



AQA IGCSE FM "Full Coverage": Surds & Indices

This worksheet is designed to cover one question of each type seen in past papers, for each AQA IGCSE Further Maths topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to www.drfrostmaths.com/homework, logging on, *Practise* → *Past Papers/Worksheets* (or *Library* → *Past/Past Papers* for teachers), and using the 'Revision' tab.

Question 1

Categorisation: Simplify surds.

[AQA IGCSE FM June2012-P1 Q9]

Write this ratio in its simplest form $\sqrt{12} : \sqrt{48} : \sqrt{300}$

..... : :

Question 2

Categorisation: Add surds by first simplifying them.

[AQA IGCSE FM SAM P1 Q10a]

Write $\sqrt{75} + \sqrt{12}$ in the form $a\sqrt{b}$ where a and b are integers.

.....

Question 3

Categorisation: Simplify surds of the form $a\sqrt{b}$.

[AQA IGCSE FM Jan2013-P1 Q11]

Write $\sqrt{500} - 2\sqrt{45}$ in the form $a\sqrt{5}$ where a is an integer.

.....

Question 4

Categorisation: Multiply out brackets involving surds and simplify.

[AQA IGCSE FM Practice paper set 3 P1 Q13]

Expand and simplify $(\sqrt{5} + 3)(\sqrt{5} - 2)(\sqrt{5} + 1)$

.....

Question 5

Categorisation: Rationalise the denominator of a surd, where the denominator is of the form $a \pm \sqrt{b}$ or $\sqrt{a} \pm \sqrt{b}$

[AQA IGCSE FM June2014-P1 Q10]

Rationalise the denominator of

$$\frac{8}{3 - \sqrt{5}}$$

Give your answer in the form $a + b\sqrt{5}$ where a and b are integers.

.....

Question 6

Categorisation: As above, but involving a more complicated numerator.

[AQA IGCSE FM SAM P1 Q10b Edited]

Rationalise the denominator and simplify

$$\frac{2\sqrt{2} + 1}{\sqrt{2} - 3}$$

.....

Question 7

Categorisation: Deal with denominators of the form $a\sqrt{b} \pm c$.

[AQA IGCSE FM Practice paper set 4 P1 Q15]

Rationalise the denominator and simplify

$$\frac{5\sqrt{5} - 2}{2\sqrt{5} - 3}$$

.....

Question 8

Categorisation: Rearrange an equation and subsequently rationalise the denominator.

[AQA IGCSE FM June2013-P1 Q13]

Solve $y(\sqrt{3} - 1) = 8$

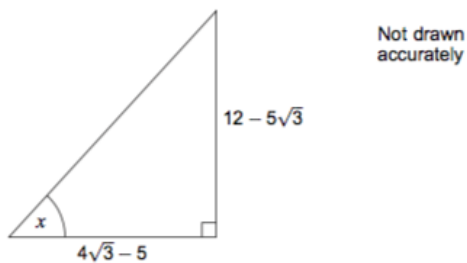
Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

$y =$

Question 9

Categorisation: Use surds in the context of trigonometric ratios.

[AQA IGCSE FM Jan2013-P1 Q15 Edited]



Find the value of x .

$x =$

Question 10

Categorisation: Solve equations of the form $x^a = b$.

[AQA IGCSE FM SAM P1 Q7a]

Solve $x^{\frac{2}{3}} = 9$

.....

Question 11

Categorisation: As above but with negative indices.

[AQA IGCSE FM June2013-P1 Q16]

Solve $x^{-\frac{2}{3}} = \frac{64}{9}$

.....

Question 12

Categorisation: As above but for multiple equations.

[AQA IGCSE FM Practice paper set 3 P1 Q8]

$x^{\frac{1}{2}} = 6$ and $y^{-3} = 64$

Work out the value of $\frac{x}{y}$

$\frac{x}{y} = \dots\dots\dots$

Question 13

Categorisation: As above but with n th roots.

[AQA IGCSE FM June2016-P1 Q10]

$$\sqrt[4]{x} = 2 \text{ and } y^{-2} = 25$$

$$x > 0 \text{ and } y > 0$$

Work out the value of $\frac{x}{y}$

$$\frac{x}{y} = \dots\dots\dots$$

Question 14

Categorisation: Use simple laws of indices.

[AQA IGCSE FM June2013-P2 Q15a]

$$a^{11} \times b^6 \times c = a^9 \times b^{10}$$

Write c in terms of a and b .

Give your answer in its simplest form.

$$c = \dots\dots\dots$$

Question 15

Categorisation: Write an expression as a single power.

[AQA IGCSE FM Practice paper set 2 P2 Q2d]

Write $\sqrt{\frac{1}{m^6}}$ as a single power of m .

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Question 16

Categorisation: Use laws of indices backwards.

[AQA IGCSE FM Practice paper set 1 P2 Q11d]

You are given that $x = 5^m$ and $y = 5^n$

Write $5^{\frac{m+n}{2}}$ in terms of x and y .

$$5^{\frac{m+n}{2}} = \dots\dots\dots$$

Question 17

Categorisation: Solve more complicated equations involving powers.

[AQA IGCSE FM June2016-P1 Q8]

Solve

$$(3 - \sqrt{x})^{\frac{1}{3}} = -2$$

.....

Question 18

Categorisation: As above.

[AQA IGCSE FM June2015-P2 Q9c]

Solve

$$3m^{\frac{1}{5}} + 9 = 0$$

.....

Question 19

Categorisation: Solve an equation involving multiple different bases (by expressing as the same base).

[AQA IGCSE FM June2015-P2 Q27 Edited]

Work out the values of a when

$$2^{a^2} = 8^a \times 16$$

Do **not** use trial and improvement.

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Answers

Question 1

$$1:2:5$$

Question 2

$$7\sqrt{3}$$

Question 3

$$4\sqrt{5}$$

Question 4

$$4$$

Question 5

$$6 + 2\sqrt{5}$$

Question 6

$$-1 - \sqrt{2}$$

Question 7

$$4 + \sqrt{5}$$

Question 8

$$y = 4 + 4\sqrt{3}$$

Question 9

$$x = 60^\circ$$

Question 10

$$x = 27$$

Question 11

$$x = \frac{27}{512} \text{ and } x = -\frac{27}{512}$$

Question 12

$$\frac{x}{y} = 144$$

Question 13

$$\frac{x}{y} = -80$$

Question 14

$$c = \frac{b^4}{a^2}$$

Question 15

$$m^{-3}$$

Question 16

$$5^{\frac{m+n}{2}} = x^{\frac{1}{2}}y^{\frac{1}{2}}$$

Question 17

$$x = 121$$

Question 18

$$m = -243$$

Question 19

$$a = -1 \text{ or } a = 4$$