Geometry Final Exam

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

1. If $m\angle BOC = 27$ and $m\angle AOC = 47$, then what is the measure of $\angle AOB$? The diagram is not to scale.

   a. 74  
   b. 40  
   c. 20  
   d. 54

2. $M$ is the midpoint of $CF$ for the points $C(3, 4)$ and $F(9, 8)$. Find $MF$.
   a. $\sqrt{13}$  
   b. $2\sqrt{13}$  
   c. 26  
   d. 13

3. Find, to the nearest tenth, the area of the region that is inside the square and outside the circle. The circle has diameter 14 inches.
   a. 42.1 in.$^2$  
   b. 10.5 in.$^2$  
   c. 153.9 in.$^2$  
   d. 196 in.$^2$

4. When a conditional and its converse are true, you can combine them as a true ___.
   a. counterexample  
   b. biconditional  
   c. unconditional  
   d. hypothesis

5. If $\angle A$ and $\angle B$ are supplementary angles and $m\angle A = 4m\angle B$, find $m\angle A$ and $m\angle B$.
   a. 72, 18  
   b. 144, 36  
   c. 18, 72  
   d. 36, 144

6. $\angle ABC \cong$ ___
7. What is the measure of a base angle of an isosceles triangle if the vertex angle measures 38° and the two congruent sides each measure 21 units?

- a. 71°
- b. 142°
- c. 152°
- d. 76°

8. Find the value of $x$. The diagram is not to scale.

- a. 32
- b. 50
- c. 64
- d. 80

9. What is the inverse of this statement?
   If he speaks Arabic, he can act as the interpreter.
   - a. If he does not speak Arabic, he can act as the interpreter.
   - b. If he speaks Arabic, he can’t act as the interpreter.
   - c. If he can act as the interpreter, then he does not speak Arabic.
   - d. If he does not speak Arabic, he can’t act as the interpreter.

Find the area. The figure is not drawn to scale.
10. \[
\text{area of trapezoid} = \frac{1}{2} \times (607.32 + 36.7) \times 19 \text{ in.}^2
\]
a. 607.32 in.\(^2\)  
b. 36.7 in.\(^2\)  
c. 303.66 in.\(^2\)  
d. 77.2 in.\(^2\)

11. A kite has diagonals 9.2 ft and 8 ft. What is the area of the kite?
a. 36.8 ft\(^2\)  
b. 8.6 ft\(^2\)  
c. 73.6 ft\(^2\)  
d. 34.4 ft\(^2\)

12. Name the major arc and find its measure.
a. arc \(ADB\); 50°  
b. arc \(AB\); 50°  
c. arc \(ADB\); 310°  
d. arc \(AB\); 310°

13. A model is built having a scale of 1 : 100,000. How high would a 35,600-ft mountain be in the model? Give your answer to the nearest tenth of an inch.
a. 4.272 in.  
b. 2.136 in.  
c. 0.356 in.  
d. 427,200 in.

14. Use the information in the diagram to determine the height of the tree to the nearest foot.
a. 80 ft  
b. 264 ft  
c. 60 ft  
d. 72 ft

The figures are similar. The area of one figure is given. Find the area of the other figure to the nearest whole number.

15. The area of the smaller trapezoid is 558 m\(^2\).
Find the value of $x$. Round your answer to the nearest tenth.

16. $\triangle$ Not drawn to scale

a. $3.3$  
b. $3.1$  
c. $24.7$  
d. $8.5$

Find the value of $x$. Round to the nearest tenth.

17. $\triangle$ Not drawn to scale

a. $12.5$  
b. $10$  
c. $13$  
d. $9.7$

18. $\triangle$ Not drawn to scale

a. $52.6$  
b. $52.9$  
c. $6.2$  
d. $6.5$

Find the area of the triangle. Give the answer to the nearest tenth. The drawing may not be to scale.
19. 
\[
\begin{array}{c}
4.7 \text{ m} \\
\angle 47^\circ \\
6.1 \text{ m}
\end{array}
\]
(a) 10.5 m²  
(b) 9.8 m²  
(c) 19.6 m²  
(d) 21.0 m²

20. Use Euler’s Formula to find the missing number.
Vertices: 16
Edges: 37
Faces:
(a) 24  
(b) 22  
(c) 23  
(d) 26

Find the volume of the square pyramid shown. Round to the nearest tenth as necessary.

