Nafn: _____

1. (20%) Einfaldaðu eftirfarandi veldadæmi:

a) $(3x^3y)^{-2} \cdot x \cdot y^{-3} \cdot y^3$

$3^{-2}x^{-6}y^{-2} \cdot x \cdot y^{-3} \cdot y^3$

$3^{-2}x^{-6+1} \cdot y^{-2-3+3} \quad = \frac{1}{3^2}x^{-5}y^{-2} = \frac{1}{9x^5y^2}$

b) $\dfrac{a^3b^2c^2}{4x} : \dfrac{abc^2}{2^3x}$ $= \dfrac{a^3b^2c^2}{4x} \cdot \dfrac{2^3x}{abc^2} = 2^{3-2} \cdot a^{3-1} \cdot b^{2-1} \cdot c^{2-2} \cdot x^{1-1}$

$\qquad\qquad\qquad\qquad\quad \downarrow \qquad\qquad\qquad = 2a^2bc^0x^0$
$\qquad\qquad\qquad\qquad\quad 2^2$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad = 2a^2b$

2. (20%) Einfaldaðu eftirfarandi rótardæmi:

a) $\sqrt[5]{x^3} \cdot \sqrt[3]{x^2} : \sqrt[6]{x^7}$

$x^{\frac{3}{5}} \cdot x^{\frac{2}{3}} : x^{\frac{7}{6}} = x^{\frac{3}{5}+\frac{2}{3}-\frac{7}{6}}$

$\qquad\qquad\qquad\quad = x^{\frac{18}{30}+\frac{20}{30}-\frac{35}{30}}$

$\qquad\qquad\quad = x^{\frac{18+20-35}{30}} = x^{\frac{3}{30}} = x^{\frac{1}{10}}$

b) $\sqrt{125} - \sqrt{45} - \sqrt{80}$

$\sqrt{5 \cdot 5^2} - \sqrt{5 \cdot 3^2} - \sqrt{5 \cdot 4^2}$

$\sqrt{5} \cdot \sqrt{5^2} - \sqrt{5} \cdot \sqrt{3^2} - \sqrt{5} \cdot \sqrt{4^2}$

$\sqrt{5} \cdot 5 - \sqrt{5} \cdot 3 - \sqrt{5} \cdot 4$

$5\sqrt{5} - 3\sqrt{5} - 4\sqrt{5}$

$\qquad = -2\sqrt{5}$

3. (45%) Leystu eftirfarandi annars stigs jöfnur:

a) $x^2 = 25$

$$x^2 - 25 = 0$$

$A=1$ $D = 0^2 - 4 \cdot 1 \cdot 25$

$B=0$ $D = 100$

$C=25$

$$x_1 = \frac{-0 + \sqrt{100}}{2 \cdot 1} = \frac{10}{2} = 5$$

$$x_2 = \frac{-0 - \sqrt{100}}{2 \cdot 1} = -\frac{10}{2} = -5$$

b) $4x^2 + 8x + 3 = 0$

$A=4$ $D = 8^2 - 4 \cdot 4 \cdot 3$

$B=8$ $D = 64 - 48$

$C=3$ $D = 16$

$$x_1 = \frac{-8 + \sqrt{16}}{2 \cdot 4} = \frac{-8 + 4}{8} = -\frac{4}{8} = -\frac{1}{2}$$

$$x_2 = \frac{-8 - \sqrt{16}}{2 \cdot 4} = \frac{-8 - 4}{8} = \frac{-12}{8} = -\frac{3}{2}$$

c) $\sqrt{x-1} = x + 3$

$$\left(\sqrt{x-1}\right)^2 = (x+3)^2$$

$$x - 1 = x^2 + 6x + 9$$

$$0 = x^2 + 5x + 10$$

$$D = 5^2 - 4 \cdot 1 \cdot 10$$

$$D = 25 - 40$$

$$D = -15$$

engin rauntölulausn

4. (15%) Summa tveggja jákvæðra talna er 106,5 og margfeldi þeirra er 2065,5. Settu upp annars stigs jöfnu og leystu með hjálp lausnarforms fyrir annars stigs jöfnu.

$$x + y = 106,5 \qquad y = 106,5 - x$$

$$x \cdot y = 2065,5$$

$$x(106,5 - x) = 2065,5$$

$$106,5x - x^2 = 2065,5$$

$$106,5x - x^2 - 2065,5 = 0$$

$A = -1$ $D = 106,5^2 - 4 \cdot (-1)(2065,5)$

$B = 106,5$ $D = 3080,25$

$C = -2065,5$ $D = 55,5$

$$x_1 = \frac{-106,5 + 55,5}{2(-1)} = 25,5$$

$$x_2 = \frac{-106,5 - 55,5}{2(-1)} = 81$$

Aðgreinir: $D = B^2 - 4 \cdot A \cdot C$ Lausnir: $x_1 = \frac{-B + \sqrt{D}}{2A}$ $x_2 = \frac{-B - \sqrt{D}}{2A}$

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

$$a^n : a^m = a^{n-m}$$

$$a^n \cdot b^n = (a \cdot b)^n \qquad a^{-n} = \frac{1}{a^n}, a^0 = 1 \qquad \sqrt[q]{a^p} = a^{\frac{p}{q}} \qquad \sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

$$a^n : b^n = (a : b)^n$$

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