

GEOMETRY

Workbook

Common Core Standards Edition

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**Common Core High School Math Reference Sheet
(Algebra I, Geometry, Algebra II)**

CONVERSIONS

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilograms	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

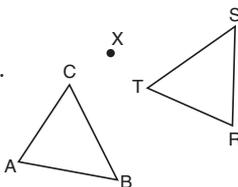
FORMULAS

Triangle	$A = \frac{1}{2}bh$	Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$	Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Circle	$C = \pi d$ or $C = 2\pi r$	Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$	Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Cylinder	$V = \pi r^2 h$	Radians	1 radian = $\frac{180}{\pi}$ degrees
Sphere	$V = \frac{4}{3}\pi r^3$	Degrees	1 degree = $\frac{\pi}{180}$ radians
Cone	$V = \frac{1}{3}\pi r^2 h$	Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$		

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 in the space provided [48]

1. After a counterclockwise rotation about point X , scalene triangle ABC maps onto $\triangle RST$, as shown in the diagram. Which statement must be true?

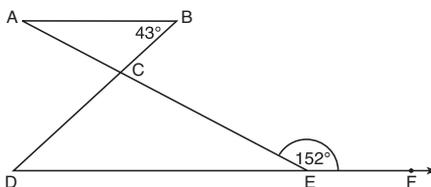
- (1) $\angle A \cong \angle R$ (3) $\overline{CB} \cong \overline{TR}$
 (2) $\angle A \cong \angle S$ (4) $\overline{CA} \cong \overline{TS}$



1 _____

2. In the diagram, $\overline{AB} \parallel \overline{DEF}$, \overline{AE} and \overline{BD} intersect at C , $m\angle B = 43^\circ$, and $m\angle CEF = 152^\circ$.

- Which statement is true?
 (1) $m\angle D = 28^\circ$ (3) $m\angle ACD = 71^\circ$
 (2) $m\angle A = 43^\circ$ (4) $m\angle BCE = 109^\circ$

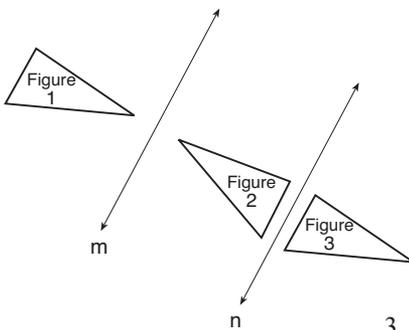


2 _____

3. In the diagram, line m is parallel to line n . Figure 2 is the image of Figure 1 after a reflection over line m . Figure 3 is the image of Figure 2 after a reflection over line n .

Which single transformation would carry Figure 1 onto Figure 3?

- (1) a dilation (3) a reflection
 (2) a rotation (4) a translation

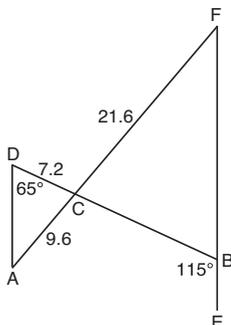


3 _____

4. In the diagram, \overline{AF} and \overline{DB} intersect at C , and \overline{AD} and \overline{FB} are drawn such that $m\angle D = 65^\circ$, $m\angle CBE = 115^\circ$, $DC = 7.2$, $AC = 9.6$, and $FC = 21.6$.

What is the length of \overline{CB} ?

- (1) 3.2
 (2) 4.8
 (3) 16.2
 (4) 19.2



4 _____

GEOMETRY

June 2018

5. Given square $RSTV$, where $RS = 9$ cm. If square $RSTV$ is dilated by a scale factor of 3 about a given center, what is the perimeter, in centimeters, of the image of $RSTV$ after the dilation?

- (1) 12 (2) 27 (3) 36 (4) 108 5 _____

6. In right triangle ABC , hypotenuse \overline{AB} has a length of 26 cm, and side \overline{BC} has a length of 17.6 cm. What is the measure of angle B , to the nearest degree?

- (1) 48° (2) 47° (3) 43° (4) 34° 6 _____

7. The greenhouse pictured can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet. To the nearest cubic foot, what is the volume of the greenhouse?

