There is a sequence of rigid motions that maps point A onto point D, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.

218 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle ABC is congruent to triangle $\triangle A'B'C'$.

219 Given $\triangle ABC \cong \triangle DEF$, which statement is *not* always true?
1 $\overline{BC} \cong \overline{DF}$
2 $m\angle A = m\angle D$
3 area of $\triangle ABC$ = area of $\triangle DEF$
4 perimeter of $\triangle ABC$ = perimeter of $\triangle DEF$

220 Given: D is the image of A after a reflection over $\overleftrightarrow{CH}$.
$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$
$\triangle ABC$ and $\triangle DEC$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$

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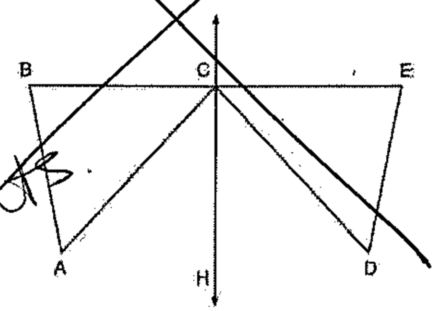

221 Given right triangles ABC and DEF where $\angle C$ and $\angle F$ are right angles, $\overline{AC} \cong \overline{DF}$ and $\overline{CB} \cong \overline{FE}$. Describe a precise sequence of rigid motions which would show $\triangle ABC \cong \triangle DEF$.

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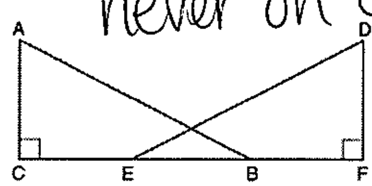
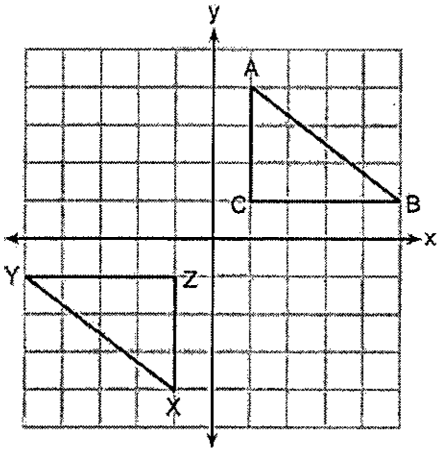
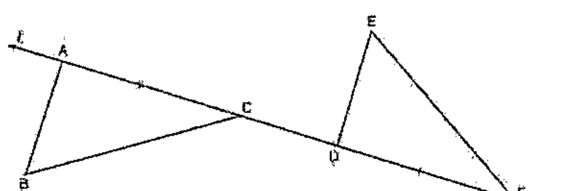


222 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



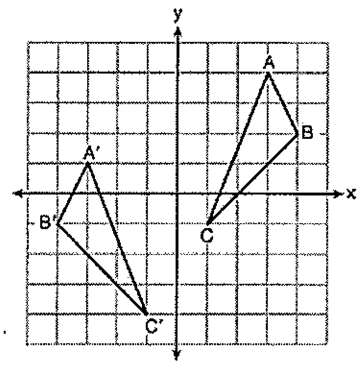
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

223 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ.



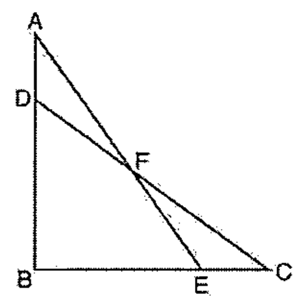
Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer. Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ. Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

224 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.



Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

225 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$

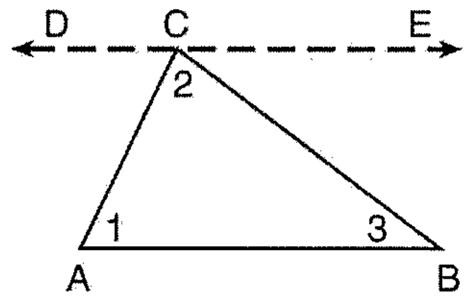


Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS ≅ SAS?

1 $\angle CDB \cong \angle AEB$
2 $\angle AFD \cong \angle EFC$
3 $\overline{AD} \cong \overline{CE}$
4 $\overline{AE} \cong \overline{CD}$

G.CO.C.10, G.SRT.B.4: TRIANGLE PROOFS

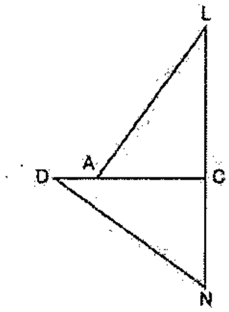
226 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.



Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

Statements	Reasons
(1) $\triangle ABC$	(1) Given
(2) Through point C, draw $\overleftrightarrow{DCE}$ parallel to $\overline{AB}$.	(2) ________
(3) $m\angle 1 = m\angle ACD$, $m\angle 3 = m\angle BCE$	(3) ________
(4) $m\angle ACD + m\angle 2 + m\angle BCE = 180°$	(4) ________
(5) $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	(5) ________

227 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.



a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

~~228 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$~~
~~Prove that $\angle YWZ$ is a right angle.~~

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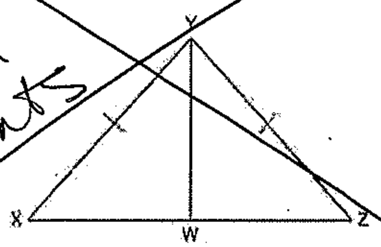
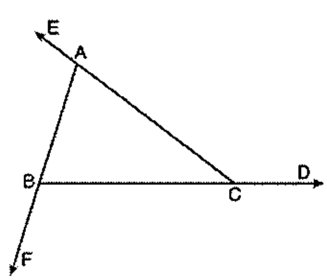
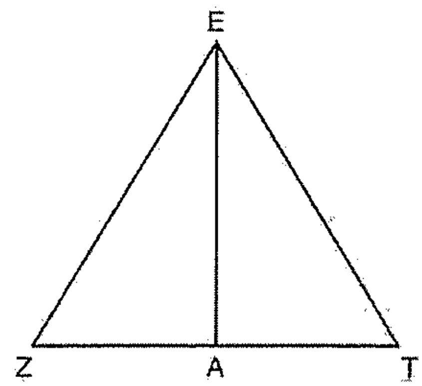


229 Prove the sum of the exterior angles of a triangle is 360°. never on a Regents



230 Two right triangles must be congruent if
1 an acute angle in each triangle is congruent
2 the lengths of the hypotenuses are equal
3 the corresponding legs are congruent
4 the areas are equal

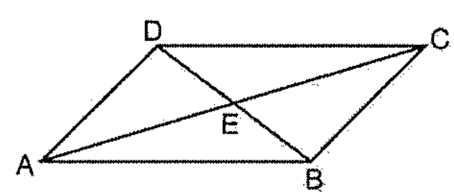
231 Line segment EA is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.



Which conclusion can *not* be proven?
1 $\overline{EA}$ bisects angle ZET.
2 Triangle EZT is equilateral.
3 $\overline{EA}$ is a median of triangle EZT.
4 Angle Z is congruent to angle T.

