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)	$\dfrac{14}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{14\sqrt{2}}{2} = 7\sqrt{2}$	Multiplying numerator and denominator by $\sqrt{2}$ Correct answer	1 1
3.2	$\sqrt{3}\left(\sqrt{80} - \sqrt{20}\right) = \sqrt{240} - \sqrt{60}$ $= \sqrt{16 \times 15} - \sqrt{4 \times 15}$ $= 4\sqrt{15} - 2\sqrt{15}$ $= 2\sqrt{15}$	Expand the brackets Factor out 15 from both Correct answer	1 1 1
3.3 (a)	$\dfrac{8}{2 - \sqrt{3}} \times \dfrac{2 + \sqrt{3}}{2 + \sqrt{3}} = \dfrac{16 + 8\sqrt{3}}{4 - 3} = 16 + 8\sqrt{3}$	Multiplying by the conjugate of the denominator over itself Correctly multiplying the terms in the denominator Correct answer	1 1 1
3.3 (b)	$\dfrac{\sqrt{3} - 1}{\sqrt{3} + 1} \times \dfrac{\sqrt{3} - 1}{\sqrt{3} - 1} = \dfrac{3 - 2\sqrt{3} + 1}{3 - 1}$ $= \dfrac{4 - 2\sqrt{3}}{2}$ $= 2 - \sqrt{3}$	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	$\left(\sqrt{11}-\sqrt{8}\right)\left(\sqrt{11}+\sqrt{8}\right)=11+\sqrt{11}\sqrt{8}-\sqrt{11}\sqrt{8}-8$ $=11-8$ $=3$	Attempt to expand brackets Cancelling middle terms Correct answer	1 1 1
3.5	$\dfrac{\left(\sqrt{2}+\sqrt{50}\right)^2}{3\left(\sqrt{2}-1\right)}=\dfrac{2+2\sqrt{100}+50}{3\left(\sqrt{2}-1\right)}$ $=\dfrac{2+20+50}{3\left(\sqrt{2}-1\right)}$ $=\dfrac{72}{3\left(\sqrt{2}-1\right)}$ $=\dfrac{24}{\left(\sqrt{2}-1\right)}\times\dfrac{\left(\sqrt{2}+1\right)}{\left(\sqrt{2}+1\right)}$ $=24\left(\sqrt{2}+1\right)$	Expand numerator correctly Multiply numerator and denominator by $\sqrt{2}+1$ Correct answer	1 1 1
3.6 (a)	$750=2\times3\times5^3$	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: $2x=2^2\times3^2\times7\times13$	Correct explanation and answer	1

Question	Answer	Extra information	Marks
3.8 (a)	Use a Venn diagram or otherwise to obtain the HCF $= 2 \times 5 = 10$		1
3.8 (b)	Use a Venn diagram or otherwise to obtain the LCM $= 2^3 \times 3^2 \times 5 \times 11 = 3960$		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)	$$\left(5 \times 10^4\right) + \left(6 \times 10^5\right) = 50000 + 600000$$ $$= 650000$$ $$= 6.5 \times 10^5$$	Converting to ordinary numbers or the same power of 10 Correct answer	1 1
3.12 (b)	$$\left(9 \times 10^{-3}\right) - \left(3 \times 10^{-4}\right) = 0.009 - 0.0003$$ $$= 0.0087$$ $$= 8.7 \times 10^{-3}$$	Converting to ordinary numbers or the same power of 10 Correct answer	1 1
3.12 (c)	$$\left(2.1 \times 10^8\right) \times \left(3 \times 10^{-5}\right) = 6.3 \times 10^{8-5}$$ $$= 6.3 \times 10^3$$	Multiplying separately numbers and powers of 10 Correct answer	1 1
3.12 (d)	$$\left(8.2 \times 10^3\right) \div \left(4.1 \times 10^7\right) = 2 \times 10^{3-7}$$ $$= 2.0 \times 10^{-4}$$	Multiplying separately numbers and powers of 10 Correct answer	1 1

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Question	Answer	Extra information	Marks
3.13	$\text{speed} = \dfrac{\text{distance}}{\text{time}}$ $4000 = \dfrac{3000}{\text{time}}$ $\text{time} = \dfrac{3000}{4000} = \dfrac{3}{4}$ $\dfrac{3}{4} \text{ hour} = 45 \text{ minutes}$	Dividing distance by speed $\dfrac{3}{4}$ hour Answer correct in minutes	1 1 1
3.14	$\text{Area} = \left(1.2 \times 10^2\right) \times \left(7 \times 10^3\right) = 120 \times 7000$ $= 840000$ $= 8.4 \times 10^5 \text{ km}^2$	Multiplying 10^5 Correct answer	1 1 1
3.15 (a)	190 260 000 000		1 1
3.15 (b)	$\dfrac{5.3 \times 10^8 - 8.9 \times 10^{-2}}{7.2 \times 10^3} = 73611.1111...$ $= 7.36\dot{1} \times 10^4$		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 nearest whole number $= 26$ Correct answer	1 1 1

Question	Answer	Extra information	Marks
3.17	$\dfrac{4.2^2 \times 5.075}{9.88} + \dfrac{11.7}{2.66} \approx \dfrac{4^2 \times 5}{10} + \dfrac{12}{3}$ $= \dfrac{80}{10} + \dfrac{12}{3}$ $= 8 + 4 = 12$	Arriving at $\dfrac{80}{10} + \dfrac{12}{3}$ Fully correct answer	1 1