- (1) 17,869 (3) 39,074
(2) 24,937 (4) 67,349



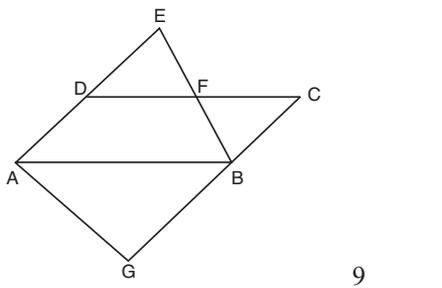
8. In a right triangle, the acute angles have the relationship $\sin(2x + 4) = \cos(46)$. What is the value of x ?

- (1) 20 (2) 21 (3) 24 (4) 25 8 _____

9. In the diagram $\overline{AB} \parallel \overline{DC}$, $\overline{ED} \parallel \overline{CB}$, and \overline{EF} and \overline{AG} are drawn.

Which statement is always true?

- (1) $\triangle DEF \cong \triangle CBF$
(2) $\triangle BAG \cong \triangle BAE$
(3) $\triangle BAG \sim \triangle AEB$
(4) $\triangle DEF \sim \triangle AEB$

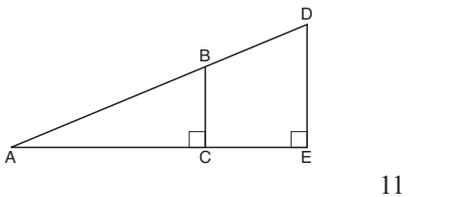


10. The base of a pyramid is a rectangle with a width of 4.6 cm and a length of 9 cm. What is the height, in centimeters, of the pyramid if its volume is 82.8 cm^3 ?

- (1) 6 (2) 2 (3) 9 (4) 18 10 _____

11. In the diagram of right triangle AED , $\overline{BC} \parallel \overline{DE}$. Which statement is always true?

- (1) $\frac{AC}{BC} = \frac{DE}{AE}$ (3) $\frac{AC}{CE} = \frac{BC}{DE}$
(2) $\frac{AB}{AD} = \frac{BC}{DE}$ (4) $\frac{DE}{BC} = \frac{DB}{AB}$



11 _____

June 2018

12. What is an equation of the line that passes through the point (6, 8) and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

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

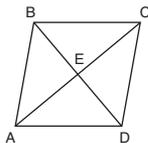
(3) $y + 8 = \frac{3}{2}(x + 6)$

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

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

12 ____

13. The diagram shows parallelogram $ABCD$ with diagonals \overline{AC} and \overline{BD} intersecting at E .



What additional information is sufficient to prove that parallelogram $ABCD$ is also a rhombus?

(1) \overline{BD} bisects \overline{AC} .

(3) \overline{AC} is congruent to \overline{BD} .

(2) \overline{AB} is parallel to \overline{CD} .

(4) \overline{AC} is perpendicular to \overline{BD} .

13 ____

14. Directed line segment DE has endpoints $D(-4, -2)$ and $E(1, 8)$. Point F divides \overline{DE} such that $DF:FE$ is 2:3. What are the coordinates of F ?

(1) $(-3, 0)$

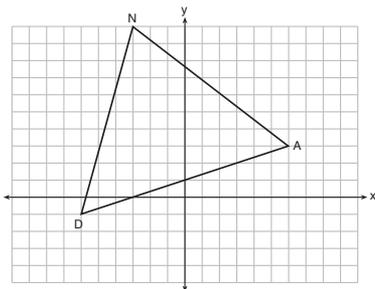
(2) $(-2, 2)$

(3) $(-1, 4)$

(4) $(2, 4)$

14 ____

15. Triangle DAN is graphed on the set of axes. The vertices of $\triangle DAN$ have coordinates $D(-6, -1)$, $A(6, 3)$, and $N(-3, 10)$.



What is the area of $\triangle DAN$?

