

Oxford Revise | AQA 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 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	<p>Volume of cube = $2\sqrt{2} = 2^1 \times 2^{\frac{1}{2}} = 2^{\frac{3}{2}}$</p> <p>Side length = $\sqrt[3]{V} = V^{\frac{1}{3}} = \left(2^{\frac{3}{2}}\right)^{\frac{1}{3}} = 2^{\frac{3}{2} \times \frac{1}{3}} = 2^{\frac{1}{2}} = \sqrt{2}$</p> <p>Surface area of undrilled cube = $6 \times (\sqrt{2})^2 = 12$</p> <p>Area of holes = $2 \times \pi r^2 = 2 \times \pi \times 0.25^2 = \frac{\pi}{8}$</p> <p>Surface area = $\left(12 - \frac{\pi}{8}\right) \text{ cm}^2$</p>	<p>Finding the length of the cube</p> <p>Finding area of six faces less two circles</p> <p>Fully correct answer</p>	<p>1</p> <p>1</p> <p>1</p>
20.4 (a)	<p>Number of parts = $2 + 1 = 3$</p> <p>$2400\pi \div 3 = 800\pi$</p> <p>Volume of larger jug = $2 \times 800\pi = 1600\pi$</p> <p>$\pi \times 12^2 \times h = 1600\pi$</p> <p>$h = 11.11\dots = 11.1 \text{ cm, to 3 sf}$</p>	<p>Calculating volume of larger jug</p> <p>Use of correct formula</p> <p>Attempt to find height</p> <p>Correct answer, to 3 sf</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>

20.4 (b)	<p>Volume of smaller jug = 800π</p> <p>$h = r$</p> <p>$\pi r^2 \times r = 800\pi$</p> <p>$r^3 = 800$</p> <p>$r = 9.28\text{ cm}$</p>	<p>Use of correct formula</p> <p>Attempt to find height by substituting $h = r$</p> <p>Correct answer, to 3 sf</p>	<p>1</p> <p>1</p> <p>1</p>	
20.5	<p>Area of base = $230 \times 230 = 52\,900\text{ m}^2$</p> <p>Volume = $\frac{1}{3}bh = \frac{1}{3} \times 52\,900 \times 147$</p> <p>$= 2\,592\,100\text{ m}^3$</p> <p>$= 2\,600\,000\text{ m}^3$, to 2 sf</p>	<p>$230 \times 230 = 52\,900$</p> <p>$\frac{1}{3} \times 52\,900 \times 147$</p> <p>Answer correct to 2 sf</p>	<p>1</p> <p>1</p> <p>1</p>	
20.6	<p>Surface area of sphere = $4\pi r^2 = 400\pi$</p> <p>$r^2 = 100$</p> <p>$r = 10$</p> <p>The radius is 10 cm</p>	<p>$4\pi r^2 = 400\pi$</p> <p>Correct answer</p>	<p>1</p> <p>1</p>	
20.7	<p>Volume = $\frac{1}{2} \times \frac{4}{3} \pi r^3 = \frac{2}{3} \pi \times 25^3 = \frac{31\,250\pi}{3}$</p> <p>To 3 sf, this is $32\,700\text{ cm}^3$</p>	<p>$\frac{1}{2} \times \frac{4}{3} \pi r^3$</p> <p>$\frac{31\,250\pi}{3}$</p> <p>Answer correct to 3 sf</p>	<p>1</p> <p>1</p> <p>1</p>	

20.8	<p>Volume of cone = $\frac{1}{3}\pi \times 6^2 \times 15 = 180\pi$</p> <p>Volume of hemisphere = $\frac{2}{3}\pi \times 6^3 = 144\pi$</p> <p>Total volume = $324\pi \text{ cm}^3$</p>	<p>Calculating volume of cone</p> <p>Calculating volume of hemisphere</p> <p>Correct final answer</p>	<p>1</p> <p>1</p> <p>1</p>	
20.9	<p>$6 \times 1500 = 9000 \text{ ml} = 9000 \text{ cm}^3$</p> <p>$100 \times 60 \times h = 9000$</p> <p>$h = 1.5 \text{ cm}$</p>	<p>1 litre = 1000 ml or 1 ml = 1 cm³ used</p> <p>6 × volume in each jug</p> <p>$100 \times 60 \times h$</p> <p>Correct answer</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	
20.10	<p>$2\pi rh + 2\pi r^2 = 2\pi \times 10 \times 40 + 2\pi \times 10^2$</p> <p>Surface area = 1000π</p> <p>$= 3141.6$</p> <p>Greta would need 3141.6 cm³ of fabric.</p> <p>Greta has 3000 cm³ fabric. So, she does not have enough fabric.</p>	<p>Attempt to use formula</p> <p>1000π or 3141.6</p> <p>Correct comparison with 3000 cm³</p>	<p>1</p> <p>1</p> <p>1</p>	
20.11	<p>Volume of cuboid = $6 \times 20 \times 18 = 2160 \text{ cm}^2$</p> <p>Volume of half cylinder = $\frac{1}{2} \times \pi r^2 h = \frac{1}{2} \times \pi \times 10^2 \times 18 = 900\pi \text{ cm}^2$</p> <p>Total volume = $2160 + 900\pi \text{ cm}^2$</p>	<p>Correct method for volume of cuboid</p> <p>Correct method for volume of half cylinder ($r = 10$)</p> <p>Correct answer</p>	<p>1</p> <p>2</p> <p>1</p>	

Questions referring to previous content

20.12	$\frac{3}{8}$ of the parcels are medium $\frac{5}{8}$ of the parcels are large $\frac{1}{3}$ of the medium parcels are 1st class $\frac{1}{3} \times \frac{3}{8} = \frac{1}{8}$ $\frac{3}{5}$ of the large parcels are 1st class $\frac{3}{5} \times \frac{5}{8} = \frac{3}{8}$ $\frac{1}{8} + \frac{3}{8} = \frac{1}{2}$ $\frac{1}{2}$ of the parcels are 1st class	<p>1 mark for $\frac{3}{8}$ or $\frac{5}{8}$</p> <p>1 mark for $\frac{1}{3}$ or $\frac{3}{5}$</p> <p>1 mark for $\frac{1}{3} \times \frac{3}{8}$ or $\frac{3}{5} \times \frac{5}{8}$</p> <p>1 mark for correct final answer</p>	1 1 1 1	
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20.13	<p>A Area = $\frac{60}{360} \times \pi(10)^2 = 16\frac{2}{3}\pi$</p> <p>B Area = $\frac{75}{360} \times \pi(9)^2 = 16\frac{7}{8}\pi$</p> <p>Compare fractions $\frac{2}{3}$ and $\frac{7}{8}$</p> <p>$\frac{2}{3} = \frac{16}{24}$</p> <p>$\frac{7}{8} = \frac{21}{24}$</p> <p>Sector B has the greater area</p>	<p>Obtaining the sector area for one of the two</p> <p>Obtaining both sector areas</p> <p>Comparing the two, with the correct conclusion</p>	<p>1</p> <p>1</p> <p>1</p>	
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