The Geometry FSA Mathematics Practice Test Answer Key provides the correct response(s) for each item on the practice test. The practice questions and answers are not intended to demonstrate the length of the actual test, nor should student responses be used as an indicator of student performance on the actual test.
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Session 1
1. In the figure, $\overline{AB} \parallel \overline{CD}$ and $\overline{BC} \parallel \overline{AE}$. Let $\angle ABD$ measure $(3x + 4)^\circ$, $\angle BCD$ measure $(6x - 8)^\circ$, and $\angle EDF$ measure $(7x - 20)^\circ$.

Click on the blank to enter the degree measure that completes the equation shown.

$m \angle BCD = 68.5$
2. Match each building with the geometric shapes that can be used to model it.

<table>
<thead>
<tr>
<th>Cone</th>
<th>Cylinder</th>
<th>Pyramid</th>
<th>Rectangular Prism</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td>☑</td>
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</tr>
</tbody>
</table>
3. In the diagram shown, chords $AB$ and $CD$ intersect at $E$. The measure of $\angle AC$ is $120^\circ$, the measure of $\angle DB$ is $(2x)^\circ$, and the measure of $\angle AEC$ is $(4x)^\circ$.

What is the degree measure of $\angle AED$?

100
4. Triangle \( SRT \) is shown.

There are three highlights in the paragraph that show equations or phrases that are missing. For each highlight, click on the correct equation or phrase.

The vertices of \( \triangle SRT \) are \( S (1, 4), R (2, 2), \) and \( T (1, 3) \). A reflection across the line \( y = -x + 6 \) and then across the line \( y = -x + 10 \) is the same as a translation of 4 units to the right and 4 units up because the lines are \( \text{parallel} \).
5. A proof with some missing statements and reasons is shown.

Given: 
- PQRS is a parallelogram.
- PQ = QR

Prove: PQRS is a rhombus.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1. Given</td>
</tr>
<tr>
<td>2.</td>
<td>2. Given</td>
</tr>
<tr>
<td>3. PQ = SR and PS = QR</td>
<td>3. Opposite sides of a parallelogram are congruent.</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
<tr>
<td>5. PQ = QR = RS = SP</td>
<td>5.</td>
</tr>
<tr>
<td>6. PQRS is a rhombus.</td>
<td>6.</td>
</tr>
</tbody>
</table>

Drag the correct statement from the statements column and the correct reason from the reasons column to the table to complete line 3 of the proof.

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT = TR and ST = TQ</td>
<td>Diagonals of a parallelogram bisect each other.</td>
</tr>
<tr>
<td>ΔPTQ = ΔQTR</td>
<td>Opposite angles of a parallelogram are congruent.</td>
</tr>
<tr>
<td>LSPQ = LQRS</td>
<td>Side-Side-Side</td>
</tr>
</tbody>
</table>
6. Johnny wants to find the equation of a circle with center \((3, -4)\) and a radius of 7. He uses the argument shown.

There are three highlights in the argument to show missing words or phrases. For each highlight, click on the word or phrase that correctly fills in the blank.

<table>
<thead>
<tr>
<th>Johnny’s Argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let ((x, y)) be any point on the circle. Then, the horizontal distance from ((x, y)) to the center is (\text{_<strong><strong>?</strong></strong>__}</td>
</tr>
</tbody>
</table>
Session 1  FSA Geometry Practice Test Answer Key

7. Kyle defines a circle as “the set of all the points equidistant from a given point.”

Explain why Kyle’s definition is not precise enough.

Type your answer in the space provided.

Because his definition is also true for a sphere.

Other correct responses include:

• His definition is not precise enough. He should specify that the set of points is on a plane.
Regular pentagon $EFGHI$ with center $K$ is shown.

Select all the transformations that carry pentagon $EFGHI$ onto itself.

- a reflection across line $EK$, a $180^\circ$ counterclockwise rotation about point $K$, and a reflection across a vertical line through point $K$.
- a $90^\circ$ counterclockwise rotation about point $E$, a reflection across line $FG$, and a vertical translation.
- a reflection across line $FI$, a reflection across line $GH$, and a $180^\circ$ clockwise rotation about point $K$.
- a reflection across a vertical line through point $K$, a $180^\circ$ clockwise rotation about point $K$, and a reflection across line $EK$.
- a $180^\circ$ clockwise rotation about point $E$, a reflection across a vertical line through point $E$, and a reflection across a horizontal line through point $E$.
9. Alejandro cut a circle with circumference $C$ and radius $r$ into 8 congruent sectors and used them to make the figure shown.

Alexandro noticed that the figure was very close to the shape of a parallelogram. Select all the statements that apply to the figure.

