REVISE
.wales

F3.03 — Perimeter, area & volume — calculator problems

Mark schemes for the F3.03 question pack

Spec 3.6.1, 3.6.3, 1.9.6 — Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 9 questions in the corresponding revise.wales question pack (32 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes.

		= 54(°) A1
20. (BC =) (24 – 2x7)/2 (BC =) 5(cm) (Area CDEF =) $\frac{(7 + 3)}{2} \times (9 - 5)$ or equivalent. = 20 (cm^2)	 M1 A1 M1 A1	*Lengths may be seen on diagram.* A clearly shown incorrect method for finding CD is M0A0 otherwise CD=4(cm) implies this M1A1. F.T. 'their derived 5' OR F.T. $\frac{(7 + 3)}{2} \times$ 'their stated or shown length CD (<9)' Allow M1 for correct intent e.g. '7 + 3 × 4 ÷ 2' then A0. Ignore any further attempt to find total area of whole shape if area of CDEF seen.

			allow SC1 for sight of 15 e.g. '15/50', 15 : 35.
5.(a)	Correct cuboid	B2	For B2, their cuboid must have edges along or parallel to the 3 directions usually associated with isometric paper (the two diagonals and the vertical). B1 for any one edge dealt with correctly for all its three occurrences in a cuboid. For any mark to be awarded the line must go 'through the dots' AND have both ends 'on a dot'. Ignore attempt at handling 'hidden lines'.
5.(b)	(Volume =) 6 × 4 × 3 = 72 cm^3.	M1 A1 U1	Any further manipulation to 6 × 4 × 3 is M0. Independent of other marks.

18. (Volume A =) $5 \times 5 \times 5$ (cm^3) OR (Volume B =) $4 \times 4 \times 5$ (cm^3) (Volume A =) 125 (cm^3) AND (Volume B =) 80 (cm^3) (Volume of B as a percentage of the volume of A) $= \frac{80}{125}$ (× 100%) = 64(%)	M1 A1 M1 A1	For use of Vol = l × b × h with <u>either</u> A or B. C.A.O. for <u>both</u> volumes. One correct implies previous M1. F.T. their derived volumes. An answer of 64(%) gains all four marks. *Allow marks if they work with base areas (as heights are equal).*
<u>Alternative method</u> *(Where 125 cm^3 and 80 cm^3 not shown.)* *$5 \times 5 \times 5$ (cm^3) OR $4 \times 4 \times 5$ (cm^3)* *$\frac{4 \times 4 \times 5}{5 \times 5 \times 5}$ (×100%)* *= 64(%)*	*M1* *M2* *A1*	

13.(a)	$3{\cdot}14 \times 10^2 \times 20$ or $\pi \times 10^2 \times 20$ $= 6280\ (cm^3)$	M1 A1	M1 A0 for 2000π. Allow M1A1 if 6280 seen in 13(b)
13.(b)	6 (litres)	B1	**A strict** FT of 'their 6280' /1000 and truncated. Truncation is required for the B1.

17. (Area of square =) $40{\cdot}96(cm^2)$	B1	
(Perp. height of triangle =) $4{\cdot}3(cm)$	B1	May be seen on the diagram. Do not accept 4·3 as a 'slant height' unless used correctly for M1.
(Area of triangle =) $\frac{6{\cdot}4 \times 4{\cdot}3}{2}$	M1	F.T. 'their unambiguously stated 4·3'. (Not 10·7).
$= 13{\cdot}76(cm^2)$	A1	
(Area of ABCDE = 40·96 + 13·76 =) $54{\cdot}72(cm^2)$	B1	F.T. from two derived areas. Allow 54·7 only if 54·72 seen. *Otherwise penalise **pre**-approximation −1 once only.*

18. Sight of at least two correct different surface areas. $2 \times (35 + 5x + 7x) = 142$ or equivalent. $x = 3$	B1 M2 A1	Sight of two of $35(cm^2)$, $5x(cm^2)$, $7x(cm^2)$. Allow M1 for 'sum of at least 3 correct surface areas = 142'. C.A.O. If M0, allow SC1 for $x = 3$ with no prior equation shown.

15. (Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$	M1	*Lengths may be shown on the diagram.* Accept equivalent e.g. $28 = 4 \times CE$.
(CE =) 7 (cm)	A1	
(Area ABCE = 7 × 7 =) 49 (cm^2)	B1	FT 'their stated or shown length CE'.
(Area of whole shape = 49 + 14 =) 63 (cm^2)	B1	FT 'their stated or shown area of square' + 14.
15. *Alternative method* *(Area of the triangle CDE =)* $14 = \frac{4 \times CE}{2}$	*M1*	*Lengths may be shown on the diagram.*
(CE =) 7 (cm)	*A1*	
(Area Trapezium ABCD =) $\frac{[(7 + 4) + 7] \times 7}{2}$	*M1*	*FT 'their stated or shown length CE (=CB)' consistently as 'their 7'.*
= 63 (cm^2)	*A1*	
16. (a =) $\frac{180 - 110}{2}$ or equivalent.	M1	
= 35(°)	A1	
b (= 180 – 90 – 35) = 55(°)	B1	OR FT 90 − 'their a'.
c (= 90 + 55) 145(°) OR c (= 180 − 35) 145(°)	B1	OR FT 90 + 'their b'. OR FT 180 − 'their a'

