1. $\boxed{\text{A}}$

2. $\boxed{124^\circ}$

3. Since $GH = HL$, we know that $\angle HGL = \angle HLG = x$.
Then $74 + 2x = 180$ so $\angle HGL = \angle HLG = 53^\circ$.
Since $\angle HLG$ and $\angle JLK$ are vertical angles, $\angle JLK = 53^\circ$.
With $\overline{HI} \parallel \overline{GJ}$ and with $\overline{IK}$ as a transversal, $\angle HIJ = \angle LJK$.
$\angle LJK + 53 + 50 = 180$ so $\angle HIJ = \angle LJK = \boxed{77^\circ}$.

4. $\boxed{146^\circ}$

5. $\boxed{60^\circ}$

6. $\boxed{124^\circ}$

7. When drawn, $\triangle AEB$ is actually a right triangle with hypotenuse $AB = 4$. Since $\triangle ABC$ is equilateral, $\angle ABE = 60^\circ$. We have a 30-60-90 triangle so $BE = 2$ and $AE = 2\sqrt{3}$. $\boxed{\text{D}}$

8. Let x be one side of $\triangle ABC$.
When we draw our altitude from A to $\overline{BC}$, intersecting at a point D. Two 30-60-90 triangles are formed so our altitude, $AD = \dfrac{x\sqrt{3}}{2}$. The area of $\triangle ABC$ is $\dfrac{1}{2} \times \dfrac{x\sqrt{3}}{2} \times x = \dfrac{x^2\sqrt{3}}{4}$.
Now we need to find the area of $\triangle A'B'C'$. Draw $\overline{C'C}$ and notice that $\angle C'CB = 30^\circ$.
If we draw a perpendicular from C' to $\overline{BC}$ through a point E on $\overline{BC}$, which is the distance from $\overline{B'C'}$ to $\overline{BC}$. The $\overline{C'E}$ has length $\dfrac{1}{6}$ the length of the altitude of $\triangle ABC$, or $\dfrac{x\sqrt{3}}{12}$.
Since $\triangle C'CE$ is a 30-60-90 triangle, $EC = \dfrac{x}{4}$. This means that $DE = \dfrac{x}{4}$ and then $B'C' = \dfrac{x}{2}$.
Now using the two 30-60-90 triangles in $\triangle A'B'C'$, the altitude of $\triangle A'B'C'$ is $\dfrac{x\sqrt{3}}{4}$. Now the area of $\triangle A'B'C' = \dfrac{1}{2} \times \dfrac{x\sqrt{3}}{4} \times \dfrac{x}{2} = \dfrac{x^2\sqrt{3}}{16}$.
Our ratio is $\dfrac{\frac{x^2\sqrt{3}}{16}}{\frac{x^2\sqrt{3}}{4}} = \dfrac{1}{4}$. $\boxed{\text{C}}$

9. Our trefoil is formed by 3 60° sectors of a circle (of radius 1) and a third shape on top that is the difficult part of the problem to deal with. Notice that the third shape has an arc cut out of the equilateral triangle that is equivalent to one extra arc that's attached to the triangle. Therefore the area of the third shape is the same as a 4th 60° sector.
Since each sector has area $\dfrac{1}{6}\pi$, the area of our trefoil is $4\dfrac{\pi}{6} = \dfrac{2\pi}{3}$. $\boxed{\text{B}}$

10. The altitude of our triangle can be the segment from M perpendicular to BC through a point E. Since $MC = 1$ and $\triangle MCE$ is 30-60-90, our altitude $ME = \dfrac{\sqrt{3}}{2}$. The area of $\triangle CDM = \dfrac{1}{2} \times \dfrac{\sqrt{3}}{2} \times 2 = \dfrac{\sqrt{3}}{2}$. $\boxed{\text{C}}$