# SURDS PRACTICE

**Question 1**

Write each of the following surds in its simplest form.

**a)** $\sqrt{45}$

**b)** $\sqrt{48}$

**c)** $\sqrt{80}$

**d)** $\sqrt{50}+3\sqrt{8}$

**e)** $5\sqrt{12}-2\sqrt{75}$

**Question 2**

Write each of the following surds in its simplest form.

**a)** $\sqrt{150}+\sqrt{54}$

**b)** $\sqrt{250}-\sqrt{40}$

**c)** $\sqrt{450}+2\sqrt{50}$

**d)** $\sqrt{243}+\sqrt{27}$

**e)** $\sqrt{343}-\sqrt{28}$

**Question 3**

Write each of the following surds in its simplest form.

**a)** $\sqrt{512}+\sqrt{18}$

**b)** $\sqrt{245}-\sqrt{45}$

**c)** $\sqrt{216}-\sqrt{24}$

**d)** $\sqrt{392}+\sqrt{8}$

**e)** $\sqrt{432}-\sqrt{48}-\sqrt{12}$

**Question 4**

Express each of the following surds in the form $\frac{m}{n}\sqrt{k}$, where $k$, $m$ and $n$ are positive integers.

**a)** $\sqrt{4.5}$

**b)** $\sqrt{12.5}$

**c)** $\sqrt{22.5}$

**d)** $\sqrt{24.5}$

**e)** $\sqrt{62.5}$

**Question 5**

Express each of the following surds in the form $\frac{m}{n}\sqrt{k}$, where $k$, $m$ and $n$ are positive integers.

