END OF COURSE GEOMETRY

Form M0110, CORE 1
# Geometry Formula Sheet

## Geometric Formulas

### Volumes
- **Cylinder:** $V = \pi r^2 h$
- **Cone:** $V = \frac{1}{3} \pi r^2 h$
- **Sphere:** $V = \frac{4}{3} \pi r^3$
- **Rectangular Solid:** $V = lwh$
- **Triangular Prism:** $V = \frac{1}{2} bh$ (lateral area) $V = \frac{1}{2} lh$ (total surface area)

### Areas
- **Triangle:** $A = \frac{1}{2} bh$
- **Parallelogram:** $A = bh$
- **Trapezoid:** $A = \frac{1}{2} (b_1 + b_2) h$
- **Circle:** $A = \pi r^2$

### Abbreviations
- **Volume** $V$
- **Lateral Area** $L.A.$
- **Total Surface Area** $S.A.$
- **Area of Base** $B$

### Geometric Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>$\triangle ABC$</td>
<td>triangle $ABC$</td>
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<tr>
<td>$\Box ABCD$</td>
<td>rectangle $ABCD$</td>
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<tr>
<td>$\square ABCD$</td>
<td>parallelogram $ABCD$</td>
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<td>$\angle A$</td>
<td>angle $A$</td>
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<tr>
<td>$m \angle A$</td>
<td>measure of angle $A$</td>
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<tr>
<td>$\overrightarrow{AB}$</td>
<td>line segment $AB$</td>
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<tr>
<td>$\overrightarrow{AB} \parallel \overrightarrow{CD}$</td>
<td>line $AB$ is parallel to line $CD$</td>
</tr>
<tr>
<td>$\overrightarrow{AB} \perp \overrightarrow{CD}$</td>
<td>line $AB$ is perpendicular to line $CD$</td>
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<tr>
<td>$\angle A \cong \angle B$</td>
<td>angle $A$ is congruent to angle $B$</td>
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<tr>
<td>$\Delta A \sim \Delta B$</td>
<td>Triangle $A$ is similar to triangle $B$</td>
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### Pi
- $\pi \approx 3.14$
- $\pi \approx \frac{22}{7}$
Read each question and choose the best answer.

**SAMPLE**

If $\triangle ABC$ is similar to $\triangle ADE$, then $AB : AD = ? : AE$. Which replaces the “?” to make the statement true?

A  $AC$
B  $AE$
C  $DE$
D  $BC$
1 A bisector of \( \overline{AB} \) contains which line segment?

- \( \overline{CG} \)
- \( \overline{DF} \)
- \( \overline{DG} \)
- \( \overline{EF} \)
2. Lines \( m \) and \( r \) are cut by a transversal.

\[ (3x - 35)° \]

\[ (7x - 115)° \]

What value of \( x \) will show that line \( m \) is parallel to line \( r \)?

- F 20
- G 24
- H 25
- J 33

3. If lines \( a \) and \( b \) are parallel, what is the value of \( x \)?

- A 120
- B 115
- C 65
- D 60
4. Which point lies on the bisector of angle $PQR$?

- F W
- G X
- H Y
- J Z

5. For what measure of $\angle D$ is $\overline{AB} \parallel \overline{DC}$ in this figure?

- A $26^\circ$
- B $59^\circ$
- C $69^\circ$
- D $95^\circ$
Which line segment is congruent to $\overline{BC}$?

F $\overline{PQ}$

G $\overline{PR}$

H $\overline{PS}$

J $\overline{PT}$
In the figure shown, line \( q \) is a transversal of parallel lines \( l, m, n, \) and \( p \).

What are the values of \( x \) and \( y \) ?

A  \( x = 30, \ y = 30 \)
B  \( x = 30, \ y = 150 \)
C  \( x = 150, \ y = 30 \)
D  \( x = 150, \ y = 150 \)
8 In the figure shown, parallel lines $j$ and $k$ are cut by transversal $m$.

What is $m\angle 1$?

F 32°
G 58°
H 122°
J 148°
9  Lines $y$ and $z$ are cut by a transversal.

For what value of $x$ is $y \parallel z$?

A  13  
B  77  
C  103  
D  154
10  In this figure, $m\angle 1 = (15x - 5)^\circ$ and $m\angle 2 = (10x + 35)^\circ$.

What is $m\angle 1$?

F  $31^\circ$
G  $65^\circ$
H  $85^\circ$
J  $115^\circ$

11  This figure represents line segments painted on a parking lot to create parking spaces.

Which equation can be used to show that these line segments are parallel?

