

ANSWERS

Exercise 1

$$\frac{2}{3} + \frac{7}{12} = \frac{15}{12} = \frac{5}{4} \quad \frac{2}{7} + \frac{3}{5} = \frac{31}{35} \quad -\frac{14}{60} + \frac{8}{21} - \frac{2}{30} = -\frac{49}{210} + \frac{80}{210} - \frac{14}{210} = \frac{17}{210}$$

$$\frac{\frac{3}{8} - \frac{1}{5}}{\frac{2}{3}} = \frac{21}{80} \quad \frac{\frac{6}{8} - \frac{2}{5}}{\frac{6}{9}} = \frac{\frac{3}{4} - \frac{2}{5}}{\frac{2}{3}} = \frac{\frac{15}{20} - \frac{8}{20}}{\frac{2}{3}} = \frac{\frac{7}{20}}{\frac{2}{3}} = \frac{7}{20} \cdot \frac{3}{2} = \frac{21}{40}$$

$$\frac{\frac{2}{4} - \frac{8}{5}}{-\frac{6}{7}} \cdot \frac{6}{11} = \frac{7}{10}$$

Exercise 2

$$8x^2 \cdot y^0 \cdot x^7 = 8x^9 \quad \sqrt[3]{8} \cdot \sqrt[6]{x^{12}} = 2x^2 \quad 2\sqrt{a} \cdot 3\sqrt{b} \cdot a^{\frac{3}{2}} \cdot b^{\frac{5}{2}} = 6a^2b^3$$

$$\sqrt[5]{x^2 \cdot y} \cdot \sqrt[10]{x^{26} \cdot y^{18}} = x^3y^2 \quad 5 \cdot \sqrt[7]{a} \cdot (\sqrt{a+b^2})^0 \cdot (\sqrt[7]{a^3})^2 = 5a$$

$$7x^2\sqrt{5} \cdot \sqrt{x^5} \cdot \sqrt{125} = 7x^2\sqrt{5} \cdot \sqrt{x^5} \cdot \sqrt{25 \cdot 5} = 7x^2\sqrt{5} \cdot x^{\frac{5}{2}} \cdot 5\sqrt{5} = 7 \cdot x^{\frac{9}{2}} \cdot 25 = 175x^{4\frac{1}{2}}$$

$$\frac{16\sqrt{2} \cdot \sqrt{x^6} \cdot \sqrt{8}}{8 \cdot \sqrt{x^{\frac{1}{2}}} \cdot \sqrt[4]{x^3}} = \frac{2^4 \cdot 2^{\frac{1}{2}} \cdot x^{\frac{6}{2}} \cdot 2^{\frac{3}{2}}}{2^3 \cdot x^{\frac{1}{4}} \cdot x^{\frac{3}{4}}} = \frac{2^4 \cdot 2^2 \cdot x^3}{2^3 \cdot x} = 2^3x^2 = 8x^2$$

Exercise 3

$$x^{-6} \cdot x^2 \cdot 3^2 = x^{2-6} \cdot 9 = x^{-4} \cdot 9 = \frac{9}{x^4}$$

$$\frac{y^3 \cdot x^{-7}}{y^{-2}} = y^{3-(-2)} \cdot x^{-7} = \frac{y^5}{x^7}$$

$$\frac{x^{\frac{1}{2}} \cdot x^{-2}}{x^{\frac{1}{2}} \cdot 2^5} = \frac{1}{2^5 x} = \frac{1}{32x}$$

$$\frac{x^{-p} \cdot y^2}{y^7} = x^{-p} \cdot y^{2-7} = x^{-p} \cdot y^{-5} = \frac{1}{x^p y^5}$$

$$\frac{x^{2p} \cdot 5^{-3p}}{x^{-p-2}} = \frac{x^{2p-(-p-2)}}{5^{3p}} = \frac{x^{3p+2}}{5^{3p}}$$

Exercise 4

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

$$3(c^2 - d) + (2c-1)(3d+1) = 3c^2 - 3d + 6cd + 2c - 3d - 1 = 3c^2 - 6d + 6cd + 2c - 1$$

$$(a^2 - 5b)^2 - \frac{1}{2}(6a^4 - 2a^2b) = a^4 - 10a^2b + 25b^2 - 3a^4 + a^2b = -2a^4 - 9a^2b + 25b^2$$

$$\begin{aligned} (2x-2y)(1-x)(2x+3y)(1+x) &= ((2x)^2 + (-2y+3y)x - (-2y) \cdot (3y)) \cdot (1-x^2) = \\ &= ((2x)^2 + 2xy - 6y^2)(1-x^2) = 4x^2 + 2xy - 6y^2 - 4x^4 - x^3y + 6x^2y^2 \end{aligned}$$

