Surds Past Edexcel Exam Questions

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1. (a) **(Question 1 - C1 May 2018)**

Simplify

$$\sqrt{48} - \frac{6}{\sqrt{3}}$$

giving your answer in the form $a\sqrt{3}$, where a is an integer to be found. [2]

(b) (*Indices Question*)

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2. (a) **(Question 3 - C1 May 2016)**

Simplify

$$\sqrt{50} - \sqrt{18}$$

Write your answer in the form $a\sqrt{2}$, where a is an integer. [2]

(b) Hence, or otherwise, simplify

$$\frac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$$

giving your answer in the form $b\sqrt{c}$ where b and c are integers and $b \neq 1$. [3]

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3. **(Question 1 - C1 May 2015)**

Simplify

(a) $\left(2\sqrt{5}\right)^2$ [1]

(b) $\frac{\sqrt{2}}{2\sqrt{5} - 3\sqrt{2}}$ giving your answer in the form $a + \sqrt{b}$, where a and b are integers. [4]

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4. **(Question 6 - C1 May 2014)**

(a) Write $\sqrt{80}$ in the form $c\sqrt{5}$, where c is a positive constant. [1]

A rectangle R has a length of $\left(1 + \sqrt{5}\right)$cm and an area of $\sqrt{80}$ cm².

(b) Calculate the width of R in cm. Express your answer in the form $p + q\sqrt{5}$, where p and q are integers to be found. [4]

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5. (**Question 1 - C1 May 2013**)

Simplify

$$\frac{7 + \sqrt{5}}{\sqrt{5} - 1}$$

giving your answer in the form $a + b\sqrt{5}$, where a and b are integers. [4]

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6. (**Question 3 - C1 Jan 2013**)

(a) Express

$$\left(5 - \sqrt{8}\right)\left(1 + \sqrt{2}\right)$$

in the form $a + b\sqrt{2}$, where a and b are integers. [3]

(b) Express

$$\sqrt{80} + \frac{30}{\sqrt{5}}$$

in the form $c\sqrt{5}$, where c is an integer. [3]

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7. (**Question 3 - C1 May 2012**)

Show that $\frac{2}{\sqrt{12} - \sqrt{8}}$ can be written in the form $\sqrt{a} + \sqrt{b}$, where a and b are integers.

[5]

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8. (**Question 2 - C1 Jan 2012**)

(a) Simplify

$$\sqrt{32} + \sqrt{18}$$

giving your answer in the form $a\sqrt{2}$, where a is an integer. [2]

(b) Simplify
$$\frac{\sqrt{32} + \sqrt{18}}{3 + \sqrt{2}},$$
giving your answer in the form $b\sqrt{2} + c$, where b and c are integers. [4]

9. **(Question 3 - C1 Jan 2011)**

Simplify
$$\frac{5 - 2\sqrt{3}}{\sqrt{3} - 1},$$
giving your answer in the form $p + q\sqrt{3}$, where p and q are rational numbers. [4]

10. **(Question 1 - C1 May 2010)**

Write
$$\sqrt{75} - \sqrt{27}$$
in the form $k\sqrt{x}$, where k and x are integers. [2]

11. **(Question 2 - C1 Jan 2010)**

(a) Expand and simplify $\left(7 + \sqrt{5}\right)\left(3 - \sqrt{5}\right)$. [3]

(b) Express $\frac{7+\sqrt{5}}{3+\sqrt{5}}$ in the form $a + b\sqrt{5}$, where a and b are integers. [3]

12. **(Question 1 - C1 Jun 2009)**

Simplify

(a) $\left(3\sqrt{7}\right)^2$, [1]

(b) $\left(8 + \sqrt{5}\right)\left(2 - \sqrt{5}\right)$. [3]

13. **(Question 3 - C1 Jan 2009)**

Expand and simplify $\left(\sqrt{7}+2\right)\left(\sqrt{7}-2\right)$. [2]

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14. **(Question 3 - C1 Jan 2008)**

Simplify
$$\frac{5-\sqrt{3}}{2+\sqrt{3}}$$
giving your answer in the form $a+b\sqrt{3}$, where a and b are integers. [4]

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15. **(Question 1 - C1 May 2007)**

Simplify $\left(3+\sqrt{5}\right)\left(3-\sqrt{5}\right)$. [2]

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16. **(Question 2 - C1 Jan 2007)**

(a) Express $\sqrt{108}$ in the form $a\sqrt{3}$, where a is an integer. [1]

(b) Express $\left(2-\sqrt{3}\right)^2$ in the form $b+c\sqrt{3}$, where b and c are integers to be found. [3]

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17. **(Question 6 - C1 May 2006)**

(a) Expand and simplify $\left(4+\sqrt{3}\right)\left(4-\sqrt{3}\right)$. [2]

(b) Express $\frac{26}{4+\sqrt{3}}$ in the form $a+b\sqrt{3}$, where a and b are integers. [2]

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18. **(Question 5 - C1 Jan 2006)**

(a) Write $\sqrt{45}$ in the form $a\sqrt{5}$, where a is an integer. [1]

(b) Express $\frac{2\left(3+\sqrt{5}\right)}{\left(3-\sqrt{5}\right)}$ in the form $b+c\sqrt{5}$, where b and c are integers. [5]

Solutions

1. (a) $2\sqrt{3}$, $a = 2$

   (b) (*Indices Question*)

2. (a) $2\sqrt{2}$, $a = 2$

   (b) $3\sqrt{6}$

3. (a) 20

   (b) $3 + \sqrt{10}$, $a = 3$, $b = 10$

4. (a) $4\sqrt{5}$, $c = 4$

   (b) $5 - \sqrt{5}$, $p = 5$ $q = -1$

5. $3 + 2\sqrt{5}$, $a = 3$, $b = 2$

6. (a) $1 + 3\sqrt{2}$, $a = 1$ $b = 3$

   (b) $10\sqrt{5}$, $c = 10$

7. $\sqrt{3} + \sqrt{2}$, $a = 3$ $b = 2$ (or vice versa)

8. (a) $7\sqrt{2}$, $a = 7$

   (b) $3\sqrt{2} - 2$, $b = 3$ $c = -2$

9. $-\frac{1}{2} + \frac{3}{2}\sqrt{3}$, $p = -\frac{1}{2}$, $q = \frac{3}{2}$

10. $2\sqrt{3}$, $k = 2$ $x = 3$

11. (a) $16 - 4\sqrt{5}$

    (b) $4 - \sqrt{5}$, $a = 4$, $b = -1$

12. (a) 63

    (b) $11 - 6\sqrt{5}$

13. 3

14. $13 - 7\sqrt{3}$, $a = 13$ $b = -7$

15. 4

16. (a) $6\sqrt{3}$, $a = 6$

 (b) $7 - 4\sqrt{3}$, $b = 7$ $c = -4$

17. (a) 13

 (b) $8 - 2\sqrt{3}$, $a = 8$ $b = -2$

18. (a) $3\sqrt{5}$, $a = 3$

 (b) $7 + 3\sqrt{5}$, $b = 7$ $c = 3$