

$$506 \quad a) \quad 3^x = 3^6 \quad b) \quad 3x = 36 \quad || :3$$

$$\underline{\underline{x = 6}}$$

$$\underline{\underline{x = 12}}$$

$$c) \quad 3 + x = 36$$
$$x = 36 - 3$$
$$\underline{\underline{x = 33}}$$

$$d) \quad 6^x = 36$$
$$6^x = 6^2$$
$$\underline{\underline{x = 2}}$$

$$6 \cdot 6$$
$$= 6^2$$

~~a) $2^x = 2^7$
 $x = 7$~~

~~b) $2^x = 2^3 \cdot 2^4$
 $2^x = 2^7$
 $x = 7$~~

~~c) $2^x = (2^3)^4$
 $2^x = 2^{12}$
 $x = 12$~~

509 a) $7^x = 49^3$
 $7^x = (7^2)^3$
 $7^x = 7^6$
 $x = 6$

b) $36^x = 6^{10}$
 $(6^2)^x = 6^{10}$
 $6^{2x} = 6^{10}$
 $2x = 10 \quad || : 2$
 $x = 5$

c) $4^x = 8^4$
 $(2^2)^x = (2^3)^4$
 $2^{2x} = 2^{12}$
 $2x = 12$
 $x = 6$

$$4 = 2 \cdot 2 = 2^2$$

$$2^{3 \cdot 4} = 2^{12}$$

||: 2

7^{2·3}

d) $25^x = 125^4 \cdot 25^3$
 $(5^2)^x = (5^3)^4 \cdot (5^2)^3$

$$5^{2x} = 5^{12} \cdot 5^6$$

$$5^{2x} = 5^{12+6}$$

$$5^{2x} = 5^{18}$$

$$2x = 18 \quad || : 2$$

$$\underline{\underline{x = 9}}$$

$$25 = 5 \cdot 5 = 5^2$$

$$125 = 5 \cdot 5 \cdot 5 = 5^3$$

95

$3^x = 81$	$3^y = 3^4$	$x = 4$	$5^x = 125$	$5^x = 5^3$	$x = 3$
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a) $a_n = 4^n + 36$	b) $b_n = 3 \cdot 5^n$
$4^n + 36 = 100$	$3 \cdot 5^n = 17$
$4^n = 64$	$5^n = \frac{17}{3}$
$4^n = 4^3$	$n = 3$
$n = 3$	

V: luku 100 on kyseisen lukujonon kolmas jäsen.

V: Yhtälöllä ei ole kokonaislukuratkaisua n , joten luku 17 ei ole kyseisen lukujonon jäsen.

1 bakteeri kaksin kertaistuu tunnissa. Onko bakteereja yhden vrk:n kuluessa yli miljoona?

522b

$$\underline{4}a^3 \cdot \underline{9}a^5 = (6a^4)^x$$

$$36a^{3+5} = (6a^4)^x$$

$$36a^8 = (6a^4)^x$$

$$6^2 \cdot (a^4)^2 = (6a^4)^x$$

$$(6 \cdot a^4)^2 = (6a^4)^x$$

$$\underline{\underline{x=2}}$$

$$a^8 = (a^4)^2$$