Exercise 5

$$x^2 - y^2 = (x+y)(x-y)$$

$$x^2 + 5x + 6 = (x+2)(x+3)$$

$$a^2 - 6a + 9 = (a-3)^2$$

$$1 - a^8 = (1+a^4)(1+a^2)(1+a)(1-a)$$

$$4x^2 + 9y^2 + 12xy = (2x+3y)^2$$

$$25k^2 + 25mk + 6m^2 = (5k)^2 + (2m+3m) \cdot (5k) + 2m \cdot 3m = (5k+3m)(5k+2m)$$

Exercise 6

Een handige formule is: $\frac{1}{\sqrt{A}} = \frac{1}{A} \sqrt{A}$

(want $\frac{1}{\sqrt{A}} = \frac{1}{\sqrt{A}} \cdot 1 = \frac{1}{\sqrt{A}} \cdot \frac{\sqrt{A}}{\sqrt{A}} = \frac{\sqrt{A}}{A} = \frac{1}{A} \sqrt{A}$ bijvoorbeeld: $\frac{1}{\sqrt{2}} = \frac{1}{2} \sqrt{2}$)

$$2\sqrt{5} - \frac{3}{\sqrt{5}} = 2\sqrt{5} - \left(\frac{3}{\sqrt{5}}\right) \cdot \left(\frac{\sqrt{5}}{\sqrt{5}}\right) = 2\sqrt{5} - \frac{3}{5}\sqrt{5} = \left(2 - \frac{3}{5}\right)\sqrt{5} = \frac{7}{5}\sqrt{5}$$

$$\frac{\frac{1}{2}\sqrt{7}}{\frac{5}{4}\sqrt{8}} = \left(\frac{1}{2}\right) \cdot \left(\frac{4}{5}\right) \cdot (\sqrt{7}) \cdot \left(\frac{1}{8} \cdot \sqrt{8}\right) = \left(\frac{1}{2}\right) \cdot \left(\frac{4}{5}\right) \cdot \left(\frac{1}{8}\right) \cdot (\sqrt{7}) \cdot (\sqrt{4 \cdot 2}) = \left(\frac{1}{20}\right) \cdot (\sqrt{7}) \cdot (2\sqrt{2}) = \frac{1}{10} \sqrt{14}$$

$$3\sqrt{20} - \frac{1}{2}\sqrt{5} = 3 \cdot \sqrt{4} \cdot \sqrt{5} - \frac{1}{2}\sqrt{5} = 6\sqrt{5} - \frac{1}{2}\sqrt{5} = \frac{11}{2}\sqrt{5}$$

$$\frac{\sqrt{40}}{6\sqrt{81}} = \frac{\sqrt{4} \cdot \sqrt{10}}{6 \cdot 9} = \left(\frac{2}{6 \cdot 9}\right) \cdot \sqrt{10} = \frac{1}{27} \sqrt{10} \qquad \frac{8\sqrt{125}}{3\sqrt{28}} = \frac{8\sqrt{25 \cdot 5}}{3\sqrt{4 \cdot 7}} = \frac{20}{21} \sqrt{35}$$

$$\frac{\sqrt{27} - 8\sqrt{3}}{\sqrt{81}} + \frac{7}{3\sqrt{3}} = \frac{3\sqrt{3} - 8\sqrt{3}}{9} + \frac{7}{3\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{-5\sqrt{3}}{9} + \frac{7\sqrt{3}}{9} = \frac{2}{9} \sqrt{3}$$

Exercise 7

The first set of two points (1, 8) and (-3, 0)

Equation of the straight line through these points $y = 2x + 6$

And the two points $\left(-\frac{3}{2}, 5\right)$ and $\left(-\frac{1}{8}, \frac{7}{8}\right)$ with equation $y = -3x + \frac{1}{2}$