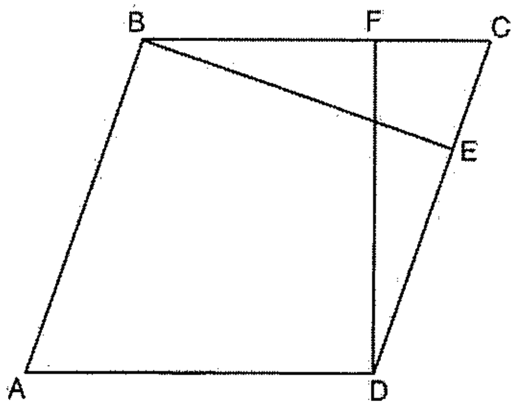
G.CO.C.11, G.SRT.B.5: QUADRILATERAL PROOFS

232 In parallelogram $ABCD$ shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.



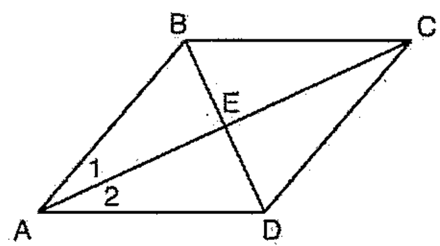
Prove: $\angle ACD \cong \angle CAB$

233 In the diagram of parallelogram $ABCD$ below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.



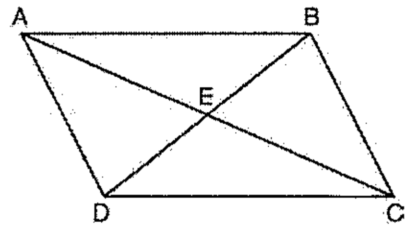
Prove $ABCD$ is a rhombus.

234 Given: Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$



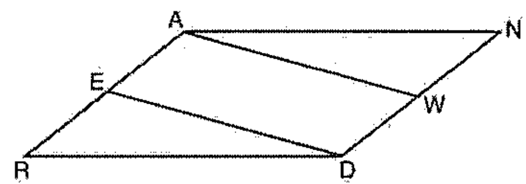
Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle

235 Given: Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E



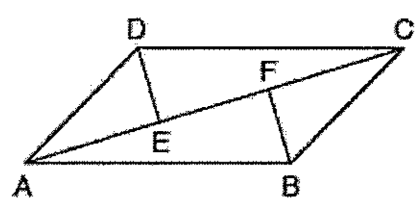
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

236 Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points W and E, respectively



Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

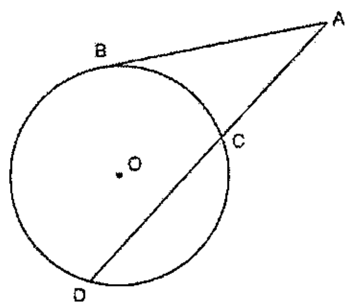
237 In quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points F and E.



Prove: $\overline{AE} \cong \overline{CF}$

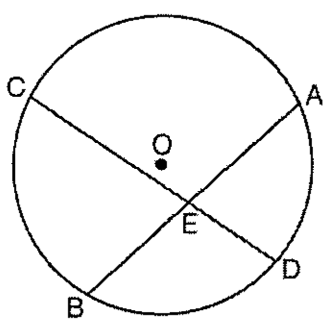
G.SRT.B.5: CIRCLE PROOFS

238 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point A to circle O.



Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. ($AC \cdot AD = AB^2$)

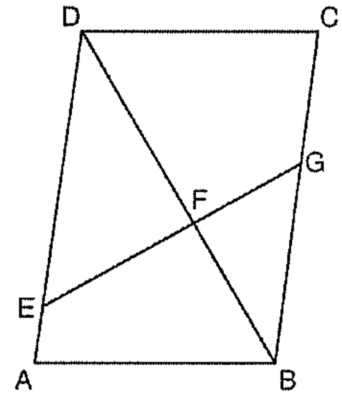
239 Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E



Theorem: If two chords intersect in a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord. Prove this theorem by proving $AE \cdot EB = CE \cdot ED$.

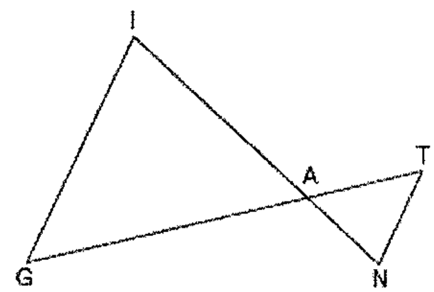
G.SRT.A.3, G.C.A.1: SIMILARITY PROOFS

240 Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$



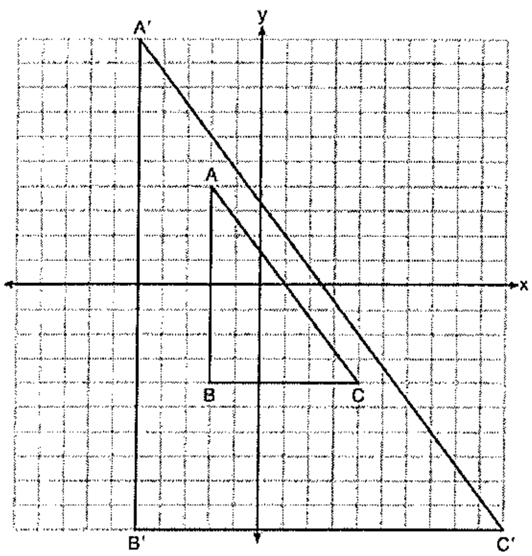
Prove: $\triangle DEF \sim \triangle BGF$

241 In the diagram below, $\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects $\overline{GT}$ at A.



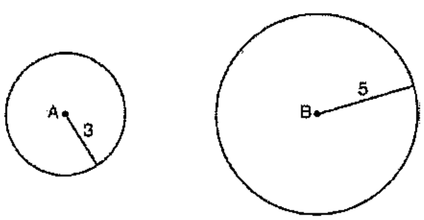
Prove: $\triangle GIA \sim \triangle TNA$

242 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.



Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

243 As shown in the diagram below, circle A has a radius of 3 and circle B has a radius of 5.



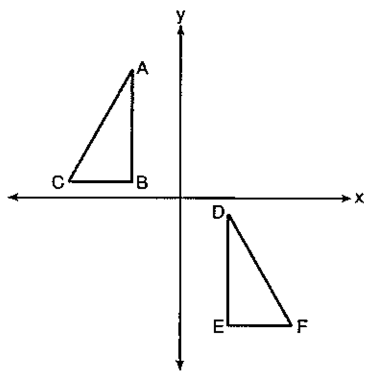
Use transformations to explain why circles A and B are similar.

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 In the diagram below, $\triangle ABC \cong \triangle DEF$.

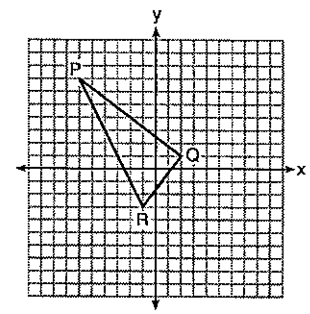


Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?

(1) a reflection over the x-axis followed by a translation
(2) a reflection over the y-axis followed by a translation
(3) a rotation of 180° about the origin followed by a translation
(4) a counterclockwise rotation of 90° about the origin followed by a translation

Use this space for computations.

