SURDS PRACTICE

Question 1

Write each of the following surds in its simplest form.

a) $\sqrt{45}$

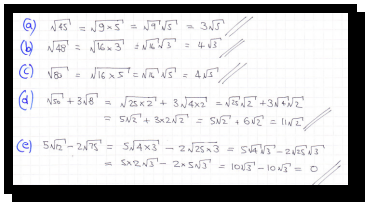
b) $\sqrt{48}$

c) $\sqrt{80}$

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

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

$\boxed{3\sqrt{5}}$, $\boxed{4\sqrt{3}}$, $\boxed{4\sqrt{5}}$, $\boxed{11\sqrt{2}}$, $\boxed{0}$



Question 2

Write each of the following surds in its simplest form.

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

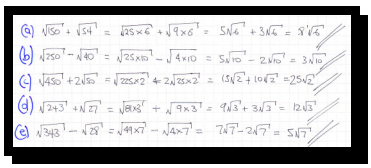
b) $\sqrt{250}-\sqrt{40}$

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

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

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

$\boxed{8\sqrt{6}}$, $\boxed{3\sqrt{10}}$, $\boxed{25\sqrt{2}}$, $\boxed{12\sqrt{3}}$, $\boxed{5\sqrt{7}}$



Question 3

Write each of the following surds in its simplest form.

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

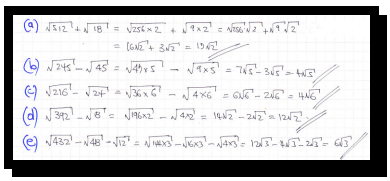
b) $\sqrt{245}-\sqrt{45}$

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

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

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

$\boxed{19\sqrt{2}}$, $\boxed{4\sqrt{5}}$, $\boxed{4\sqrt{6}}$, $\boxed{16\sqrt{2}}$, $\boxed{6\sqrt{3}}$



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) $\sqrt{4.5}$

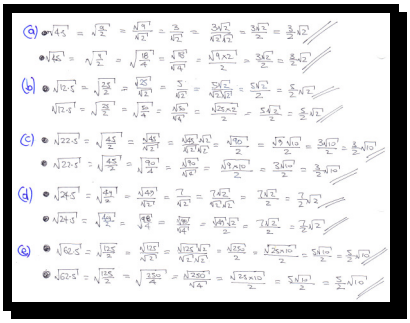
b) $\sqrt{12.5}$

c) $\sqrt{22.5}$

d) $\sqrt{24.5}$

e) $\sqrt{62.5}$

$\boxed{\frac{3}{2}\sqrt{2}}$, $\boxed{\frac{5}{2}\sqrt{2}}$, $\boxed{\frac{3}{2}\sqrt{10}}$, $\boxed{\frac{7}{2}\sqrt{2}}$, $\boxed{\frac{5}{2}\sqrt{10}}$



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

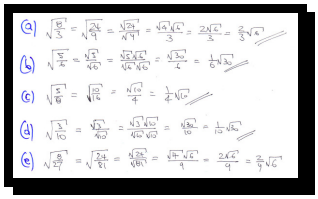
b) $\sqrt{\frac{5}{6}}$

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

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

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

$\boxed{\frac{2}{3}\sqrt{6}}$, $\boxed{\frac{1}{6}\sqrt{30}}$, $\boxed{\frac{1}{4}\sqrt{10}}$, $\boxed{\frac{1}{10}\sqrt{30}}$, $\boxed{\frac{2}{9}\sqrt{6}}$



Question 6

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

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

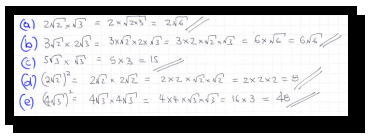
b) $3\sqrt{2}\times 2\sqrt{3}$

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

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

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

$\boxed{2\sqrt{6}}$, $\boxed{6\sqrt{6}}$, $\boxed{15}$, $\boxed{8}$, $\boxed{48}$



