1. Each side is 24. Its area is 576, labeled with a D.

2. The sum of the sides is 391/120. My vote is for D.

3. In any convex polygon, the sum is 360°, choice B.

4. The distance to the midline from a base is half the height. So the area is (8)(12), or 96. Choice D.

5. Opposite angles of a parallelogram are congruent, which means that choice C is a filthy lie.

6. The perimeter of 160 is reduced to 40, then to 36. Each side is 9 and the area is 81, choice D.

7. Opposite angles of a quadrilateral inscribed in a circle are supplementary. Choice A, 86°.

8. The quadrilateral can be subdivided into a rectangle with area 6 and right triangle with area 9. The sum is 15, choice C.

9. Each diagonal = \( \sqrt{500} \). \((\sqrt{500})^2 = 500\); it’s D.

10. PQ = 6. The diagonals bisect each other and are congruent, so NX = 5. The sum is 11, choice C.

11. The area is \( 80 - 1.5^2 \pi \approx 73 \ldots \) choice D (for definition of diameter!)

12. The quadrilateral must have all right angles to avoid area loss by law of cosines. Let the rectangle have length L and width (.5P-L), where P is the perimeter. The maximum of A = L(.5P-L) is at L = P/4. If L = P/4, then W = P/4. The shape is a square. Choice D.

13. Altitude to \( AM = 20; AT = \frac{20}{\sin 50^0} \approx 26.1 \). Vote C!

14. Each diagonal is \( \sqrt{12} \), and forms a 45-45-90 triangle. Each side is \( \sqrt{6} \). The area is 6, choice D.

15. Symmetry reveals that it is a 45-45-90 triangle with legs of \( 5\sqrt{2} \). The area is 25, as you can C.


17. Let the edges of the prism be \( x, y, \) and \( z \).

\((xyz) = 48; (xy) = 6; (yz) = 16\). Substitution reveals that \( x = 3, y = 6, \) and \( z = 8 \). The surface area is \( 2(xy + yz + xz) \), or 92. Feels like a C.

18. Solving the system \( L+W = 4; 3L + 4W = 15 \), we find that \( L = 1 \). \( L + 3L = 4 \), earning an A.

19. Statement III alone is true (I is false, and II is just plain ridiculous!) Choice C is the way to go.

20. PL = 15, and PC = 8. The sum of the areas of congruent triangles LAP & PCL = 120, choice B.

21. The diagonals are perpendicular. \( AE = 12, \) so \( BE = 5 \). The area of each small triangle is 30, so the area of each large triangle is 96. Hence, \( DE = 16 \) and then \( DC = 20 \). \( 16 + 20 = 36 \), choice C.

22. Law of cosines: \( AC = \sqrt{6^2 + 8^2 - 2(6)(8)\cos 150^0} \), which rounds to 14. Let it B.

23. \( x^2 = 4x \) has only 1 positive solution (4), choice B.

24. Each of the 4 congruent right triangles formed by the diagonals has area = 5.25, and one leg = 6. Other leg = 7/4. Hypotenuse, which is the side of the rhombus = 25/4. \((25/4)(4) = 25\), choice C.

25. \( A = (s-a)(s-b)(s-c)(s-d) \), by Brahmagupta’s Generalization. \( s = 21 \), so \( A \approx 104.5 = A \).

26. The perimeter of ABCD is 28. The perimeter ratio is the square root of the area ratio. Solving \( \sqrt{\frac{45}{80}} = \frac{28}{x} \), gives \( x = \frac{112\sqrt{5}}{3\sqrt{5}} = \frac{112}{3} \), choice A.

27. The mean of the bases is 4x + 4. Solving the quadratic \((3x - 5)(4x + 4) = 512 \) yields one real solution, \( x = 7 \). \( QD = 22, \ QN = 16 \), and the product is 352. Wipe your brow and bubble C.

28. Draw the altitudes shown. Find that I is a 30-60-90 triangle with short leg (adjacent to II) of 15 and long leg (adjacent to III) of \( 15\sqrt{3} \approx 26 \). II is a 45-45-90 triangle with legs of \( (66 - 26) = 40 \). III is a rectangle with dimensions 26 and 25. The areas of I, II, and III respectively are 195, 800, and 650. The sum is 1645. Quite D-manding!

29. Parallelograms are distinguished both by their side lengths and by their angles. Take rhombi with sides of 2. One such rhombus exists with an 80° angle, one with a 79° angle, one with a 64° angle, etc. The answer is \( \infty \), which is not given -> E.

30. Drop all 4 heights and label the segments.

Since the areas of both trapezoids are calculated by the same formula, they have the factors \( (1/2) \) and \( H \) in common. These will cancel, so the area ratio is the same as the ratio of the sums of the bases. In the 30° trapezoid, the sum of the bases is \( P-4H \). In the 45° trapezoid, the sum is \( P-(2\sqrt{2})H \). Many equivalent fractions may be made, but the ratio \( \frac{ab}{cd} \) that we are looking for is always the same.

\( \frac{ab}{cd} = \frac{(1)(4)}{(1)(2\sqrt{2})} = \frac{\sqrt{2}}{2} \), which is choice C.