2 On the set of axes below, the vertices of $\triangle PQR$ have coordinates $P(-6,7)$, $Q(2,1)$, and $R(-1,-3)$.



What is the area of $\triangle PQR$?

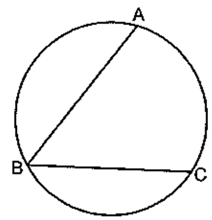
(1) 10
(2) 20
(3) 25
(4) 50

3 In right triangle ABC, $m\angle C = 90°$. If $\cos B = \frac{5}{13}$, which function also equals $\frac{5}{13}$?

(1) $\tan A$
(2) $\tan B$
(3) $\sin A$
(4) $\sin B$

4 In the diagram below, $m\widehat{ABC} = 268°$.

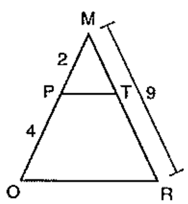
Use this space for computations.



What is the number of degrees in the measure of $\angle ABC$?

(1) 134° (3) 68°
(2) 92° (4) 46°

5 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.



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

(1) 4.5 (3) 3
(2) 5 (4) 6

6 A line segment is dilated by a scale factor of 2 centered at a point not on the line segment. Which statement regarding the relationship between the given line segment and its image is true?

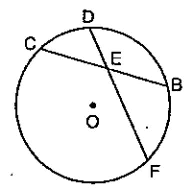
Use this space for computations.

(1) The line segments are perpendicular, and the image is one-half of the length of the given line segment.
(2) The line segments are perpendicular, and the image is twice the length of the given line segment.
(3) The line segments are parallel, and the image is twice the length of the given line segment.
(4) The line segments are parallel, and the image is one-half of the length of the given line segment.

7 Which figure always has exactly four lines of reflection that map the figure onto itself?

(1) square (3) regular octagon
(2) rectangle (4) equilateral triangle

8 In the diagram below of circle O, chord $\overline{DF}$ bisects chord $\overline{BC}$ at E.

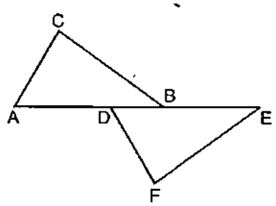


If $BC = 12$ and FE is 5 more than DE, then FE is

(1) 13 (3) 6
(2) 9 (4) 4

Use this space for computations.

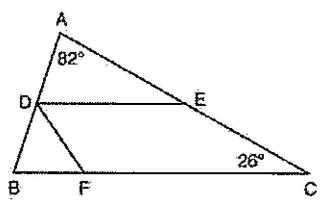
9 Kelly is completing a proof based on the figure below.



She was given that $\angle A \cong \angle EDF$, and has already proven $\overline{AB} \cong \overline{DE}$. Which pair of corresponding parts and triangle congruency method would *not* prove $\triangle ABC \cong \triangle DEF$?

(1) $\overline{AC} \cong \overline{DF}$ and SAS
(2) $\overline{BC} \cong \overline{EF}$ and SAS
(3) $\angle C \cong \angle F$ and AAS
(4) $\angle CBA \cong \angle FED$ and ASA

10 In the diagram below, $\overline{DE}$ divides $\overline{AB}$ and $\overline{AC}$ proportionally. $m\angle C = 26°$, $m\angle A = 82°$, and $\overline{DF}$ bisects $\angle BDE$.



The measure of angle DFB is

(1) 36°
(2) 54°
(3) 72°
(4) 82°

Use this space for computations.

11 Which set of statements would describe a parallelogram that can always be classified as a rhombus?

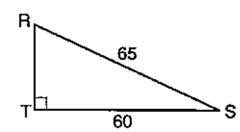
I. Diagonals are perpendicular bisectors of each other.
II. Diagonals bisect the angles from which they are drawn.
III. Diagonals form four congruent isosceles right triangles.

(1) I and II
(2) I and III
(3) II and III
(4) I, II, and III

12 The equation of a circle is $x^2 + y^2 - 12y + 20 = 0$. What are the coordinates of the center and the length of the radius of the circle?

(1) center (0,6) and radius 4
(2) center (0,−6) and radius 4
(3) center (0,6) and radius 16
(4) center (0,−6) and radius 16

13 In the diagram of $\triangle RST$ below, $m\angle T = 90°$, $RS = 65$, and $ST = 60$.



What is the measure of $\angle S$, to the *nearest degree*?

(1) 23°
(2) 43°
(3) 47°
(4) 67°

14 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation followed by a translation.

Which statement(s) would always be true with respect to this sequence of transformations?

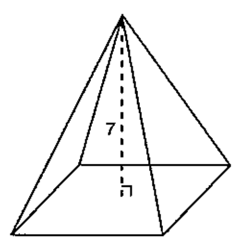
I. $\triangle ABC \cong \triangle A'B'C'$
II. $\triangle ABC \sim \triangle A'B'C'$
III. $\overline{AB} \parallel \overline{A'B'}$
IV. $AA' = BB'$

(1) II. only (3) II and III
(2) I and II (4) II, III, and IV

15 Line segment RW has endpoints $R(-4,5)$ and $W(6,20)$. Point P is on $\overline{RW}$ such that $RP:PW$ is 2:3. What are the coordinates of point P?

(1) (2,9) (3) (2,14)
(2) (0,11) (4) (10,2)

16 The pyramid shown below has a square base, a height of 7, and a volume of 84.

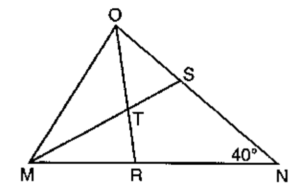


What is the length of the side of the base?

(1) 6 (3) 18
(2) 12 (4) 36

Use this space for computations.

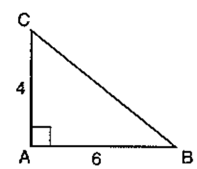
17 In the diagram below of triangle MNO, $\angle M$ and $\angle O$ are bisected by $\overline{MS}$ and $\overline{OR}$, respectively. Segments MS and OR intersect at T, and $m\angle N = 40°$.



If $m\angle TMR = 28°$, the measure of angle OTS is

(1) 40° (3) 60°
(2) 50° (4) 70°

18 In the diagram below, right triangle ABC has legs whose lengths are 4 and 6.



What is the volume of the three-dimensional object formed by continuously rotating the right triangle around $\overline{AB}$?

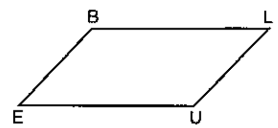
(1) 32π (3) 96π
(2) 48π (4) 144π

Use this space for computations.

19 What is an equation of a line that is perpendicular to the line whose equation is $2y = 3x - 10$ and passes through $(-6,1)$?

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

20 In quadrilateral $BLUE$ shown below, $\overline{BE} \cong \overline{UL}$.



Which information would be sufficient to prove quadrilateral $BLUE$ is a parallelogram?

(1) $\overline{BL} \parallel \overline{EU}$
(2) $\overline{LU} \parallel \overline{BE}$
(3) $\overline{BE} \cong \overline{BL}$
(4) $\overline{LU} \cong \overline{EU}$

21 A ladder 20 feet long leans against a building, forming an angle of 71° with the level ground. To the *nearest foot*, how high up the wall of the building does the ladder touch the building?