- The height of the parallelogram is approximately equal to the circle's diameter.
- The area of the parallelogram is approximately $\frac{1}{2}Cr$.
- The length of the parallelogram is approximately equal to the circle's circumference.
- The radius of the circle is approximately equal to the height of the parallelogram.
- The area of the parallelogram is approximately $8\left(\frac{45}{360} \pi r^2\right)$. 

10. Evelyn is designing a pattern for a quilt using polygon \( EQFRGSHP \) shown.

Evelyn transforms \( EQFRGSHP \) so that the image of \( E \) is at \((2, 0)\) and the image of \( R \) is at \((6, -7)\).

Which transformation could Evelyn have used to show \( EQFRGSHP \) and its image are congruent?

A. \( EQFRGSHP \) was reflected over the line \( y = x + 2 \).

B. \( EQFRGSHP \) was translated right 7 units and down 4 units.

C. \( EQFRGSHP \) was rotated 135 degrees clockwise about the point \( Q \).

D. \( EQFRGSHP \) was rotated 90 degrees clockwise about the point \((-3, -1)\).
11. Mrs. Henry gave her students an incomplete proof as shown.

Given: \( \overline{RQ} \parallel \overline{TX} \)
\( \angle FNH \equiv \angle NPR \)

Prove: \( \angle RWV \equiv \angle XWZ \)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( \overline{RQ} \parallel \overline{TX} )</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. ( \angle FNH \equiv \angle NPR )</td>
<td>2. Given</td>
</tr>
<tr>
<td>3. ( \angle FNH \equiv \angle RWV )</td>
<td>3. If two parallel lines are cut by a transversal, the corresponding angles are congruent.</td>
</tr>
<tr>
<td>4. ( \angle RWV \equiv \angle XWZ )</td>
<td>4. Vertical angles are congruent.</td>
</tr>
<tr>
<td>5. ( \angle FNH \equiv \angle XWZ )</td>
<td>5. Transitive property</td>
</tr>
<tr>
<td>6. ( \angle NPR \equiv \angle RVW )</td>
<td>6. If two parallel lines are cut by a transversal, the alternate interior angles are congruent.</td>
</tr>
<tr>
<td>7. ( \angle RVW \equiv \angle XWZ )</td>
<td>7. Transitive property</td>
</tr>
</tbody>
</table>

Complete the proof by dragging the correct reasons to the table for lines 3 and 6.

**Reason 3**
- Vertical angles are congruent.
- If two parallel lines are cut by a transversal, the alternate exterior angles are congruent.
- If two parallel lines are cut by a transversal, the alternate interior angles are congruent.
- If two parallel lines are cut by a transversal, the corresponding angles are congruent.

**Reason 6**
- Vertical angles are congruent.
- If two parallel lines are cut by a transversal, the alternate exterior angles are congruent.
- If two parallel lines are cut by a transversal, the alternate interior angles are congruent.
- If two parallel lines are cut by a transversal, the corresponding angles are congruent.
12. Trapezoid $ABCD$ is inscribed in circle $O$. Diagonals $BD$ and $AC$ meet at point $E$ and $AD$ is parallel to $BC$, as shown.

Select the angles and value that make a true statement about trapezoid $ABCD$. 

$$m\angle ABC = 180^\circ - m\angle ADC$$
Katherine uses $\triangle ABC$, where $DE \parallel AC$, to prove that a line parallel to one side of a triangle divides the other two sides proportionally. A part of her proof is shown.

**Statements** | **Reasons**
---|---
1. $DE \parallel AC$ | 1. Given
2. $\angle BDE \cong \angle BAC$ and $\angle BED \cong \angle BCA$ | 2.
3. $\triangle BAC \sim \triangle BDE$ | 3.
4. $\frac{BA}{BD} = \frac{BC}{BE}$ | 4.
5. $BA = BD + DA; BC = BE + EC$ | 5. Segment addition postulate
6. | 6.
7. | 7.
8. | 8. Subtraction property of equality

Which statement completes step 8 of the proof?

- $BA - BD = DA$ and $BC - BE = EC$
- $AD = BD$ and $CE = BE$
- $\frac{BA}{BC} = \frac{DA}{EC}$
- $\frac{DA}{BD} = \frac{EC}{BE}$
14. Circle A has a center at the origin and a point D located on the circle at (1,0). Circle B has a center at (1, -2) and a point E located on the circle at (4, -2).

Logan performs two transformations on circle A to show that circle A is similar to circle B. He first dilates the circle with the center of dilation at the origin and then translates the new circle.

