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# Core 1: Surds

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## Past Paper Questions 2006-2013

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Name:

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### January 2006 Question 1

- |   |                  |
|---|------------------|
| (a) Simplify $(\sqrt{5} + 2)(\sqrt{5} - 2)$ .   | <i>(2 marks)</i> |
| (b) Express $\sqrt{8} + \sqrt{18}$ in the form $n\sqrt{2}$ , where $n$ is an integer. | <i>(2 marks)</i> |

### June 2006 Question 4

- |   |                  |
|---|------------------|
| (a) Express $(4\sqrt{5} - 1)(\sqrt{5} + 3)$ in the form $p + q\sqrt{5}$ , where $p$ and $q$ are integers. | <i>(3 marks)</i> |
| (b) Show that $\frac{\sqrt{75} - \sqrt{27}}{\sqrt{3}}$ is an integer and find its value.                  | <i>(3 marks)</i> |

### January 2007 Question 3

- |   |                  |
|---|------------------|
| (a) Express $\frac{\sqrt{5} + 3}{\sqrt{5} - 2}$ in the form $p\sqrt{5} + q$ , where $p$ and $q$ are integers. | <i>(4 marks)</i> |
| (b) (i) Express $\sqrt{45}$ in the form $n\sqrt{5}$ , where $n$ is an integer.                                | <i>(1 mark)</i>  |
| (ii) Solve the equation   |                  |
| $x\sqrt{20} = 7\sqrt{5} - \sqrt{45}$  |                  |
| giving your answer in its simplest form.  | <i>(3 marks)</i> |

June 2007 Question 2

- (a) Express  $\frac{\sqrt{63}}{3} + \frac{14}{\sqrt{7}}$  in the form  $n\sqrt{7}$ , where  $n$  is an integer. *(3 marks)*
- (b) Express  $\frac{\sqrt{7} + 1}{\sqrt{7} - 2}$  in the form  $p\sqrt{7} + q$ , where  $p$  and  $q$  are integers. *(4 marks)*

January 2008 Question 3

- (a) Express  $5\sqrt{8} + \frac{6}{\sqrt{2}}$  in the form  $n\sqrt{2}$ , where  $n$  is an integer. *(3 marks)*
- (b) Express  $\frac{\sqrt{2} + 2}{3\sqrt{2} - 4}$  in the form  $c\sqrt{2} + d$ , where  $c$  and  $d$  are integers. *(4 marks)*

June 2008 Question 2

It is given that  $x = \sqrt{3}$  and  $y = \sqrt{12}$ .

Find, in the simplest form, the value of:

- (a)  $xy$ ; *(1 mark)*
- (b)  $\frac{y}{x}$ ; *(2 marks)*
- (c)  $(x + y)^2$ . *(3 marks)*

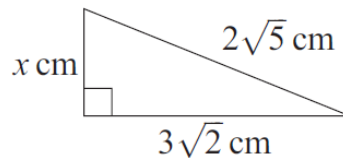
January 209 Question 3

- (a) Express  $\frac{7 + \sqrt{5}}{3 + \sqrt{5}}$  in the form  $m + n\sqrt{5}$ , where  $m$  and  $n$  are integers. *(4 marks)*
- (b) Express  $\sqrt{45} + \frac{20}{\sqrt{5}}$  in the form  $k\sqrt{5}$ , where  $k$  is an integer. *(3 marks)*

June 2009 Question 2

(a) Express  $\frac{5 + \sqrt{7}}{3 - \sqrt{7}}$  in the form  $m + n\sqrt{7}$ , where  $m$  and  $n$  are integers. (4 marks)

(b) The diagram shows a right-angled triangle.



The hypotenuse has length  $2\sqrt{5}$  cm. The other two sides have lengths  $3\sqrt{2}$  cm and  $x$  cm. Find the value of  $x$ . (3 marks)

January 2010 Question 4

(a) Show that  $\frac{\sqrt{50} + \sqrt{18}}{\sqrt{8}}$  is an integer and find its value. (3 marks)

(b) Express  $\frac{2\sqrt{7} - 1}{2\sqrt{7} + 5}$  in the form  $m + n\sqrt{7}$ , where  $m$  and  $n$  are integers. (4 marks)

June 2010 Question 2

(a) Express  $(3 - \sqrt{5})^2$  in the form  $m + n\sqrt{5}$ , where  $m$  and  $n$  are integers. (2 marks)

(b) Hence express  $\frac{(3 - \sqrt{5})^2}{1 + \sqrt{5}}$  in the form  $p + q\sqrt{5}$ , where  $p$  and  $q$  are integers. (4 marks)

January 2011 Question 2

(a) Simplify  $(3\sqrt{3})^2$ . (1 mark)

(b) Express  $\frac{4\sqrt{3} + 3\sqrt{7}}{3\sqrt{3} + \sqrt{7}}$  in the form  $\frac{m + \sqrt{21}}{n}$ , where  $m$  and  $n$  are integers. (4 marks)

June 2012

1 Express  $\frac{5\sqrt{3} - 6}{2\sqrt{3} + 3}$  in the form  $m + n\sqrt{3}$ , where  $m$  and  $n$  are integers. (4 marks)

June 2011

- 2 (a) (i)** Express  $\sqrt{48}$  in the form  $k\sqrt{3}$ , where  $k$  is an integer. *(1 mark)*
- (ii)** Simplify  $\frac{\sqrt{48} + 2\sqrt{27}}{\sqrt{12}}$ , giving your answer as an integer. *(3 marks)*
- (b)** Express  $\frac{1 - 5\sqrt{5}}{3 + \sqrt{5}}$  in the form  $m + n\sqrt{5}$ , where  $m$  and  $n$  are integers. *(4 marks)*

January 2012

- 3 (a) (i)** Simplify  $(3\sqrt{2})^2$ . *(1 mark)*
- (ii)** Show that  $(3\sqrt{2} - 1)^2 + (3 + \sqrt{2})^2$  is an integer and find its value. *(4 marks)*
- (b)** Express  $\frac{4\sqrt{5} - 7\sqrt{2}}{2\sqrt{5} + \sqrt{2}}$  in the form  $m - \sqrt{n}$ , where  $m$  and  $n$  are integers. *(4 marks)*

January 2013

- 3 (a) (i)** Express  $\sqrt{18}$  in the form  $k\sqrt{2}$ , where  $k$  is an integer. *(1 mark)*
- (ii)** Simplify  $\frac{\sqrt{8}}{\sqrt{18} + \sqrt{32}}$ . *(3 marks)*
- (b)** Express  $\frac{7\sqrt{2} - \sqrt{3}}{2\sqrt{2} - \sqrt{3}}$  in the form  $m + \sqrt{n}$ , where  $m$  and  $n$  are integers. *(4 marks)*

June 2013

- 2 (a) (i)** Express  $\sqrt{48}$  in the form  $n\sqrt{3}$ , where  $n$  is an integer. *(1 mark)*
- (ii)** Solve the equation
- $$x\sqrt{12} = 7\sqrt{3} - \sqrt{48}$$
- giving your answer in its simplest form. *(3 marks)*
- (b)** Express  $\frac{11\sqrt{3} + 2\sqrt{5}}{2\sqrt{3} + \sqrt{5}}$  in the form  $m - \sqrt{15}$ , where  $m$  is an integer. *(4 marks)*