		2 10
13. (Length of AB) $18^2 = AB^2 + 10^2$ OR $(AB^2 =)$ $18^2 - 10^2$ or equivalent	M1	note: $(AB^2 =)$ $324 - 100$
$(AB^2 =)$ 224	A1	
$(AB =)$ 14·9(66…) or 15 or $4\sqrt{14}$ or $\sqrt{224}$ (cm)	A1	FT √'their 224' provided M1 gained for M1A0A1. *Alternative method to find AB* *A correct and complete method that would lead to a correct answer (using trigonometric relationships).* *M2* *(AB =) 14·9(66…) or 15 or $4\sqrt{14}$ or $\sqrt{224}$ (cm) A1*
(Area of the circle =) $\pi \times 9^2$	M1	
(Area of the triangle =) ½ × 10 × 14·9(66…) or equivalent	M1	Award M1 for sight of 75 or $20\sqrt{14}$. FT ½ × 10 × 'their *AB*', provided not 18 or 10. Accept any valid method that leads to a correct answer.
254.4(69…) (cm²) or 81π **AND** 74·8(33..) or $20\sqrt{14}$ (cm²)	A1	An answer between 254·3 and 254·51 (cm²). Allow 254. Allow 75.
(Area of the shaded region = 254.4(69) – 74·8(33..) =) 179 to 180 (cm²)	B1	Allow rounded or truncated answers. FT 'their area of a circle' – 'their triangle' (not 'their *AB*') provided at least one area M1 awarded previously.

8(a)(i) 440 × 48 ÷ 2.2 9600 (kg)	M1 A1	May be seen in stages Mark final answer Allow answers in the inclusive range 9588 to 9601 from premature approximation Answer space takes precedence
8(a)(ii) 230 000 000 000	B1	
8(b) (Area) 2.47 × 40000 ÷ 10000 or equivalent 9.88 (acres) (Density of trees) 615 ÷ 9.88 62(.2...trees per acre) (>60)	 M1 A1 m1 A1	**Throughout, if 4 marks are awarded, penalise -1 if conclusion 'Yes' is not indicated** **On FT the conclusion may be different to 'Yes'** May be implied in further working Allow 9.8 (acres), 9.9 (acres) or 10 (acres) Depends on M1 m1 previously awarded
8(b) Alternative method 1 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Maximum number of trees) 9.88 × 60* *592(.8) (trees) or 593 (trees) (< 615)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Depends on M1 m1 previously awarded* *Allow suitable rounding, e.g. 590 or 600*
8(b) Alternative method 2 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Minimum area) 615 ÷ 60* *10.25 (acres) (> 9.88)*	*M1* *A1* *M1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Do not allow embedded in further working* *Allow rounded to 10 (acres) provided 'their area' ($9.88m^2$) has not been rounded to 10*
8(b) Alternative method 3 *(Minimum area) 615 ÷ 60* *10.25 (acres)* *(Convert to m^2) 10000 × 10.25 ÷ 2.47* *41 497(.97 m^2) or 41 498(m^2) (>40 000)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 10 (acres)* *Depends on M1 m1 previously awarded* *Accept suitable rounding, e.g. 41 000 or 41 500*
8(b) Alternative method 4 *(Trees in 2.47 acres) 615 ÷ (40 000 ÷ 10 000) or equivalent* *153.75 (trees)* *(Density of trees) 153.75 ÷ 2.47* *62(.2...trees per acre) (> 60)*	*M1* *A1* *m1* *A1*	 *May be implied in further working* *Allow 153, 153.8 or 154 (trees)* *Depends on M1 m1 previously awarded*
8(b) Alternative method 5 *(Forest area per tree) 40 000 ÷ 615* *65(.0406.. m^2)* *(Fire risk, area per tree) 10 000 ÷ (60 × 2.47)* *67(.476…m^2) (> 65)*	*M1* *A1* *M1* *A1*	*Do not allow embedded in further working*

8(c)(i) (Height of the tree =) $21 \times \tan 39$	M2	*OR alternative full method* M1 for $\tan 39 = \frac{\text{height of tree}}{21}$
17.(…. m)	A1	CAO
8(c)(i) Alternative method 1 *Hypotenuse = 21/cos39* *(= 27.02…)* ***AND** Height* = $\sqrt{(27(.02)^2 - 21^2)}$	*M2*	*M1 for Hypotenuse = 21/cos39* *(= 27.02…)* ***AND** Height*^{2} = $27(.02)^2 - 21^2$
16.9(7…m) to 17.(0..m)	*A1*	*CAO*
8(c)(i) Alternative method 2 *(Angle of elevation)* $\tan^{-1}\frac{17}{21}$	*M2*	*M1 tan (elevation)* = $\frac{17}{21}$
38.9(9…°) or 39(°)	*A1*	*CAO*
8(c)(i) Alternative method 3 *(Horizontal distance)* $\frac{17}{\tan 39}$	*M2*	*M1 for tan 39* = $\frac{17}{\text{distance}}$
20.9(98…m) or 21m	*A1*	*CAO*
8(c)(ii) diameter = $\frac{1.75}{\pi}$ or (radius =) $\frac{1.75}{2 \times \pi}$	M2	M1 for any one of the following: • $1.75 = \pi \times$ diameter • $1.75 = 2 \times \pi \times$ radius (Note: radius = $\frac{7}{8\pi}$ m, radius ≈ 0.28m)
(Area of cross section =) $\pi \times (1.75 \div 2\pi)^2$	M1	FT for 'their derived radius' provided it is from a calculation involving the use of π (Note: area of cross section = $\frac{49}{64\pi}$ m^2 area of cross section ≈ 0.24 m^2)
$\times 17 \div 2$	m1	FT provided previous M1awarded
(Volume) answer in the range 2.07 (m^3) to 2.15 (m^3)	A1	CAO, accept an answer of 2 (m^3) from correct working without sight of premature approximation leading to an answer outside the range

End of solutions