21. 
\[
\begin{array}{c}
10 \text{ cm} \\
12 \text{ cm} \\
12 \text{ cm}
\end{array}
\]
Not drawn to scale
(a) 40 cm³  
(b) 480 cm³  
(c) 147.3 cm³  
(d) 720 cm³

22. Find the similarity ratio of a cube with volume 729 m³ to a cube with volume 3375 m³.
(a) 81 : 225  
(b) 3 : 5  
(c) 5 : 3  
(d) 225 : 81

23. JK, KL, and LJ are all tangent to O (not drawn to scale). JA = 9, AL = 10, and CK = 14. Find the perimeter of ΔJKL.
Find the value of \( x \). If necessary, round your answer to the nearest tenth. The figure is not drawn to scale.

24. The figure consists of a chord, a secant and a tangent to the circle. Round to the nearest hundredth, if necessary.

\[
\begin{array}{c}
\text{a. } 15.75 \\
\text{b. } 9 \\
\text{c. } 5.14 \\
\text{d. } 28
\end{array}
\]

25. Find the diameter of the circle for \( BC = 16 \) and \( DC = 28 \). Round to the nearest tenth. (The diagram is not drawn to scale.)

\[
\begin{array}{c}
\text{a. } 33 \\
\text{b. } 49 \\
\text{c. } 14.3 \\
\text{d. } 65
\end{array}
\]

Short Answer

26. \( MO \) bisects \( \angle LMN \), \( m\angle LMO = 8x - 23 \), and \( m\angle NMO = 2x + 37 \). Solve for \( x \) and find \( m\angle LMN \). The diagram is not to scale.
Find the volume of the cone shown as a decimal rounded to the nearest tenth.

27.

22 m

Not drawn to scale

28. A jewelry store buys small boxes in which to wrap items that they sell. The diagram below shows one of the boxes. Find the lateral area and the surface area of the box to the nearest whole number.

Not drawn to scale

Solve for \(a\) and \(b\).

29.

8

10

6

3

\(a\)

\(b\)

30. The widths of two similar rectangles are 16 cm and 14 cm. What is the ratio of the perimeters? Of the areas?

31. Find the value of \(x\) and \(y\) rounded to the nearest tenth.
32. Find the value of $x$.

33. Find the value of $x$ to the nearest degree.

34. Find the values of $x$ and $y$. The diagram is not to scale.

Find the area. The figure is not drawn to scale.
35.
### MULTIPLE CHOICE

1. **ANS:** C  **DIF:** L1  **REF:** 1-4 Measuring Segments and Angles  
   **OBJ:** 1-4.2 Finding Angle Measures  
   **STO:** IN G.1.1  
   **TOP:** 1-4 Example 6  
   **KEY:** Angle Addition Postulate  
   **MSC:** NAEP M1e, NAEP M1f, CAT5.LV20.55, CAT5.LV20.56, IT.LV16.CP, S9.TSK2.GM, S10.TSK2.GM, TV.LV20.13, TV.LV20.14

2. **ANS:** A  **DIF:** L2  **REF:** 1-6 The Coordinate Plane  
   **OBJ:** 1-6.2 Finding the Midpoint of a Segment  
   **STO:** IN G.1.1  
   **KEY:** coordinate plane, Midpoint Formula  

3. **ANS:** A  **DIF:** L2  **REF:** 1-7 Perimeter, Circumference, and Area  
   **OBJ:** 1-7.2 Finding Area  
   **STO:** IN G.2.5, IN G.3.3, IN G.6.7  
   **TOP:** 1-7 Example 6  
   **KEY:** circle, square, area  

4. **ANS:** B  **DIF:** L1  **REF:** 2-2 Biconditionals and Definitions  
   **OBJ:** 2-2.1 Writing Biconditionals  
   **STO:** IN G.8.4, IN G.8.6, IN G.8.7  
   **TOP:** 2-2 Example 1  
   **KEY:** conditional statement, biconditional statement  
   **MSC:** NAEP G1c, NAEP G5a, CAT5.LV20.54, IT.LV16.CP, IT.LV16.PS, S9.TSK2.PRA, S10.TSK2.PRA, TV.LV20.17, TV.LV20.18

5. **ANS:** B  **DIF:** L2  **REF:** 2-5 Proving Angles Congruent  
   **OBJ:** 2-5.1 Identifying Angle Pairs  
   **STO:** IN G.8.8, IN G.8.7  
   **KEY:** supplementary angles  

6. **ANS:** D  **DIF:** L1  **REF:** 4-1 Congruent Figures  
   **OBJ:** 4-1.1 Congruent Figures  
   **STO:** IN G.2.3, IN G.8.8, IN G.4.6  
   **TOP:** 4-1 Example 1  
   **KEY:** congruent figures, corresponding parts  

