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	diameter	Cost per wafer	Dies per wafer	Defects /cm^2
Wafer x	16cm	15	64	0.02
Wafer y	20cm	24	100	0.03

A) $\text{Wafer area}_x = \pi r^2 = \pi (8cm)^2 = 64\pi = 201,16 \text{ cm}^2$

$\text{Wafer area}_y = \pi r^2 = \pi (10cm)^2 = 100\pi = 314,159 \text{ cm}^2$

$\text{Die area}_x = \dfrac{\text{wafer area}_x}{\text{Dies per wafer}_x} = \dfrac{64\pi}{64} = \pi \text{ cm}^2$

$\text{Die area}_y = \dfrac{\text{Wafer area}_y}{\text{Dies per wafer}_y} = \dfrac{100\pi}{100} = \pi \text{ cm}^2$

$\text{Yield} = \dfrac{1}{(1 + (\text{Defects/cm}^2 * \text{Die area}/2))^2}$

$\text{Cost per die} = \dfrac{\text{Cost per wafer}}{\text{Dies per wafer} \times \text{yield}}$

B) $\text{Yield}_x = \dfrac{1}{(1+(0.02 * \pi/2))^2} = 0,94$ $\quad \text{Yield}_y = \dfrac{1}{(1+(0.03 * \pi/2))^2} = 0,912$

$\text{Cost per die } x = \dfrac{15}{64 * 0,94} = 0,2493$ $\quad \text{Cost per die } y = 0,2631$

C)

	diameter	cost per wafer	dies per wafer	defects /cm^2
Wafer x	16cm	18,75	58,18	0,017
Wafer y	20cm	30	90,90	0,026

$x \cdot 0,8 = 15 \quad x = 18,75$ $\quad x \cdot 1,1 = 64 \quad x = 58,18$ $\quad x \cdot 1,15 = 0,02 \quad x = 0.017$

$y \cdot 0,8 = 24 \quad y = 30$ $\quad y \cdot 1,1 = 100 \quad y = 90,90$ $\quad y \cdot 1,15 = 0.03 \quad y = 0,026$

$\text{Wafer area}_x = \pi r^2 = 64\pi$

$\text{Wafer area}_y = \pi r^2 = 100\pi$

$\text{Die area}_x = \dfrac{64\pi}{58,18} = 3,4558$

$\text{Die area}_y = \dfrac{100\pi}{90,90} = 3,4560$

$\text{Yield}_x = \dfrac{1}{(1+(0,017 * 3,4558/2))^2} = \dfrac{1}{1,0596} = 0,9437$

$\text{Yield}_y = \dfrac{1}{(1+(0,026 * 3,4560/2))^2} = \dfrac{1}{1,0918} = 0,9159$

$\text{Cost per die}_x = \dfrac{18,75}{58,18 * 0,9437} = 0,3415$

$\text{Cost per die}_y = \dfrac{30}{90,90 * 0,9159} = 0,3603$

Cost per die

	Before year	This year	
x	0,3415	0,2493	Decreased %26,99
y	0,3603	0,2631	Decreased %26,97

2) $P1 \Rightarrow 3.10^9$ Hz $\quad P2 \Rightarrow 1{,}5.10^9$ Hz $\quad 10^9$ instructions

%30 $\Rightarrow 3.10^8 \Rightarrow$ R type instructions $\quad$ %50 $\Rightarrow 5.10^8 \Rightarrow$ I type instructions $\quad$ %20 $\Rightarrow 2.10^8 \Rightarrow$ J type instructions

P1 has 2 R type, 4 I type, 3 J type

P2 has 3 R type, 3 I type, 3 J type

A) Clock cycle P1 $\Rightarrow$ Needed cycles $\Rightarrow 2.3.10^8 + 4.5.10^8 + 3.2.10^8$
$= 32.10^8$ cycles

Clock cycle $P2 \Rightarrow 3.3.10^8 + 3.5.10^8 + 3.2.10^8 = 30.10^8$ cycles

B) Average for P1 $\Rightarrow \dfrac{\text{Clock cycle}}{\text{Instruction count}} = \dfrac{32.10^8}{10^9} = 3{,}2$ cycles for each instructions

$P2 \Rightarrow \dfrac{30.10^8}{10^9} = 3$ cycles for each instruction

C) Execution time $P1 \Rightarrow \dfrac{\text{Needed cycles}}{\text{Clock rate}} = \dfrac{32.10^8}{3.10^9} = 1{,}067$ seconds

$P2 \Rightarrow \dfrac{30.10^8}{1{,}5.10^9} = 2$ seconds

D) $\dfrac{2}{1{,}067} = 1{,}875$ $\quad P_1$ is faster than P2 1,875 times