

2.7

i)

$$\left(\frac{5^{-9}}{5^{19}} \right)^3 = \frac{(5^{-9})^3}{(5^{19})^3} = \frac{5^{-9 \cdot 3}}{5^{19 \cdot 3}} = \frac{5^{-27}}{5^{57}} =$$

$$\left(\frac{a}{b} \right)^n = \frac{a^n}{b^n}$$

$$(2^m)^n = 2^{m \cdot n}$$

$$5^{-27-57}$$

$$\frac{2^m}{2^n} = 2^{m-n}$$

$$2^{-n} = \frac{1}{2^n}$$

$$5^{-84}$$

$$\frac{1}{5^{84}}$$

$$k) \left(\frac{98^2}{76^0} \right)^4 = \left(\frac{98^2}{1} \right)^4 = (98^2)^4 = 98^{2 \cdot 4}$$

$$= 98^8$$

$$2^0 = 1$$

$$(2^m)^n = 2^{mn}$$

$$= (2 \cdot 49)^8$$

$$= 2^8 \cdot 49^8$$

$$= 2^8 \cdot (7^2)^8$$

$$= 2^8 \cdot 7^{16}$$

m)

$$\left(\frac{2^7}{2^{-3} \cdot 2^5} \right)^2 = \left(\frac{2^7}{2^2} \right)^2 = (2^5)^2 = 2^{10}$$

$$2^m \cdot 2^n = 2^{m+n}$$

$$\frac{2^m}{2^n} = 2^{m-n}$$

$$(2^m)^n = 2^{mn}$$

2.12

8

1	2	4					
8							

8

2^0	2^1	2^2	2^3	2^4	2^5	2^6	2^7
1	2	4	8	16	32	64	128
256	512	1024	2^{11}	2^{12}	2^{13}	2^{14}	2^{15}

Théorème

64^{ème}

2^{63}

$\sim 9 \cdot 10^{18}$

$$2^0 + 2^1 + 2^2 + \dots + 2^{63} = 2^{64} - 1 \approx 18 \cdot 10^{24}$$

$$R_{ya} \sim 1,5 \cdot 10^7 \text{ grains/tonne}$$

$$\frac{18 \cdot 10^{21}}{1,5 \cdot 10^7} \text{ t} = 12 \cdot 10^{14} \text{ t}$$

$$\text{Prod. mond:} \sim 700 \text{ Mt} \sim 7 \cdot 10^8 \text{ t}$$

100 grains	10g	↓ $\div 10$
10 grains	1g	
10^4 grains	1kg	↓ $\cdot 100$
10^7 grains	1t	

$$\frac{18 \cdot 10^{21} \text{ grains}}{10^4 \text{ grains/kg}}$$

$$18 \cdot 10^{17} \text{ kg}$$

0)

$$\left(\frac{2^{-3}}{b^{-2}} \right)^{-7} = \frac{(2^{-3})^{-7}}{(b^{-2})^{-7}} = \frac{2^{(-3) \cdot (-7)}}{b^{(-2) \cdot (-7)}} = \boxed{\frac{2^{21}}{b^{14}}} \quad \left(= 2^{21} b^{-14} \right)$$

$\left(\frac{a}{b} \right)^n = \frac{a^n}{b^n}$

$(a^m)^n = a^{mn}$

Tangente à un cercle par P hors du cercle