Question 7

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

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

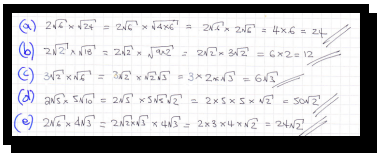
b) $2\sqrt{2}\times\sqrt{18}$

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

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

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

$\boxed{24}$, $\boxed{12}$, $\boxed{6\sqrt{3}}$, $\boxed{50\sqrt{2}}$, $\boxed{24\sqrt{2}}$



Question 8

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

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

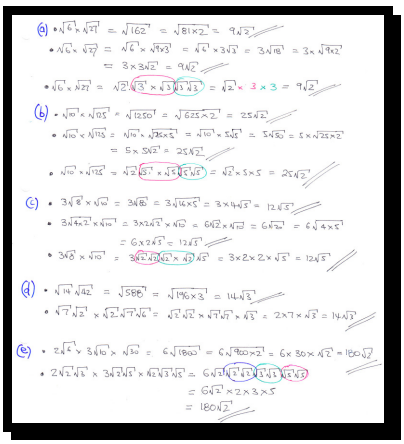
b) $\sqrt{10}\times\sqrt{125}$

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

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

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

$\boxed{9\sqrt{2}}$, $\boxed{25\sqrt{2}}$, $\boxed{12\sqrt{5}}$, $\boxed{14\sqrt{3}}$, $\boxed{180\sqrt{2}}$



Question 9

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

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

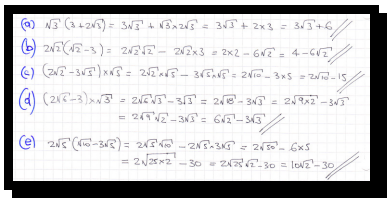
b) $2\sqrt{2}\left(\sqrt{2}-3\right)$

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

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

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

$\boxed{6+3\sqrt{3}}$, $\boxed{4-6\sqrt{2}}$, $\boxed{-15+2\sqrt{10}}$, $\boxed{6\sqrt{2}-3\sqrt{3}}$, $\boxed{-30+10\sqrt{2}}$



Question 10

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

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

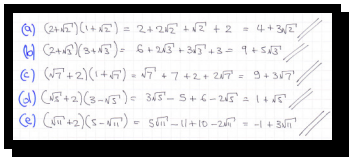
b) $\left(2+\sqrt{3}\right)\left(3+\sqrt{3}\right)$

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

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

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

$\boxed{4+3\sqrt{2}}$, $\boxed{9+5\sqrt{3}}$, $\boxed{9+3\sqrt{7}}$, $\boxed{1+\sqrt{5}}$, $\boxed{-1+3\sqrt{11}}$



Question 11

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

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

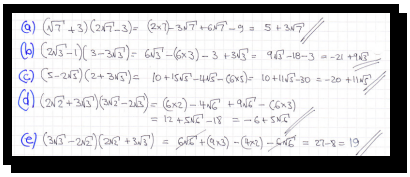
b) $\left(2\sqrt{3}-1\right)\left(3-3\sqrt{3}\right)$

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

$\boxed{5+3\sqrt{7}}$, $\boxed{-21+9\sqrt{3}}$, $\boxed{-20+11\sqrt{5}}$, $\boxed{-6+5\sqrt{6}}$, $\boxed{19}$



Question 12

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

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

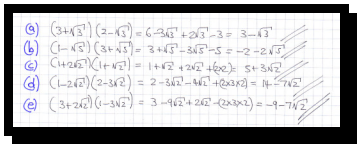
b) $\left(1-\sqrt{5}\right)\left(3+\sqrt{5}\right)$

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

$\boxed{3-\sqrt{3}}$, $\boxed{-2-2\sqrt{5}}$, $\boxed{5+3\sqrt{2}}$, $\boxed{14-7\sqrt{2}}$, $\boxed{-9-7\sqrt{2}}$



Question 13

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

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

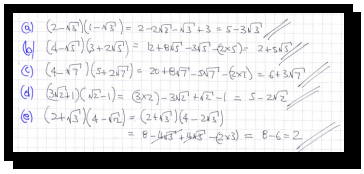
b) $\left(4-\sqrt{5}\right)\left(3+2\sqrt{5}\right)$

