1. $\boxed{\frac{1}{2}}$

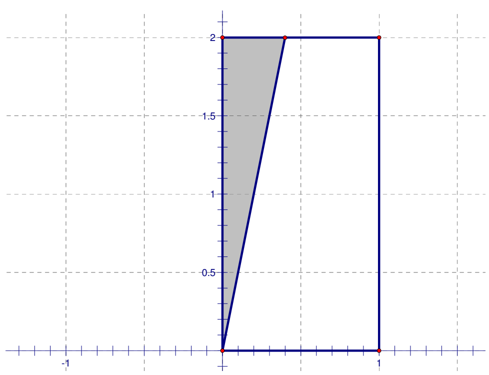
2. The interval for which $x^2 \leq \frac{1}{2}$ is the interval in which $-\frac{\sqrt{2}}{2} \leq x \leq \frac{\sqrt{2}}{2}$. This segment has length $\sqrt{2}$. The probability that $x^2 \leq \frac{1}{2}$ is then $\frac{\sqrt{2}}{2}$. We want $x^2 > \frac{1}{2}$, so the answer is $\boxed{1 - \frac{\sqrt{2}}{2}}$.

3. First fix point P, since we're only looking at the relative position of the two points. Then Q can fall anywhere within 60 degrees left or right of P, which is an arc of 120 degrees. Therefore the probability is $\frac{120}{360} = \boxed{\frac{1}{3}}$.

4. $\boxed{\frac{1}{8}}$

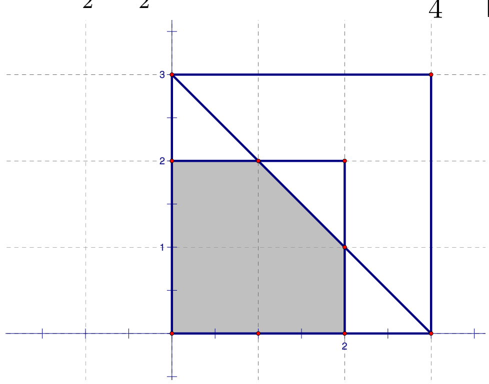
5. $\boxed{\frac{1}{4}}$

6. $\frac{y}{x} > 5$ can be written as $y > 5x$. Consider if it was $y = 5x$; then we would have a line with slope 5.



The triangle has area $\frac{2}{5}$, and the rectangle has area 2, so $\frac{\frac{2}{5}}{2} = \boxed{\frac{1}{5}}$

7. The points that lie on the perpendicular bisector l of $(0,0)$ and $(3,3)$ are equidistant to the two points. So all of the points below the line l are points closer to $(0,0)$ that to $(3,3)$. So these are points such that $x + y < 3$. This is all the points inside the square except for the right triangle bordered by $(2,1), (1,2)$ and $(2,2)$, which has area $\frac{1}{2}$, which means that the successful region has area $4 - \frac{1}{2} = \frac{7}{2}$. Thus the answer is $\frac{\frac{7}{2}}{4} = \boxed{\frac{7}{8}}$



8. $\boxed{\frac{5}{12}}$

9. Since x, y, z are randomly and independently placed, any ordering for them is equally likely. There are $3! = 6$ orderings for 3 random numbers, so the chance that it is any one particular order (in this case $x \leq y \leq z$) is $\boxed{\frac{1}{6}}$

10. Three lengths a, b, c can be the sides of the triangle if and only if they satisfy the Triangle Inequality in every possible way; that is, if $a+b > c$, $b+c > a$, and $c+a > b$. Suppose that our line segment is the unit interval, and we are braeking it at points x and y with $0 < x < y < 1$. Then the three resulting segments will form a triangle if and only if $x < \frac{1}{2}, y > \frac{1}{2}$, and $y - x < \frac{1}{2}$. So the "'possible"' region is the triangle with vertices $(0,0), (0,1), (1,1)$, and the "'successful"' region is as shaded in the diagram below. Therefore the probability of success is $\frac{\frac{1}{8}}{\frac{1}{2}} = \boxed{\frac{1}{4}}$