# SURDS PRACTICE

#### **Question 1**

Write each of the following surds in its simplest form.

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

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

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

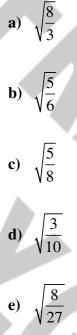
#### **Question 4**

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.



#### **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**)  $(2\sqrt{2})^2$
- **e**)  $(4\sqrt{3})^2$

#### **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**)  $2\sqrt{5} \times 5\sqrt{10}$
- e)  $2\sqrt{6} \times 4\sqrt{3}$

#### **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)  $2\sqrt{6} \times 3\sqrt{10} \times \sqrt{30}$

#### **Question 9**

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

- **a**)  $\sqrt{3}(3+2\sqrt{3})$
- **b**)  $2\sqrt{2}(\sqrt{2}-3)$
- c)  $\left(2\sqrt{2}-3\sqrt{5}\right)\times\sqrt{5}$
- **d**)  $\left(2\sqrt{6}-3\right)\times\sqrt{3}$
- **e**)  $2\sqrt{5}(\sqrt{10}-3\sqrt{5})$

#### **Question 10**

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

- **a**)  $(2+\sqrt{2})(1+\sqrt{2})$
- **b**)  $(2+\sqrt{3})(3+\sqrt{3})$
- **c**)  $(\sqrt{7}+2)(1+\sqrt{7})$
- **d**)  $(\sqrt{5}+2)(3-\sqrt{5})$
- e)  $(\sqrt{11}+2)(5-\sqrt{11})$

#### **Question 11**

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

- **a**)  $(\sqrt{7}+3)(2\sqrt{7}-3)$
- **b**)  $(2\sqrt{3}-1)(3-3\sqrt{3})$
- c)  $(5-2\sqrt{5})(2+3\sqrt{5})$
- **d**)  $(2\sqrt{2}+3\sqrt{3})(3\sqrt{2}-2\sqrt{3})$
- e)  $(3\sqrt{3} 2\sqrt{2})(2\sqrt{2} + 3\sqrt{3})$

#### **Question 12**

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

- **a**)  $(3+\sqrt{3})(2-\sqrt{3})$
- **b**)  $(1-\sqrt{5})(3+\sqrt{5})$
- c)  $(1+2\sqrt{2})(1+\sqrt{2})$
- **d**)  $(1-2\sqrt{2})(2-3\sqrt{2})$
- e)  $(3+2\sqrt{2})(1-3\sqrt{2})$

#### **Question 13**

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

- **a**)  $(2-\sqrt{3})(1-\sqrt{3})$
- **b**)  $(4-\sqrt{5})(3+2\sqrt{5})$
- c)  $(4-\sqrt{7})(5+2\sqrt{7})$
- **d**)  $(3\sqrt{2}+1)(\sqrt{2}-1)$
- **e**)  $(2+\sqrt{3})(4-\sqrt{12})$

#### **Question 14**

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

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

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

- c)  $(4-\sqrt{7})(5+2\sqrt{7})$
- **d**)  $(3\sqrt{2}+1)(\sqrt{2}-1)$
- **e**)  $(2+\sqrt{5})(5-\sqrt{20})$

#### **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) 
$$\frac{18}{\sqrt{3}} - 2\sqrt{27}$$

#### **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**) 
$$3\sqrt{20} + \frac{10}{\sqrt{5}}$$

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

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

#### **Question 17**

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

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

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

c) 
$$\frac{14}{\sqrt{2}} - \sqrt{18} - (\sqrt{2})^3$$

**1**) 
$$2\sqrt{5} \times \sqrt{15} - \sqrt{75} - \frac{\sqrt{60}}{\sqrt{5}}$$

#### **Question 18**

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

a) 
$$\frac{2}{\sqrt{2}}$$

**b**) 
$$(2\sqrt{3})^3 - \frac{12}{\sqrt{3}}$$

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

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

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

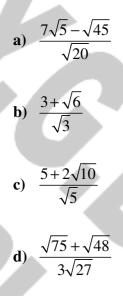
#### **Question 19**

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

**a**) 
$$\frac{\sqrt{50} + \sqrt{18}}{\sqrt{8}}$$
  
**b**)  $\sqrt{50} + \sqrt{3} \times \sqrt{6} - \frac{14}{\sqrt{2}}$ 

#### **Question 20**

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



#### **Question 21**

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

- **a**)  $(\sqrt{75} \sqrt{48})^2$
- **b**)  $(\sqrt{8} + \sqrt{2})^2$
- **c**)  $(\sqrt{27} \sqrt{3})^2$
- **d**)  $(\sqrt{108} \sqrt{12})^2$

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

#### **Question 22**

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

- **a**)  $(4 \sqrt{5})^2$ **b**)  $(\sqrt{3} - \sqrt{2})^2$
- **c**)  $(2+\sqrt{3})^2$
- **d**)  $(2-3\sqrt{5})^2$

#### **Question 23**

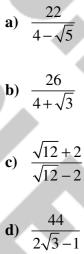
Find the value of each of the following surd expressions, writing the final answer in its simplest form.