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

$\boxed{5-3\sqrt{3}}$, $\boxed{2+5\sqrt{5}}$, $\boxed{6+3\sqrt{7}}$, $\boxed{5-2\sqrt{2}}$, $\boxed{2}$



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

$\boxed{5-3\sqrt{3}}$, $\boxed{2+5\sqrt{5}}$, $\boxed{6+3\sqrt{7}}$, $\boxed{5-2\sqrt{2}}$, $\boxed{\sqrt{5}}$

Question 15

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

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

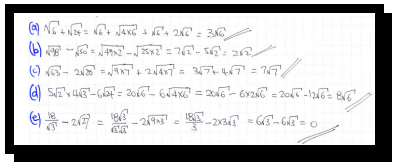
b) $\sqrt{98}-\sqrt{50}$

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

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

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

$\boxed{3\sqrt{6}}$, $\boxed{2\sqrt{2}}$, $\boxed{7\sqrt{7}}$, $\boxed{8\sqrt{6}}$, $\boxed{0}$



Question 16

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

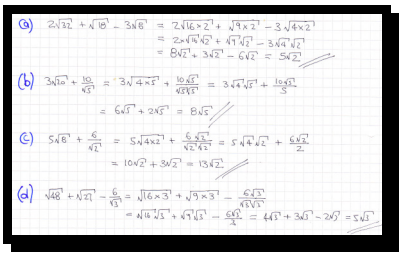
a) $2\sqrt{32}+\sqrt{18}-3\sqrt{8}$

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

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

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

$\boxed{5\sqrt{2}}$, $\boxed{8\sqrt{5}}$, $\boxed{13\sqrt{2}}$, $\boxed{5\sqrt{3}}$



Question 17

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

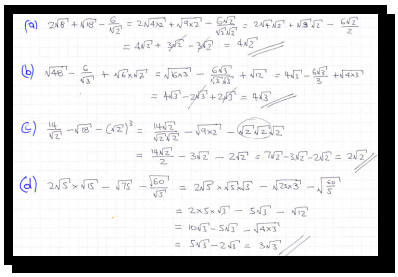
a) $2\sqrt{8}+\sqrt{18}-\dfrac{6}{\sqrt{2}}$

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

$\boxed{4\sqrt{2}}$, $\boxed{4\sqrt{3}}$, $\boxed{2\sqrt{2}}$, $\boxed{3\sqrt{3}}$



Question 18

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

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

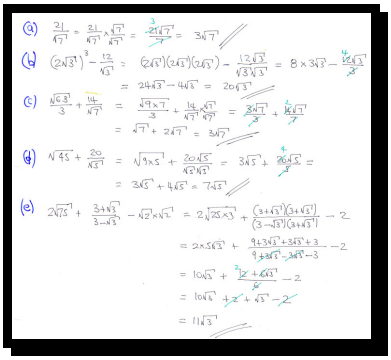
b) $\left(2\sqrt{3}\right)^3-\dfrac{12}{\sqrt{3}}$

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

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

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

$\boxed{3\sqrt{7}}$, $\boxed{20\sqrt{3}}$, $\boxed{3\sqrt{7}}$, $\boxed{7\sqrt{5}}$, $\boxed{11\sqrt{3}}$



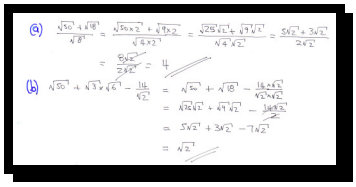
Question 19

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

$\boxed{4}$, $\boxed{\sqrt{2}}$



Question 20

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

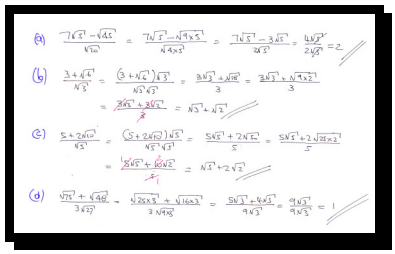
a) $\dfrac{7\sqrt{5}-\sqrt{45}}{\sqrt{20}}$

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

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

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

$\boxed{2}$, $\boxed{\sqrt{3}+\sqrt{2}}$, $\boxed{\sqrt{5}+2\sqrt{2}}$, $\boxed{1}$



