

Ch. 9

- ① fingers, cipher
- ② al-Khwarizmi's name
- ③ geometric pf (alg. reasoning)
- ④ al-jabr
- ⑤ $3\frac{1}{7}$, $\frac{62832}{20000} \approx 3.1416$, $\sqrt{10} \approx 3.16$
- ⑥ cosine + versine = radius
used because angles > 90 have neg. cos.

7) to 4 sexagesimal places

8) not much differently from
other #s

$$\sqrt{(x - (2\sqrt{x} + 10))^2} = \sqrt{8x}$$

$$(x - (2\sqrt{x} + 10)) = \sqrt{8x}$$

$$\text{Let } x = y^2$$

$$y^2 - 2\sqrt{y} - 10 = \sqrt{8y}$$

$$y^2 - 2y - \sqrt{8}y = 10$$

$$y^2 + y(-\sqrt{8} - 2) = 10$$

$$\frac{(-2 - \sqrt{8})}{2} = -(\sqrt{2} + 1)(-(\sqrt{2} + 1)) = 2\sqrt{2} + 3$$

$$y^2 + \frac{(-2 - \sqrt{8})}{2}y + 2\sqrt{2} + 3 = 10 + 2\sqrt{2} + 3$$

$$\sqrt{(y - \sqrt{2} - 1)^2} = \sqrt{13 + 2\sqrt{2}}$$

$$\begin{array}{r}
 \frac{x^2+6}{x+3} \\
 \underline{x^2+3} \\
 x^2 \quad x \quad 1 \quad \frac{1}{x} \quad \frac{1}{x^2} \\
 \quad 1 \quad 0 \quad 6 \\
 \quad 0 \quad 1 \quad 3 \\
 \quad x^2 \quad x \quad \frac{1}{x} \quad \frac{1}{x^2} \\
 \quad \quad -3 \quad +6 \\
 \quad \quad \quad 1 \quad 3 \\
 \quad \quad \quad x^2 \quad x \quad \frac{1}{x} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad 1 \quad -3 \quad +\frac{1}{15} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad \quad +15 \\
 \quad \quad \quad \quad \quad \quad 1 \quad \frac{1}{x} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad \quad \quad \quad 1 \quad -3 \quad -\frac{1}{15} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad \quad \quad \quad \quad -45 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad 1 \quad \frac{1}{x} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad 1 \quad -3 \quad -\frac{1}{15} \quad \frac{1}{x^2} \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad -45
 \end{array}
 = x - 3 + 15\left(\frac{1}{x}\right) + 45\left(\frac{1}{x^2}\right)$$

