



## Surds Exam Practice

Q1. Simplify the following expression showing all your steps:

$$\sqrt{200} - \sqrt{32}$$

Answer: \_\_\_\_\_  
(2 marks)

Q2. Write  $\sqrt{75}$  in the form  $k\sqrt{3}$  where  $k$  is an integer to be found. You must show your working out.

Answer: \_\_\_\_\_  
(2 marks)

Q2. Simplify the following expression, showing all your working out:

$$\frac{3\sqrt{7} - 5\sqrt{7} - 6\sqrt{28}}{7}$$

Answer: \_\_\_\_\_  
(3 marks)



Q4. Rationalise the denominator of each of the following expressions, and give your answer in its most simplified form:

a)  $\frac{27}{3\sqrt{13}}$

Answer: \_\_\_\_\_  
(2 marks)

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

Answer: \_\_\_\_\_  
(3 marks)



Q5. Express  $\sqrt{32} - \frac{14}{\sqrt{2}}$  in the form  $k\sqrt{2}$  where  $k$  is an integer.

Answer: \_\_\_\_\_  
(2 marks)

Q6. Show that the following expression:  $\frac{1}{\frac{3}{\sqrt{2}} + \sqrt{2}} - \frac{\sqrt{2}}{5}$  is equal to 0.

Answer: \_\_\_\_\_  
(3 marks)



Q7. Rationalise the denominator and simplify the following expression:

$$\frac{b + \sqrt{c}}{b - \sqrt{c}} \text{ where } b \text{ and } c \text{ are positive integers.}$$

Answer: \_\_\_\_\_  
(4 marks)

Q8. Let  $a$  be a positive integer. Simplify the following expression:

$$\sqrt{a}\sqrt{a} - (\sqrt{a} - 2a)^2$$

Answer: \_\_\_\_\_  
(2 marks)



Q9. Let  $c$  and  $d$  be any positive integers. Express  $c\sqrt{d}$  in the form  $\sqrt{E}$ , where  $E$  is an expression in terms of  $c$  and  $d$ .

Answer: \_\_\_\_\_  
(1 mark)

### Applied Mixed Practice Problems

Q10. One cube has side length  $3\sqrt{10}$ , whilst another cube has side length  $4\sqrt{5}$ .

Work out the ratio of the volume of the smaller cube to the larger cube, simplifying your answer.

Answer: \_\_\_\_\_  
(4 marks)



Q11. A cathedral is  $2\sqrt{3}$  miles due South and  $\sqrt{12} - 4$  due West of a railway station. Show that the exact distance of the railway station to the cathedral can be expressed in the form  $a(b - c\sqrt{3})$ , where  $a$ ,  $b$  and  $c$  are integers.

Answer: \_\_\_\_\_  
(4 marks)



Q12. (i) Suppose that  $a$  and  $b$  are positive integers and  $a > b$ . Write down an inequality relating  $a^2$  and  $b^2$ .

Answer: \_\_\_\_\_  
(1 mark)

(ii) Hence or otherwise, prove, using algebra, that  $\sqrt{3} + \sqrt{7} > \sqrt{10}$ .

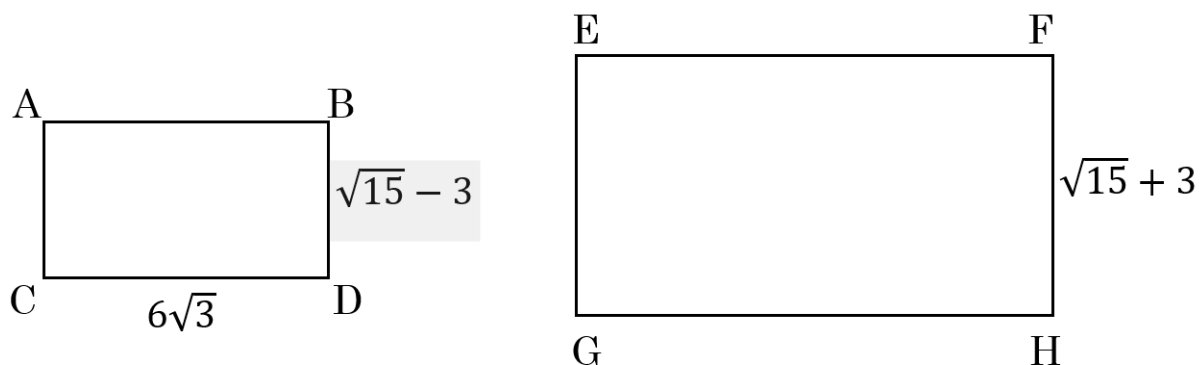
Answer: \_\_\_\_\_  
(3 marks)

Q13. Show that  $3^{\frac{3}{2}} - 27(3^{-\frac{1}{2}})$  can be written in the form  $k\sqrt{3}$  for some integer  $k$ .

Answer: \_\_\_\_\_  
(3 marks)



Q14. ABCD and EFGH are similar shapes. Find the length of side GH, giving your answer in the form  $a + \sqrt{b}$ .



Answer: \_\_\_\_\_  
(4 marks)