1. **Solution**

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

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

(a) We are given $x = 21.563$. This means $i = 1$. We know $n = 6$. Determine the percentile ℓ.

$$\ell = \frac{1}{6}$$

$$\ell = 0.167$$

So, the percentile rank is $\boxed{0.167}$, or 16.7th percentile.

(b) We are given $\ell = 0.333$. 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.

$$i = (6)(0.333)$$

$$i = 2$$

Determine the x associated with $i = 2$.

$$x = \boxed{27.973}$$

(c) The mean: $\bar{x} = \frac{171.605}{6} = \boxed{28.601}$

(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, $n = 6$ and so n is even.

$$\text{median} = \frac{x_3 + x_4}{2} = \frac{29.211 + 30.211}{2}$$

So, median = $\boxed{29.711}$.

2. **Solution**

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

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

   (a) We are given $x = 51.499$. This means $i = 9$. We know $n = 21$. Determine the percentile ℓ.

   $$\ell = \frac{9}{21}$$

   $$\ell = 0.429$$

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

   (b) We are given $\ell = 0.476$. 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.

   $$i = (21)(0.476)$$
   $$i = 10$$

   Determine the x associated with $i = 10$.

   $$x = \boxed{51.729}$$

   (c) The mean: $\bar{x} = \frac{1098.839}{21} = \boxed{52.326}$

   (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, $n = 21$ and so n is odd.

   $$\text{median} = x_{(21+1)/2,} = x_{11}$$

   So, median = $\boxed{52.005}$.