13. $\frac{527}{62} = 8.5$, which is midway between the first integer and the last. $8 - 30 = -22$.

14. $7^1 = 7,\ 7^2 = 49,\ 7^3 = 343,\ 7^4 = 2401$, etc. $\Rightarrow 17^{325}$ has a units' digit of 7.
$3^1 = 3,\ 3^2 = 9,\ 3^3 = 27,\ 3^4 = 81$, etc. $\Rightarrow 23^{108}$ has a units' digit of 1. $1 + 7 = 8$.

15.
$$\begin{array}{r} 7x + 62y = -2 \\ +\ (23x - 27y = 16) \\ \hline 30x + 35y = 14 \end{array} \quad \Rightarrow \quad 6x + 7y = \frac{14}{5} = 2.8$$

16. A sum of 8 can be rolled with three dice if the first two dice have a sum of 2, 3, 4, 5, 6, or 7. The probability that this will occur is $\frac{21}{36}$. A sum of 10 can be rolled with three dice if the first two dice have a sum of 4, 5, 6, 7, 8, or 9. The probability that this will occur is $\frac{27}{36}$. The probability of rolling 8 or 10 with three dice is $\frac{1}{6}\left(\frac{21}{36} + \frac{27}{36}\right) = \frac{2}{9}$.

17. The area of a square is one half the square of the length of the diagonal. Let x = the length of the diagonal of the original square.
$\frac{(x+8)^2}{2} = \frac{x^2}{2} + 144;\ x^2 + 16x + 64 = x^2 + 288 \Rightarrow 16x = 224 \Rightarrow x = 14$.
The side of the original square $= \frac{14}{\sqrt{2}} = 7\sqrt{2}$.

18. Let x = the radius of the circumscribed circle and y = the radius of the inscribed circle.
The ratio of the area of the circumscribed circle to the area of the inscribed circle is $\left(\frac{x}{y}\right)^2$.
$x = y + y\sqrt{2} \Rightarrow y = \frac{x}{1+\sqrt{2}} \Rightarrow \left(\frac{x}{y}\right)^2 = \left(1+\sqrt{2}\right)^2 = 3 + 2\sqrt{2}$.