

## Mental Computation – Square Roots

It is quite easy to estimate square roots of reasonably small numbers with often amazing accuracy.

Let  $N$  = the original number.

Let  $M$  = the nearest perfect square.

Let  $F = \sqrt{M}$

Let  $E$  = the estimate of  $\sqrt{N}$

Then  $E = M + (N - M)/(2F)$

Example: Estimate  $\sqrt{150}$  mentally.

$N = 150$

$M = 144$

$F = 12$

$E = 144 + 6/24 = 12.25$

To two decimal places:  $\sqrt{150} = 12.25$

Example: Estimate  $\sqrt{215}$  mentally.

$N = 215$

$M = 225$

$F = 15$

$E = 15 - 10/30 = 14.67$

To two decimal places:  $\sqrt{215} = 14.66$

Example: Estimate  $\sqrt{500}$  mentally.

$N = 500$

$M = 484$

$F = 22$

$E = 22 + 16/44 = 22.35$

To two decimal places:  $\sqrt{500} = 22.36$