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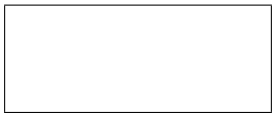

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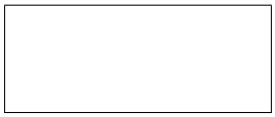

Problem 5. Find the smallest integer k greater than 1 such that k divided by i has remainder 1 for all i in the set $\{2, 3, 4, 5, 6, 7, 8\}$.

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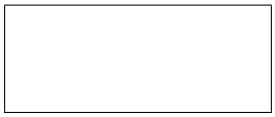
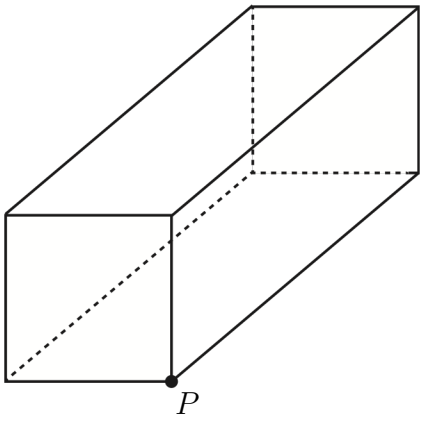


Problem 6. We define the distance between two points on the surface of a $1 \times 1 \times 2$ rectangular box to be the length of the shortest path (on the surface of the box) which joins them. With this definition, the circle of radius 1 centered at P is the set of all points which are a distance of 1 from P. What is the circumference of this circle?



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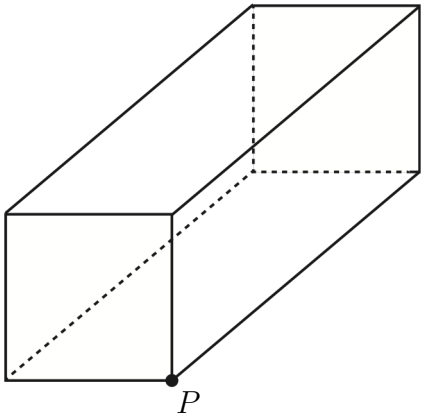

Problem 7. Find the sum of the solutions of

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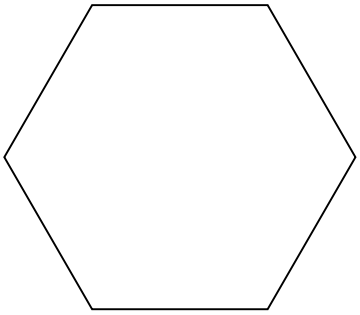
Problem 8. If three vertices of a regular hexagon are chosen at random, what is the probability that they are the vertices of a right triangle?



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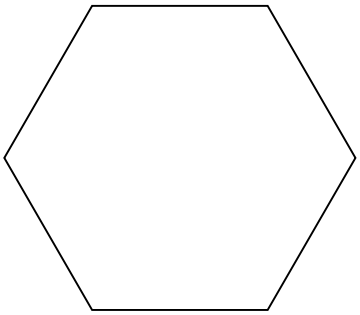

Problem 9. How many degree 4 monomials are there in the variables w, x, y, z? A degree 4 monomial is a term $w^a x^b y^c z^d$ such that a, b, c and d are integers with $0 \leq a, b, c, d \leq 4$ and $a + b + c + d = 4$.

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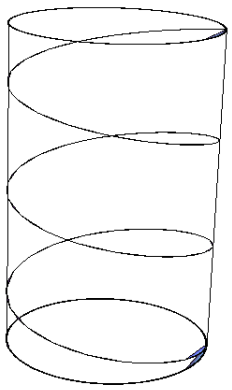
Problem 10. A string will wrap around the base of a certain cylinder exactly 5 times. If instead the same string spirals tightly to the top, it goes around the cylinder exactly 3 times. If the radius of the cylinder is 1, what is the height of the cylinder? Your answer should be written as an integral multiple of π.



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