

Question	Answer	Solution
0	30°	$2x + 5x + 8x = 180^\circ$ so $15x = 180^\circ$ and $x = 12^\circ$ The middle angle is $5x$ which gives 60° and its complement is 30° .
1	90	There are 5 choices for the digit in hundreds place, 6 choices for tens place, and 3 choices for ones place to make it even. $5 \times 6 \times 3 = 90$
2	11	Changing to exponential form gives $5x + 9 = 4^3$ $5x = 55$ so $x = 11$
3	$\frac{225}{16}$	Factoring: $(x - y) = (\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y}) = 14$ Substituting gives $4(\sqrt{x} - \sqrt{y}) = 14$ or $(\sqrt{x} - \sqrt{y}) = 7/2$ Solving with $(\sqrt{x} + \sqrt{y}) = 4$ leads to $2\sqrt{x} = 15/2$ Thus $\sqrt{x} = 15/4$ and $x = 225/16$
4	3	The locus is the perpendicular bisector of the segment between the two points. Slope of bisector will be $-1/2$ and the midpoint is $(1/2, 1)$. Using point-slope formula: $y - 1 = (-1/2)(x - 1/2)$ which becomes $x + 2y = 5/2$ or $2x + 4y = 5$. $2A + B - C = 4 + 4 - 5 = 3$
5	1,026,169	2026 factors into 2 primes 2 and 1013. $1013^2 = 1,026,169$
6	324	Exterior angles are 10° and $360/10 = 36$ sides for the polygon. Each side is 9 cm so $36 \times 9 = 324$ cm for the perimeter.
7	3	Squaring both sides of the equation gives $6 + x = 4 + 4\sqrt{10 - 3x} + 10 - 3x$ Isolating the radical: $4x - 8 = 4\sqrt{10 - 3x}$ or $x - 2 = \sqrt{10 - 3x}$ Squaring again: $x^2 - 4x + 4 = 10 - 3x$ and collecting terms $x^2 - x - 6 = 0$ Factoring: $(x - 3)(x + 2) = 0$ and the solutions are 3 and -2 (extraneous)
8	-16	$i^{2026} = i^2 = -1$ $(1 + i)^8 = [(1 + i)^2]^4 = (-2i)^4 = 16i^4 = 16$ $-1(16) = -16$
9	$\frac{1 + \sqrt{29}}{2}$	Let x equal the extended radical and square both sides of equation, so we get $x^2 = 7 + x$. Solving the quadratic $x^2 - x - 7 = 0$ gives $x = \frac{1 \pm \sqrt{29}}{2}$. Only the positive solution works.
10	$(2/3, 5) \cup (5, 11)$	Critical points for sign changes on each factor are at $2/3$, 5, and 11. Making a sign chart gives the intervals $(2/3, 5)$ and $(5, 11)$ for positive function value. NOTE: $(-3x + 2)$ signs are reversed – positive to the left and negative to the right of $x = 2/3$.
11	$128\sqrt{3} - 64\pi$	The radius of the circle is the height of one of the 6 equilateral triangles that make up the hexagon, so the triangle height is 8 and the side of the triangle is $\frac{16\sqrt{3}}{3}$. For the hexagon, $A = 6 \left[\left(\frac{1}{2} \right) (8) \left(\frac{16\sqrt{3}}{3} \right) \right] = 128\sqrt{3}$.

		For the circle, $A = 64\pi$.
12	$-11/6$	Substituting $(-x)$ into $h(x)$ and adding the coefficients tells us that $x = -1$ is a solution. Using synthetic division and factoring the resulting quotient gives the factorization $h(x) = (x + 1)(6x + 5)(2x - 3)$ which has roots of -1 , $-5/6$, and $3/2$. $-1 + (-5/6) = -11/6$
13	$4\sqrt{7}$	Sketch a picture and draw the common internal tangent. Draw the 5-unit radius to the point of tangency and extend it 7 units. Connect that endpoint to the center of the 7-unit circle forming a right triangle with a hypotenuse of 16 (distance between centers). Use the Pythagorean Theorem $(x^2 + 12^2 = 16^2)$ to solve for the missing side which is equivalent to the internal tangent segment. $x^2 = 256 - 144 = 112$ and $x = 4\sqrt{7}$
14	136π	The diagonal of the inscribed rectangle is a diameter of the circle. $12^2 + 20^2 = d^2 = (2r)^2$ so $4r^2 = 544$ and $r^2 = 136$ Circle area is $\pi r^2 = 136\pi$