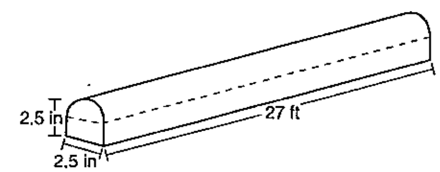
(1) 15
(2) 16
(3) 18
(4) 19

22 In the two distinct acute triangles ABC and DEF, $\angle B \cong \angle E$. Triangles ABC and DEF are congruent when there is a sequence of rigid motions that maps

(1) $\angle A$ onto $\angle D$, and $\angle C$ onto $\angle F$
(2) $\overline{AC}$ onto $\overline{DF}$, and $\overline{BC}$ onto $\overline{EF}$
(3) $\angle C$ onto $\angle F$, and $\overline{BC}$ onto $\overline{EF}$
(4) point A onto point D, and $\overline{AB}$ onto $\overline{DE}$

Use this space for computations.

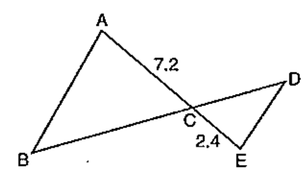
23 A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.



How much metal, to the *nearest cubic inch*, will the railing contain?

(1) 151
(2) 795
(3) 1808
(4) 2025

24 In the diagram below, $AC = 7.2$ and $CE = 2.4$.



Which statement is *not* sufficient to prove $\triangle ABC \sim \triangle EDC$?

(1) $\overline{AB} \parallel \overline{ED}$
(2) $DE = 2.7$ and $AB = 8.1$
(3) $CD = 3.6$ and $BC = 10.8$
(4) $DE = 3.0$, $AB = 9.0$, $CD = 2.9$, and $BC = 8.7$

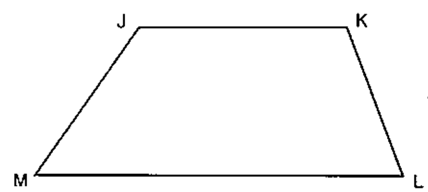
Use this space for computations.

Part II

Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [14]

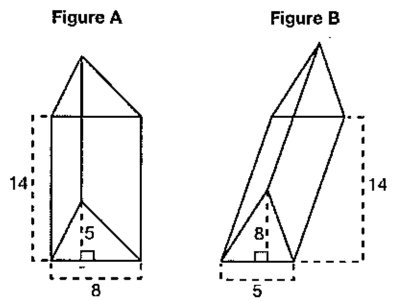
25 Given: Trapezoid $JKLM$ with $\overline{JK} \parallel \overline{ML}$

Using a compass and straightedge, construct the altitude from vertex J to $\overline{ML}$.
[Leave all construction marks.]



26 Determine and state, in terms of π, the area of a sector that intercepts a 40° arc of a circle with a radius of 4.5.

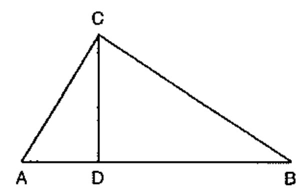
27 The diagram below shows two figures. Figure A is a right triangular prism and figure B is an oblique triangular prism. The base of figure A has a height of 5 and a length of 8 and the height of prism A is 14. The base of figure B has a height of 8 and a length of 5 and the height of prism B is 14.



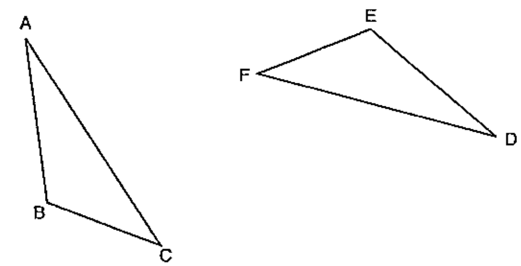
Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

28 When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in^3. After being fully inflated, its volume is approximately 294 in^3. To the *nearest tenth of an inch*, how much does the radius increase when the volleyball is fully inflated?

29 In right triangle ABC shown below, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. Explain why $\triangle ABC \sim \triangle ACD$.



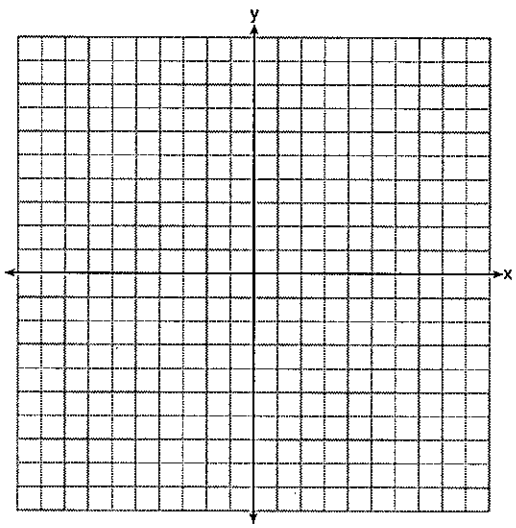
30 Triangle ABC and triangle DEF are drawn below.



If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\angle A \cong \angle D$, write a sequence of transformations that maps triangle ABC onto triangle DEF.

31 Line n is represented by the equation $3x + 4y = 20$. Determine and state the equation of line p, the image of line n, after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.]

Explain your answer.



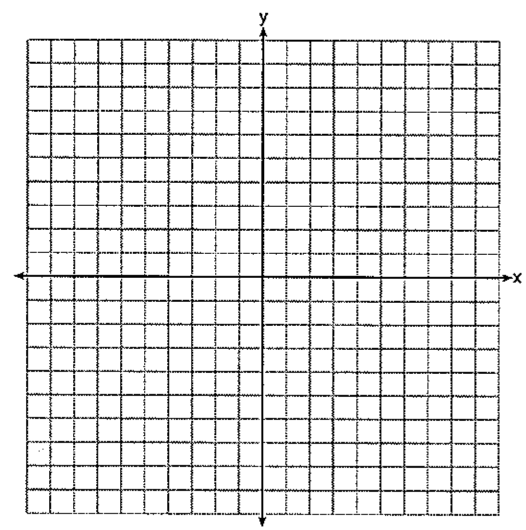
Part III

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

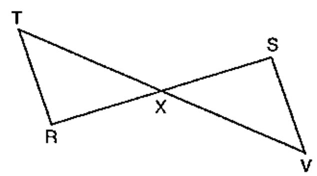
32 Triangle ABC has vertices at $A(-5,2)$, $B(-4,7)$, and $C(-2,7)$, and triangle DEF has vertices at $D(3,2)$, $E(2,7)$, and $F(0,7)$. Graph and label $\triangle ABC$ and $\triangle DEF$ on the set of axes below.

Determine and state the single transformation where $\triangle DEF$ is the image of $\triangle ABC$.

Use your transformation to explain why $\triangle ABC \cong \triangle DEF$.

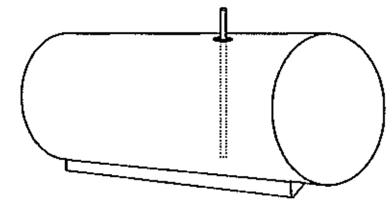


33 Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point X
$\overline{TR}$ and $\overline{SV}$ are drawn



Prove: $\overline{TR} \parallel \overline{SV}$

34 A gas station has a cylindrical fueling tank that holds the gasoline for its pumps, as modeled below. The tank holds a maximum of 20,000 gallons of gasoline and has a length of 34.5 feet.



