Oxford Revise | AQA GCSE Maths Higher | Answers

Chapter 22 Similarity and congruence

Question	Answer	Extra information	Marks
22.1 (a)	$DF = 24$ cm		1
22.1 (b)	$CAB = 75°$		1
22.2	$\angle DCE = \angle ACB$ (opposite angles) $\angle DEC = \angle CAB$ (alternate interior angles) $\angle EDC = \angle ABC$ (alternate interior angles) $AB = DE$ is given Thus, by ASA, the triangles are congruent.	$\angle DCE = \angle ACB$ $\angle DEC = \angle CAB$ $\angle EDC = \angle ABC$ Use of ASA test for congruency	1 1 1 1
22.3	$AB = DC$ (opposite sides of a parallelogram) Angle *FEH* = angle *FGH* (diagonally opposite angles of a rhombus) Angle *GAB* = angle *CJB* (corresponding angles) and angle *CJB* = angle *DCE* (alternate angles) Therefore, angle *GAB* = angle *DCE* Triangles *ABG* and *CDE* are congruent because of AAS (Angle Angle Side).	$AB = DC$ with reason Angle *FEH* = angle *FGH* with reason Angle *GAB* = angle *DCE* with reason(s) or for angle *EDC* = angle *GBA* with reason(s) All three conditions stated with reasons, along with conclusion e.g. AAS or ASA.	1 1 1 1
22.4	The ratio of corresponding sides is 1.5 for all three pairs: $\frac{19.5}{13} = \frac{18}{12} = \frac{7.5}{5} = 1.5$ Therefore, the triangles are similar.	Comparing at least two pairs of sides Scale factor of 1.5 with conclusion	1 1

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22.5	$\frac{AC}{AB}=\frac{AD}{AE}$ $\frac{11.5}{9.2}=\frac{AD}{8.4}$ $AD=\frac{8.4\times11.5}{9.2}=10.5$ $ED=AD-AE=10.5-8.4=2.1$ cm	Comparing ratios of two pairs of sides Correct answer of 2.1 cm	1 1
22.6	Length scale factor = $22 \div 10 = 2.2$ Therefore, volume scale factor = $2.2^3 = 10.648$ Mass is proportional to volume. Mass of B = $1.5 \times 10.648 = 15.972$ kg	Length scale factor of 2.2 Volume (or mass) scale factor of 10.648 Correct final answer	1 1 1
22.7	Area scale factor = $50 \div 12.5 = 4$ Therefore, length scale factor = $\sqrt{4}=2$ Base length of shape B = $4 \times 2 = 8$ cm	$50 \div 12.5 = 4$ Length scale factor = $\sqrt{4}=2$ Correct final answer	1 1 1
22.8	Volume scale factor = $675 \div 25 = 27$ Therefore, the length scale factor = $\sqrt[3]{27}=3$ This makes the surface area scale factor $3^2 = 9$ Smaller solid's surface area = $360 \div 9 = 40$ cm^2	Length scale factor = $\sqrt[3]{27}=3$ Surface area scale factor $3^2=9$ Correct final answer	1 1 1

Question	Answer	Extra information	Marks
22.9	$80 \times 0.75 = 60$, and $120 \times 0.75 = 90$ Medium trapezoid has height $0.75h$, and parallel sides of length 60 and 90 Area of medium trapezium: $\frac{1}{2}\times(60+90)\times0.75h = 56.25h$ $0.75h \times 0.5 = 0.375h$ $60\times0.5 = 30$ $90\times0.5 = 45$ Small trapezium has height $0.375h$ and parallel sides of length 30 and 45 Area of small trapezium: $\frac{1}{2}\times(30+45)\times0.375h = 14.0625h$ $56.25h - 14.0625h = 4050$ $42.1875h = 4050$ $h = 96$ cm	$0.75h$ or 60 or 90 $0.5 \times 0.75h$ or 0.5×60, or 0.5×90 Attempt to use trapezium area formula Subtracting small from medium area Correct final answer	1 1 1 1 1

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22.10	Let the height of the portion of the cone that was cut off be *h*. $\frac{24}{18}=\frac{36+h}{h}$ since the cones are similar $24h=648+18h$ $h=108$ mm Radius of large cone $= 24 \div 2 = 12$ Radius of small cone $= 18 \div 2 = 9$ Volume of large cone = $\frac{1}{3}\pi\times12^2\times(36+108)=6912\pi$ Volume of small cone = $\frac{1}{3}\pi\times9^2\times108=2916\pi$ Volume of frustum $= 6912\pi-2916\pi=3996\pi$ mm^3	Attempt to find h by equating ratios of corresponding lengths Solving to find h Using your value of h to find the volume of either the small cone or the large cone Finding both volumes and subtracting Correct final answer in terms of π.	1 1 1 1 1
22.11	B = 1.2A B = 0.4C So, 1.2A = 0.4C $A=\frac{0.4}{1.2}C=\frac{1}{3}C$	B = 1.2A or B = 0.4C Equates answers Correct answer in simplest form	1 1 1
22.12	Volume ratio $= 125 : 8$ Length ratio $= \sqrt[3]{125}:\sqrt[3]{8}=5:2$ Area ratio $= 5^2 : 2^2 = 25 : 4$ Surface area of $J = 460 \div 4 \times 25 = 2875$ cm^3	Cube roots the volume ratio Squares this answer Correct calculation Correct final answer, showing all working	1 1 1 1

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22.13	Create triangle *CAD*, by introducing point *D*, the midpoint of *AB*. The base of triangle *CAD* is thus 3 cm $\cos CAB = \frac{3}{15}$ $CAB = 78.5°$ (1 dp)	Create triangle *CAD* Use the cosine ratio Find the angle to 1 dp	1 1 1
22.14	Let the width be w. Then the length is $2w$ Area $=$ length $\times$ width $= w \times 2w = 2w^2$ $2w^2 = 20$ $w^2 = 10$ $w = \sqrt{10}$ Therefore, the length $= 2\sqrt{10}$ cm	Attributing variables to the length and width Using the area formula Solving for the width Correct final answer for the length	1 1 1 1