(1) 60

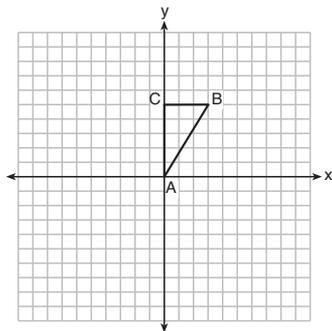
(3) $20\sqrt{13}$

(2) 120

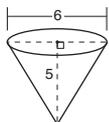
(4) $40\sqrt{13}$

15 ____

16. Triangle ABC , with vertices at $A(0, 0)$, $B(3, 5)$, and $C(0, 5)$, is graphed on the set of axes shown.



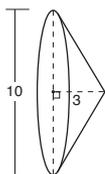
Which figure is formed when $\triangle ABC$ is rotated continuously about \overline{BC} ?



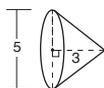
(1)



(2)



(3)

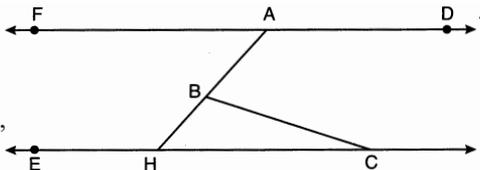


(4)

16 ____

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 in the space provided [48]

1. In the diagram, $\overleftrightarrow{FAD} \parallel \overleftrightarrow{EHC}$, and \overline{ABH} and \overline{BC} are drawn.



If $m\angle FAB = 48^\circ$ and $m\angle ECB = 18^\circ$, what is $m\angle ABC$?

- (1) 18° (3) 66°
 (2) 48° (4) 114°

1 _____

2. A cone has a volume of 108π and a base diameter of 12. What is the height of the cone?

- (1) 27 (2) 9 (3) 3 (4) 4

2 _____

3. Triangle JGR is similar to triangle MST . Which statement is *not* always true?

- (1) $\angle J \cong \angle M$ (2) $\angle G \cong \angle T$ (3) $\angle R \cong \angle T$ (4) $\angle G \cong \angle S$

3 _____

4. In parallelogram $ABCD$, diagonals \overline{AC} and \overline{BD} intersect at E . Which statement proves $ABCD$ is a rectangle?

- (1) $\overline{AC} \cong \overline{BD}$ (2) $\overline{AB} \perp \overline{BD}$ (3) $\overline{AC} \perp \overline{BD}$ (4) \overline{AC} bisects $\angle BCD$

4 _____

5. The endpoints of directed line segment \overline{PQ} have coordinates of $P(-7, -5)$ and $Q(5, 3)$. What are the coordinates of point A , on \overline{PQ} , that divide \overline{PQ} into a ratio of 1:3?

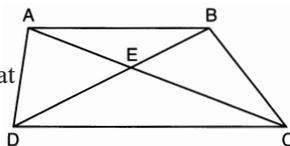
- (1) $A(-1, -1)$ (2) $A(2, 1)$ (3) $A(3, 2)$ (4) $A(-4, -3)$

5 _____

6. In trapezoid $ABCD$, $\overline{AB} \parallel \overline{CD}$.

If $AE = 5.2$, $AC = 11.7$, and $CD = 10.5$, what is the length of \overline{AB} , to the nearest tenth?

- (1) 4.7 (3) 8.4
 (2) 6.5 (4) 13.1

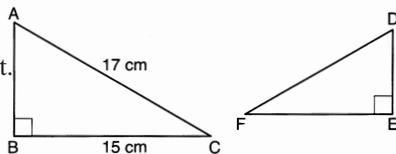


6 _____

7. Kayla was cutting right triangles from wood to use for an art project. Two of the right triangles she cut are shown to the right.

If $\triangle ABC \sim \triangle DEF$, with right angles B and E , $BC = 15$ cm, and $AC = 17$ cm, what is the measure of $\angle F$, to the nearest degree?

- (1) 28° (2) 41° (3) 62° (4) 88°

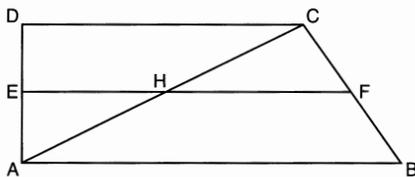


7 _____

8. The line represented by $2y = x + 8$ is dilated by a scale factor of k centered at the origin, such that the image of the line has an equation of $y - \frac{1}{2}x = 2$. What is the scale factor?

- (1) $k = \frac{1}{2}$ (2) $k = 2$ (3) $k = \frac{1}{4}$ (4) $k = 4$ 8 _____

9. In quadrilateral $ABCD$, $\overline{AB} \parallel \overline{CD}$, and E , H , and F are the midpoints of \overline{AD} , \overline{AC} , and \overline{BC} , respectively.



