

# RATKAISUHAHMOTELMAT

42p  
21p 6/2  
12p 5  
2p / - x

①

1.1.  $a^{3 \cdot 2} \cdot a^2 = a^{6+2} = a^8$  a)

1.2.  $\frac{x^{3n+1}}{x^{-1+3}} = x^{3n+1-2} = x^{3n-1}$  b)

1.3.  $\frac{5}{3} - \left(-\frac{3}{5}\right) = \frac{5}{3} + \frac{3}{5} = \frac{25+9}{15} = \frac{34}{15}$  c)

1.4.  $|-25+23| = |-2| = 2$  b)

② a)  $f(0) = 15 \cdot 0 - 6(2 \cdot 0 + 3)$

$= -6 \cdot 3 = -18$

$15x - 6(2x+3) = 0$

$15x - 12x - 18 = 0$

$3x = 18$  eli  $x = 6$

b)  $3^x = 3^{-5}$  joten  $x = -5$

c)  $(2^3)^x = 2^{-5}$  eli  $2^{3x} = 2^{-5}$  josta  $3x = -5$  eli  $x = -\frac{5}{3}$

③ a)  $2(x-3) + 5 = x-3$

$2x - 6 + 5 = x - 3$

$2x - x = 1 - 3$  josta  $x = -2$

b)  $\frac{x-1}{3} - \frac{2x-3}{4} = x+1 \quad | \cdot 12$

$4(x-1) - 3(2x-3) = 12(x+1)$

$4x - 4 - 6x + 9 = 12x + 12$

$-14x = 7$  eli  $x = -\frac{7}{14} = -\frac{1}{2}$

④ a)  $f(-1) = 2$  <sup>1p</sup>    b)  $f(3) = 4$  <sup>1p</sup>

c)  $f(x) = 4$ , kun  $x = -6$  tai  $x = 0$  tai  $x = 3$  <sup>3p</sup>

d)  $x = -5$  tai  $x = -2$  tai  $x = 4$  <sup>3p</sup>

e)  $f(x) > 0$ , kun  $x < -5$  tai  $-2 < x < 4$  <sup>4p</sup>

⑤ a = alkuperäinen hinta

loppuhinta =  $1,075 \cdot 1,025 \cdot 0,91 \cdot 0,985 a$   
 $\approx 0,9877 a$

$\Rightarrow$  Hinta aleni  $(1 - 0,9877) \cdot 100\% \approx 1,2\%$

⑥ P = paino    r = etäisyys Maan keskipisteestä

Paino (N)	Etäisyyden neliö (km <sup>2</sup> )
127630	6370 <sup>2</sup>
x	6378 <sup>2</sup>

$6378^2 \cdot x = 6370^2 \cdot 127630$

$x = \frac{6370^2 \cdot 127630}{6378^2} \approx 127310$

V: 127310 N

⑦  $\frac{2 \cdot (2^2)^n \cdot (2^3)^{n+3}}{(2^5)^{n+2}} = \frac{2 \cdot 2^{2n} \cdot 2^{3(n+3)}}{2^{5(n+2)}}$

$= 2^{1+2n+3n+9 - (5n+10)} = 2^0 = 1$

V: Ei riippu vaan on aina 1