Wiskunde voor bachelor en master

Deel 1 Basiskennis en basisvaardigheden

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Uitwerkingen diagnostische toets hoofdstuk 2

1. a. $\sqrt[3]{8^2}\cdot\sqrt{(-25)^2} = \sqrt[3]{(2^3)^2}\cdot\sqrt{25^2} = \sqrt[3]{2^6}\cdot 25 = 2^{\frac{6}{3}}\cdot 25 = 2^2\cdot 25 = 100$

   b. $\dfrac{\sqrt{18}}{\sqrt{18}-\sqrt{8}} = \dfrac{\sqrt{2\cdot 9}}{\sqrt{2\cdot 9}-\sqrt{2\cdot 4}} = \dfrac{3\sqrt{2}}{3\sqrt{2}-2\sqrt{2}} = \dfrac{3\sqrt{2}}{\sqrt{2}} = 3$

2. a. $\dfrac{\sqrt{300}}{2\sqrt{6}} = \dfrac{\sqrt{50}\cdot\sqrt{6}}{2\sqrt{6}} = \dfrac{\sqrt{50}}{2} = \dfrac{\sqrt{2\cdot 25}}{2} = \dfrac{5\sqrt{2}}{2} = 2\tfrac{1}{2}\sqrt{2}$

   b. $\dfrac{3\sqrt{6}}{\sqrt{48}} = \dfrac{3\sqrt{2}\cdot\sqrt{3}}{\sqrt{3\cdot 16}} = \dfrac{3\sqrt{2}\cdot\sqrt{3}}{4\sqrt{3}} = \tfrac{3}{4}\sqrt{2}$

   c. $\dfrac{\sqrt{128}}{2\sqrt{18}+8\sqrt{2}} = \dfrac{\sqrt{2\cdot 64}}{2\sqrt{2\cdot 9}+8\sqrt{2}} = \dfrac{8\sqrt{2}}{6\sqrt{2}+8\sqrt{2}} = \dfrac{8\sqrt{2}}{14\sqrt{2}} = \dfrac{8}{14} = \tfrac{4}{7}$

   d. $\dfrac{1}{\sqrt{150}} = \dfrac{1}{\sqrt{6\cdot 25}} = \dfrac{1}{5\sqrt{6}} = \dfrac{\sqrt{6}}{5\sqrt{6}\cdot\sqrt{6}} = \dfrac{\sqrt{6}}{5\cdot 6} = \tfrac{1}{30}\sqrt{6}$

   e. $\sqrt{2}\cdot\dfrac{\sqrt{120}}{\sqrt{8}} = \dfrac{\sqrt{2}\cdot\sqrt{120}}{\sqrt{8}} = \dfrac{\sqrt{2}\cdot\sqrt{2\cdot 2\cdot 2\cdot 15}}{\sqrt{2\cdot 2\cdot 2}} = \sqrt{2}\cdot\sqrt{15} = \sqrt{30}$

   f. $\dfrac{\sqrt{98}}{2\sqrt{28}+3\sqrt{7}} = \dfrac{\sqrt{2\cdot 49}}{2\sqrt{4\cdot 7}+3\sqrt{7}} = \dfrac{7\sqrt{2}}{4\sqrt{7}+3\sqrt{7}} = \dfrac{7\sqrt{2}}{7\sqrt{7}} = \dfrac{\sqrt{2}}{\sqrt{7}} = \dfrac{\sqrt{2}\cdot\sqrt{7}}{7} = \tfrac{1}{7}\sqrt{14}$

3. a. $\dfrac{\sqrt{a}+\sqrt{b}}{\sqrt{b}} = \dfrac{(\sqrt{a}+\sqrt{b})\sqrt{b}}{\sqrt{b}\sqrt{b}} = \dfrac{\sqrt{ab}+b}{b} = \dfrac{b+\sqrt{ab}}{b}$

   b. $\dfrac{x-2}{\sqrt{x}} + \dfrac{\sqrt{x}}{x-2} = \dfrac{(x-2)^2}{(x-2)\sqrt{x}} + \dfrac{(\sqrt{x})^2}{(x-2)\sqrt{x}} = \dfrac{(x-2)^2+x}{(x-2)\sqrt{x}} =$

   $$= \frac{x^2-4x+4+x}{(x-2)\sqrt{x}} = \frac{(x^2-3x+4)\sqrt{x}}{x(x-2)}$$

4. a. $x^3 = -\frac{1}{27}$ {standaardvergelijking}

$\Leftrightarrow \quad x = \sqrt[3]{-\frac{1}{27}}$ $\{(\frac{1}{3})^3 = \frac{1}{27}\}$

$\Leftrightarrow \quad x = -\frac{1}{3}$

b. $x^4 = 64$ {standaardvergelijking}

$\Leftrightarrow \quad x = \sqrt[4]{64} \ \vee \ x = -\sqrt[4]{64}$ $\{64 = 2^6\}$

$\Leftrightarrow \quad x = \sqrt[4]{2^6} \ \vee \ x = -\sqrt[4]{2^6}$ $\{\sqrt[4]{2^6} = 2^{\frac{6}{4}} = 2^{1\frac{1}{2}}\}$

$\Leftrightarrow \quad x = 2^{1\frac{1}{2}} \ \vee \ x = -2^{1\frac{1}{2}}$

$\Leftrightarrow \quad x = 2\sqrt{2} \ \vee \ x = -2\sqrt{2}$

c. $|x^6 - 32| = 32$ {definitie absolute waarde}

$\Leftrightarrow \quad x^6 - 32 = 32 \ \vee \ x^6 - 32 = -32$ {breng -32 naar rechts}

$\Leftrightarrow \quad x^6 = 64 \ \vee \ x^6 = 0$ {standaardvergelijkingen, zie ook onderdeel b.}

$\Leftrightarrow \quad x = 2 \ \vee \ x = -2 \ \vee \ x = 0$