7. **ANS:** A  **DIF:** L1  **REF:** 4-5 Isosceles and Equilateral Triangles  
   **OBJ:** 4-5.1 The Isosceles Triangle Theorems  
   **STO:** IN G.4.1, IN G.8.8  
   **TOP:** 4-5 Example 3  
   **KEY:** isosceles triangle, Converse of Isosceles Triangle Theorem, Triangle Angle-Sum Theorem  

8. **ANS:** C  **DIF:** L1  **REF:** 5-1 Midsegments of Triangles  
   **OBJ:** 5-1.1 Using Properties of Midsegments  
   **STO:** IN G.4.5, IN G.4.9
TOP: 5-1 Example 1  KEY: midsegment, Triangle Midsegment Theorem

9. ANS: D  DIF: L1
REF: 5-4 Inverses, Contrapositives, and Indirect Reasoning
OBJ: 5-4.1 Writing the Negation, Inverse, and Contrapositive  STO: IN G.8.5, IN G.8.8
TOP: 5-4 Example 2  KEY: contrapositive

10. ANS: C  DIF: L1
REF: 7-4 Areas of Trapezoids, Rhombuses, and Kites
OBJ: 7-4.1 Area of a Trapezoid  STO: IN G.2.5, IN G.3.3
TOP: 7-4 Example 3  KEY: trapezoid, area

11. ANS: A  DIF: L1
REF: 7-4 Areas of Trapezoids, Rhombuses, and Kites
OBJ: 7-4.2 Finding Areas of Rhombuses and Kites  STO: IN G.2.5, IN G.3.3
TOP: 7-4 Example 3  KEY: area, kite

12. ANS: C  DIF: L1  REF: 7-6 Circles and Arcs
OBJ: 7-6.1 Central Angles and Arcs  STO: IN G.6.2, IN G.6.5, IN G.6.6, IN G.6.7
TOP: 7-6 Example 3  KEY: major arc, measure of an arc, arc

13. ANS: A  DIF: L2  REF: 8-1 Ratios and Proportions
OBJ: 8-1.1 Using Ratios and Proportions  TOP: 8-1 Example 4
KEY: proportion, Cross-Product Property, scale, word problem

14. ANS: A  DIF: L1  REF: 8-3 Proving Triangles Similar
OBJ: 8-3.2 Applying AA, SAS, and SSS Similarity  STO: IN G.2.3, IN G.4.4, IN G.4.6, IN G.8.8  TOP: 8-3 Example 4
KEY: Angle-Angle Similarity Postulate, word problem

15. ANS: A  DIF: L1  REF: 8-6 Perimeters and Areas of Similar Figures
OBJ: 8-6.1 Finding Perimeters and Areas of Similar Figures  STO: IN G.2.3, IN G.2.5, IN G.3.2, IN G.4.4  TOP: 8-6 Example 2
KEY: similar figures, area, trapezoid
16. ANS: C  DIF: L1  REF: 9-1 The Tangent Ratio
OBJ: 9-1.1 Using Tangents in Triangles  STO: IN G.5.4, IN G.5.6
TOP: 9-1 Example 2  KEY: side length using tangent, tangent, tangent ratio
MSC: NAEP M1m, CAT5.LV20.45, CAT5.LV20.46, CAT5.LV20.50, CAT5.LV20.55,
S10.TSK2.GM, S10.TSK2.PRA, TV.LV20.13, TV.LV20.14, TV.LV20.16,
TV.LV20.47

17. ANS: A  DIF: L1  REF: 9-2 Sine and Cosine Ratios
OBJ: 9-2.1 Using Sine and Cosine in Triangles  STO: IN G.5.4, IN G.5.6
TOP: 9-2 Example 2  KEY: sine, side length using sine and cosine, cosine ratio
MSC: NAEP M1m, CAT5.LV20.45, CAT5.LV20.46, CAT5.LV20.50, CAT5.LV20.55,
TV.LV20.47

18. ANS: C  DIF: L1  REF: 9-2 Sine and Cosine Ratios
OBJ: 9-2.1 Using Sine and Cosine in Triangles  STO: IN G.5.4, IN G.5.6
TOP: 9-2 Example 2  KEY: sine, side length using sine and cosine, sine ratio
MSC: NAEP M1m, CAT5.LV20.45, CAT5.LV20.46, CAT5.LV20.50, CAT5.LV20.55,
TV.LV20.47

19. ANS: A  DIF: L1  REF: 9-5 Trigonometry and Area
OBJ: 9-5.2 Finding the Area of a Triangle  TOP: 9-5 Example 3
KEY: area of a triangle, area, sine
MSC: NAEP M1h, CAT5.LV20.50, CAT5.LV20.55, CAT5.LV20.56, IT.LV16.AM,
TV.LV20.14, TV.LV20.16

