Oxford Revise | Edexcel GCSE Maths Higher | Answers

Chapter 20 Surface area and volume

Question	Answer	Extra information	Marks
20.1 (a)	Volume $= \pi \times r^2 h = \pi \times 4^2 \times 11 = 176\pi \, \text{cm}^3$	$\pi \times 4^2 \times 11$ 176π	1 1
20.1 (b)	Curved surface area $= 2 \times \pi \times 4 \times 11 = 88\pi$ Circular base area $= \pi \times 4^2 = 16\pi$ Total surface area $=$ $120\pi = 377 \, \text{cm}^2 \, (3\,\text{sf})$	$2 \times \pi \times 4 \times 11 = 88\pi$ $\pi \times 4^2 = 16\pi$ Adding all surfaces Correct answer, to 3 sf	1 1 1 1
20.2	Volume 1 = Volume 2 $\frac{1}{2} \times 1.6 \times 1.8 \times 11 = \frac{1}{2} \times 2.4 \times 4 \times h$ $15.84 = 4.8h$ $h = \frac{15.84}{4.8} = 3.3$ $h = 3.3 \, \text{cm}$	Convert to all mm or all cm Equate volumes correctly Solve for h Correct answer, in appropriate units	1 1 1 1

Question	Answer	Extra information	Marks
20.3	Volume of cube = $2\sqrt{2} = 2^1 \times 2^{\frac{1}{2}} = 2^{\frac{3}{2}}$ Side length = $\sqrt[3]{V} = V^{\frac{1}{3}} = \left(2^{\frac{3}{2}}\right)^{\frac{1}{3}} = 2^{\frac{3}{2} \times \frac{1}{3}} = 2^{\frac{1}{2}} = \sqrt{2}$ Surface area of undrilled cube = $6 \times \left(\sqrt{2}\right)^2 = 12$ Area of holes = $2 \times \pi r^2 = 2 \times \pi \times 0.25^2 = \frac{\pi}{8}$ Surface area = $\left(12 - \frac{\pi}{8}\right)$ cm^2	Finding the length of the cube Finding area of six faces less two circles Fully correct answer	1 1 1
20.4 (a)	Number of parts $= 2 + 1 = 3$ $2400\pi \div 3 = 800\pi$ Volume of larger jug $= 2 \times 800\pi = 1600\pi$ $\pi \times 12^2 \times h = 1600\pi$ $h = 11.11... = 11.1$ cm, to 3 sf	Calculating volume of larger jug Use of correct formula Attempt to find height Correct answer, to 3 sf	1 1 1 1
20.4 (b)	Volume of smaller jug = 800π $h = r$ $\pi r^2 \times r = 800\pi$ $r^3 = 800$ $r = 9.28$ cm	Use of correct formula Attempt to find height by substituting $h = r$ Correct answer, to 3 sf	1 1 1

Question	Answer	Extra information	Marks
20.5	Area of base $= 230 \times 230 = 52\,900$ m^2 Volume $= \dfrac{1}{3}bh = \dfrac{1}{3} \times 52\,900 \times 147$ $= 2\,592\,100$ m^3 $= 2\,600\,000$ m^3, to 2 sf	$230 \times 230 = 52\,900$ $\dfrac{1}{3} \times 52900 \times 7$ Answer correct to 2 sf	1 1 1
20.6	Surface area of sphere $= 4\pi r^2 = 400\pi$ $r^2 = 100$ $r = 10$ The radius is 10 cm	$4\pi r^2 = 400\pi$ Correct answer	1 1
20.7	Volume $= \dfrac{1}{2} \times \dfrac{4}{3}\pi r^3 = \dfrac{2}{3}\pi \times 25^3 = \dfrac{31\,250\pi}{3}$ To 3 sf, this is $32\,700$ cm^3	$\dfrac{1}{2} \times \dfrac{4}{3}\pi r^3$ $\dfrac{31\,250\pi}{3}$ Answer correct to 3 sf	1 1 1
20.8	Volume of cone $= \dfrac{1}{3}\pi \times 6^2 \times 15 = 180\pi$ Volume of hemisphere $= \dfrac{2}{3}\pi \times 6^3 = 144\pi$ Total volume $= 324\pi$ cm^3	Calculating volume of cone Calculating volume of hemisphere Correct final answer	1 1 1
20.9	$6 \times 1500 = 9000$ ml $= 9000$ cm^3 $100 \times 60 \times h = 9000$ $h = 1.5$ cm	1 litre $= 1000$ ml or 1 ml $= 1$ cm^3 used $6 \times$ volume in each jug $100 \times 60 \times h$ Correct answer	1 1 1 1

Question	Answer	Extra information	Marks
20.10	Surface area = $2\pi rh + 2\pi r^2 = 2\pi \times 10 \times 40 + 2\pi \times 10^2$ $= 1000\pi$ $= 3141.6$ Greta would need 3141.6 cm^3 of fabric. Greta has 3000 cm^3 fabric. So, she does not have enough fabric.	Attempt to use formula 1000π or 3141.6 Correct comparison with 3000 cm^3	1 1 1
20.11	Volume of hemisphere $= \frac{2}{3}\pi r^3 = \frac{2}{3}\pi \times 6^3 = 144\pi$ Volume of cone $= \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times 6^2 h = 12\pi h$ Total volume $= 144\pi + 12\pi h = 276\pi$ $12h = 132$ $h = 11$ cm	Correct method for volume of hemisphere or volume of cone Equates calculated total volume to 276π Correct method to find h Correct answer	1 1 1 1

Question	Answer	Extra information	Marks
20.12	$\dfrac{3}{8}$ of the parcels are medium $\dfrac{5}{8}$ of the parcels are large $\dfrac{1}{3}$ of the medium parcels are 1st class $\dfrac{1}{3} \times \dfrac{3}{8} = \dfrac{1}{8}$ $\dfrac{3}{5}$ of the large parcels are 1st class $\dfrac{3}{5} \times \dfrac{5}{8} = \dfrac{3}{8}$ $\dfrac{1}{8} + \dfrac{3}{8} = \dfrac{1}{2}$ $\dfrac{1}{2}$ of the parcels are 1st class	1 mark for $\dfrac{3}{8}$ or $\dfrac{5}{8}$ 1 mark for $\dfrac{1}{3}$ or $\dfrac{3}{5}$ 1 mark for $\dfrac{1}{3} \times \dfrac{3}{8}$ or $\dfrac{3}{5} \times \dfrac{5}{8}$ 1 mark for correct final answer	1 1 1 1

Question	Answer	Extra information	Marks
20.13	A Area = $\dfrac{60}{360} \times \pi(10)^2 = 16\dfrac{2}{3}\pi$ B Area = $\dfrac{75}{360} \times \pi(9)^2 = 16\dfrac{7}{8}\pi$ Compare fractions $\dfrac{2}{3}$ and $\dfrac{7}{8}$ $\dfrac{2}{3} = \dfrac{16}{24}$ $\dfrac{7}{8} = \dfrac{21}{24}$ Sector B has the greater area	Obtaining the sector area for one of the two Obtaining both sector areas Comparing the two, with the correct conclusion	1 1 1