If $AB = 24$, $CD = 18$, and $AH = 10$, then FH is

- (1) 9 (2) 10 (3) 12 (4) 21 9 _____

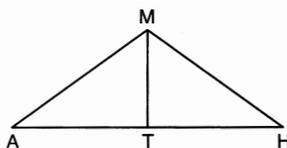
10. Jaden is comparing two cones. The radius of the base of cone A is twice as large as the radius of the base of cone B . The height of cone B is twice the height of cone A . The volume of cone A is

- (1) twice the volume of cone B
 (2) four times the volume of cone B
 (3) equal to the volume of cone B
 (4) equal to half the volume of cone B 10 _____

11. A regular hexagon is rotated about its center. Which degree measure will carry the regular hexagon onto itself?

- (1) 45° (2) 90° (3) 120° (4) 135° 11 _____

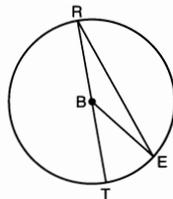
12. In accompanying triangle MAH , \overline{MT} is the perpendicular bisector of \overline{AH} .



Which statement is *not* always true?

- (1) $\triangle MAH$ is isosceles.
 (2) $\triangle MAT$ is isosceles.
 (3) \overline{MT} bisects $\angle AMH$.
 (4) $\angle A$ and $\angle TMH$ are complementary. 12 _____

13. In accompanying circle B , diameter \overline{RT} , radius \overline{BE} , and chord \overline{RE} are drawn.



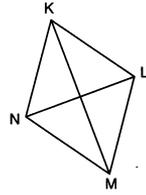
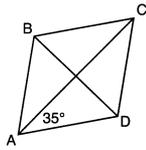
If $m\angle TRE = 15^\circ$ and $BE = 9$, then the area of sector EBR is

- (1) 3.375π (2) 6.75π (3) 33.75π (4) 37.125π 13 _____

14. Lou has a solid clay brick in the shape of a rectangular prism with a length of 8 inches, a width of 3.5 inches, and a height of 2.25 inches. If the clay weighs 1.055 oz/in^3 , how much does Lou's brick weigh, to the nearest ounce?

- (1) 66 (2) 64 (3) 63 (4) 60 14 _____

15. Rhombus $ABCD$ can be mapped onto rhombus $KLMN$ by a rotation about point P , as shown to the right.

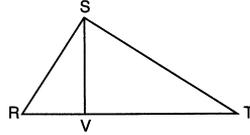


What is the measure of $\angle KNM$ if the measure of $\angle CAD = 35^\circ$?

- (1) 35° (3) 70°
 (2) 55° (4) 110°

15 _____

16. In accompanying right triangle RST , altitude \overline{SV} is drawn to hypotenuse \overline{RT} .

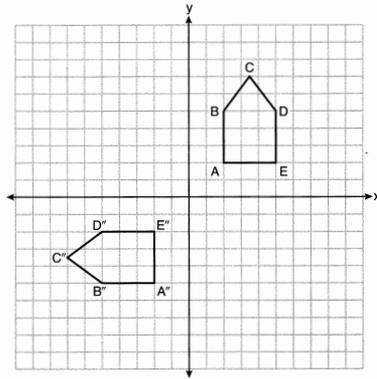


If $RV = 4.1$ and $TV = 10.2$, what is the length of \overline{ST} , to the nearest tenth?

- (1) 6.5 (2) 7.7 (3) 11.0 (4) 12.1

16 _____

17. On the accompanying set of axes, pentagon $ABCDE$ is congruent to $A''B''C''D''E''$.



Which describes a sequence of rigid motions that maps $ABCDE$ onto $A''B''C''D''E''$?