What are the algebraic descriptions of the two transformations?

\[
\begin{align*}
(x, y) &\rightarrow (3x, 3y) \\
(x, y) &\rightarrow (x+1, y-2)
\end{align*}
\]
Session 1  FSA Geometry Practice Test Answer Key

15. The equation for line $A$ is shown.

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

Line $A$ and line $B$ are perpendicular, and the point $(-2,1)$ lies on line $B$.

Write an equation for line $B$.

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

*Other correct responses: any equivalent equation*
16. A rectangle and a horizontal line segment are shown.

What is the resulting object when the rectangle is rotated around the horizontal line segment?

- (Correct Answer)
- 
- 
- 
- 
17. Triangle $R'T'V'$ is shown on the graph.

Triangle $R'T'V'$ is formed using the transformation $(0.2x, 0.2y)$ centered at $(0, 0)$.

Select the three equations that show the correct relationship between the two triangles based on the transformation.

- $RV = 5R'V'\checkmark$

- $\frac{R'V'}{RV} = \frac{\sqrt{26}}{0.2\sqrt{26}}$

- $0.2\sqrt{10}RT = \sqrt{10}R'T'\checkmark$

- $RT = 0.2R'T'$

- $0.2T'V' = TV$

- $\frac{TV}{T'V'} = \frac{\sqrt{34}}{0.2\sqrt{34}}\checkmark$
18. Nicole, Jeremy, and Frances each perform a transformation on triangle $RST$. Each recorded his or her transformation and the location of $S'$ in the table. Point $S$ of triangle $RST$ is located at $(5, -7)$.

Complete the table to determine the values of $a$ and $b$ that make the algebraic descriptions of each person’s transformation true.

<table>
<thead>
<tr>
<th>Student</th>
<th>Transformation</th>
<th>Location of $S'$</th>
<th>$a$</th>
<th>$b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicole</td>
<td>$(x, y) \rightarrow (x + a, y + b)$</td>
<td>$(-6, 12)$</td>
<td>-11</td>
<td>19</td>
</tr>
<tr>
<td>Jeremy</td>
<td>$(x, y) \rightarrow (ax, by)$</td>
<td>$(-15, 21)$</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>Frances</td>
<td>$(x, y) \rightarrow (ax + 1, by - 6)$</td>
<td>$(-4, 8)$</td>
<td>-1</td>
<td>-2</td>
</tr>
</tbody>
</table>
This is the end of Session 1.
Session 2
19. Given: $\triangle RST$ is a right triangle.

$SV \perp RT$

$\triangle RST \cong \triangle SVT$

$\triangle RST \cong \triangle RVS$

Let $RS = a$, $ST = b$, $SV = f$, $RV = d$, $VT = e$, and $RT = c$.

Prove: $a^2 + b^2 = c^2$.

An incomplete proof is shown.

Click on each blank to select a statement for row 3 and row 5 in the table.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\triangle RST$ is a right triangle. $SV \perp RT$ $\triangle RST \cong \triangle SVT$ $\triangle RST \cong \triangle RVS$</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. $\triangle SVT \cong \triangle RVS$</td>
<td>2. Transitive Property</td>
</tr>
<tr>
<td>3. $\frac{a}{d} = \frac{c}{f}$, $\frac{b}{e} = \frac{c}{b}$</td>
<td>3. Definition of Similarity</td>
</tr>
<tr>
<td>4.</td>
<td>4.</td>
</tr>
<tr>
<td>5. $a^2 + b^2 = cd + ce$</td>
<td>5. Addition Property of Equality</td>
</tr>
<tr>
<td>6.</td>
<td>6. Distributive Property</td>
</tr>
<tr>
<td>7. $RV + VT = RT$</td>
<td>7. Segment Addition Postulate</td>
</tr>
<tr>
<td>8.</td>
<td>8. Substitution</td>
</tr>
<tr>
<td>9. $a^2 + b^2 = c^2$</td>
<td>9. Substitution</td>
</tr>
</tbody>
</table>
Points $A$, $B$, and $C$ are collinear and $AB:AC = \frac{2}{5}$. Point $A$ is located at $(-3, 6)$, point $B$ is located at $(n, q)$, and point $C$ is located at $(-3, -4)$.

What are the values of $n$ and $q$?

$n = -3$
$q = 2$
21. A figure is shown, where \( \overline{DE} \) is parallel to \( \overline{BC} \).