**a**)  $(3-\sqrt{8})^2$ **b**)  $(2-3\sqrt{2})^2$ c)  $\frac{(2-\sqrt{3})^2}{2+\sqrt{3}}$ 

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

#### **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



#### **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) 
$$\frac{4}{3-\sqrt{7}}$$
  
b)  $\frac{\sqrt{3}+1}{\sqrt{3}-1}$   
c)  $\frac{5+\sqrt{7}}{3-\sqrt{7}}$   
d)  $\frac{\sqrt{7}+1}{\sqrt{7}-2}$ 

#### **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) 
$$\frac{\sqrt{2}}{1+\sqrt{2}}$$
  
b)  $\frac{5-\sqrt{3}}{\sqrt{3}+1}$   
c)  $\frac{2\sqrt{7}-1}{2\sqrt{7}+5}$   
d)  $\frac{4+\sqrt{28}}{2+\sqrt{7}}$ 

#### **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) 
$$\frac{36}{5-\sqrt{7}}$$
  
b)  $\frac{\sqrt{5}}{2+\sqrt{5}}$   
c)  $\frac{1-\sqrt{2}}{3-\sqrt{2}}$   
d)  $\frac{\sqrt{3}}{6-\sqrt{3}}$ 

#### **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) 
$$\frac{4}{3-\sqrt{5}}$$
  
b)  $\frac{5\sqrt{7}-\sqrt{3}}{\sqrt{7}-\sqrt{3}}$   
c)  $\frac{6+2\sqrt{5}}{3-\sqrt{5}}$ 

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

#### **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) 
$$\frac{6+\sqrt{30}}{6-\sqrt{30}}$$
  
b)  $\frac{2\sqrt{5}+2}{\sqrt{5}-2}$   
c)  $\frac{2}{3\sqrt{5}+7}$ 

d)

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) 
$$\frac{8-\sqrt{7}}{\sqrt{7}-2}$$
  
b)  $\frac{6+\sqrt{2}}{2+\sqrt{2}}$   
c)  $\frac{1+\sqrt{7}}{3-\sqrt{7}}$   
d)  $\frac{4\sqrt{3}+3\sqrt{7}}{2\sqrt{2}+\sqrt{7}}$ 

#### **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) 
$$\frac{5+\sqrt{15}}{5-\sqrt{15}}$$
  
b)  $\frac{2\sqrt{11}-3}{2+\sqrt{11}}$   
c)  $\frac{5\sqrt{5}-2}{4+\sqrt{5}}$   
d)  $\frac{(3-\sqrt{5})^2}{\sqrt{5}}$ 

 $1 + \sqrt{5}$ 

#### **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) 
$$\frac{2(\sqrt{3}+2)^2}{\sqrt{3}+1}$$
  
b)  $\frac{98}{(3+\sqrt{2})^2}$   
c)  $\frac{(2+\sqrt{3})^2 - (1)}{\sqrt{3}}$ 

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

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#### **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) 
$$\frac{1}{5+\sqrt{2}} + \frac{1}{5-\sqrt{2}}$$
  
b)  $\frac{5}{\sqrt{3}-1} - \frac{1}{1-\sqrt{3}}$   
c)  $\frac{2+\sqrt{5}}{3-\sqrt{5}} + \frac{5}{3+\sqrt{5}}$   
d)  $\frac{1+\sqrt{7}}{3-\sqrt{7}} - \frac{8-\sqrt{7}}{-2+\sqrt{7}}$ 

#### **Question 34**

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

**a**) 
$$\sqrt{3}(x-\sqrt{3}) = x+\sqrt{3}$$
  
**b**)  $\frac{2+y}{y} = \sqrt{2}$ 

$$z\sqrt{8}-6=\frac{2z}{\sqrt{2}}$$

 $\mathbf{d}) \quad \frac{1+w}{w} = \sqrt{2}$