1. In the accompanying diagram, transversal $RS$ intersects parallel lines $XY$ and $WZ$ at $E$ and $H$, respectively. If $m\angle HEY = 72$, what is $m\angle ZHS$?

2. In the accompanying figure, $a \parallel b$ and $c \parallel d$. If $m\angle 1 = 68$, find $m\angle 3$.

3. Line $n$ intersects lines $l$ and $m$, forming the angles shown in the diagram below.

Which value of $x$ would prove $l \parallel m$?

A. 2.5  B. 4.5  C. 6.25  D. 8.75

4. In the accompanying diagram, $\overline{AGB} \parallel \overline{CED}$, $m\angle AGF = 30$, and $m\angle CEF = 45$. What is $m\angle GFE$?

A. 45  B. 52  C. 60  D. 75

5. In the accompanying diagram, $\overline{AB} \parallel \overline{CD}$. From point $E$ on $\overline{AB}$ transversals $\overline{EF}$ and $\overline{EG}$ are drawn, intersecting $\overline{CD}$ at $H$ and $I$, respectively.

If $m\angle CHF = 20$ and $m\angle DIG = 60$, what is $m\angle HEI$?

A. 60°  B. 80°  C. 100°  D. 120°

6. In the accompanying diagram, $m\angle ECB = 6x$, $m\angle ECD = 3x - 11$, and $m\angle DCB = 74$. What is the value of $x$?

7. The measures of the three angles of a triangle are in the ratio 1:3:5. Find the measure of the smallest angle.
8. \( \triangle ABC \) is similar to \( \triangle DEF \). The ratio of the length of \( AB \) to the length of \( DE \) is \( 3:1 \). Which ratio is also equal to \( 3:1 \)?

A. \( \frac{\angle A}{\angle D} \)
B. \( \frac{\angle B}{\angle F} \)
C. \( \frac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} \)
D. \( \frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} \)

9. As shown in the diagram below, \( \overline{CD} \) is a median of \( \triangle ABC \).

Which statement is always true?

A. \( \overline{AD} \cong \overline{DB} \)
B. \( \overline{AC} \cong \overline{AD} \)
C. \( \angle ACD \cong \angle CDB \)
D. \( \angle BCD \cong \angle ACD \)

10. In which quadrilateral are the diagonals always congruent?

A. rectangle  
B. trapezoid  
C. rhombus  
D. parallelogram

11. If the diagonals of a parallelogram are perpendicular but not congruent, then the parallelogram is

A. a rectangle  
B. a rhombus  
C. a square  
D. an isosceles trapezoid

12. In quadrilateral \( ABCD \), \( m\angle A = 72 \), \( m\angle B = 94 \), and \( m\angle C = 113 \). What is \( m\angle D \)?

A. 81  
B. 86  
C. 108  
D. 136

13. In the accompanying diagram of rhombus \( ABCD \), diagonal \( \overline{AC} \) is drawn. If \( m\angle CAB = 35 \) find \( m\angle ADC \).

![Diagram of rhombus with diagonal AC and angle CAB]

14. In parallelogram \( ABCD \), diagonals \( \overline{AC} \) and \( \overline{DB} \) intersect at \( E \). Which statement is always true?

A. Triangle \( AED \) is isosceles.  
B. Triangle \( ABD \) is a right triangle.  
C. Triangle \( AEB \) is congruent to triangle \( AED \).  
D. Triangle \( ABC \) is congruent to triangle \( CDA \).  

15. If the perimeter of a square is 8, which is the length of a diagonal?

A. \( 2\sqrt{2} \)  
B. \( 2\sqrt{3} \)  
C. \( 8\sqrt{2} \)  
D. 4

16. The perimeter of a rhombus is 60. If the length of its longer diagonal measures 24, the length of the shorter diagonal is

A. 9  
B. 15  
C. 18  
D. 20

17. In rectangle \( ABCD \), diagonal \( AC = x + 10 \) and diagonal \( BD = 2x - 30 \). Find the value of \( x \).

![Diagram of rectangle with diagonals AC and BD]
18. Two adjacent sides of a rhombus are represented by $5x + 7$ and $6x - 1$. Find the value of $x$.

19. In the accompanying diagram of rectangle $ABCD$, $m\angle BAC = 3x + 4$ and $m\angle ACD = x + 28$.

![Diagram of rectangle ABCD with angles labeled]

What is $m\angle CAD$?

A. 12  
B. 37  
C. 40  
D. 50

20. The lengths of the sides of a triangle are 8, 15, and 17. If the longest side of a similar triangle is 51, what is the length of the shortest side?

A. 32  
B. 24  
C. 16  
D. 4

21. In the accompanying diagram, $\triangle ABC$ is similar to $\triangle DEF$, $\angle A \cong \angle D$, and $\angle B \cong \angle E$. If $AB = 3$, $BC = 12$, $DE = x + 2$, and $EF = 18$, find the value of $x$.