A metal pole is used to measure how much gas is in the tank. To the *nearest tenth of a foot*, how long does the pole need to be in order to reach the bottom of the tank and still extend one foot outside the tank? Justify your answer. [1 ft^3 = 7.48 gallons]

Part IV

Answer the 2 questions in this part. Each correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

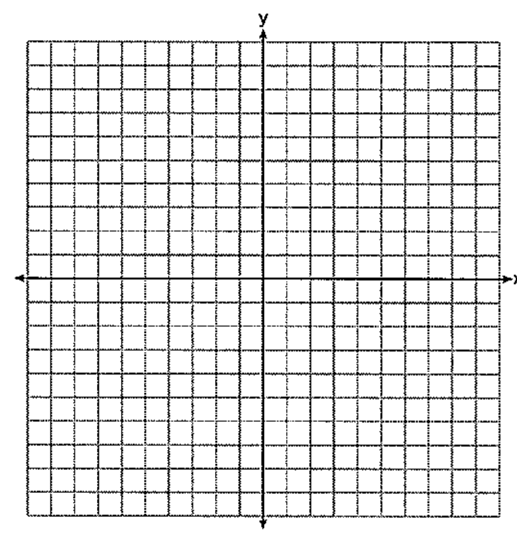
35 Quadrilateral *PQRS* has vertices $P(-2,3)$, $Q(3,8)$, $R(4,1)$, and $S(-1,-4)$.

Prove that *PQRS* is a rhombus.
[The use of the set of axes on the next page is optional.]

Question 35 is continued on the next page.

Question 35 continued.

Prove that *PQRS* is *not* a square.
[The use of the set of axes below is optional.]



36 Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, she sees the airplane at an angle of elevation of 52°. How far has the airplane traveled, to the *nearest foot*?

Determine and state the speed of the airplane, to the *nearest mile per hour*.

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 A two-dimensional cross section is taken of a three-dimensional object. If this cross section is a triangle, what can *not* be the three-dimensional object?

(1) cone
(2) cylinder
(3) pyramid
(4) rectangular prism

2 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will the triangles *not* be congruent?

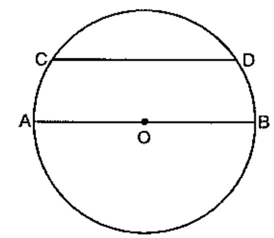
(1) a reflection through the origin
(2) a reflection over the line $y = x$
(3) a dilation with a scale factor of 1 centered at (2,3)
(4) a dilation with a scale factor of $\frac{3}{2}$ centered at the origin

3 The vertices of square $RSTV$ have coordinates $R(-1,5)$, $S(-3,1)$, $T(-7,3)$, and $V(-5,7)$. What is the perimeter of $RSTV$?

(1) $\sqrt{20}$
(2) $\sqrt{40}$
(3) $4\sqrt{20}$
(4) $4\sqrt{40}$

Use this space for computations.

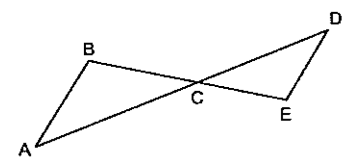
4 In the diagram below of circle O, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{CD} = 130$.



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

(1) 25
(2) 50
(3) 65
(4) 115

5 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.

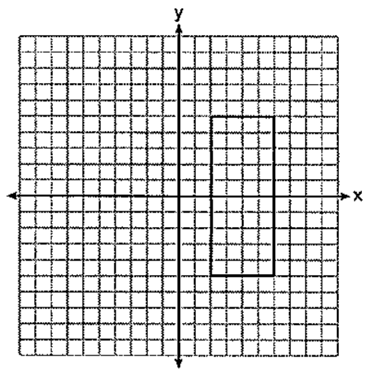


If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?

(1) 2.70
(2) 3.34
(3) 5.28
(4) 8.25

Use this space for computations.

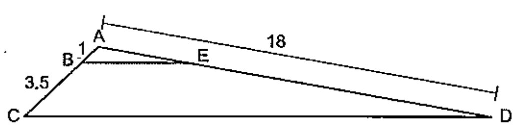
6 As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

(1) a reflection over the x-axis
(2) a reflection over the line $x = 4$
(3) a rotation of 180° about the origin
(4) a rotation of 180° about the point (4,0)

7 In the diagram below, triangle ACD has points B and E on sides $\overline{AC}$ and $\overline{AD}$, respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.

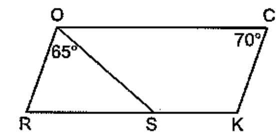


What is the length of $\overline{AE}$, to the *nearest tenth*?

(1) 14.0
(2) 5.1
(3) 3.3
(4) 4.0

Use this space for computations.

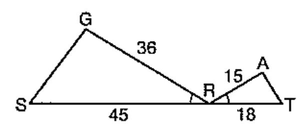
8 In the diagram below of parallelogram $ROCK$, $m\angle C$ is 70° and $m\angle ROS$ is 65°.



What is $m\angle KSO$?

(1) 45°
(2) 110°
(3) 115°
(4) 135°

9 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.



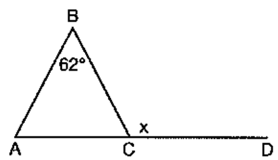
Which triangle similarity statement is correct?

(1) $\triangle GRS \sim \triangle ART$ by AA.
(2) $\triangle GRS \sim \triangle ART$ by SAS.
(3) $\triangle GRS \sim \triangle ART$ by SSS.
(4) $\triangle GRS$ is not similar to $\triangle ART$.

10 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?

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

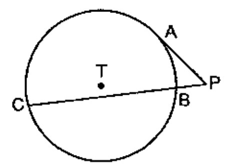
11 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to D, as shown below.



Which value of x makes $\overline{AB} \cong \overline{CB}$?

(1) 59°
(2) 62°
(3) 118°
(4) 121°

12 In the diagram shown below, $\overline{PA}$ is tangent to circle T at A, and secant $\overline{PBC}$ is drawn where point B is on circle T.

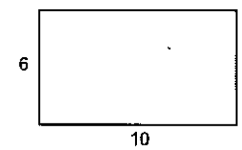


If $PB = 3$ and $BC = 15$, what is the length of $\overline{PA}$?

(1) $3\sqrt{5}$
(2) $3\sqrt{6}$
(3) 3
(4) 9

Use this space for computations.

13 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π.



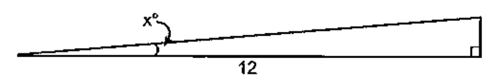
Which line could the rectangle be rotated around?

(1) a long side
(2) a short side
(3) the vertical line of symmetry
(4) the horizontal line of symmetry

14 If $ABCD$ is a parallelogram, which statement would prove that $ABCD$ is a rhombus?

(1) $\angle ABC \cong \angle CDA$
(2) $\overline{AC} \cong \overline{BD}$
(3) $\overline{AC} \perp \overline{BD}$
(4) $\overline{AB} \perp \overline{CD}$

15 To build a handicapped-access ramp, the building code states that for every 1 inch of vertical rise in height, the ramp must extend out 12 inches horizontally, as shown in the diagram below.



