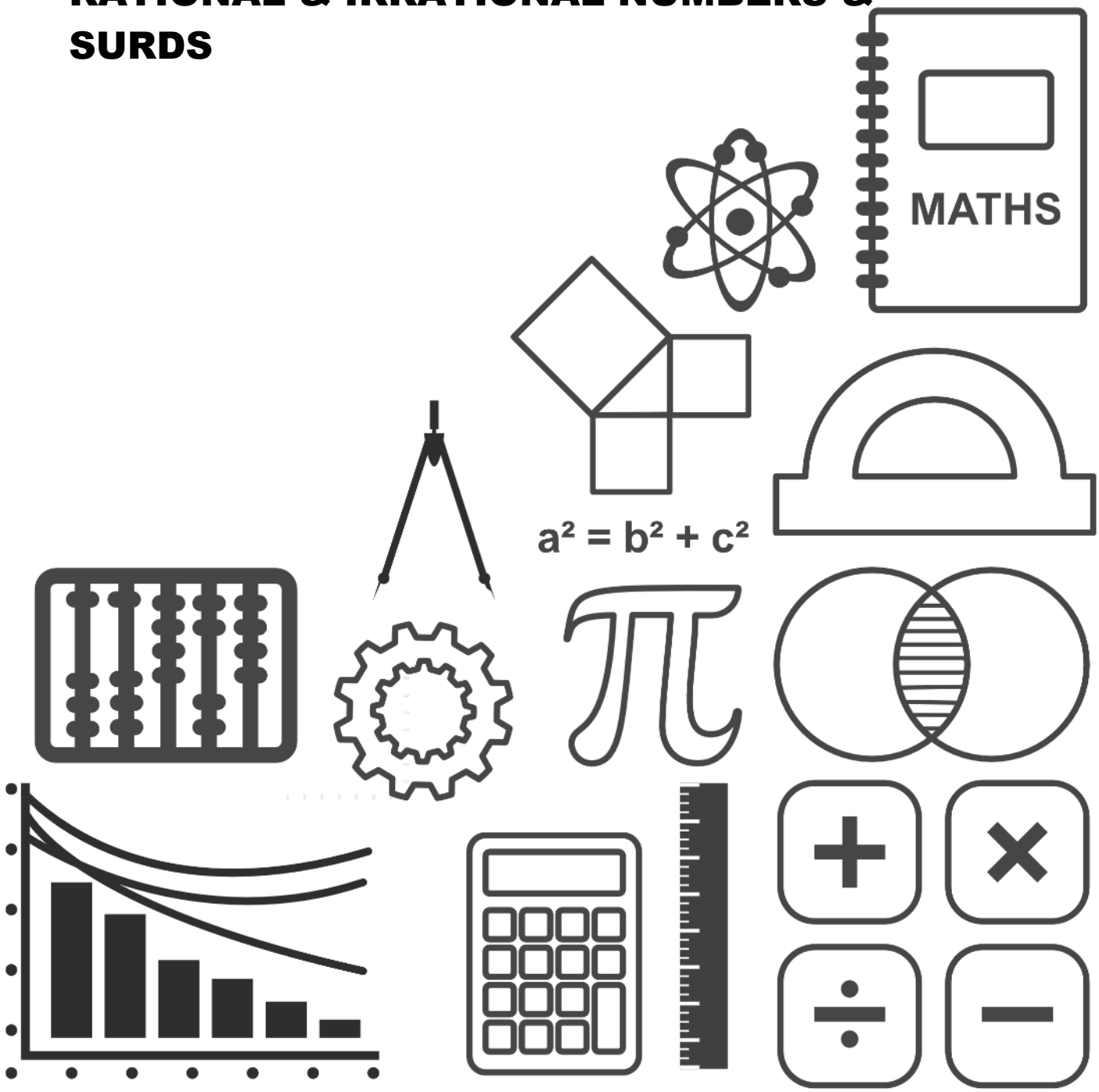
MATHSDIY

GCSE TOPIC BOOKLET
RATIONAL & IRRATIONAL NUMBERS & SURDS



1. Expand $(5-\sqrt{2})^2$ and state whether the result is rational or irrational.

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(2)

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

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(2)

3. Show that $\left(\sqrt{72}-\sqrt{2}\right)^2 = 50$.

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4. Write down a value of x for which $x^{\frac{3}{2}}$ is rational .

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5. Show that $\left(\sqrt{3}+\sqrt{12}\right)^2 = 27$.

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(2)

6. Give an example of an irrational number

a) whose square is rational,

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(1)

b) whose square is irrational.

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(2)

7. Find the value of $\left(\sqrt{32}+\sqrt{2}\right)^2$

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(2)

8. Given that $x = \sqrt{12}, y = \sqrt{3}$ and $z = \sqrt{6}$, simplify **each** of the following, indicating in each case whether your answer is rational or irrational.

a) $xy - 4$

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b) $\frac{x}{yz^2}$

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c) $(z + y)^2$

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(5)

9. **Do not use a calculator when answering this question. All working must be shown.** Simplify each of the following, indicating in each case whether your answer is rational or irrational.

a) $\frac{6}{\sqrt{3}} + \sqrt{48}$

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b) $(3 - \sqrt{2})^2$

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10. Evaluate $\frac{(7-\sqrt{3})(7+\sqrt{3})}{2}$.

State clearly whether your answer is rational or irrational.

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11. Simplify $\frac{(5\sqrt{3})^2 - \frac{2\sqrt{18}}{\sqrt{2}}}{\sqrt{32} \times \sqrt{2}}$.

State clearly whether your answer is rational or irrational.

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

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(3)

13. Given that $f = \sqrt{2}$, $g = \sqrt{5}$ and $h = \sqrt{10}$, simplify **each** of the following, indicating in each case whether your answer is rational or irrational.

a) $fg + h$

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b) $\frac{fg}{h}$

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c) fh

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14. Simplify $\sqrt{288}$, leaving your answer in surd form.

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

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

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

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(3)

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

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

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