

L10

Grade A*

Progression: Quick

Rationalising Surds (D)



Section A: Rationalise the denominator of the following.

1) $\frac{3}{\sqrt{2}}$

6) $\frac{15}{\sqrt{3}}$

11) $\frac{28}{3\sqrt{7}}$

16) $\frac{\sqrt{27}}{\sqrt{3}}$

2) $\frac{11}{\sqrt{5}}$

7) $\frac{14}{\sqrt{2}}$

12) $\frac{18}{5\sqrt{3}}$

17) $\frac{\sqrt{75}}{\sqrt{3}}$

3) $\frac{9}{\sqrt{7}}$

8) $\frac{20}{\sqrt{5}}$

13) $\frac{2}{7\sqrt{4}}$

18) $\frac{\sqrt{64}}{\sqrt{4}}$

4) $\frac{4}{\sqrt{11}}$

9) $\frac{22}{\sqrt{11}}$

14) $\frac{25}{3\sqrt{5}}$

19) $\frac{\sqrt{98}}{\sqrt{2}}$

5) $\frac{20}{\sqrt{13}}$

10) $\frac{8}{\sqrt{6}}$

15) $\frac{54}{9\sqrt{2}}$

20) $\frac{\sqrt{24}}{\sqrt{6}}$

Section B: Rationalise the denominators of the following.

1) $\frac{11}{2-\sqrt{3}}$

3) $\frac{12}{3-\sqrt{3}}$

5) $\frac{4}{3+\sqrt{11}}$

2) $\frac{1}{2-\sqrt{5}}$

4) $\frac{7}{1+\sqrt{2}}$

6) $\frac{1}{\sqrt{3}-1}$

Section C

1) Express $\frac{\sqrt{9}+13}{\sqrt{9}-1}$ as an integer.

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

3) Express $\frac{\sqrt{2}+5}{\sqrt{2}-1}$ in the form $a\sqrt{2}+b$, where a and b are integers.

4) Express $\frac{\sqrt{12}-6}{\sqrt{12}+2}$ in the form $a-b\sqrt{3}$, where a and b are integers.

5) Express $\frac{\sqrt{7}+4}{2\sqrt{7}-2}$ in the form $p\sqrt{7}+q$, where p and q are rational.

6) Express $\frac{2\sqrt{3}+8}{5\sqrt{3}-6}$ in the form $q+p\sqrt{3}$, where p and q are rational.

Rationalising Surds (D)

ANSWERS

**Section A:** Rationalise the denominator of the following.

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|---------------------------|--------------------------|---------------------------|-----------------------|----------------------------|-----------------------|----------------------------------|---|
| 1) $\frac{3}{\sqrt{2}}$ | $\frac{3\sqrt{2}}{2}$ | 6) $\frac{15}{\sqrt{3}}$ | $5\sqrt{3}$ | 11) $\frac{28}{3\sqrt{7}}$ | $\frac{4\sqrt{7}}{3}$ | 16) $\frac{\sqrt{27}}{\sqrt{3}}$ | 3 |
| 2) $\frac{11}{\sqrt{5}}$ | $\frac{11\sqrt{5}}{5}$ | 7) $\frac{14}{\sqrt{2}}$ | $7\sqrt{2}$ | 12) $\frac{18}{5\sqrt{3}}$ | $\frac{6\sqrt{3}}{5}$ | 17) $\frac{\sqrt{75}}{\sqrt{3}}$ | 5 |
| 3) $\frac{9}{\sqrt{7}}$ | $\frac{9\sqrt{7}}{7}$ | 8) $\frac{20}{\sqrt{5}}$ | $4\sqrt{5}$ | 13) $\frac{2}{7\sqrt{4}}$ | $\frac{1}{7}$ | 18) $\frac{\sqrt{64}}{\sqrt{4}}$ | 4 |
| 4) $\frac{4}{\sqrt{11}}$ | $\frac{4\sqrt{11}}{11}$ | 9) $\frac{22}{\sqrt{11}}$ | $2\sqrt{11}$ | 14) $\frac{25}{3\sqrt{5}}$ | $\frac{5\sqrt{5}}{3}$ | 19) $\frac{\sqrt{98}}{\sqrt{2}}$ | 7 |
| 5) $\frac{20}{\sqrt{13}}$ | $\frac{20\sqrt{13}}{13}$ | 10) $\frac{8}{\sqrt{6}}$ | $\frac{4\sqrt{6}}{3}$ | 15) $\frac{54}{9\sqrt{2}}$ | $3\sqrt{2}$ | 20) $\frac{\sqrt{24}}{\sqrt{6}}$ | 2 |

Section B: Rationalise the denominators of the following.

- | | | | | | |
|----------------------------|-------------------|----------------------------|------------------|----------------------------|------------------------|
| 1) $\frac{11}{2-\sqrt{3}}$ | $22 + 11\sqrt{3}$ | 3) $\frac{12}{3-\sqrt{3}}$ | $6 + 2\sqrt{3}$ | 5) $\frac{4}{3+\sqrt{11}}$ | $-6 + 2\sqrt{11}$ |
| 2) $\frac{1}{2-\sqrt{5}}$ | $-2 - \sqrt{5}$ | 4) $\frac{7}{1+\sqrt{2}}$ | $-7 - 7\sqrt{2}$ | 6) $\frac{1}{\sqrt{3}-1}$ | $\frac{1+\sqrt{3}}{2}$ |

Section C

- Express $\frac{\sqrt{9} + 13}{\sqrt{9} - 1}$ as an integer. 8
- Express $\frac{\sqrt{3} + 3}{\sqrt{3} - 1}$ in the form $m + n\sqrt{3}$, where m and n are integers. $3 + 2\sqrt{3}$
- Express $\frac{\sqrt{2} + 5}{\sqrt{2} - 1}$ in the form $a\sqrt{2} + b$, where a and b are integers. $6\sqrt{2} + 7$
- Express $\frac{\sqrt{12} - 6}{\sqrt{12} + 2}$ in the form $a - b\sqrt{3}$, where a and b are integers. $3 - 2\sqrt{3}$
- Express $\frac{\sqrt{7} + 4}{2\sqrt{7} - 2}$ in the form $p\sqrt{7} + q$, where p and q are rational. $\frac{5}{12}\sqrt{7} + \frac{11}{12}$
- Express $\frac{2\sqrt{3} + 8}{5\sqrt{3} - 6}$ in the form $q + p\sqrt{3}$, where p and q are rational. $2 + \frac{4}{3}\sqrt{3}$