



Aberdare Community School
Mathematics Department

WJEC GCSE
Higher – Non Calculator
Number

Surds and irrational numbers

Name:

Set:

Date:

Teacher:

26. Expand $(5 + \sqrt{2})(6 + \sqrt{2})$, simplifying your answer and stating whether it is rational or irrational.

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[2]

22. (a) Expand $(5 + 3\sqrt{2})^2$. Simplify your answer.

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25. Given that $d = \sqrt{8}$, $e = \sqrt{2}$ and $f = \sqrt{18}$ simplify **each** of the following. State whether your answer is rational or irrational.

(a) $\frac{d}{e}$

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(b) df

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23. (a) Write down a value of x (where $x > 1$) for which $x^{\frac{3}{2}}$ is rational.

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25. Given that $f = \sqrt{2}$, $g = \sqrt{3}$ and $h = \sqrt{6}$, find in the simplest form,

(a) $\frac{fh}{g}$,

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[1]

(b) $fg + 2h$.

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16.

(c) Expand and simplify $(3 + \sqrt{2})(5 + \sqrt{2})$.

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25. Expand $(5 + \sqrt{2})(6 + \sqrt{2})$, simplifying your answer and stating whether it is rational or irrational.

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18. (a) Find the value of $(\sqrt{12} - \sqrt{3})^2$.

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(b) Given that $p = \sqrt{5}$, $q = \sqrt{13}$ and $r = \sqrt{65}$, simplify pqr .

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13.

(c) Evaluate $(\sqrt{72} - \sqrt{2})^2$.

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13.

(c) Find the value of $(\sqrt{32} - \sqrt{2})^2$.

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(d) Given that $p = \sqrt{7}$, $q = \sqrt{11}$ and $r = \sqrt{154}$, write pqr in the form $a\sqrt{2}$.

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14.

(b) Simplify $(\sqrt{75} - \sqrt{3})^2$ and state whether your answer is rational or irrational.

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15.

(b) Given that $p = \sqrt{5}$, $q = \sqrt{13}$ and $r = \sqrt{325}$, simplify pqr .

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(b) Simplify $(5 - 3\sqrt{2})^2$ and state whether your answer is rational or irrational.

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6.

(c) Simplify $\sqrt{(2^3 \times \sqrt{64})}$.

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11.

(b) Simplify $(3\sqrt{5} - \sqrt{2})(3\sqrt{5} + \sqrt{2})$ and state whether your answer is rational or irrational.

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12. (a) Find the value of $(\sqrt{45} - \sqrt{5})$.

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[3]



13.

(c) Evaluate $(\sqrt{3})^6$.

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(d) Simplify $(2 + 3\sqrt{2})(5 - \sqrt{2})$.

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15.

(c) Simplify $(3 - 5\sqrt{2})^2$ and state whether your answer is rational or irrational.

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10. (a) Evaluate $\frac{\sqrt{5} \times \sqrt{3} \times \sqrt{3}}{\sqrt{5}}$.

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12.

(b) Find the value of $(\sqrt{80} - \sqrt{5})^2$.

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(d) Simplify $(\pi + 3)(\pi - 3)$.
Give your answer in terms of π .

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15.

(c) Given that $f = \sqrt{2}$, $g = \sqrt{5}$ and $h = \sqrt{10}$, find, in its simplest form,

(i) $\frac{fg}{h}$,

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..... [1]

(ii) $fg + h$,

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..... [1]

(iii) fh .

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15. (a) Evaluate $6\sqrt{5} \times 2\sqrt{5}$.

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(b) Evaluate $(7\sqrt{2} - 4\sqrt{2})^4$.

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8.

(b) Simplify $(\pi\sqrt{20} - \pi\sqrt{5})^2$, leaving your answer in terms of π .

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16.

(d) Evaluate $(\sqrt{32} + \sqrt{2})^2$.

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(b) Write down any three values of x for which $x^{\frac{3}{2}}$ is rational. [2]

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(c) Give an example of an irrational number

(i) whose square is rational, [1]

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(ii) whose square is irrational. [1]

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13.

(c) Evaluate $(\sqrt{20} - \sqrt{5})^2$ and state whether your answer is rational or irrational. [3]

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(b) Simplify $\sqrt{(2^4 \times \sqrt{81})}$.

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(c) Simplify $(4 + \sqrt{3})^2$.

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16.

(c) Given that $a = \sqrt{5}$, $b = \sqrt{7}$ and $c = \sqrt{70}$, find the value of abc .

Write your answer in the form $n\sqrt{2}$ where n is a whole number.

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14.

(c) Simplify $\sqrt{3}(5 + \sqrt{3}) - \sqrt{3}(5 - 2\sqrt{3})$.

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12. Write each of the following in its simplest form.

(a) $\sqrt{50}$

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(b) $\sqrt{40} \times \sqrt{20}$

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(c) $(3 + 2\sqrt{5})(2 - \sqrt{5})$

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10. A giant crane on a construction site can carry a maximum load of 1.32×10^6 kg. The crane is required to lift concrete blocks, each weighing 400 kg. What is the greatest number of concrete blocks that the crane can lift each time? Give your answer in standard form.

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(b) Evaluate $(\sqrt{32} - \sqrt{2})^2$ and state whether your answer is rational or irrational.

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