**a)** $\sqrt{\frac{8}{3}}$

**b)** $\sqrt{\frac{5}{6}}$

**c)** $\sqrt{\frac{5}{8}}$

**d)** $\sqrt{\frac{3}{10}}$

**e)** $\sqrt{\frac{8}{27}}$

**Question 6**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $2\sqrt{2}\times\sqrt{3}$

**b)** $3\sqrt{2}\times 2\sqrt{3}$

**c)** $5\sqrt{3}\times\sqrt{3}$

**d)** $\left(2\sqrt{2}\right)^2$

**e)** $\left(4\sqrt{3}\right)^2$

**Question 7**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $2\sqrt{6}\times\sqrt{24}$

**b)** $2\sqrt{2}\times\sqrt{18}$

**c)** $3\sqrt{2}\times\sqrt{6}$

**d)** $2\sqrt{5}\times5\sqrt{10}$

**e)** $2\sqrt{6}\times4\sqrt{3}$

**Question 8**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\sqrt{6}\times\sqrt{27}$

**b)** $\sqrt{10}\times\sqrt{125}$

**c)** $3\sqrt{8}\times\sqrt{10}$

**d)** $\sqrt{14}\times\sqrt{42}$

**e)** $2\sqrt{6}\times3\sqrt{10}\times\sqrt{30}$

**Question 9**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\sqrt{3}\left(3+2\sqrt{3}\right)$

**b)** $2\sqrt{2}\left(\sqrt{2}-3\right)$

**c)** $\left(2\sqrt{2}-3\sqrt{5}\right)\times\sqrt{5}$

**d)** $\left(2\sqrt{6}-3\right)\times\sqrt{3}$

**e)** $2\sqrt{5}\left(\sqrt{10}-3\sqrt{5}\right)$

**Question 10**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(2+\sqrt{2}\right)\left(1+\sqrt{2}\right)$

**b)** $\left(2+\sqrt{3}\right)\left(3+\sqrt{3}\right)$

**c)** $\left(\sqrt{7}+2\right)\left(1+\sqrt{7}\right)$

**d)** $\left(\sqrt{5}+2\right)\left(3-\sqrt{5}\right)$

**e)** $\left(\sqrt{11}+2\right)\left(5-\sqrt{11}\right)$

**Question 11**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(\sqrt{7}+3\right)\left(2\sqrt{7}-3\right)$

**b)** $\left(2\sqrt{3}-1\right)\left(3-3\sqrt{3}\right)$

**c)** $\left(5-2\sqrt{5}\right)\left(2+3\sqrt{5}\right)$

**d)** $\left(2\sqrt{2}+3\sqrt{3}\right)\left(3\sqrt{2}-2\sqrt{3}\right)$

**e)** $\left(3\sqrt{3}-2\sqrt{2}\right)\left(2\sqrt{2}+3\sqrt{3}\right)$

**Question 12**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(3+\sqrt{3}\right)\left(2-\sqrt{3}\right)$

**b)** $\left(1-\sqrt{5}\right)\left(3+\sqrt{5}\right)$

**c)** $\left(1+2\sqrt{2}\right)\left(1+\sqrt{2}\right)$

**d)** $\left(1-2\sqrt{2}\right)\left(2-3\sqrt{2}\right)$

**e)** $\left(3+2\sqrt{2}\right)\left(1-3\sqrt{2}\right)$

**Question 13**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(2-\sqrt{3}\right)\left(1-\sqrt{3}\right)$

**b)** $\left(4-\sqrt{5}\right)\left(3+2\sqrt{5}\right)$

**c)** $\left(4-\sqrt{7}\right)\left(5+2\sqrt{7}\right)$

**d)** $\left(3\sqrt{2}+1\right)\left(\sqrt{2}-1\right)$

**e)** $\left(2+\sqrt{3}\right)\left(4-\sqrt{12}\right)$

**Question 14**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(2-\sqrt{3}\right)\left(1-\sqrt{3}\right)$

**b)** $\left(4-\sqrt{5}\right)\left(3+2\sqrt{5}\right)$

**c)** $\left(4-\sqrt{7}\right)\left(5+2\sqrt{7}\right)$

**d)** $\left(3\sqrt{2}+1\right)\left(\sqrt{2}-1\right)$

**e)** $\left(2+\sqrt{5}\right)\left(5-\sqrt{20}\right)$

**Question 15**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\sqrt{24}+\sqrt{6}$

**b)** $\sqrt{98}-\sqrt{50}$

**c)** $\sqrt{63}+2\sqrt{28}$

**d)** $5\sqrt{2}\times 4\sqrt{3}-6\sqrt{24}$

**e)** $\dfrac{18}{\sqrt{3}}-2\sqrt{27}$

**Question 16**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $2\sqrt{32}+\sqrt{18}-3\sqrt{8}$

**b)** $3\sqrt{20}+\dfrac{10}{\sqrt{5}}$

**c)** $5\sqrt{8}+\dfrac{6}{\sqrt{2}}$

**d)** $\sqrt{48}+\sqrt{27}-\dfrac{6}{\sqrt{3}}$

**Question 17**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $2\sqrt{8}+\sqrt{18}-\dfrac{6}{\sqrt{2}}$

**b)** $\sqrt{48}-\dfrac{6}{\sqrt{3}}+\sqrt{6}\times\sqrt{2}$

**c)** $\dfrac{14}{\sqrt{2}}-\sqrt{18}-\left(\sqrt{2}\right)^3$

**d)** $2\sqrt{5}\times\sqrt{15}-\sqrt{75}-\dfrac{\sqrt{60}}{\sqrt{5}}$

**Question 18**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\dfrac{21}{\sqrt{7}}$

**b)** $\left(2\sqrt{3}\right)^3-\dfrac{12}{\sqrt{3}}$

**c)** $\dfrac{\sqrt{63}}{3}+\dfrac{14}{\sqrt{7}}$

**d)** $\sqrt{45}+\dfrac{20}{\sqrt{5}}$

**e)** $2\sqrt{75}+\dfrac{3+\sqrt{3}}{3-\sqrt{3}}-\sqrt{2}\times\sqrt{2}$

**Question 19**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\dfrac{\sqrt{50}+\sqrt{18}}{\sqrt{8}}$

**b)** $\sqrt{50}+\sqrt{3}\times\sqrt{6}-\dfrac{14}{\sqrt{2}}$

**Question 20**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\dfrac{7\sqrt{5}-\sqrt{45}}{\sqrt{20}}$

**b)** $\dfrac{3+\sqrt{6}}{\sqrt{3}}$

**c)** $\dfrac{5+2\sqrt{10}}{\sqrt{5}}$

**d)** $\dfrac{\sqrt{75}+\sqrt{48}}{3\sqrt{27}}$

**Question 21**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(\sqrt{75}-\sqrt{48}\right)^2$

**b)** $\left(\sqrt{8}+\sqrt{2}\right)^2$

**c)** $\left(\sqrt{27}-\sqrt{3}\right)^2$

**d)** $\left(\sqrt{108}-\sqrt{12}\right)^2$

**e)** $\dfrac{7\left(\sqrt{50}-\sqrt{8}\right)^2}{\sqrt{18}+\sqrt{32}}$

**Question 22**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(4-\sqrt{5}\right)^2$

**b)** $\left(\sqrt{3}-\sqrt{2}\right)^2$

**c)** $\left(2+\sqrt{3}\right)^2$

**d)** $\left(2-3\sqrt{5}\right)^2$

**Question 23**

Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a)** $\left(3-\sqrt{8}\right)^2$

