Mixed Exercise 1

1.

Simplify $\frac{12ab^{-2}-16a}{8ab}$.

2.

Write in the form $ax^p + bx^q$:

a i $\frac{(3+2x)}{\sqrt{x}}$ ii $\frac{(4-3\sqrt{x})}{x}$

b i $\frac{(x^2-3)}{(2x)}$ ii $\frac{(4x-3)}{(2x^2)}$

c i $\frac{(2x^2+1)}{4\sqrt{x}}$ ii $\frac{(2-9\sqrt{x})}{(3x)}$

3.

Simplify $\frac{(16a^2b^8)^{\frac{1}{2}}}{ab^3}$.

4.

Simplify $\left(3x^9+\frac{3}{8}x^9\right)^{-\frac{1}{3}}$.

5.

If $\sqrt{3^{2a+b}}=\frac{27^a}{3^b}$ express a in terms of b.

6.

Express $\left(3x^{\frac{3}{4}}-x^{-\frac{3}{4}}\right)^2$ in the form $ax^n+\frac{b}{x^n}+c$ where a, b, c and n are to be found.

7.

Make x the subject of the equation $4^{ax}=b\times 8^x$ where a and b are constants. Leave your answer in a simplified form.

8.

Simplify $\frac{1}{1+\sqrt{n}}+\frac{1}{1-\sqrt{n}}$.

9.

Show that $\frac{4}{\sqrt{20}-\sqrt{12}}$ can be written in the form $\sqrt{a}+\sqrt{b}$ where a and b are whole numbers.

10.

Explain without using decimal approximations why $3\sqrt{2}$ is larger than $2\sqrt{3}$.

11.

Solve the equation $x\sqrt{27}=5x\sqrt{3}+2\sqrt{48}$.

12.

Rationalise the denominator of $\frac{1}{2\sqrt{n}-3}$.

13.

If n is a positive whole number write $\left(n\sqrt{15}-\sqrt{5}\right)^2$ in the form $a+b\sqrt{3}$.

14.

A rectangle has length $a+b\sqrt{2}$ and width $b-a\sqrt{2}$.

a Find the area of the rectangle in the form $m+n\sqrt{2}$.

b Find and simplify an expression for the length of the diagonal of the rectangle.

15.

a Write $\sqrt{27}+\sqrt{3}$ in the form $\sqrt{a}$.

b Explain without using decimal approximations whether $\sqrt{27}-\sqrt{20}$ is bigger or smaller than $\sqrt{5}-\sqrt{3}$.

16.

a Find and simplify an expression for $(a+b\sqrt{2})^2$.

b By considering $(1-\sqrt{2})^4$ prove that $\sqrt{2}<\frac{17}{12}$.

17.

a Show that $a^3-b^3=(a-b)(a^2+ab+b^2)$.

b Hence rationalise the denominator of $\frac{1}{\sqrt[3]{3}-\sqrt[3]{2}}$.

18.

Is it always true that $\sqrt{x^2}$ equals x?