1. **Solution**
   Let $x$ represent a datum of interest. Let $i$ represent that datum's index. Let $\ell$ represent that datum's percentile. Let $n$ represent the sample size (number of measurements). In general,

   $$\ell = \frac{i}{n}$$

   (a) We are given $x = 27.726$. This means $i = 3$. We know $n = 7$. Determine the percentile $\ell$.

   $$\ell = \frac{3}{7}$$

   $$\ell = 0.429$$

   So, the percentile rank is $\boxed{0.429}$, or 42.9th percentile.

   (b) We are given $\ell = 0.571$. We can use algebra to solve for $i$.

   $$\ell = \frac{i}{n}$$

   Multiply both sides by $n$.

   $$n \cdot (\ell) = n \cdot \left(\frac{i}{n}\right)$$

   Simplify both sides.

   $$n\ell = i$$

   To make me happy, switch the sides.

   $$i = n\ell$$

   Now, we can evaluate $i$.

   $$i = (7)(0.571)$$
   $$i = 4$$

   Determine the $x$ associated with $i = 4$.

   $$x = \boxed{29.714}$$

   (c) The mean: $\bar{x} = \frac{205.447}{7} = \boxed{29.35}$

   (d) If $n$ is odd, then median is $x_{i=\frac{n+1}{2}}$, the value of $x$ when $i = \frac{n+1}{2}$. Otherwise, if $n$ is even, the median is mean of $x_{i=\frac{n}{2}}$ and $x_{i=\frac{n}{2}+1}$. In this case, $n = 7$ and so $n$ is odd.

   $$\text{median} = x_{(7+1)/2,} = x_4$$

   So, median = $\boxed{29.714}$.

2. **Solution**

Let $x$ represent a datum of interest. Let $i$ represent that datum's index. Let $\ell$ represent that datum's percentile. Let $n$ represent the sample size (number of measurements). In general,

$$\ell = \frac{i}{n}$$

(a) We are given $x = 44.156$. This means $i = 37$. We know $n = 48$. Determine the percentile $\ell$.

$$\ell = \frac{37}{48}$$

$$\ell = 0.771$$

So, the percentile rank is $\boxed{0.771}$, or 77.1th percentile.

(b) We are given $\ell = 0.375$. We can use algebra to solve for $i$.

$$\ell = \frac{i}{n}$$

Multiply both sides by $n$.

$$n \cdot (\ell) = n \cdot \left(\frac{i}{n}\right)$$

Simplify both sides.

$$n\ell = i$$

To make me happy, switch the sides.

$$i = n\ell$$

Now, we can evaluate $i$.

$$i = (48)(0.375)$$

$$i = 18$$

Determine the $x$ associated with $i = 18$.

$$x = \boxed{41.09}$$

(c) The mean: $\bar{x} = \frac{2037.066}{48} = \boxed{42.439}$

(d) If $n$ is odd, then median is $x_{i=\frac{n+1}{2}}$, the value of $x$ when $i = \frac{n+1}{2}$. Otherwise, if $n$ is even, the median is mean of $x_{i=\frac{n}{2}}$ and $x_{i=\frac{n}{2}+1}$. In this case, $n = 48$ and so $n$ is even.

$$\text{median} = \frac{x_{24} + x_{25}}{2} = \frac{41.968 + 41.979}{2}$$

So, median = $\boxed{41.9735}$.