![Diagram with angles and sides labeled]

22. In the accompanying diagram, $\overline{BAE}$, $\overline{CAD}$, $\angle B$ and $\angle E$ are right angles, $AB = 3$, $BC = 4$, and $AD = 15$.

What is the length of $DE$?

A. 5  
B. 8  
C. 9  
D. 12

23. Triangle $ABC$ is shown in the diagram below.

![Diagram with triangle ABC labeled]

If $\overline{DE}$ joins the midpoints of $\overline{ACD}$ and $\overline{AEB}$, which statement is not true?

A. $DE = \frac{1}{2} CB$  
B. $\overline{DE} \parallel \overline{CB}$  
C. $\frac{AD}{DC} = \frac{DE}{CB}$  
D. $\triangle ABC \sim \triangle AED$

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

![Diagram with right triangle ABC and altitude CD drawn]

If $AD = 3$ and $DB = 12$, what is the length of altitude $\overline{CD}$?

A. 6  
B. $6\sqrt{5}$  
C. 3  
D. $3\sqrt{5}$
25. On level ground, a person 6 feet tall casts a shadow of 8 feet. At the same time, a nearby tree casts a shadow of 20 feet. Find the number of feet in the height of the tree.

26. In the accompanying diagram, \( \triangle ABC \) is similar to \( \triangle PQR \). \( AC = 6, \ AB = BC = 12, \) and \( PR = 8 \). Find the perimeter of \( \triangle PQR \).

27. If \( \triangle RST \sim \triangle ABC \), \( m\angle A = x^2 - 8x, \ m\angle C = 4x - 5, \) and \( m\angle R = 5x + 30 \), find \( m\angle C \).

28. In the accompanying diagram, trapezoid \( ABCD \) is similar to trapezoid \( AFGH \). If \( AF = 18, \ AB = 54, \) and \( HG = 9 \), what is the length of \( DC \)?

29. In \( \triangle ABC \), \( AB = 8, \ BC = 10, \) and \( CA = 16 \). If \( D \) is the midpoint of \( AB \) and \( E \) is the midpoint of \( BC \), find the length of \( DE \).

30. In the accompanying diagram of \( \triangle ABD \), \( AB \perp AD \) and \( EC \perp AD \). If \( AB = 6, \ EC = 4, \) and \( ED = 8 \), find \( AE \).

31. In the accompanying diagram of \( \triangle ABC \), \( \triangle DEF \) is formed by joining the midpoints of the sides of \( \triangle ABC \). If \( DE = 9, \ FE = 18, \) and \( DF = 13 \), what is the perimeter of \( \triangle ABC \)?

   A. 10   B. 20   C. 40   D. 80

32. In \( \triangle ABC \) shown below, \( P \) is the centroid and \( BF = 18 \).

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

   A. 6   B. 9   C. 3   D. 12

33. In the accompanying diagram, \( \triangle ABC \) is a right triangle and \( \overline{CD} \) is the altitude to hypotenuse \( AB \). If \( \overline{AD} = 4 \) and \( \overline{DB} = 16 \), find the length of \( \overline{CD} \).

34. The length of the line segment connecting \((2, -2)\) and \((-3, -1)\) is

   A. \( \sqrt{10} \)   B. 2   C. \( \sqrt{26} \)   D. \( \sqrt{34} \)
35. In triangles $ABC$ and $DEF$, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A = \angle D$. Which method could be used to prove $\triangle ABC \sim \triangle DEF$?

A. AA  
B. SAS  
C. SSS  
D. ASA

36. Lines $m$ and $n$ intersect at point $A$. Line $k$ is perpendicular to both lines $m$ and $n$ at point $A$. Which statement must be true?

A. Lines $m$, $n$, and $k$ are in the same plane.
B. Lines $m$ and $n$ are in two different planes.
C. Lines $m$ and $n$ are perpendicular to each other.
D. Line $k$ is perpendicular to the plane containing lines $m$ and $n$.

37. The measures of two complementary angles are represented by $(3x + 15)$ and $(2x - 10)$. What is the value of $x$?

A. 17  
B. 19  
C. 35  
D. 37
1. Answer: 72
2. Answer: 112
3. Answer: B
4. Answer: D
5. Answer: C
6. Answer: 21
7. Answer: 20
8. Answer: D
9. Answer: A
10. Answer: A
11. Answer: B
12. Answer: A
13. Answer: 110
14. Answer: D
15. Answer: A
16. Answer: C
17. Answer: 40
18. Answer: 8
19. Answer: D
20. Answer: B
21. Answer: 2.5
22. Answer: D
23. Answer: C
24. Answer: A
25. Answer: 15
26. Answer: 40
27. Answer: 55
28. Answer: 27
29. Answer: 8
30. Answer: 4
31. Answer: D
32. Answer: D
33. Answer: 8
34. Answer: C
35. Answer: B
36. Answer: D
37. Answer: A