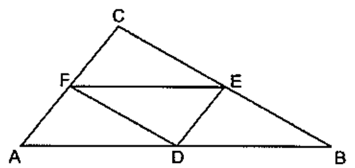
What is the angle of inclination, x, of this ramp, to the *nearest hundredth of a degree*?

(1) 4.76
(2) 4.78
(3) 85.22
(4) 85.24

Use this space for computations.

16 In the diagram below of $\triangle ABC$, D, E, and F are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.

Use this space for computations.



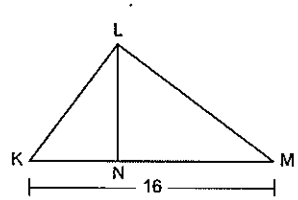
What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?

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

17 The coordinates of the endpoints of $\overline{AB}$ are $A(-8,-2)$ and $B(16,6)$. Point P is on $\overline{AB}$. What are the coordinates of point P, such that $AP:PB$ is 3:5?

(1) (1,1) (3) (9.6,3.6)
(2) (7,3) (4) (6.4,2.8)

18 Kirstie is testing values that would make triangle KLM a right triangle when $\overline{LN}$ is an altitude, and $KM = 16$, as shown below.



Which lengths would make triangle KLM a right triangle?

(1) $LM = 13$ and $KN = 6$ (3) $KL = 11$ and $KN = 7$
(2) $LM = 12$ and $NM = 9$ (4) $LN = 8$ and $NM = 10$

19 In right triangle ABC, $m\angle A = 32°$, $m\angle B = 90°$, and $AC = 6.2$ cm. What is the length of $\overline{BC}$, to the *nearest tenth of a centimeter*?

Use this space for computations.

(1) 3.3 (3) 5.3
(2) 3.9 (4) 11.7

20 The 2010 U.S. Census populations and population densities are shown in the table below.

State	Population Density $\left(\frac{\text{people}}{\text{mi}^2}\right)$	Population in 2010
Florida	350.6	18,801,310
Illinois	231.1	12,830,632
New York	411.2	19,378,102
Pennsylvania	283.9	12,702,379

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?

(1) Illinois, Florida, New York, Pennsylvania
(2) New York, Florida, Illinois, Pennsylvania
(3) New York, Florida, Pennsylvania, Illinois
(4) Pennsylvania, New York, Florida, Illinois

21 In a right triangle, $\sin(40 - x)° = \cos(3x)°$. What is the value of x?

(1) 10 (3) 20
(2) 15 (4) 25

22 A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be

(1) 10° (3) 225°
(2) 150° (4) 252°

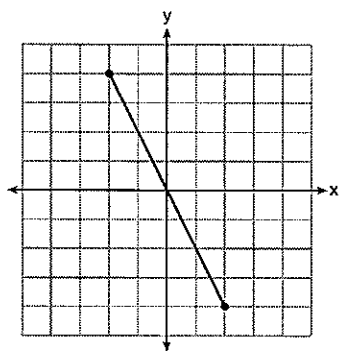
Use this space for computations.

23 In a circle with a diameter of 32, the area of a sector is $\frac{512\pi}{3}$. The measure of the angle of the sector, in radians, is

(1) $\frac{\pi}{3}$ (3) $\frac{16\pi}{3}$

(2) $\frac{4\pi}{3}$ (4) $\frac{64\pi}{3}$

24 What is an equation of the perpendicular bisector of the line segment shown in the diagram below?



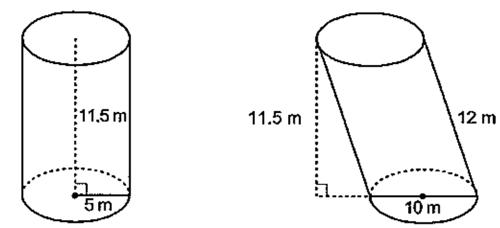
(1) $y + 2x = 0$ (3) $2y + x = 0$

(2) $y - 2x = 0$ (4) $2y - x = 0$

Part II

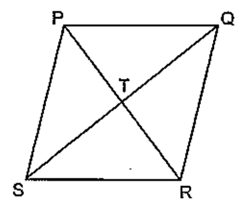
Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [14]

25 Sue believes that the two cylinders shown in the diagram below have equal volumes.

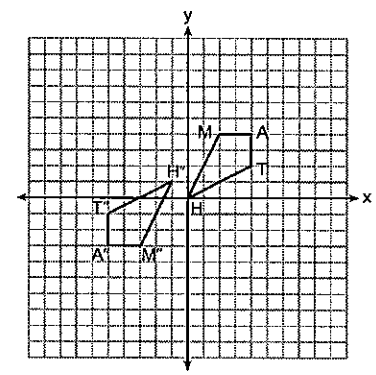


Is Sue correct? Explain why.

26 In the diagram of rhombus $PQRS$ below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point T, $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.

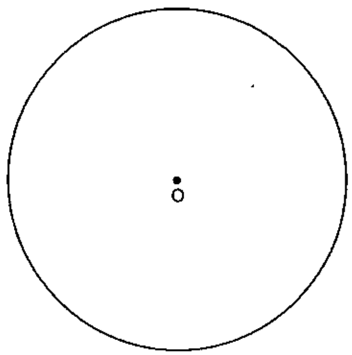


27 Quadrilateral $MATH$ and its image $M''A''T''H''$ are graphed on the set of axes below.



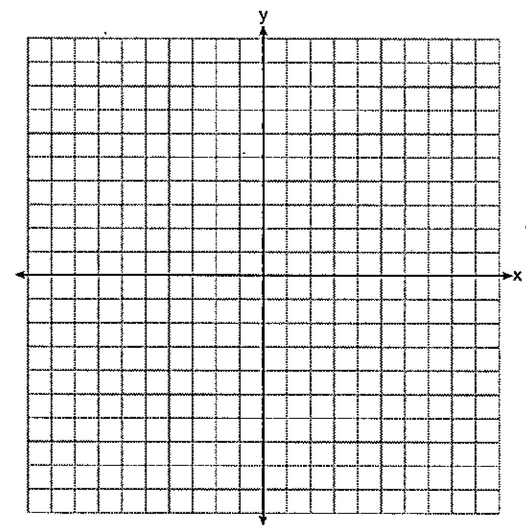
Describe a sequence of transformations that maps quadrilateral $MATH$ onto quadrilateral $M''A''T''H''$.

28 Using a compass and straightedge, construct a regular hexagon inscribed in circle O.
[Leave all construction marks.]

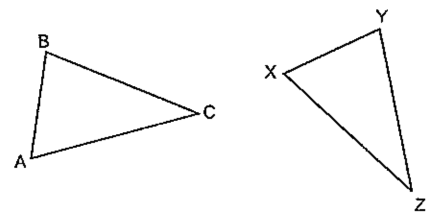


29 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin.

[The use of the set of axes below is optional.]



30 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.



Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

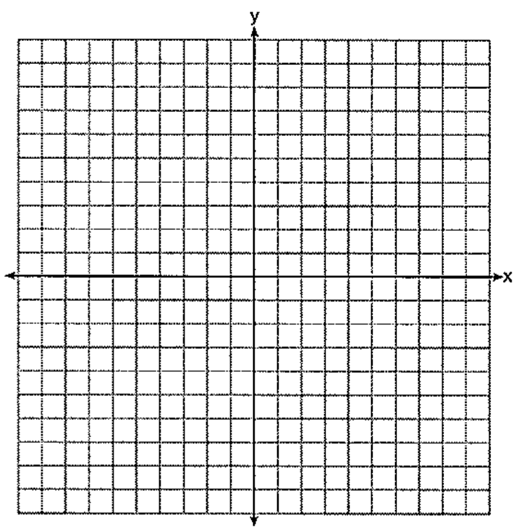
31 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

Part III

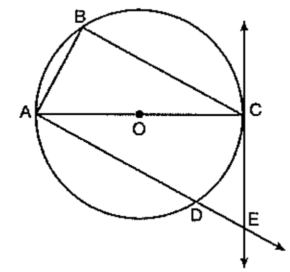
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

32 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$.

[The use of the set of axes below is optional.]

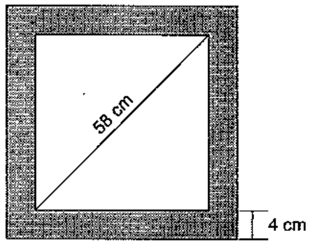


33 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overline{ADE}$, and chord $\overline{AB}$ is drawn.



Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

34 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.

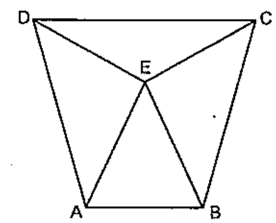


Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter.*

Part IV

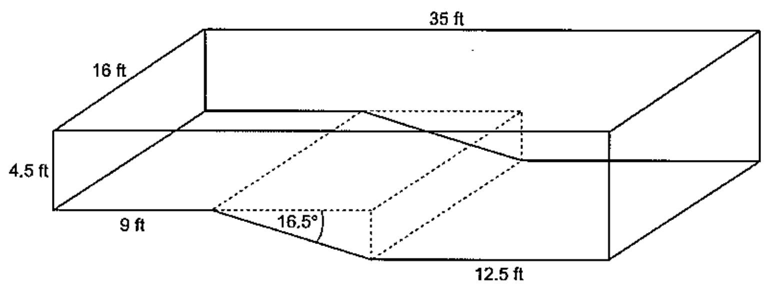
Answer the 2 questions in this part. Each correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

35 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

36 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.



If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?

Find the volume of the inside of the pool to the *nearest cubic foot*.

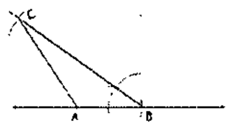
Question 36 is continued on the next page.

Question 36 continued

A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10.5 gallons per minute. How much time, to the *nearest hour*, will it take to fill the pool 6 inches from the top? [1 ft^3 = 7.48 gallons]

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

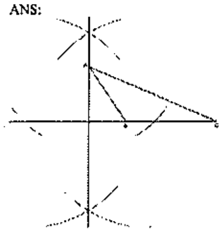
1 ANS:



SAS ≅ SAS

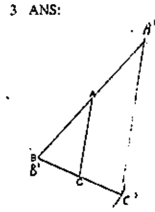
PTS: 4 REF: 011634geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

2 ANS:



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

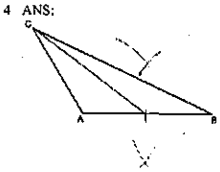
3 ANS:



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

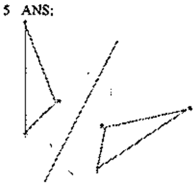
PTS: 4 REF: 081632geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

4 ANS:



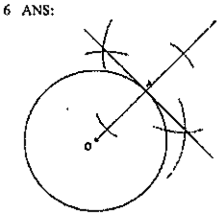
PTS: 2 REF: 081628geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

5 ANS:



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

6 ANS:

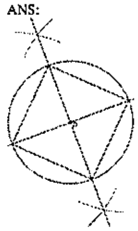


PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

7 ANS:

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

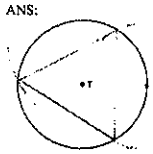
8 ANS:



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.

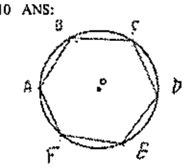
PTS: 4 REF: fall1412geo NAT: G.CO.D.13 TOP: Constructions

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

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

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

$-5+6$ $\quad -4+3$

1 $\quad -1$

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:

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

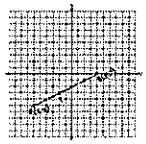
$4+\frac{4}{9}(18)$ $\quad 2+\frac{4}{9}(0)$

$4+8$ $\quad 2+0$

12 $\quad 2$

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

14 ANS:



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

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

$-6+4$ $-5+2$

-2 -3

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

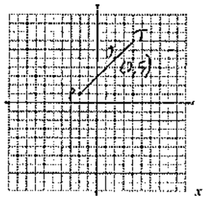
15 ANS: 1

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

1

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

16 ANS:



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

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

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

17 ANS: 4

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

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 $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.

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

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

$1=-4+b$

$5=b$

PTS: 2 REF: 081510geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: write equation of parallel line

26 ANS: 4

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

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

$-16=b$

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

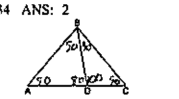
KEY: without graphics

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:

ΔMNO is congruent to ΔPNO by SAS. Since $\Delta MNO \cong \Delta PNO$, 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.

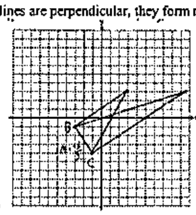
$39.375=39.375$

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 $-4 = \frac{2}{3}(-1) + b$

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

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

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

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

$3 = x$ $19 = 2x$

$9.5 = x$

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

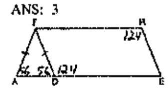
46 ANS: 1
$180 - (68 \cdot 2)$

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

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

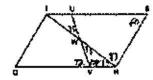
PTS: 2 REF: 081607geo NAT: G.CO.C.11 TOP: Parallelograms

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

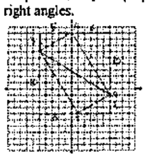
55 ANS: 3
$\frac{7-1}{0-2} = \frac{6}{-2} = -3$ The diagonals of a rhombus are perpendicular.

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. ΔRST 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.

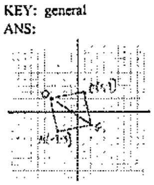


PTS: 6 REF: 061536geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

58 ANS: 1
$m_{\overline{TA}} = -1$ $y = mx + b$
$m_{\overline{EM}} = 1$ $1 = 1(2) + b$
$-1 = b$

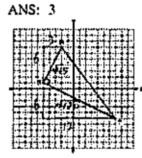
PTS: 2 REF: 081614geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: general

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

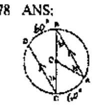
74 ANS: 3
$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$

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

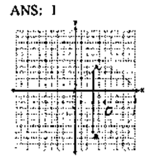
87 ANS: 4
$x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4$
$(x+3)^2 + (y-2)^2 = 36$

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

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

95 ANS: 1
$\frac{64}{4} = 16 \quad 16^2 = 256 \quad 2w + 2(w+2) = 64 \quad 15 \times 17 = 255 \quad 2w + 2(w+4) = 64 \quad 14 \times 18 = 252 \quad 2w + 2(w+6) = 64$
$w = 15 \qquad w = 14 \qquad w = 13$
$13 \times 19 = 247$

