MEMO 2015-9ŒB-00003(2)

(1) Simplify (without a calculator):
Write the answers as positive exponents!

(a) $\dfrac{(0{,}5)^{3x} \times (4)^{2x}}{\sqrt{16x^8}}$

$= \dfrac{\left(\frac{1}{2^1}\right)^{3x} \times \left(2^2\right)^{2x}}{\sqrt[2]{2^4x^8}}$

$= \dfrac{\left(2^{-1}\right)^{3x} \times 2^{4x}}{2^{\frac{4}{2}}x^{\frac{8}{2}}}$

$= \dfrac{2^{-3x} \times 2^{4x}}{2^2x^4}$

$= \dfrac{2^{-3x+4x-2}}{x^4}$

$= \dfrac{2^{x-2}}{x^4}$

(b) $\dfrac{8^{3m-1} \times 4^{1-2m}}{32^m}$

$= \dfrac{\left(2^3\right)^{3m-1} \times \left(2^2\right)^{1-2m}}{\left(2^5\right)^m}$

$= \dfrac{2^{9m-3} \times 2^{2-4m}}{2^{5m}}$

$= 2^{9m-3+2-4m-5m}$

$= 2^{-1}$

$= \frac{1}{2}$

(c) $\sqrt{\dfrac{0{,}09}{0{,}81} \div \sqrt[3]{64}}$

$= \sqrt{\frac{9}{81} \div \sqrt[3]{4^3}}$

$= \sqrt{\frac{1}{9} \div 4^{\frac{3}{3}}}$

$= \sqrt{\frac{1}{9} \times \frac{1}{4}}$

$= \sqrt{\frac{1}{36}}$

$= \frac{1}{6}$

(d) $\sqrt[x]{x^{5x}} + 2(x^2)^3$

$= x^{\frac{5x}{x}} + 2x^6$

$= x^5 + 2x^6$

(2) Solve x:

(a) $-2x^{\frac{1}{2}} = -18$

$\therefore \quad x^{\frac{1}{2}} = \frac{-18}{-2}$

$\therefore \quad x^{\frac{1}{2}} = 9$

$\therefore \quad x^{\frac{1}{2}} = 3^2$

$\therefore \quad \left(x^{\frac{1}{2}}\right)^2 = (3^2)^2$

$\therefore \quad x = 3^4$

$\therefore \quad x = 81$

(b) $3^{2x+1} . 27^2 = 9^{1-x} . 3$

$\therefore \quad 3^{2x+1} . (3^3)^2 = (3^2)^{1-x} . 3$

$\therefore \quad 3^{2x+1} . 3^6 = 3^{2-2x} . 3^1$

$\therefore \quad 3^{2x+1+6} = 3^{2-2x+1}$

$\therefore \quad EB \Leftrightarrow EE$

$\therefore \quad 2x + 7 = 3 - 2x$

$\therefore \quad 2x + 2x = 3 - 7$

$\therefore \quad 4x = -4$

$\therefore \quad x = -1$

(3) Simplify and write the answer in scientific notation: (Without a calculator.)

(a) $(1{,}44 \times 10^3) \div (1{,}2 \times 10^{-2})$

$= 1{,}44 \times 10^3 \div 1{,}2 \div 10^{-2}$

$= 1{,}44 \div 1{,}2 \times 10^3 \div 10^{-2}$

$= 1{,}2 \times 10^{3-(-2)}$

$= 1{,}2 \times 10^5$

(b) $(4{,}0 \times 10^2)^3$

$= (4{,}0)^3 \times (10^2)^3$

$= 64 \times 10^6$

$= 6{,}4 \times 10^1 \times 10^6$

$= 6{,}4 \times 10^7$