Simplifying Algebraic Fractions www.m4ths.com

(1) Simplify each:

(a) $\dfrac{p^7}{p^5}$

(b) $\dfrac{p^2}{p^8}$

(c) $\dfrac{10p^6}{2p^3}$

(d) $\dfrac{4p^2}{8p^5}$

(e) $\dfrac{p^8 q^{10}}{p^3 q^4}$

(f) $\dfrac{p^3 q^8}{p^3 q^2}$

(g) $\dfrac{2p^{10} \times q^3}{8p^5 \times q^2}$

(h) $\dfrac{(p^2)^8 \times 8q}{4p^5 \times q^2}$

(i) $\dfrac{21p^6 q^{11}}{14p^{-3} q^2}$

(2) By first factorising the expressions (where required) simplify each of the following

(a) $\dfrac{5x+10}{3x+6}$

(b) $\dfrac{x^2+4x}{2x+8}$

(c) $\dfrac{15x-10xy}{6-4y}$

(d) $\dfrac{10(x+5)}{5x+25}$

(e) $\dfrac{10x^2-10x}{2x}$

(f) $\dfrac{15xy}{5y^2-5y}$

(g) $\dfrac{20xy}{10y-20yz}$

(h) $\dfrac{15x+10y+5}{5x}$

(i) $\dfrac{2x^2-8x}{4x^2}$

(j) $\dfrac{y^2-y}{y-1}$

(3) Factorise each quadratic expression to simplify the following fractions:

(a) $\dfrac{x^2+6x+8}{(x+1)(x+4)}$

(b) $\dfrac{x^2+10x+16}{x^2+6x+8}$

(c) $\dfrac{x^2-x-6}{x^2+x-12}$

(d) $\dfrac{x^2-x-6}{x^2+2x}$

(e) $\dfrac{x^2-10x+16}{x^2-8x}$

(f) $\dfrac{x^2-25}{x^2+x-20}$

(g) $\dfrac{x^2-2x+1}{x^2-1}$

(h) $\dfrac{x^2-36}{x^2+6x}$

(i) $\dfrac{2x^2-2x-12}{x^2-3x}$

(j) $\dfrac{x^2-10x}{2x^2-200}$

(k)$\star$ $\dfrac{2x^2+x-1}{3x^2+8x+5}$

(l)$\star$ $\dfrac{4x^2+11x+6}{2x^2+5x+2}$

(1) Simplify each of the following:

(a) $\dfrac{p^7}{q^5} \times \dfrac{p^{11}}{p^3}$

(b) $\dfrac{8p^3}{q^9} \times \dfrac{q^{14}}{2p^6}$

(c) $\dfrac{16p}{4q^7} \times \dfrac{q^7}{2p^4}$

(d) $\dfrac{p^{16}}{q^9} \div \dfrac{p^{14}}{2q^{13}}$

(e) $\dfrac{p^6}{10q^8} \div \dfrac{p}{25q^3}$

(f) $\dfrac{\left(p^6\right)^2}{3q^2} \div \dfrac{4p}{6q^3}$

(2) By first factorising the expressions (where required) simplify each of the following

(a) $\dfrac{6x+12}{5x-4} \times \dfrac{20x-16}{x+2}$

(b) $\dfrac{x^2+2x}{x(x-1)} \times \dfrac{5x-5}{x+3}$

(c) $\dfrac{3x^2+12x}{x(x+2)} \div \dfrac{2x+8}{5x+10}$

(3) Factorise each quadratic expression to simplify the following fractions:

(a) $\dfrac{x^2+3x+2}{x^2+6x+8} \times \dfrac{x^2+6x+5}{x^2+2x+1}$

(b) $\dfrac{x^2-x-12}{x^2+x-20} \times \dfrac{x^2+6x+5}{(x+3)^2}$

(c) $\dfrac{x^2+4x+4}{x^2-x-6} \div \dfrac{x^2+6x+8}{x^2-10x+21}$

(d) $\dfrac{x^2+3x}{2x-6} \div \dfrac{x^2+5x+6}{x^2-9}$

(e) $\dfrac{2x^2+6x+4}{x^2+6x+5} \times \dfrac{x^2-25}{x^2+x}$

(f)* $\dfrac{2x^2+13x+6}{x^2-36} \times \dfrac{3x^2-16x-12}{2x^2+11x+5}$

(g)* $\dfrac{x^2+x}{2x^2-2} \div \dfrac{3x^2+6x}{4x^2+x-5}$

(h)* $\dfrac{25x^2-49}{5x^2+2x-7} \div \dfrac{3(x+1)(x+6)}{x^3-x^2}$

(2) A rectangle is shown below

An expression for the area of the rectangle is $x^2 + 5x - 6$ and the an expression for the longer side is $x + 6$

(a) Show that an expression for the shorter side of the rectangle is $\dfrac{(x-1)(x+6)}{(x+6)}$

(b) Hence, find a simplified expression for the length of the shorter side.

(c) Find an expression for the perimeter of the rectangle.

(d) The rectangle is now made into a cuboid and the volume is given as:
$$V = x^3 + 5x^2 - 6x$$
Find the missing side length of the cuboid.

(3) Simplify fully $\dfrac{p^2-q^2}{-2p-2q}$

(4) Show that $\dfrac{\left(9x^6\right)^2}{(3x^4)^3}$ is an integer independent of x.