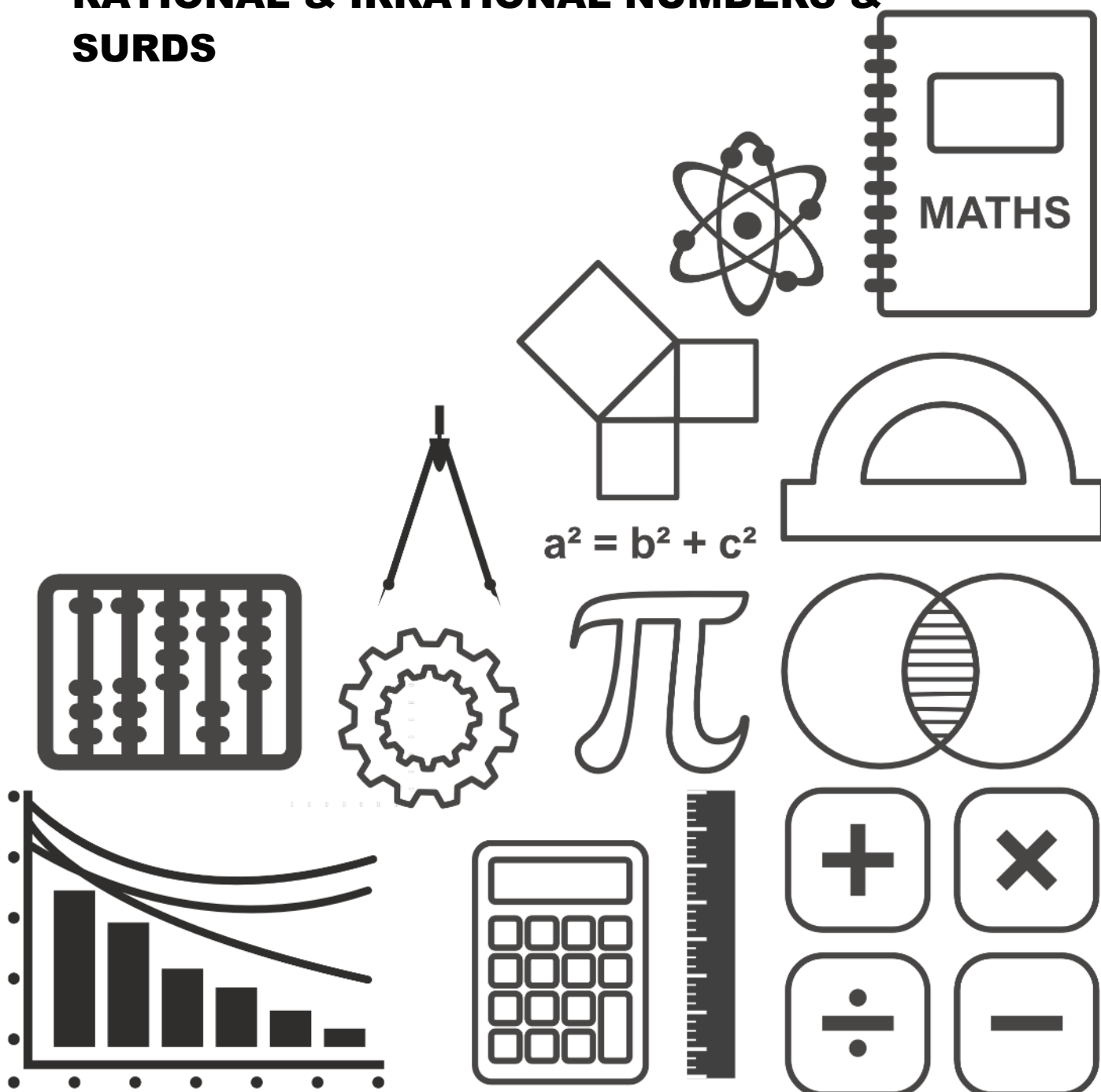


# MATHSDIY

## 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  $(\sqrt{72} - \sqrt{2})^2 = 50$ .

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(2)

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

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(2)

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

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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  $(\sqrt{32} + \sqrt{2})^2$

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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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(4)

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

State clearly whether your answer is rational or irrational.

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(2)

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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(5)

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

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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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(3)

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

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(2)

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

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(2)

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

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(1)

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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(3)

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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(3)