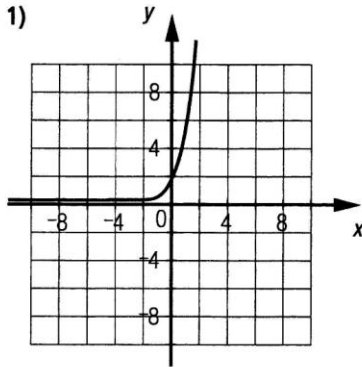


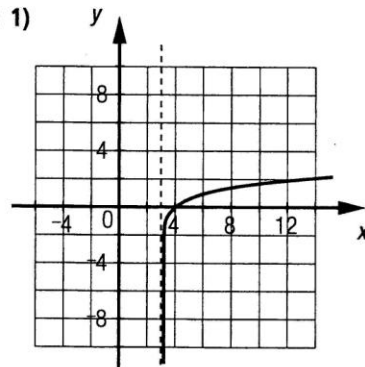
1.
 - a) Light deafness (threshold approximately 34.81 dB).
 - b) Moderate deafness (threshold approximately 49.97 dB).
 - c) Light deafness (threshold 20 dB).
2. $F = 62.5(2)^x$ where F represents the frequency (in Hz) and x represents the stage number of the hearing test.

1. a) 1)



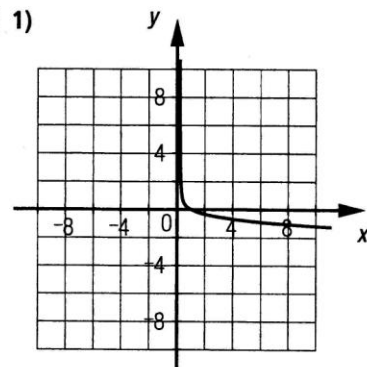
- 2) Domain: \mathbb{R} , range: $]0, +\infty[$.
- 3) 1.8
- 4) No zero.
- 5) Positive: \mathbb{R} .

b) 1)



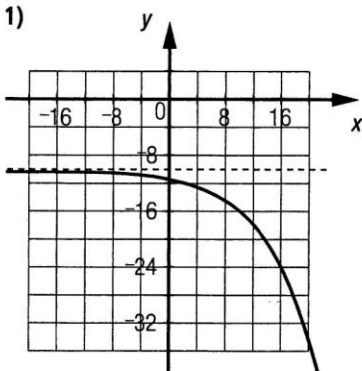
- 2) Domain: $]3, +\infty[$, range: \mathbb{R} .
- 3) No initial value.
- 4) 4
- 5) Positive: $[4, +\infty[$
and negative: $]3, 4[$.

c) 1)



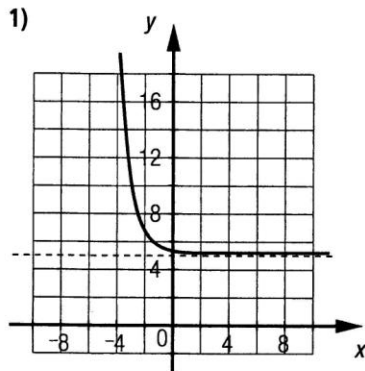
- 2) Domain: $]0, +\infty[$, range: \mathbb{R} .
- 3) No initial value.
- 4) 1
- 5) Positive: $]0, 1[$
and negative: $[1, +\infty[$.

d) 1)



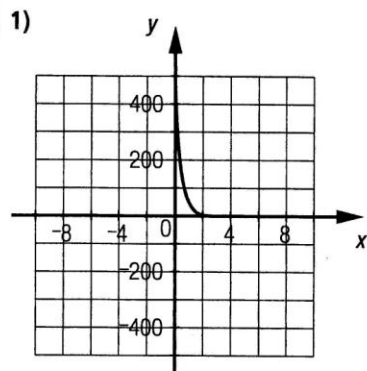
- 2) Domain: \mathbb{R} , range: $]-\infty, -10[$.
- 3) ≈ -11.49
- 4) No zero.
- 5) Negative: \mathbb{R} .

e) 1)



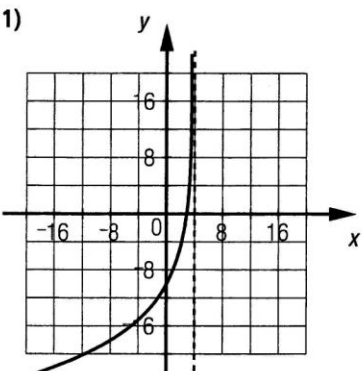
- 2) Domain: \mathbb{R} , range: $]5, +\infty[$.
- 3) 5.15
- 4) No zero.
- 5) Positive: \mathbb{R} .

f) 1)



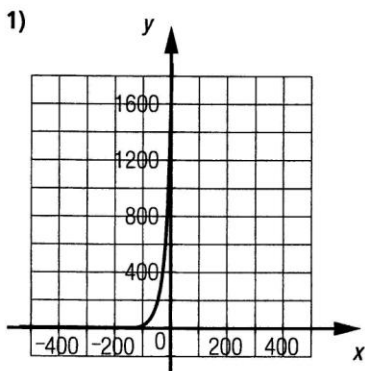
- 2) Domain: \mathbb{R} , range: $]0, +\infty[$.
- 3) 450
- 4) No zero.
- 5) Positive: \mathbb{R} .

