22. Each small triangle has equal area and equal height, so they must all also have equal bases: \( \frac{3}{2} \). [D]

23. \( \text{Area} = \frac{3\sqrt{3}}{4} = \frac{9\sqrt{3}}{4} \). [B]

24. Look at triangle \( XQH \). It is a 45-45-90 triangle with leg \( XQ = 2 + \sqrt{2} \). Area of \( XQH = 3 + 2\sqrt{2} \).
Area of \( \triangle OPH = \text{Area of } \triangle XQH - \text{Area of } \triangle XPO = 3 + 2\sqrt{2} - 1 = 2 + 2\sqrt{2} \). [A]

25. \( UX = \frac{1}{2} SQ = \frac{\sqrt{17}}{2} \). [D]

26. [Area of \( A = \frac{1}{2} \times \text{base} \times \text{height} \)
Area of \( B = \frac{1}{2} \times 3 \times 2 = \frac{1}{3} \)]. [B]

27. \((\sin A)^2 + (\cos A)^2 = 1\). [B]

28. [Draw in auxiliary lines, then examine the parallelogram to find \( PE \).]

29. \( \frac{AB}{BD} = \frac{AC}{CD} \), so \( \triangle A \) D must be an angle bisector. [1:1]. [E]

30. \( 4 \) is too short, \( 24 \) is too long, \( 14 \) is just right. [B]
1. \( A = \frac{1}{2} bh \)
   \[ = \frac{1}{2} \cdot 5 \cdot \sqrt{3} = \frac{5\sqrt{3}}{2} \]

2. \( R = \frac{abc}{4A} = \frac{5 \cdot 12 \cdot 13}{4 \cdot 30} = 6.5 \)

3. \( A = \frac{P \cdot r}{2}, \quad r = 4 \)
   \[ A = \frac{12 \cdot 4}{2} = 24 \]

4. \( \frac{x}{3} = \frac{x+20}{21}, \quad x = \frac{10}{3} \]

5. Total length \( L = (2+\sqrt{2}) + \frac{1}{2}(2+\sqrt{2}) + \frac{1}{4}(2+\sqrt{2}) + \ldots \)
   \[ 2L = 2(2+\sqrt{2}) + \frac{1}{2}(2+\sqrt{2}) + \frac{1}{4}(2+\sqrt{2}) + \ldots \]
   \[ L = 2L - L = 2(2+\sqrt{2}) - 4 + 2\sqrt{2} \]

6. \( \Delta ABC \) is the cross section.
   \( AB = CB, \) but \( AC \) is not. \[ [AC = \text{one edge of the tetrahedron}, \ AB = CB = \left( \frac{\sqrt{2}}{2} \right) AC. \]

7. 3-4-5. These are the only ones.
    5-12-13. (After 12 and 13, the difference of any two consecutive squares is greater than 5².)

8. \( \left( \frac{-5+4+7}{3}, \frac{0+1+2}{3} \right) = (2, 1) \)


10. The roof:
    \( H = \text{spot helicopter is above (also the center of the roof).} \)

11. No triangle can be more than one of the following: right, acute, obtuse.
    So, choose: one right,
    one obtuse - scalene, and
    one equilateral - isosceles - acute.

12. \( \tan A = \frac{3y}{x} \)

13. \( \frac{180 - (\theta + 35 - \theta)}{2} = 180 - 35 = 45 \]

14. Max Pieces using \( n \)-cuts:
    \( M_n = M_{n-1} + n. \)
    \( M_4 = 11. \)
    \# of triangles:
    \( T_n = n-2 \) for \( n \geq 2. \)
    (With each new cut, every existing triangle becomes a quadrilateral and a smaller triangle, and one new triangle is made as well. This can be seen by drawing the correct cuts in order and counting the number of triangles each time.)
    \( T_4 = 4-2 = 2. \)