Question 21

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

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

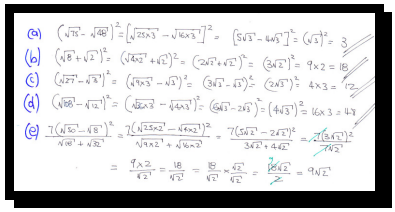
b) $\left(\sqrt{8}+\sqrt{2}\right)^2$

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

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

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

$\boxed{3}$, $\boxed{18}$, $\boxed{12}$, $\boxed{48}$, $\boxed{9\sqrt{2}}$



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

$\boxed{5+3\sqrt{3}}$, $\boxed{22-12\sqrt{2}}$, $\boxed{6+\sqrt{3}}$, $\boxed{\frac{10}{23}}$

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

$\boxed{17-12\sqrt{2}}$, $\boxed{22-12\sqrt{2}}$, $\boxed{26-15\sqrt{3}}$, $\boxed{3-5\sqrt{7}}$

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

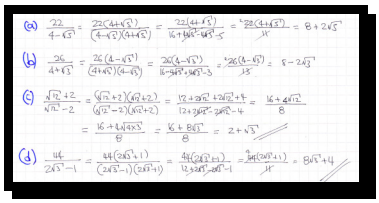
a) $\dfrac{22}{4-\sqrt{5}}$

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

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

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

$\boxed{8+2\sqrt{5}}$, $\boxed{8-2\sqrt{3}}$, $\boxed{2+\sqrt{3}}$, $\boxed{4+8\sqrt{3}}$



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

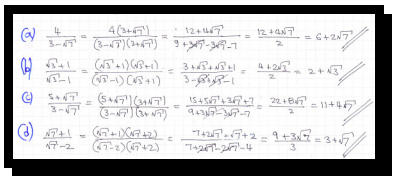
a) $\dfrac{4}{3-\sqrt{7}}$

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

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

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

$\boxed{6+2\sqrt{7}}$, $\boxed{2+\sqrt{3}}$, $\boxed{11+4\sqrt{7}}$, $\boxed{3+\sqrt{7}}$



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

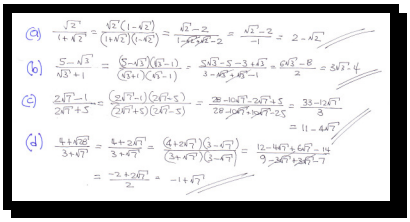
a) $\dfrac{\sqrt{2}}{1+\sqrt{2}}$

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

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

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

$\boxed{2-\sqrt{2}}$, $\boxed{-4+3\sqrt{3}}$, $\boxed{11-4\sqrt{7}}$, $\boxed{-1+\sqrt{7}}$



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

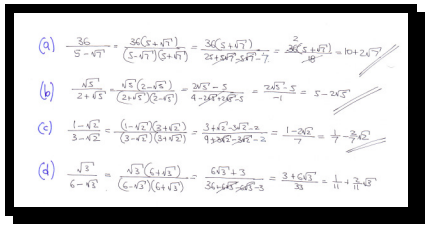
a) $\dfrac{36}{5-\sqrt{7}}$

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

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

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

$\boxed{10+2\sqrt{7}}$, $\boxed{5-2\sqrt{5}}$, $\boxed{\frac{1}{7}-\frac{2}{7}\sqrt{2}}$, $\boxed{\frac{1}{11}+\frac{2}{11}\sqrt{3}}$



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

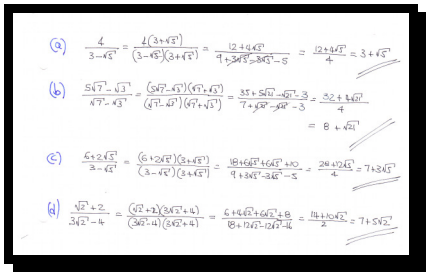
a) $\dfrac{4}{3-\sqrt{5}}$

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

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

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

$\boxed{3+\sqrt{5}}$, $\boxed{8+\sqrt{21}}$, $\boxed{7+3\sqrt{5}}$, $\boxed{7+5\sqrt{2}}$