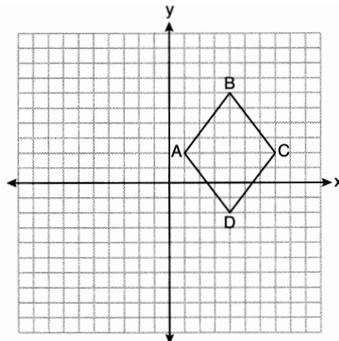
- (1) a rotation of 90° counterclockwise about the origin followed by a reflection over the x -axis
 (2) a rotation of 90° counterclockwise about the origin followed by a translation down 7 units
 (3) a reflection over the y -axis followed by a reflection over the x -axis
 (4) a reflection over the x -axis followed by a rotation of 90° counterclockwise about the origin

17 _____

18. On the set of axes, rhombus $ABCD$ has vertices whose coordinates are $A(1, 2)$, $B(4, 6)$, $C(7, 2)$, and $D(4, -2)$.

What is the area of rhombus $ABCD$?

- (1) 20
 (2) 24
 (3) 25
 (4) 48



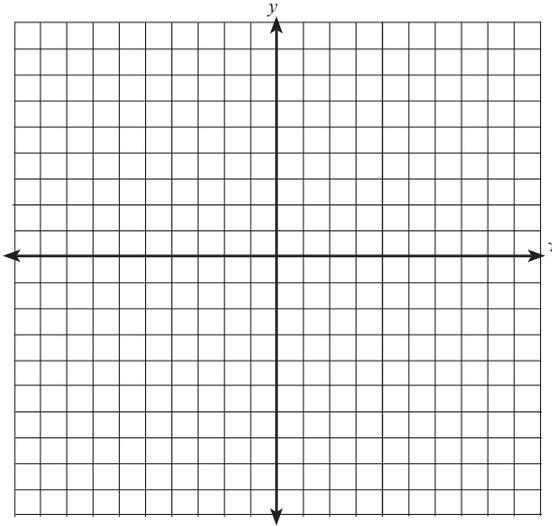
18 _____

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. Quadrilateral $NATS$ has coordinates $N(-4, -3)$, $A(1, 2)$, $T(8, 1)$, and $S(3, -4)$.

Prove quadrilateral $NATS$ is a rhombus.

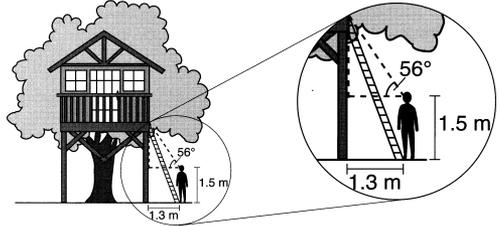
[The use of the set of axes below is optional.]



January 2020

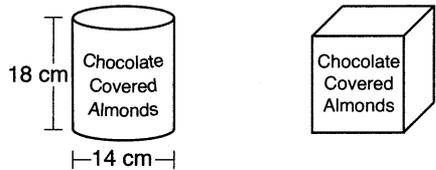
33. David has just finished building his treehouse and still needs to buy a ladder to be attached to the ledge of the treehouse and anchored at a point on the ground, as modeled below. David is standing 1.3 meters from the stilt supporting the treehouse. This is the point on the ground where he has decided to anchor the ladder. The angle of elevation from his eye level to the bottom of the treehouse is 56 degrees. David's eye level is 1.5 meters above the ground.

Determine and state the minimum length of a ladder, to the *nearest tenth of a meter*, that David will need to buy for his treehouse.



34. A manufacturer is designing a new container for their chocolate-covered almonds. Their original container was a cylinder with a height of 18 cm and a diameter of 14 cm. The new container can be modeled by a rectangular prism with a square base and will contain the same amount of chocolate-covered almonds.

If the new container's height is 16 cm, determine and state, to the *nearest tenth of a centimeter*, the side length of the new container if both containers contain the same amount of almonds.



A store owner who sells the chocolate-covered almonds displays them on a shelf whose dimensions are 80 cm long and 60 cm wide. The shelf can only hold one layer of new containers when each new container sits on its square base. Determine and state the maximum number of new containers the store owner can fit on the shelf.

Answer the question in this part. A 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. 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. [6]

35. In quadrilateral $ABCD$, E and F are points on \overline{BC} and \overline{AD} , respectively, and \overline{BGD} and \overline{EGF} are drawn such that $\angle ABG \cong \angle CDG$, $\overline{AB} \cong \overline{CD}$, and $\overline{CE} \cong \overline{AF}$.

Prove: $\overline{FG} \cong \overline{EG}$