A  $118 - w = x$
B  $118 - x = w$
C  $x + 118 = 180$
D  $w + 118 = 180$
12 Given: \( \triangle ABC \sim \triangle LMN \)

What is the length of \( \overline{AC} \)?

F 11  
G 12  
H 22  
J 24

13 Given the following measures of the sides of triangles, which is a right triangle?

A 41 cm, 40 cm, 9 cm  
B 45 ft, 40 ft, 35 ft  
C 52 in., 50 in., 11 in.  
D 45 yd, 35 yd, 25 yd
Which of the following statements must be true about this Venn diagram?

F  All rectangles are rhombi.
G  Some rhombi are rectangles.
H  Quadrilaterals are not rhombi or rectangles.
J  All quadrilaterals are rhombi and rectangles.
15  Given: In this figure, \( \overline{AC} \) and \( \overline{BD} \) bisect each other.

Based on the information given, which triangle congruence theorem could be used to prove \( \triangle AED \cong \triangle CEB \) ?

A  Angle-Angle-Side (AAS)
B  Angle-Side-Angle (ASA)
C  Side-Angle-Side (SAS)
D  Side-Side-Side (SSS)

16  Statement: *If lines are skew, then they are not coplanar.*

What is the contrapositive of the statement?

F  If lines are not coplanar, then they are skew.
G  If lines are not skew, then they are coplanar.
H  If lines are coplanar, then they are not skew.
J  If lines are skew, then they are coplanar.
17 Coordinates $A(2, 5)$, $B(6, 4)$, and $C(6, 0)$ are connected to form $\triangle ABC$.

If $\triangle CDA$ is congruent to $\triangle ABC$, what are the coordinates of $D$?

A  $(1, 1)$  
B  $(1, 2)$  
C  $(2, 2)$  
D  $(2, 1)$
18 Let $p = \text{An equation is of the form } y = mx + b$. Let $q = \text{Its graph is a line.}$

Argument: If an equation is of the form $y = mx + b$, then its graph is a line. The graph is not a line. Therefore, the equation is not of the form $y = mx + b$.

Which of the following is the symbolic representation of the given argument?

F

\[
\begin{align*}
p & \rightarrow q \\
\sim q & \\
\therefore \sim p
\end{align*}
\]

G

\[
\begin{align*}
p & \rightarrow q \\
q & \\
\therefore p
\end{align*}
\]

H

\[
\begin{align*}
p & \rightarrow q \\
\sim p & \\
\therefore \sim q
\end{align*}
\]

J

\[
\begin{align*}
p & \rightarrow q \\
p & \\
\therefore q
\end{align*}
\]
19 \( \triangle TRG \) is a right triangle.

Which is closest to the length of \( \overline{RT} \) ?

A 5  
B 11  
C 14  
D 28
Which list has the sides of \( \triangle ABC \) ordered from longest to shortest?

- **F** \( \overline{BC}, \overline{AC}, \overline{AB} \)
- **G** \( \overline{AB}, \overline{AC}, \overline{BC} \)
- **H** \( \overline{AC}, \overline{AB}, \overline{BC} \)
- **J** \( \overline{BC}, \overline{AB}, \overline{AC} \)

21 Three survey markers are located on a map at points \( H, I, \) and \( J \). A triangle is formed by connecting these markers by string so that \( HI = 150 \) feet, \( HJ = 245 \) feet, and \( IJ = 365 \) feet.

Which statement is true about the measures of the angles of \( \triangle HIJ \)?

- **A** \( \angle H \) is the smallest
- **B** \( \angle H \) is the largest
- **C** \( \angle I \) is the smallest
- **D** \( \angle I \) is the largest
In the figure, what is the value of $x$?

F 6
G $6\sqrt{2}$
H $6\sqrt{3}$
J 12

23 Two sides of a triangle measure 14 inches and 8 inches. Which cannot be the length of the remaining side?

A 6 in.
B 8 in.
C 14 in.
D 21 in.
In the circle, what is the measure of \( \angle ABC \)?

F 30°
G 60°
H 120°
J 140°

25  This figure shows a pattern of triangles and regular hexagons.

What is the value of \( x \)?

A 30
B 60
C 90
D 120
26. Which figure has all sides of equal measure but not necessarily all angles of equal measure?

- F  Square
- G  Rectangle
- H  Rhombus
- J  Trapezoid

27. What is $m\angle DAR$ in circle $A$?

- A  $17^\circ$
- B  $34^\circ$
- C  $56^\circ$
- D  $68^\circ$
28 Two chords intersect with the measures shown in the drawing.

What is the value of $x$?