**b)** $\left(2-3\sqrt{2}\right)^2$

**c)** $\dfrac{\left(2-\sqrt{3}\right)^2}{2+\sqrt{3}}$

**d)** $\left(1+\sqrt{2}\right)^3$

**Question 24**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{22}{4-\sqrt{5}}$

**b)** $\dfrac{26}{4+\sqrt{3}}$

**c)** $\dfrac{\sqrt{12}+2}{\sqrt{12}-2}$

**d)** $\dfrac{44}{2\sqrt{3}-1}$

**Question 25**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{4}{3-\sqrt{7}}$

**b)** $\dfrac{\sqrt{3}+1}{\sqrt{3}-1}$

**c)** $\dfrac{5+\sqrt{7}}{3-\sqrt{7}}$

**d)** $\dfrac{\sqrt{7}+1}{\sqrt{7}-2}$

**Question 26**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{\sqrt{2}}{1+\sqrt{2}}$

**b)** $\dfrac{5-\sqrt{3}}{\sqrt{3}+1}$

**c)** $\dfrac{2\sqrt{7}-1}{2\sqrt{7}+5}$

**d)** $\dfrac{4+\sqrt{28}}{3+\sqrt{7}}$

**Question 27**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{36}{5-\sqrt{7}}$

**b)** $\dfrac{\sqrt{5}}{2+\sqrt{5}}$

**c)** $\dfrac{1-\sqrt{2}}{3-\sqrt{2}}$

**d)** $\dfrac{\sqrt{3}}{6-\sqrt{3}}$

**Question 28**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{4}{3-\sqrt{5}}$

**b)** $\dfrac{5\sqrt{7}-\sqrt{3}}{\sqrt{7}-\sqrt{3}}$

**c)** $\dfrac{6+2\sqrt{5}}{3-\sqrt{5}}$

**d)** $\dfrac{\sqrt{2}+2}{3\sqrt{2}-4}$

**Question 29**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{6+\sqrt{30}}{6-\sqrt{30}}$

**b)** $\dfrac{2\sqrt{5}+2}{\sqrt{5}-2}$

**c)** $\dfrac{2}{3\sqrt{5}+7}$

**d)** $\dfrac{10\sqrt{3}-1}{4-\sqrt{3}}$

**Question 30**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{8-\sqrt{7}}{\sqrt{7}-2}$

**b)** $\dfrac{6+\sqrt{2}}{2+\sqrt{2}}$

**c)** $\dfrac{1+\sqrt{7}}{3-\sqrt{7}}$

**d)** $\dfrac{4\sqrt{3}+3\sqrt{7}}{3\sqrt{3}+\sqrt{7}}$

**Question 31**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{5+\sqrt{15}}{5-\sqrt{15}}$

**b)** $\dfrac{2\sqrt{11}-3}{2+\sqrt{11}}$

**c)** $\dfrac{5\sqrt{5}-2}{4+\sqrt{5}}$

**d)** $\dfrac{\left(3-\sqrt{5}\right)^2}{1+\sqrt{5}}$

**Question 32**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{2\left(\sqrt{3}+2\right)^2}{\sqrt{3}+1}$

**b)** $\dfrac{98}{\left(3+\sqrt{2}\right)^2}$

**c)** $\dfrac{\left(2+\sqrt{3}\right)^2-\left(1-\sqrt{3}\right)^2}{\sqrt{3}}$

**d)** $\dfrac{6}{3+\sqrt{7}}-\dfrac{4}{3-\sqrt{7}}$

**Question 33**

Simplify each of the following surd expressions, giving the final answer in the form $p+q\sqrt{r}$, where $p$, $q$ and $r$ are integers

**a)** $\dfrac{1}{5+\sqrt{2}}+\dfrac{1}{5-\sqrt{2}}$

**b)** $\dfrac{5}{\sqrt{3}-1}-\dfrac{1}{1-\sqrt{3}}$

**c)** $\dfrac{2+\sqrt{5}}{3-\sqrt{5}}+\dfrac{5}{3+\sqrt{5}}$

**d)** $\dfrac{1+\sqrt{7}}{3-\sqrt{7}}-\dfrac{8-\sqrt{7}}{-2+\sqrt{7}}$

**Question 34**

Solve each of the following equations, giving the answer as an exact simplified surd.

**a)** $\sqrt{3}\left(x-\sqrt{3}\right)=x+\sqrt{3}$

**b)** $\dfrac{2+y}{y}=\sqrt{2}$

**c)** $z\sqrt{8}-6=\dfrac{2z}{\sqrt{2}}$

**d)** $\dfrac{1+w}{w}=\sqrt{2}$