

Oxford Revise | AQA GCSE Maths Higher | Answers

Chapter 3 Factors, multiples, primes, standard form, and surds

Question	Answer	Extra information	Marks
3.1 (a)	$\sqrt{200} + \sqrt{72} - \sqrt{98} = 10\sqrt{2} + 6\sqrt{2} - 7\sqrt{2}$ $= 9\sqrt{2}$	Simplifying the three surds Correct answer	1 1
3.1 (b)	$\frac{14}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$	Multiplying numerator and denominator by $\sqrt{2}$ Correct answer	1 1
3.2	$\sqrt{3}(\sqrt{80} - \sqrt{20}) = \sqrt{240} - \sqrt{60}$ $= \sqrt{16 \times 15} - \sqrt{4 \times 15}$ $= 4\sqrt{15} - 2\sqrt{15}$ $= 2\sqrt{15}$	Expand the brackets or realise $\sqrt{80} = 2\sqrt{20}$ Factor out 15 from both or simplify to $\sqrt{3} \times \sqrt{20} = \sqrt{60}$ Correct answer	1 1 1
3.3 (a)	$\frac{8}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} = \frac{16 + 8\sqrt{3}}{4 - 3} = 16 + 8\sqrt{3}$	Multiplying by the conjugate of the denominator over itself Correctly multiplying the terms in the denominator Correct answer	1 1 1
3.3 (b)	$\frac{\sqrt{3} - 1}{\sqrt{3} + 1} \times \frac{\sqrt{3} - 1}{\sqrt{3} - 1} = \frac{3 - 2\sqrt{3} + 1}{3 - 1}$ $= \frac{4 - 2\sqrt{3}}{2}$ $= 2 - \sqrt{3}$	Multiplying by the conjugate of the denominator over itself Correctly multiplying the terms in the denominator Correct answer	1 1 1

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3.4	$(\sqrt{11} - \sqrt{8})(\sqrt{11} + \sqrt{8}) = 11 + \sqrt{11}\sqrt{8} - \sqrt{11}\sqrt{8} - 8$ $= 11 - 8$ $= 3$	Attempt to expand brackets Cancelling middle terms Correct answer	1 1 1
3.5	$\frac{(\sqrt{2} + \sqrt{50})^2}{3(\sqrt{2} - 1)} = \frac{2 + 2\sqrt{100} + 50}{3(\sqrt{2} - 1)}$ $= \frac{2 + 20 + 50}{3(\sqrt{2} - 1)}$ $= \frac{72}{3(\sqrt{2} - 1)}$ $= \frac{24}{(\sqrt{2} - 1)} \times \frac{(\sqrt{2} + 1)}{(\sqrt{2} + 1)}$ $= 24(\sqrt{2} + 1)$	Expand numerator correctly (as shown or using $\sqrt{2} + \sqrt{50} = \sqrt{2} + 5\sqrt{2} = 6\sqrt{2}$) Multiply numerator and denominator by $\sqrt{2} + 1$ Correct answer	1 1 1
3.6 (a)	$750 = 2 \times 3 \times 5^3$	Finding or listing the prime factors by use of a factor tree or otherwise Correct answer	1 1
3.6 (b)	750 contains only one factor of 2, but 4 has two factors of 2.	Correct explanation	1
3.7 (a)	x is even, because it contains a factor of 2	Correct explanation	1
3.7 (b)	The prime factors of $2x$ will be the same as x , with just one more factor of 2: $2x = 2^2 \times 3^2 \times 7 \times 13$	Correct explanation and answer	1

Question	Answer	Extra information	Marks
3.8 (a)	Use a Venn diagram or otherwise to obtain the $\text{HCF} = 2 \times 5 = 10$		1
3.8 (b)	Use a Venn diagram or otherwise to obtain the $\text{LCM} = 2^3 \times 3^2 \times 5 \times 11 = 3960$	Accept in index form	1
3.9 (a)	$4 = 2 \times 2$, so p must have two factors of 2, thus $x = 2$		1
3.9 (b)	$p = 2 \times 2 \times 3 \times 7 = 84$		1
3.10	$150\,000\,000 = 1.5 \times 10^8$		1
3.11	Write all numbers either in standard form or ordinary form and then compare. $2.3 \times 10^5, 2.1 \times 10^4, 2200, 0.21 \times 10^4$	Converting at least two numbers correctly into the other form Any three in correct order All correct	1 1 1
3.12 (a)	$(5 \times 10^4) + (6 \times 10^5) = 50000 + 600000$ $= 650000$ $= 6.5 \times 10^5$	Converting to ordinary numbers or the same power of 10 Correct answer	1 1
3.12 (b)	$(9 \times 10^{-3}) - (3 \times 10^{-4}) = 0.009 - 0.0003$ $= 0.0087$ $= 8.7 \times 10^{-3}$	Converting to ordinary numbers or the same power of 10 Correct answer	1 1
3.12 (c)	$(2.1 \times 10^8) \times (3 \times 10^{-5}) = 6.3 \times 10^{8-5}$ $= 6.3 \times 10^3$	Multiplying separately numbers and powers of 10 Correct answer	1 1
3.12 (d)	$(8.2 \times 10^3) \div (4.1 \times 10^7) = 2 \times 10^{3-7}$ $= 2.0 \times 10^{-4}$	Dividing separately numbers and powers of 10 Correct answer	1 1

Question	Answer	Extra information	Marks
3.13	$\text{speed} = \frac{\text{distance}}{\text{time}}$ $4000 = \frac{3000}{\text{time}}$ $\text{time} = \frac{3000}{4000} = \frac{3}{4}$ $\frac{3}{4}\text{hour} = 45 \text{ minutes}$	Dividing distance by speed $\frac{3}{4}$ hour Answer correct in minutes	1 1 1
3.14	$\text{Area} = (1.2 \times 10^2) \times (7 \times 10^3) = 120 \times 7000$ $= 840000$ $= 8.4 \times 10^5 \text{ km}^2$	Multiplying 10^5 Correct answer	1 1 1
3.15 (a)	190 260 000 000		1 1
3.15 (b)	$\frac{5.3 \times 10^8 - 8.9 \times 10^{-2}}{7.2 \times 10^3} = 73611.1111\dots$ $= 7.361 \times 10^4$		1 1
3.16	$21.263 + 4.801 = 26.064$ Rounded to 3 sf, this is 26.1 $88.155 - 61.379 = 26.776$ Truncated to the nearest whole number, this is 26 So, the first calculation is greater by 0.1	26.064 rounded to 3 sf = 26.1 26.776 truncated to a whole number = 26 Correct answer	1 1 1

Question	Answer	Extra information	Marks
3.17	$\frac{4.2^2 \times 5.075}{9.88} + \frac{21.7}{4.66} \approx \frac{4^2 \times 5}{10} + \frac{20}{5}$ $= \frac{80}{10} + \frac{20}{5}$ $= 8 + 4 = 12$	Arriving at $\frac{80}{10} + \frac{20}{5}$ Fully correct answer	1 1