- F 8.0
- G 9.5
- H 10.0
- J 14.5

29 In rectangle $ABCD$, the slope of $AB$ is $\frac{1}{2}$. What is the slope of $CD$?

- A $-2$
- B $-\frac{1}{2}$
- C $\frac{1}{2}$
- D 2
30 In the figure shown, what is \( m \angle WXY \) ?

\[
\begin{align*}
Y & \quad 62^\circ \\
X & \quad Z \\
\end{align*}
\]

- F 45°  
- G 107°  
- H 120°  
- J 135°  

31 \( DEFG \) is a rhombus with \( m \angle EFG = 28^\circ \).

What is \( m \angle GDE \) ?

- A 14°  
- B 28°  
- C 30°  
- D 56°
32  This figure is a traffic sign in the shape of a regular octagon.  

![Stop Sign](image)

What is the value of $x$ ?  

- **F** 45  
- **G** 60  
- **H** 135  
- **J** 180

33  A rectangular rug is 24 feet long and 10 feet wide. A rhombus design is formed inside the rug by joining the midpoints of each side of the rectangle. What is the length of each side of the rhombus?  

- **A** 13 ft  
- **B** 26 ft  
- **C** 169 ft  
- **D** 240 ft
34 A man who is 6 feet tall casts a shadow that is 4 feet long. At the same time, a nearby flagpole casts a shadow that is 18 feet long. How tall is the flagpole?

F 10 ft
G 12 ft
H 22 ft
J 27 ft

35 A fish tank in the shape of a rectangular prism has these dimensions:

- length = 20 inches
- width = 10 inches
- height = 12 inches

What is the volume of water in the tank when it is \( \frac{4}{5} \) full?

A 1,120 cu in.
B 1,920 cu in.
C 2,400 cu in.
D 3,000 cu in.
36 Which of these nets would form a cube when folded?

F

G

H

J

37 If a cube with side length 6 inches has its dimensions divided in half, what will be the volume of the new cube?

A  108 cubic inches
B  54 cubic inches
C  27 cubic inches
D  9 cubic inches
38 A right cone is placed on its circular base.

Which statement about the cone is incorrect?

F The view from the front is a triangle.
G The view from the bottom is a circle.
H The view from the top is a circle.
J The view from the left is a rhombus.

39 A cone has a slant height of 10 centimeters and a lateral area of $60\pi$ square centimeters. What is the volume of a sphere with a radius equal to that of the cone?

A $102\pi$ cm$^3$
B $144\pi$ cm$^3$
C $288\pi$ cm$^3$
D $1,333\pi$ cm$^3$
40 Which line of reflection maps point $K$ at $(-2, 2)$ to point $K'$ at $(2, -2)$?

- F $y = 2$
- G $y = x$
- H $x$-axis
- J $y$-axis

41 If the coordinates of $A$ are $(1, 1)$ and the midpoint of $AB$ is $(-2, 0)$, then the coordinates of $B$ are —

- A $(-0.5, 0.5)$
- B $(0.5, 0.5)$
- C $(-1, 0)$
- D $(-5, -1)$
42. Which transformation could move the triangle $P$ to triangle $P'$ in a single step?

F. Reflection over $x = 4$

G. Rotation about $(2, 3)$

H. Reflection over $y = 4$

J. Translation
43 Figure *STARFIND* is symmetric with respect to the $x$-axis. The coordinates of point $A$ are $(8, 6)$. What are the coordinates of point $N$?

A $(8, -6)$
B $(6, -8)$
C $(-6, 8)$
D $(-8, 6)$
Parallelogram $RSTV$ has coordinates $R(0, 0), S(2, 4), T(6, 0),$ and $V(4, -4)$. Which ordered pair represents the intersection of the diagonals of this parallelogram? (The coordinate grid may be used to help answer this question.)

- **F** $(2, 0)$
- **G** $(3, 0)$
- **H** $(3, 1)$
- **J** $(4, -1)$
45 A regular quadrilateral has what type of symmetry?

A  Line symmetry only
B  Point symmetry only
C  Both point and line symmetry
D  Neither point nor line symmetry
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<th>Reporting Category Description</th>
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If you get this many items correct: | Then your converted scale score is:
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0 | 000
1 | 177
2 | 213
3 | 234
4 | 250
5 | 263
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35 | 442
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41 | 497
42 | 513
43 | 534
44 | 569
45 | 600

A total raw score (left column) is converted to a total scaled score (right column). The total scaled score may range from 0 to 600.

A scaled score of 400 or more means the student passed the SOL test, while a scaled score of 399 or less means the student did not pass the test. A scaled score of 500 or more indicates the student passed the SOL test at an advanced level.