g) 1)



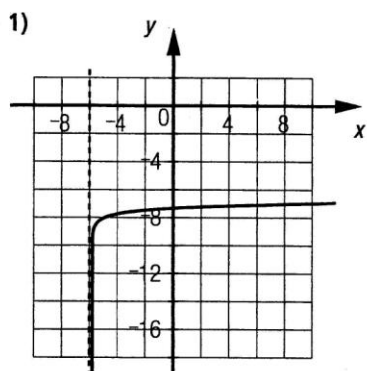
- 2) Domain: $]-\infty, 4[$, range: \mathbb{R} .
- 3) -10
- 4) 3
- 5) Negative: $]-\infty, 3[$
and positive: $]3, 4[$.

h) 1)



- 2) Domain: \mathbb{R} , range: $]0, +\infty[$.
- 3) 1500
- 4) No zero.
- 5) Positive: \mathbb{R} .

i) 1)



- 2) Domain: $]-6, +\infty[$, range: \mathbb{R} .
- 3) ≈ -7.33
- 4) $\approx 2\,087\,372\,975.67$
- 5) Negative: $[-6, \approx 2\,087\,372\,975.67[$
and positive: $[\approx 2\,087\,372\,975.67, +\infty[$.

2. a) $f(x) = 2(3)^x - 5$ b) $f(x) = \log_2 x$ c) $f(x) = \log_{\frac{3}{4}}(x + 2)$
 d) $f(x) = 4\left(\frac{1}{2}\right)^x - 4$ e) $f(x) = 1500\left(\frac{82}{75}\right)^{\frac{x}{2}}$ f) $f(x) = \log_{\frac{1}{2}}(x + 4)$
 g) $f(x) = -2(4)^x$ h) $f(x) = \log_{\frac{1}{2}}(x - 1)$ i) $f(x) = -2^x + 5$

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3. a) $x \approx 13.64$ b) $x = 15$ c) $x \approx 1.62$ d) $x = 125\,000$
 e) $x \approx 0.20$ f) $x \approx 0.74$ g) $x = -79$ h) $x \approx 0.85$
 4. a) $x > 99\,998$ b) $x > 7$ c) $x < 5.27$ d) $x \leq -252$
 e) $x > \approx 81\,337.40$ f) $x \geq 3.42$ g) $x \leq 2$ h) $x \geq 10^{-7}$
 5. a) $f^{-1}(x) = \log_{0.7\frac{1}{3}}(x - 2)$ b) $g^{-1}(x) = -0.5 \ln -0.4x$ c) $h^{-1}(x) = 2^{\frac{x}{7}} - 9$
 d) $i^{-1}(x) = -\log_{0.05\frac{2}{3}} \frac{2x}{3} + 4$ e) $j^{-1}(x) = 321e^{\frac{x}{455}}$ f) $k^{-1}(x) = 7(10)^{\frac{x}{3}}$
 6. a) $x = 5$ b) $x = 2$ c) $x \approx -1.63$ d) $x \approx 3.61$
 7. Yes. At an annual interest rate of 4% where the interest rate is compounded annually, the value of the investment after 20 years is $1600(1.04)^{20} \approx \$3,505.80$; however, if the interest is compounded every 6 months, the amount after 20 years is $1600(1.02)^{40} \approx \$3,532.86$.
 8. The moment when the critical threshold is reached: $5(1.5)^x = 5(1.5)^{14-x}$
 $x = 14 - x$
 $x = 7$ years
 The power associated to the critical threshold is $5(1.5)^7 \approx 85.43$ MW.

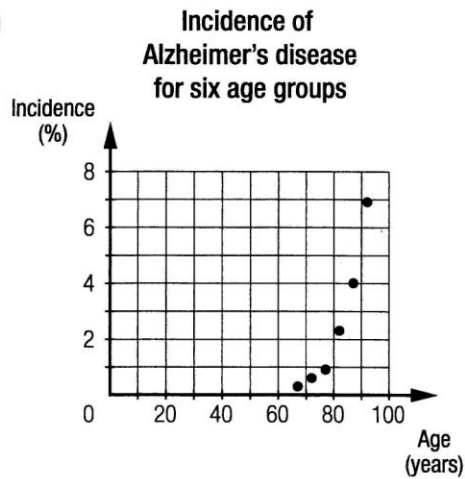
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9. a) 1) $\approx \$7,401.22$ 2) $\approx \$7,429.74$ 3) $\approx \$7,456.83$
 b) For the same annual interest rate, the more the value of the investment increases.
 10. a) Approximately 3.46 million visitors. b) 4 million visitors. c) Approximately 4.95 million visitors.
 11. Several answers possible. Example: $y \approx 0.92(1.007)^x$

