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