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

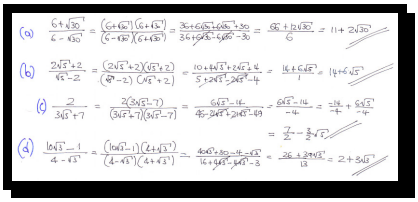
a) $\dfrac{6+\sqrt{30}}{6-\sqrt{30}}$

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

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

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

$\boxed{11+2\sqrt{30}}$, $\boxed{14+6\sqrt{5}}$, $\boxed{\frac{7}{2}-\frac{3}{2}\sqrt{5}}$, $\boxed{2+3\sqrt{3}}$



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

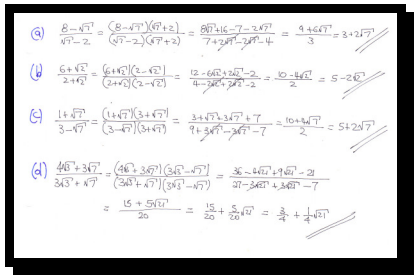
a) $\dfrac{8-\sqrt{7}}{\sqrt{7}-2}$

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

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

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

$\boxed{3+2\sqrt{7}}$, $\boxed{5-2\sqrt{2}}$, $\boxed{5+2\sqrt{7}}$, $\boxed{\dfrac{3+\sqrt{21}}{4}}$



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

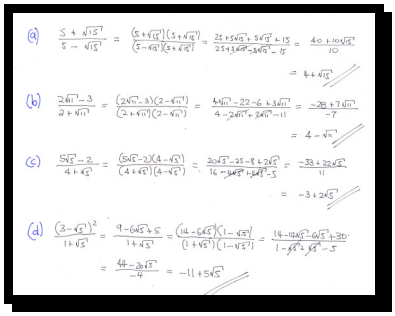
a) $\dfrac{5+\sqrt{15}}{5-\sqrt{15}}$

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

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

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

$\boxed{4+\sqrt{15}}$, $\boxed{4-\sqrt{11}}$, $\boxed{-3+2\sqrt{5}}$, $\boxed{-11+5\sqrt{5}}$



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

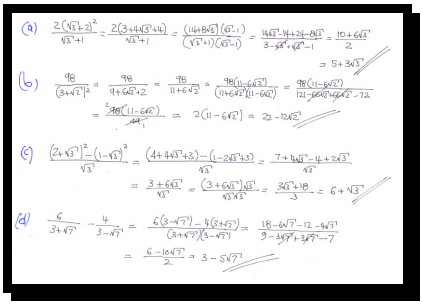
a) $\dfrac{2\left(\sqrt{3}+2\right)^2}{\sqrt{3}+1}$

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

$\boxed{5+3\sqrt{3}}$, $\boxed{22-12\sqrt{2}}$, $\boxed{6+\sqrt{3}}$, $\boxed{3-5\sqrt{7}}$



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

$\boxed{\dfrac{10}{23}}$, $\boxed{3+3\sqrt{3}}$, $\boxed{\dfrac{13}{2}}$, $\boxed{2}$

Question 34

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

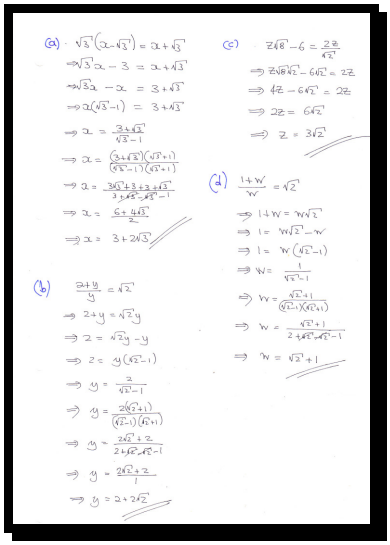
a) $\sqrt{3}\left(x-\sqrt{3}\right)=x+\sqrt{3}$

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

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

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

$\boxed{x=3+2\sqrt{3}}$, $\boxed{y=2+2\sqrt{2}}$, $\boxed{z=3\sqrt{2}}$, $\boxed{w=1+\sqrt{2}}$



Created by T. Madas