![Diagram of triangle with parallel lines]

Given: \( \overline{DE} \parallel \overline{BC} \)  
Prove: \( \angle ABC + \angle BCA + \angle CAB = 180^\circ \)

Drag statements from the statements column and reasons from the reasons column to their correct location to complete the proof.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( \overline{DE} \parallel \overline{BC} )</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. ( \angle DAB \equiv \angle ABC )</td>
<td>2. If two parallel lines are cut by a transversal, then the alternate interior angles are congruent.</td>
</tr>
<tr>
<td>3. ( \angle EAC = \angle ACB )</td>
<td>3. If two parallel lines are cut by a transversal, the alternate interior angles are congruent.</td>
</tr>
<tr>
<td>4. ( \angle DAE = 180^\circ )</td>
<td>4. Supplementary angles</td>
</tr>
<tr>
<td>5. ( \angle DAB + \angle CAB + \angle EAC = \angle DAE )</td>
<td>5. Angle addition</td>
</tr>
<tr>
<td>6. ( \angle DAB + \angle CAB + \angle EAC = 180^\circ )</td>
<td>6. Substitution</td>
</tr>
<tr>
<td>7. ( \angle ABC + \angle BCA + \angle CAB = 180^\circ )</td>
<td>7. Substitution</td>
</tr>
</tbody>
</table>

Other correct responses: Statements 2 and 3 may be switched.
22. Quadrilateral $MATH$ is shown.

Quadrilateral $MATH$ is dilated by a scale factor of 2.5 centered at $(1, 1)$ to create quadrilateral $M'AT'H'$. Select all the statements that are true about the dilation.

- $MA = M'A'$
- $A'T'$ will overlap $AT$.
- $H'A'$ will overlap $HA$.
- The slope of $HT$ is equal to the slope of $H'T'$.
- The area of $M'AT'H'$ is equal to 2.5 times the area of $MATH$. 

23. Circle Q has a radius, $r$, in units. The measure of $\angle AQB$ is $x^\circ$, as shown.

A. Create an expression using $r$ and $x$ that can be used to find the length of $\overline{AB}$, in units.

B. Then, create an expression that could be used to find the length of $\overline{AB}$, in units, if circle Q were dilated by a scale factor of 3.7.

\[
A. \quad \frac{x \pi r}{180} \\
B. \quad \frac{3.7 \pi r x}{180}
\]

Other correct responses: any equivalent expressions
24. The trunk of a palm tree has cylindrical tubes that carry water. Each tube is 0.0003 meters wide. One of the tubes in a palm tree trunk is shown.

A. Using the diagram as a model, approximately how many tubes could fit in a palm tree trunk with a diameter of 0.5 meters?

B. The tubes in a palm tree are between 20 to 21 meters long. What is the approximate volume, in cubic meters, of one tube?

A. 2777778
B. 0.00000141

**Other correct responses:**
- for part A, 2,777,777; and
- for part B, any value in the range of $1.41 \times 10^{-6}$ to $1.49 \times 10^{-6}$
25. One diagonal of square $EFGH$ is shown on the coordinate grid.

There are two highlights in the sentence to show which word or phrase may be incorrect. For each highlight, click the word or phrase that is correct.

The location of point $F$ could be $(-1,6)$ because diagonals of a square are congruent and ______?______ are perpendicular.
26. Polygon $ABCDE$ is shown on the coordinate grid.

What is the perimeter, to the nearest hundredth of a unit, of polygon $ABCDE$?

20.31
27. Ruben carries out a construction using \( \triangle ABC \). Click the play button to see a part of his construction.

What will be the result of Ruben’s construction?

A. Ruben constructs a segment perpendicular to \( \overline{AC} \).
B. Ruben constructs the bisector of \( \overline{AC} \).
C. Ruben constructs an angle congruent to \( \angle B \).
D. Ruben constructs the bisector of \( \angle B \).
28. As phosphate is mined, it moves along a conveyor belt, falling off of the end of the belt into the shape of a right circular cone, as shown.

A shorter conveyor belt also has phosphate falling off of the end into the shape of a right circular cone. The height of the second pile of phosphate is 3.6 feet shorter than the height of the first. The volume of both piles is the same.

To the nearest tenth of a foot, what is the diameter of the second pile of phosphate?

55.6
29. Gabriel wrote a partial narrative proof to prove $FD \cong BD$.

Given: $\overline{AD}$ bisects $\angle EAC$

$\angle FDA \cong \angle BDA$

Prove: $FD \cong BD$

There are three highlights in the paragraph to show blanks in the proof. For each highlight, click on the word or phrase to fill in the blank.

It is given that $\overline{AD}$ bisects $\angle EAC$, and $\angle FDA \cong \angle BDA$. Since $\overline{AD}$ bisects $\angle EAC$, then $\angle DAE \cong \angle DAC$ from the definition of angle bisector. $\overline{AD} \cong \overline{AD}$ by the reflexive property. $\triangle DAF \cong \triangle DAB$ because of $\cong \overline{ASA}$. Therefore, $FD \cong BD$ because corresponding parts of congruent triangles are congruent.

