REVISE
.wales

3.14 — Pythagoras in 2D & 3D

Mark schemes for the 3.14 question pack

Spec 3.7.1, 3.7.2 — Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 10 questions in the corresponding revise.wales question pack (42 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

4.	$16{\cdot}9^2 = 6{\cdot}5^2 + MN^2$ or equivalent. $(MN^2) = 243{\cdot}36$ or $(MN) = \sqrt{243{\cdot}36}$ $(MN =)$ 15·6(cm)		M1 A1 A1	Allow M1 for $16{\cdot}9^2 - 6{\cdot}5^2$. C.A.O.

8. AB or AC = 2.5 ÷ cos52° OR AB or AC = 2.5 ÷ sin38° OR AB or AC = 4(.06067… m)	M2	M1 for any of the following • cos52° = 2.5/ AB • cos52° = 2.5/ AC • sin38° = 2.5/AB • sin38° = 2.5/AC • equivalent full method without AB or AC as the subject
Total length 2 × 4(.06067…) (+ 6)	m1	FT 'their derived AB or AC' provided M1 awarded
14(.12… metres)	A1	FT from M1, m1 previously awarded
Cost per metre is 410 ÷ 14(.12…)	m1	FT from 'their total length' for m1 only Depends on previous M1
(£)29(.03…)	A1	CAO, i.e. (£)29.(….) (Note: 410 ÷14 = £29(.285…) Accept an answer that would round to (£)29 from correct working

8. (Length of circular arc =) $\frac{20}{360} \times 2 \times \pi \times 10$	M1	Or equivalent
= 3·48(888…) to 3·5 (cm)	A1	(OR $10\pi/9$ or equivalent)
(Length^2 =) 4^2 + (3·48(888…) to 3·5)^2	M1	FT 'their derived 3·48…'
Length^2 = 28·1104 to 28·25 or (Length =) $\sqrt{}$(28·1104 to 28·25)	A1	
(Length =) 5·3 to 5·32 (cm)	A1	FT the square root of 'their 28·…' provided their answer is the longest length of their triangle. On FT, accept an answer that is correct to 1dp for 'their 3·48(888…)'.
(Total length of piping needed =) $\frac{360}{20}$ × (5·3 to 5·32)	M1	FT 'their 5·3…' provided previous M1 awarded.
= 95·4 to 95·8 (cm)	A1	

8.*(a)* $x = \sqrt{25^2 - 10^2}$	B1	
8.*(b)* $\sin 40° = \frac{y}{25}$	B1	

		for a partial attempt.
14. Sight of 22(cm) OR $\sqrt[3]{10648}$ (cm) $\sqrt{(22^2+22^2+22^2)}$ OR $\sqrt{(1452)}$	B1 M2	FT 'their 22' for M2. May be seen in stages. *(If the answer is completed in stages, then any arithmetic errors in intermediate answers can be ignored, allowing for a FT for the M marks).* M1 for $22^2+22^2+22^2$ (=1452)
= 38·1(…cm) OR $22\sqrt{3}$(cm) OR a value that rounds to 38·1(cm), e.g. 38·09(cm)	A1	CAO. Allow 38(cm) from correct working provided their answer would round to 38·1.

4. $(AC^2 =)\ 8^2 + 4{\cdot}5^2$ or equivalent $(AC =)\ \sqrt{8^2 + 4.5^2}$ or equivalent 9·1(7878…) (cm) ISW	M1 m1 A1	Check diagram. note: $(AC^2 =)\ 64 + 20{\cdot}25$. note: $(AC =)\ \sqrt{84{\cdot}25}$. FT √'their 84·25' for m1 only provided M1 gained. Accept the answer rounded or truncated to at least one decimal place. Final answer of • ***AC*** = 84·25 is M1m0A0.
4. Alternative method to find AC using Trig *A correct and complete method (using trigonometric relationships)* *9·1(7878…) (cm) ISW*	*M2* *A1*	 *Accept the answer rounded or truncated to at least one decimal place.*