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

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

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. $\frac{x+5}{1.5} = \frac{x}{1}$ $\quad \frac{1}{3}\pi(1.5)^2(15) - \frac{1}{3}\pi(1)^2(10) \approx 24.9$

$x + 5 = 1.5x$

$5 = .5x$

$10 = x$

$10 + 5 = 15$

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:

$\frac{137.8}{6^3} \approx 0.638$ 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:

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

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

125 ANS: 2

$\frac{11}{1.2\text{ oz}}\left(\frac{16\text{ oz}}{1\text{ lb}}\right) = \frac{13.\bar{3}1}{\text{lb}} \quad \frac{13.\bar{3}1}{\text{lb}}\left(\frac{1\text{ g}}{3.7851}\right) \approx \frac{3.5\text{ g}}{1\text{ lb}}$

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:

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

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

128 ANS: 2

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

$4.5 = \pi d$

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

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

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

129 ANS:

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

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

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

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

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

131 ANS: 3

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

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

$90 = 90$

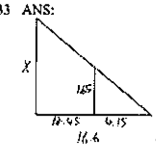
PTS: 2 REF: 061515geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

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 $\triangle DEF \cong \triangle A'B'C'$ because $\triangle DEF$ is a reflection of

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

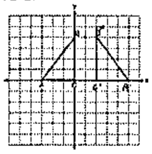
$B(6,-8) - (2,-3) = (4,-5) \rightarrow (5,4) + (2,-3) = B'(7,1)$

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

$\triangle A'B'C'$ 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

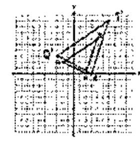
161 ANS: 1
$3^2 = 9$

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

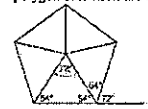
163 ANS:



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

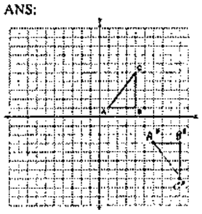
172 ANS:
$T_{0,-2} \circ r_{y\text{-axis}}$

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 28° and 62° 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

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

$T\approx 13.5$

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. $\tan 6=\frac{112-1.5}{x}$ $\tan(49+6)=\frac{112-1.5}{y}$ $\frac{1051.3-77.4}{5}\approx 195$

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

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

204 ANS:

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

$h=x\tan 52.8$

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

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

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

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

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

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

$x\approx 9$

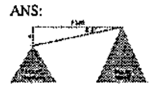
$\tan 52.8\approx\frac{h}{9}$

$x\approx 11.86$

$11.86+1.7\approx 13.6$

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

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

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

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

$A\approx 50°$

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

216 ANS:
$\tan x=\frac{12}{75}$ $\tan y=\frac{72}{75}$ $43.83-9.09\approx 34.7$

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

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

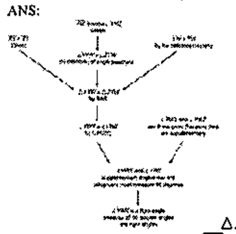
226 ANS:
(2) Euclid's Parallel Postulate; (3) Alternate interior angles formed by parallel lines and a transversal are congruent; (4) Angles forming a line are supplementary; (5) Substitution

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 90° 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

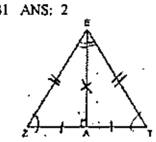
229 ANS:
As the sum of the measures of the angles of a triangle is 180°, $m\angle ABC + m\angle BCA + m\angle CAB = 180°$. Each interior angle of the triangle and its exterior angle form a linear pair. Linear pairs are supplementary, so $m\angle ABC + m\angle FBC = 180°$, $m\angle BCA + m\angle DCA = 180°$, 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). $m\angle BDC = \frac{1}{2} m\overset{\frown}{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $m\angle CBA = \frac{1}{2} m\overset{\frown}{BC}$ (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); $\frac{AE}{CE} = \frac{ED}{EB}$ (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:
$\overleftrightarrow{GI}$ is parallel to $\overleftrightarrow{NT}$, 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 $\frac{5}{2}$ 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 $\frac{5}{3}$. 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

June 2017 answers

Part I

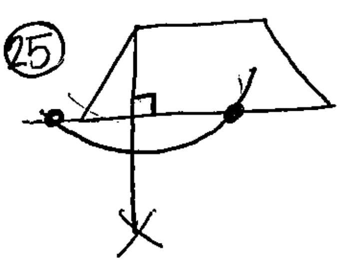
Allow a total of 48 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 2	(9) 2	(17) . . . . . 4 . . . . .
(2) 3	(10) 2	(18) . . . . . 1 . . . . .
(3) 3	(11) 4	(19) . . . . . 2 . . . . .
(4) 4	(12) 1	(20) . . . . . 2 . . . . .
(5) 4	(13) 1	(21) . . . . . 4 . . . . .
(6) 3	(14) . . . . . *	(22) . . . . ** . . . .
(7) 1	(15) 2	(23) . . . . . 3 . . . . .
(8) 2	(16) 1	(24) . . . . . 2 . . . . .

* **Question 14** — When scoring this question, either choice 1 or choice 3 should be awarded credit.

** **Question 22** — When scoring this question, all students should be awarded credit regard-less of the answer, if any, they record on the answer sheet for this question.

25



26 2.25π

27 Each prism has same base area + same height so volumes must be the same

28 0.6

29 ~ by AA. They both have a Right ∡ and they share angle A. (reflexive)

30 Rotate △ABC clockwise until $\overline{DF} \parallel \overline{AC}$ then translate along $\overline{CF}$ until C maps onto F.

31 CENTER ON LINE

equation stays the same

P: $3x + 4y = 20$

32 $r_{x=-1}$

Reflections are rigid motions which preserves distances, so the △'s are ≅.

33 Prove △'s ≅ by SAS (bisectors and vertical angles ≅) then show alternate interior ∠'s ≅ (CPCTC) That makes lines ∥.

34 10.9

35 Show all sides ≅ or 6slopes oppsides ∥ and diags ⊥

36 4883 ft / 210 mph

August 2017 Answers.

Part I

Allow a total of 48 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

(1) 2	(9) 4	(17) . . . . . 1 . . . . .
(2) 4	(10) 1	(18) . . . . . 2 . . . . .
(3) 3	(11) 4	(19) . . . . . 1 . . . . .
(4) 1	(12) 2	(20) . . . . . 1 . . . . .
(5) 4	(13) 3	(21) . . . . . 4 . . . . .
(6) 3	(14) 3	(22) . . . . . 4 . . . . .
(7) 4	(15) 1	(23) . . . . . 2 . . . . .
(8) 4	(16) 4	(24) . . . . . 4 . . . . .

(25) Yes, bases have same area and same height.

(26) 68

(27) answers may vary
R_{180} about $\left(-\frac{1}{2}, \frac{1}{2}\right)$

(28)

(29) 2.5

(30) Rigid motions preserve distances so Δ's must be congruent (ASA) which makes $\overline{BC} \cong \overline{YZ}$ by CPCTC

(31) $C = (3, -4)$
$r = 9$

(32) mdpts $(-2, 3)$
$(1, 5)$

slopes $\frac{2}{3}, \frac{2}{3}$
$\parallel$

dist $\sqrt{13}$
$2\sqrt{13}$ > half

(33) Proof

(34) 2402.2 cm^2

(35) Proof

(36) 8.5 ft
3752 ft^3
41 hours.