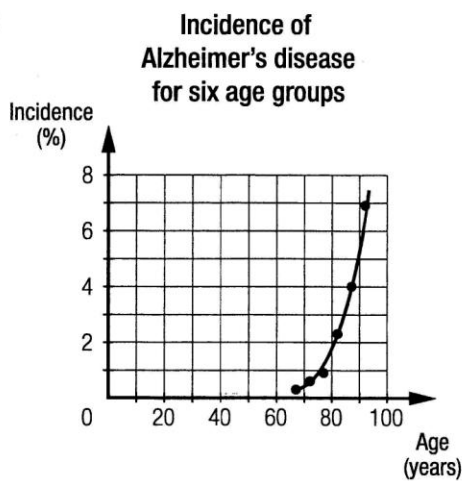
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12. In approximately 9.63 years.
 13. a) $Q = 1000(0.9)^t$ b) 190 L c) Approximately 35.01 h after it starts to boil. d) 25 L
 14. a) 1) 450 2) 10.7 3) 225
 b) 1) $225 = 450e^{a10.7}$ 2) ≈ -0.06 3) $M = 450e^{-0.0648t}$
 c) 1) $M = 5e^{-0.0001t}$ 2) $M = 50e^{-0.0564t}$ 3) $M = M_0 e^{\frac{-t}{1024 \frac{1}{313} \frac{1}{479}}}$

15. a)



b) 1)



2) Several answers possible. Example:

$$I = \frac{e^{0.1275a}}{16\,666.67}$$

where I represents the incidence and a , the age.

c) A person must undergo these tests as of age of 76.

16. a) The rod was expanded by approximately 2.54 mm.

b) The rod expands by 2 mm at 20°C.

c) The expansion of the rod is greater than 4 mm for temperatures that are greater than 2000°C.

d) The maximum expansion of the rod is approximately 3.35 mm.

17. Approximately 1.81 min after it is activated.

18. a) $e^{-0.1 \times 5} \approx 60.65\%$

b) $0.05C_0 = C_0e^{-0.1t}$
 $0.05 = e^{-0.1t}$
 $-0.1t = \ln 0.05$
 $t \approx 29.96$

The water must remain in the tank for approximately 29.96 days.

19. a) The voltage of Battery ① is decreasing because the base, $e^{-1.2}$, is less than 1.

b) 1) At 0 h.

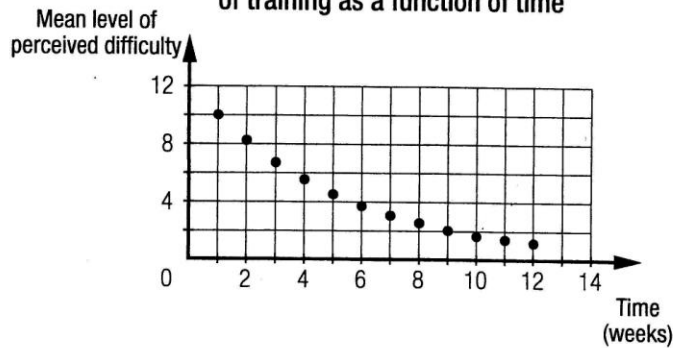
2) At approximately 0.24 h (approximately 14 min 23 s).

c) There is a risk of fire as of approximately 0.58 h (approximately 34 min 39 s).

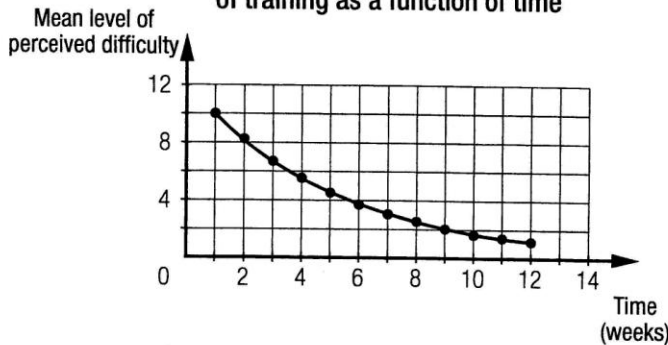
20. a) $250e^{0.7 \times 0} = 250$ dandelions.
 b) 1) $250e^{0.7 \times 1} \approx 503$ dandelions. 2) $250e^{0.7 \times 2} \approx 1014$ dandelions. 3) $250e^{0.7 \times 4} \approx 4111$ dandelions.

c) $250e^{\frac{0.7}{7}} - 250 \approx 26$ dandelions.

21. a) **Level of perceived difficulty of training as a function of time**



- b) 1) **Level of perceived difficulty of training as a function of time**



- 2) Several possible answers. Example:
 $y \approx 12.34(0.82)^x$

- c) 1) At ≈ 2.14 weeks. 2) At ≈ 2.80 weeks. 3) At ≈ 3.56 weeks. 4) At ≈ 5.56 weeks.

22. a) At the start of the aging process, the water counts as 30% of the mass of this cheese.
 b) The quantity of water would be 28% of the mass of this cheese in approximately 6.90 years.
23. a) ≈ 99.37 kPa b) ≈ 793 m c) ≈ 137.38 K