~~#13~~ - Margin of Error Key

(1) sample = 550
64% spent over $25

$MOE = 1.96\sqrt{\frac{.64(.36)}{550}}$

$MOE = .0401$

interval: $.64 \pm .0401$

$.5999 - .6801$

or about 60% - 68%

(2) 18/225 were damaged

$18/225 = .08$ so 8% are damaged

$MOE = 1.96\sqrt{\frac{.08(.92)}{225}}$

$MOE = .0354$

interval: $.08 \pm .0354$

$.0446 - .1154$

or about $4\frac{1}{2}\% - 11\frac{1}{2}\%$

(3) 1000 adults
832 supported

$\frac{832}{1000} = .832$

$MOE = 1.96\sqrt{\frac{.832(.168)}{1000}}$

$MOE = .0232$

interval: $.832 \pm .0232$

$.8088 - .8552$

or about 81% - 86%

(4) 50 products
16% are defective

$MOE = 1.96\sqrt{\frac{.16(.84)}{50}}$

$MOE = .1016$

interval: $.16 \pm .1016$

$.0584 - .2616$

or about 6% - 26%

5) 90 teens
20%

$MOE = 1.96\sqrt{\frac{.20(.80)}{90}}$

$MOE = .0826$

6) 9000 teens
20%

$MOE = 1.96\sqrt{\frac{.20(.80)}{9000}}$

$MOE = .00826$

7) 90,000 teens
20%

$MOE = 1.96\sqrt{\frac{.20(.80)}{90000}}$

$MOE = .0026$

8) The bigger the sample size, the smaller the MOE!

9) To cut MOE in half, you need to QUADRUPLE the sample size! Here's why:

$\frac{1}{2}MOE = \frac{1}{2} \cdot 1.96 \cdot \frac{s}{\sqrt{n}}$

$\frac{1}{2}MOE = 1.96 \cdot \frac{s}{2\sqrt{n}}$

$\frac{1}{2}MOE = 1.96 \frac{s}{\sqrt{4n}}$

notice that n is being multiplied by 4!

10) $\bar{x} = \$540$

$s_x = \$80$

10 apt

$MOE = 1.96 \frac{80}{\sqrt{10}}$

$MOE = 49.58$

interval: 540 ± 49.58

$490.42 - 589.58$

11) start by finding $\bar{x}$ & s_x in your calc.... look at the directions in the notes!!

$\bar{x} = 61.8$

$s_x = 4.8$

$MOE = 1.96 \frac{4.8}{\sqrt{24}}$

$MOE = 1.92$

interval: $59.88 - 63.72$

12) 50 bolts

$\bar{x} = 5.11$ mm

$s_x = 0.1$ mm

$MOE = 1.96 \frac{0.1}{\sqrt{50}}$

$MOE = .0277$

interval: $5.0823 - 5.1377$

13) 31 grades

$\bar{x} = 105.84$ $s_x = 14.27$

$MOE = 1.96 \frac{14.27}{\sqrt{31}}$

$MOE = 5.0234$

interval: $9.2466 - 19.2934$

MOE = $1.96 \frac{14.27}{\sqrt{90}}$

MOE = 2.9482

The margin of error went down! Almost cut in half!

(15) MOE = $1.96 \frac{14.27}{\sqrt{250}}$

MOE = 1.7689

Now its even lower!

(16) The bigger the sample, the lower the MOE!

(17) (a) 750 adults
14% 12+ hours

MOE = $1.96 \sqrt{\frac{.14(.86)}{750}}$

MOE = .0248

(b) .14 ± .0248

.1152 - .1648

so about 11½% - 16½%

(c) I would say that this statistic isn't true! Our statistic was 14% and with the MOE it should only reach as high as 16½%

(18) (a) Do this in your calc!

$\bar{x}$ = 31.58

s_x = .3259

(b) MOE = $1.96 \frac{.3259}{\sqrt{10}}$

MOE = .20199

(c) 31.58 ± .20199

31.37801 - 31.78199

(d) Julie does have a reason to complain! 31.8 is slightly higher than the high end of the interval.

(19) 51% of voters

MOE ± 5%

Not yet! The MOE gives an interval of 46-56% of votes. He could lose the election!!