Exercise 8

$$7x - 3y = 5$$

$$6x - 5y = -3$$

$$x = 2 \quad y = 3$$

$$\frac{1}{2}x + \frac{2}{5}y = 5$$

$$x + \frac{3}{5}y = 8$$

$$x = 2 \quad y = 10$$

$$7x + y\sqrt{2} = 8\sqrt{2}$$

$$x\sqrt{3} + 8y\sqrt{6} = 9\sqrt{6}$$

$$x = \sqrt{2} \quad y = 1$$

$$x + 2y + z = 8$$

$$2x + 3y - 2z = 10$$

$$3x - 5y + 7z = 6$$

$$x = 3 \quad y = 2 \quad z = 1$$

$$3x + y - 5z = 4$$

$$2x + 4y + z = 17$$

$$x + 4z = 6$$

$$x = 2 \quad y = 3 \quad z = 1$$

$$15x + 6y + 3z = 24$$

$$9x - 9y - 6z = -15$$

$$6x + 5y + 3z = 17$$

$$x = 1 \quad y = -2 \quad z = 7$$

Exercise 9

$$3x \leq \frac{1}{8}(2 + 14x) - 1 \quad \Rightarrow \quad x \leq -\frac{3}{5}$$

$$7x \leq \frac{1}{2}(2 + 16x) - 4 \quad \Rightarrow \quad x \geq 3$$

$$6 - 7x > 3(3 - 2x) \quad \Rightarrow \quad 6 - 7x > 9 - 6x \quad \Rightarrow \quad 6x - 7x > 9 - 6$$

$$-x > 3 \quad \Rightarrow \quad x < -3 \quad !!$$

Exercise 10

$$\frac{\sqrt[7]{a^5} (a^3 - \sqrt{b})^0 a^{-6}}{\sqrt[7]{a^3} \sqrt[3]{b^6}} = \frac{(a^5)^{\frac{1}{7}} \cdot a^{-6}}{(a^3)^{\frac{1}{7}} \cdot (b^6)^{\frac{1}{3}}} = \frac{a^{\frac{5}{7}} \cdot a^{-6}}{a^{\frac{3}{7}} \cdot b^{\frac{6}{3}}} = \frac{a^{\frac{5}{7}-\frac{42}{7}} \cdot a^{-6}}{b^2} = \frac{a^{-\frac{37}{7}}}{b^2}$$

$$p = -\frac{37}{7}, \quad q = 2$$

Exercise 11

$$\frac{1}{2a} + \frac{b}{a^2} = \frac{a+2b}{2a^2}$$

$$\frac{2\sqrt{y}}{\sqrt{x}} + \frac{5\sqrt{x}}{\sqrt{y}} = \frac{2\sqrt{y}}{\sqrt{x}} \cdot \left(\frac{\sqrt{y}}{\sqrt{y}}\right) + \frac{5\sqrt{x}}{\sqrt{y}} \cdot \left(\frac{\sqrt{x}}{\sqrt{x}}\right) = \frac{2y}{\sqrt{xy}} + \frac{5x}{\sqrt{xy}} = \frac{5x+2y}{\sqrt{xy}}$$

$$\frac{\frac{2-y}{x-x} \cdot \frac{y}{5x}}{\frac{y}{x^2}} = \frac{\frac{2-y}{x}}{\frac{y}{x^2}} \cdot \frac{y}{5x} = \left(\frac{2-y}{x}\right) \cdot \left(\frac{x^2}{y}\right) \cdot \left(\frac{y}{5x}\right) = \frac{2-y}{5}$$

Exercise 12

$$2x^2 + 3x = -7x - 12 \quad \Rightarrow \quad 2x^2 + 10x + 12 = 0 \quad \Rightarrow \quad x^2 + 5x + 6 = 0$$

$$(x+2)(x+3) = 0 \quad \Rightarrow \quad x+2=0 \quad \vee \quad x+3=0 \quad \Rightarrow \quad x=-2 \quad \vee \quad x=-3$$

$$\frac{1}{2}x + 5 = \frac{5x-3}{2} \quad \Rightarrow \quad x+10 = 5x-3 \quad \Rightarrow \quad x-5x = -10-3 \quad \Rightarrow \quad x = 3\frac{1}{4}$$

$$2x = 7 - x^2 \quad \Rightarrow \quad x^2 + 2x - 7 = 0 \quad \Rightarrow \quad x_{1,2} = \frac{-2 \pm \sqrt{4+28}}{2}$$

$$x_{1,2} = \frac{-2 \pm \sqrt{32}}{2} \quad \Rightarrow \quad x_{1,2} = -1 \pm \frac{1}{2}\sqrt{16 \cdot 2} \quad \Rightarrow \quad x_{1,2} = -1 \pm 2\sqrt{2}$$

$$x_1 = -1 + 2\sqrt{2} \quad , \quad x_2 = -1 - 2\sqrt{2}$$