Other correct responses: $DAB$, then $DAF$, then $ASA$
30. The population of Florida in 2010 was 18,801,310 and the land area was 53,625 square miles. The population increased 5.8% by 2014.

A. To the nearest whole number, what is the population density, in people per square mile, for Florida in 2014?

B. To the nearest whole number, how much did the population density, in people per square mile, increase from 2010 to 2014?

A. 371

B. 20

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>0</td>
<td>.</td>
<td>-</td>
</tr>
</tbody>
</table>
31. The Leaning Tower of Pisa is 56.84 meters (m) long.

In the 1990s, engineers restored the building so that angle $y$ changed from $5.5^\circ$ to $3.99^\circ$.

To the nearest hundredth of a meter, how much did the restoration change the height of the Leaning Tower of Pisa?

\[ 0.12 \]
GO ON TO THE NEXT PAGE.
32. Triangles $BKW$ and $DMT$ are shown where $\angle B \cong \angle D$, $\angle K \cong \angle T$, and $\overline{BK} \cong \overline{DT}$.

This question has three parts.

Rashaad performs a sequence of transformations on $\triangle BK W$ to map it to $\triangle DTM$.

**Part A.** Which sequence of transformations could be used to map $\triangle BK W$ to $\triangle DTM$?

- a translation of up 8 and a reflection across the $y$-axis
- a translation of left 10, then a reflection across the $x$-axis
- a translation of left 10 and up 4, then a reflection across the line $y = 3$
- a translation of up 8 and a reflection across the line that passes through the origin and $B'$
**Part B.** The coordinate grid below shows three triangles that could be an intermediate step of Rashaad’s sequence of transformations.

Step 1: Use the Add Arrow tool to map the vertices of $\triangle BKW$ to show the translation(s) chosen in Part A.

Step 2: Then, label the transformed triangle by dragging $B'$, $K'$, and $W'$ to the correct vertex.

**Other correct responses:** Rays may be drawn directly from triangle BKW to triangle B’K’W’.

**Part C.** Rashaad wants to justify that $\angle B \cong \angle D$, $\angle K \cong \angle T$, and $\overline{BK} \cong \overline{DT}$ are sufficient to show that the triangles are congruent.

Select words, phrases or equations to complete Rashaad’s justification.

By translating $\triangle BKW$ so that $B$ maps to $B'$, then $B'$ coincides with $D$. The outcome of reflecting $\triangle B'K'W'$ is that $K'$ coincides with $T$ and $W'$ coincides with $M$. Because the definition of congruence in terms of rigid motions preserves distances and angles, then triangle $BKW$ is congruent to triangle $DTM$. Therefore, $m\angle B = m\angle D$, $m\angle K = m\angle T$ and $|BK| = |DT|$.
33. Natasha’s classmates have ordered her a cookie pizza for her birthday celebration. To share it among the class, they will be slicing the cookie into equal pieces. They want everyone to have an icing packet to add to his or her slice.

In order to approximate how much icing each person will need, they want to know the area of each slice of the cookie. The following table lists the radius of the cookie pizza and the area of some of the possible divisions of the cookie.

<table>
<thead>
<tr>
<th>Measure of central angle (in degrees)</th>
<th>Whole Cookie</th>
<th>1/2 Cookie</th>
<th>1/4 Cookie</th>
<th>1/8 Cookie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius (in units)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Area of cookie slice (in square units)</td>
<td>36π</td>
<td>18π</td>
<td>9π</td>
<td>4.5π</td>
</tr>
</tbody>
</table>
This question has three parts.

**Part A.** What is the relationship between the area of a whole cookie with a radius of 6 units and the area of a portion whose central angle measures $k$ degrees?

- The area of the portion is $\frac{1}{6}k$ of the whole cookie.
- The area of the portion is $k$ times the area of the whole cookie.
- The area of the portion is $\frac{k}{360}$ times the area of the whole cookie.
- The area of the portion is $360k$ times the area of the whole cookie.

**Part B.** Using the information in the table, click on the blank to complete the equation for finding the area of a portion of a cookie with a radius of 6 units when given the measure of a central angle, in degrees, of the portion.

\[ A = \frac{36\pi \times k}{360} \]

**Part C.** Click on the blank to complete the formula that can be used to find the area of any portion of a circle with radius $w$ and a central angle of $z$ degrees.

\[ A = \frac{\pi w^2 \times z}{360} \]

**Other correct responses:** any equivalent equations
This is the end of Session 2.