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1. A) Wafer_X

Wafer area = $\pi . r^2 = 3.14 \times 8^2 = \underline{200,96\ cm^2}$

Die area = $\frac{200,96}{64} = \underline{3,14\ cm^2}$

Wafer_Y

Wafer area = $\pi . r^2 = 3.14 \times 10^2 = \underline{314\ cm^2}$

Die area = $\frac{314}{100} = \underline{3.14\ cm^2}$

B) Wafer_X

$$Yield = \frac{1}{\left(1 + \left(0.02 \times \frac{3.14}{2}\right)\right)^2} = \frac{1}{1,064} = \underline{0,94}$$

$$Cost\ per\ die = \frac{15}{64 \times 0,94} = \frac{15}{60,16} = \underline{0,249}$$

Wafer_Y

$$Yield = \frac{1}{\left(1 + \left(0.03 \times \frac{3.14}{2}\right)\right)^2} = \frac{1}{1,096} = \underline{0,912}$$

$$Cost\ per\ die = \frac{24}{100 \times 0,912} = \frac{24}{91,2} = \underline{0,263}$$

C) Wafer_X

Wafer area = $3,14 \times 8^2 = \underline{200,96\ cm^2}$ (Same)

Die area = $\frac{200,96}{70,4} = \underline{2,855\ cm^2}$

$$Yield = \frac{1}{\left(1 + \left(0.023 \times \frac{2.855}{2}\right)\right)^2} = \frac{1}{1,066} = \underline{0,937}$$

$$Cost\ per\ die = \frac{12}{70,4 \times 0,937} = \underline{0,182} \Rightarrow$$ 1,368 times less than previous year.

Wafer_Y

Wafer area = $3,14 \times 10^2 = \underline{314\ cm^2}$ (Same)

Die area = $\frac{314}{110} = \underline{2,855\ cm^2}$

$$Yield = \frac{1}{\left(1 + \left(0,0345 \times \frac{2.855}{2}\right)\right)^2} = \frac{1}{1,1009} = \underline{0,908}$$

$$Cost\ per\ die = \frac{19,2}{110 \times 0,908} = \underline{0,192} \Rightarrow$$ 1,369 times less than previous year

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2. A) Clock cycle = CPI × Instruction count

P1

$(0.3 \times 2 + 0.5 \times 4 + 0.2 \times 3) \times 10^9 = 3.2 \times 10^9$

$0.6 + 2 + 0.6 = 3.2$

P2

$(0.3 \times 3 + 0.5 \times 3 + 0.2 \times 3) \times 10^9 = 3 \times 10^9$

$0.9 + 1.5 + 0.6 = 3$

B) P1 (Average CPI) = $\frac{\text{Clock cycle}}{\text{Instruction count}} = \frac{3.2 \times 10^9}{10^9} = 3.2$

P2 (Average CPI) = $\frac{\text{Clock cycle}}{\text{Instruction count}} = \frac{3 \times 10^9}{10^9} = 3$

C) P1 (Execution time) = $\frac{3.2 \times 10^9}{3 \times 10^9} = 1{,}066$ sec

P2 (Execution time) = $\frac{3 \times 10^9}{1.5 \times 10^9} = 2$ sec

D) P1 is 1,876 times faster than P2.

$\frac{2}{1{,}066} = 1{,}876$