20. ANS: C  DIF: L1  REF: 10-1 Space Figures and Nets
OBJ: 10-1.1 Identifying Nets of Space Figures  STO: IN G.7.1, IN G.7.2, IN G.7.3
TOP: 10-1 Example 3  KEY: polyhedron, face, vertices, edge, Euler's Formula
TV.LV20.17

21. ANS: B  DIF: L1  REF: 10-6 Volumes of Pyramids and Cones
OBJ: 10-6.1 Finding Volume of a Pyramid  STO: IN G.7.7
TOP: 10-6 Example 1  KEY: volume of a pyramid, pyramid, volume formulas, volume
MSC: NAEP M1j, CAT5.LV20.46, CAT5.LV20.50, CAT5.LV20.55, CAT5.LV20.56,
TV.LV20.52

22. ANS: B  DIF: L1  REF: 10-8 Areas and Volumes of Similar Solids
OBJ: 10-8.1 Finding Relationships in Area and Volume  STO: IN G.7.6, IN G.7.7
TOP: 10-8 Example 2  KEY: similarity ratio, volumes of similar solids

23. ANS: A   DIF: L1   REF: 11-1 Tangent Lines
OBJ: 11-1.2 Using Multiple Tangents   STO: IN G.6.2, IN G.6.3, IN G.6.5, IN G.8.8
TOP: 11-1 Example 5   KEY: properties of tangents, tangent to a circle, triangle

24. ANS: A   DIF: L2   REF: 11-4 Angle Measures and Segment Lengths
OBJ: 11-4.2 Finding Segment Lengths   STO: IN G.6.2, IN G.6.3, IN G.6.5, IN G.8.8
KEY: circle, chord, intersection inside the circle, intersection outside the circle, secant, tangent to a circle

25. ANS: A   DIF: L1   REF: 11-4 Angle Measures and Segment Lengths
OBJ: 11-4.2 Finding Segment Lengths   STO: IN G.6.2, IN G.6.3, IN G.6.5, IN G.8.8
TOP: 11-4 Example 3   KEY: circle, intersection outside the circle, secant, tangent, diameter

SHORT ANSWER

26. ANS:

\[ x = 10, \; m\angle LMN = 114 \]

DIF: L1   REF: 1-5 Basic Constructions
OBJ: 1-5.2 Constructing Bisectors   STO: IN G.1.2, IN G.4.2, IN G.8.9
TOP: 1-5 Example 4   KEY: angle bisector

27. ANS:

\[ 829.4 \; m \]

DIF: L1   REF: 10-6 Volumes of Pyramids and Cones
OBJ: 10-6.2 Finding Volume of a Cone   STO: IN G.7.7  TOP: 10-6 Example 4
KEY: volume of a cone, volume formulas, volume, cone
28. **ANS:**

\[ 181 \text{ cm}^2; 206 \text{ cm}^2 \]

**DIF:** L2  
**REF:** 10-3 Surface Areas of Prisms and Cylinders  
**OBJ:** 10-3.1 Finding Surface Area of a Prism  
**TOP:** 10-3 Example 2  
**KEY:** surface area of a prism, lateral area, prism, surface area formulas, surface area, word problem  

29. **ANS:**

\[ a = \frac{9}{2}, \quad b = \frac{15}{2} \]

**DIF:** L2  
**REF:** 8-4 Similarity in Right Triangles  
**OBJ:** 8-4.1 Using Similarity in Right Triangles  
**STO:** IN G.2.3, IN G.4.4, IN G.4.6, IN G.4.7, IN G.5.2, IN G.8.8  
**TOP:** 8-4 Example 2  
**KEY:** corollaries of the geometric mean, proportion  

30. **ANS:**

\[ 8 : 7 \text{ and } 64 : 49 \]

**DIF:** L1  
**REF:** 8-6 Perimeters and Areas of Similar Figures  
**OBJ:** 8-6.1 Finding Perimeters and Areas of Similar Figures  
**STO:** IN G.2.3, IN G.2.5, IN G.3.2, IN G.4.4  
**TOP:** 8-6 Example 1  
**KEY:** perimeter, area, similar figures  

31. **ANS:**

\[ x = 24.0, \quad y = 46.4 \]

**DIF:** L2  
**REF:** 7-3 Special Right Triangles  
**OBJ:** 7-3.2 Using 30°-60°-90° Triangles  
**STO:** IN G.4.7, IN G.5.3, IN G.5.6  
**TOP:** 7-3 Example 5  
**KEY:** special right triangles, leg, hypotenuse  

32. **ANS:**

\[-19\]
33. ANS: 60

34. ANS: 
\[ x = 77, \quad y = 57 \]

35. ANS: 
\[ 1188 \text{ in.}^2 \]