10. $10.97^2 + (7.32 \div 2)^2$ OR $(7.32 \div 2)^2 + 2.44^2$ OR $2.44^2 + 10.97^2$ or $\sqrt{10.97^2 + (7.32 \div 2)^2}$ OR $\sqrt{(7.32 \div 2)^2 + 2.44^2}$ OR $\sqrt{2.44^2 + 10.97^2}$	M1	May be embedded within incorrect work and possibly in stages
(Distance from penalty spot to A =) $\sqrt{10.97^2 + (7.32 \div 2)^2 + 2.44^2}$	M2	May be seen in stages Implies previous M1 M1 for $10.97^2 + (7.32 \div 2)^2 + 2.44^2$
(Distance from penalty spot to A =) 11.82 (m) or an answer in the range 11.814 to 11.821 (m)	A1	Allow 11.8 or 11.81 (m) Needs to come from use of √139.5872 to √139.7332 if method done in stages with premature rounding

Unit 1: Higher Tier	Mark	Comments
9(a) Use of Volume = $\frac{\text{Mass}}{\text{Density}}$ (Maximum possible volume =) $\frac{155}{2.5}$ $= 62\ (\text{cm}^3)$	B1 M1 A1	FT 'their 155' provided $150 < \text{mass} \leq 160$ AND 'their 2.5' provided $2 \leq \text{density} < 3$ CAO If no marks awarded, SC1 for use of 155 AND 2.5
9(b)(i) Identification of correct right-angled triangle $(AD^2 =) 40^2 - (12-2)^2$ or $(AD^2 =) 40^2 - 10^2$ $AD^2 = 1500$ OR $(AD =) \sqrt{1500}$ AND $(AD =)\ 10\sqrt{15}$ (cm)	B1 M1 A1	May be implied by sight of 40 AND (12 – 2) or 10 in working Sight of $AD^2 = 1500$ OR $(AD =)\sqrt{1500}$ AND $10\sqrt{15}$ need to be seen
9(b)(ii) (Total arc length =) $\frac{150}{360} \times 2 \times \pi \times 2$ + $\frac{210}{360} \times 2 \times \pi \times 12$ (= 5π/3 or $1^2/_3\pi$) (= 14π or 42π/3) $= 15\frac{2}{3}\pi$ or $\frac{5640\pi}{360}$ or $\frac{47\pi}{3}$ (cm) or equivalent (Total length of chain =) $20\sqrt{15} + \frac{5640\pi}{360}$ (cm) or equivalent	M2 A2 B1	Allow values of π from 3.14 to 3.142 for M marks only Or equivalent M1 for $\frac{150}{360} \times 2 \times \pi \times 2$ OR $\frac{210}{360} \times 2 \times \pi \times 12$ or equivalents CAO. Allow 15.66π, 15.67π or 15.7π A1 for any one of the following: • AB = 600π/360 or equivalent (= 5π/3 or $1^2/_3\pi$), allowing 1.66π, 1.67π or 1.7π • CD = 5040π/360 or equivalent (=14π or 42π/3) • On FT from M1 for a correct evaluation of 'their $\frac{150}{360}\times2\times\pi\times2$ + $\frac{210}{360}\times2\times\pi\times12$' with 1 correct term, accepting similar notation possibilities as A2 ISW Accept use of $15\frac{2}{3}\pi$ Allow use of 15.66π, 15.67π or 15.7π FT 'their 5640π/360' provided at least 2 marks previously awarded If no marks awarded, and from using π × radius in their calculations, i.e. using the method $2\times10\sqrt{15} + \frac{150}{360}\times\pi\times2 + \frac{210}{360}\times\pi\times12$ SC3 for an answer of $20\sqrt{15} + \frac{5640\pi}{720}$ (cm) or equivalent, allowing use of 7.83(…)π OR SC2 for … + $\frac{5640\pi}{720}$ (cm) or equivalent, allowing use of 7.83(…)π OR SC1 for use of $2\times10\sqrt{15} + \frac{150}{360}\times\pi\times2 + \frac{210}{360}\times\pi\times12$

5. Strategy of attempting to use the cosine rule followed by sine rule (Length of pipe from new house 1 =)	S1	

End of solutions