

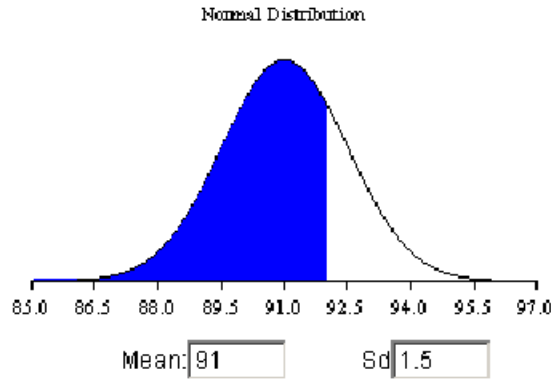
## Normal Model for Octane Ratings

Population mean:  $\mu=91.0$

Population standard deviation:  $\sigma=1.5$

1. What percentage of octane ratings fall below 92?

a. Draw a picture.



b. Standardize.

$$z = \frac{y - \mu}{\sigma} = \frac{92 - 91}{1.5} = 0.67$$

c. Use Table Z.

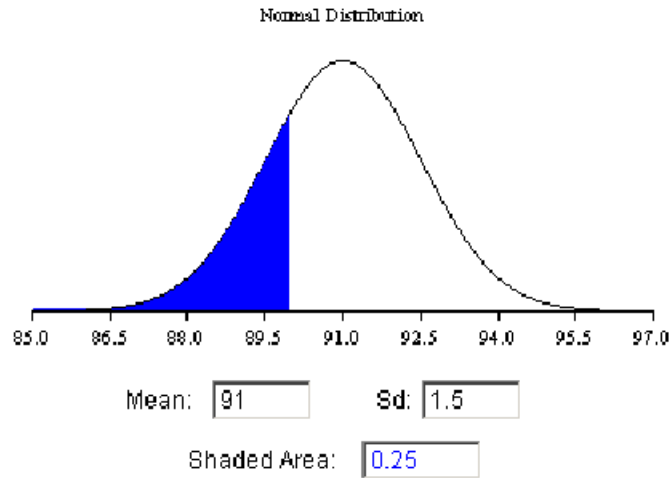
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	<b>0.07</b>	0.08	0.09
0.0										
0.1										
0.2										
0.3										
0.4										
0.5										
<b>0.6</b>										
0.7										

A vertical arrow points from the 0.07 column down to the 0.6 row, and a horizontal arrow points from the 0.6 row to the 0.07 column, meeting at the value 0.7486.

**74.86% of octane ratings fall below 92.**

2. What octane rating corresponds to the 25<sup>th</sup> percentile?

a. Draw a picture.



b. Use Table Z

0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	<i>z</i>
										-0.9
										-0.8
										-0.7
0.2451	0.2483	<b>0.2514</b>	0.2546							-0.6
										-0.5

$$z = -0.67$$

c. Reverse standardize

$$z = \frac{y - \mu}{\sigma} \Rightarrow -0.67 = \frac{y - 91.0}{1.5}$$

$$-0.67(1.5) + 91.0 = y$$

-1.00 + 91.0 = 90 is the 25<sup>th</sup> percentile octane rating.