

REVISE

.wales

F3.04 – Pythagoras' theorem in 2-D

Mark schemes for the F3.04 question pack

Spec 3.7.1 – Unit 3

SOLUTIONS · 2025 SPECIFICATION

Mark schemes for the 8 questions in the corresponding revise.wales question pack (26 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.

11.(b)		D2	D1101 14°3 OR 14°2(.....)
12. $3x - 2 + 2x + 1 + 5x - 9 = 180$ $10x = 190$ $x = 19$	✓ ✓ ✓	M1 A1 A1	F.T. from $ax = b$. Allow all 3 marks for $x = 19$.
Substituting $x = 19$ into at least one expression. $(3x - 2 =) 55(^{\circ})$ $(2x + 1 =) 39(^{\circ})$ $(5x - 9 =) 86(^{\circ})$ (So not a right-angled triangle)	✓ ✓	M1 A1	If $x \neq 19$ F.T. 'their <u>derived</u> value of x '. F.T. for this A1 if $x \geq 2$. Any two of these expressions correctly evaluated with no incorrect evaluation, provided the sum of the two found is ≥ 90 . (Statement not required)

		Mark final answer.
14.	$16 \cdot 9^2 = 6 \cdot 5^2 + MN^2$ or equivalent. $(MN^2) = 243 \cdot 36$ or $(MN) = \sqrt{243 \cdot 36}$	M1 A1 A1
		Allow M1 for $16 \cdot 9^2 - 6 \cdot 5^2$.

14.(b)	9.6	B2	Mark final answer. B1 for sight of 3.2.
15.	$(QR^2 =) 1.41^2 + 0.89^2$ $(QR^2) = 2.78(02)$ or $(QR) = \sqrt{2.78(02)}$ $(QR =) 1.66(\dots)(m)$ or $1.67 (m)$ or $1.7(m)$ OR $166.7(\dots) \text{ cm}$ or 167cm	M1 A1 A1	Allow 2.8 for 2.78. FT from M1 for the correctly evaluated square root of 'their 2.78(02)' provided their answer > 1.41 Allow working in centimetres but penalise -1 from any A marks gained if units not shown for final answer e.g. $QR^2 = 27802 (A1)$, $QR = 166.74 (A1)$ then -1 BUT $QR = 166.74 \text{ cm}$ OR 167 cm is M1A1A1.
<u>Alternative method.</u> Correct use of 'two-step' trigonometric relationship. $(QR =) 1.66(\dots)(m)$ or $1.67 (m)$ or $1.7(m)$ OR $166.7(\dots) \text{ cm}$ or 167cm		M2 A1	A partial trigonometric method is M0. C.A.O.

<p>10. Intent to square at least two of the three values.</p> <p>Comparing $(25.6)^2$ with $(12.8)^2 + (22.7)^2$ or Any intent to compare any other relevant values. (e.g. $(25.6)^2 - (22.7)^2$ with $(12.8)^2$ or $\sqrt{[(12.8)^2 + (22.7)^2]}$ (with 25.6))</p> <p>Correct evaluation of value(s) to be compared. (e.g 'sight of 655.36 WITH 679.13' or 'sight of 140.07 WITH 163.84' or 'sight of 26.06 (WITH 25.6)')</p> <p>Statement that it is NOT possible</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>(Note: $12.8^2 = 163.84$, $22.7^2 = 515.29$ and $25.6^2 = 655.36$)</p> <p>The comparison attempted must show <u>both</u> intended calculations e.g. $(25.6)^2$ AND $(12.8)^2 + (22.7)^2$ unless intention is to compare with a given side e.g. $\sqrt{[(12.8)^2 + (22.7)^2]}$ with 25.6</p> <p>C.A.O. but allow evaluated answers to be given to the nearest whole number. e.g. 655 WITH 679.</p> <p>Allow FT if M1 awarded. If all marks gained ISW.</p>																																			
<p>10. <u>Alternative method 1</u> Intent to use two right-angled trig ratios using 2 different pairs of given sides</p> <p>Correct right-angled trig ratio used twice, using 2 different given sides, in order to compare</p> <ul style="list-style-type: none"> the values of the same angle or the sum of the two angles with 90°. <p>Correct evaluation of value(s) to be compared. e.g. sight of any two of 30°, $27.5\dots^\circ$ and $29.4\dots^\circ$ OR sight of 30° and $60.58\dots^\circ$ (and the sum to be compared with 90°)</p> <p>Statement that it is NOT possible</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>i.e. In order to find the value of either the same angle OR two different angles, whilst sufficient to show that it isn't a right-angled triangle.</p> <p>CAO</p> <table border="1" data-bbox="879 880 1385 1081"> <thead> <tr> <th>Ratio</th> <th>Opp</th> <th>Adj</th> <th>Hyp</th> <th>Angle</th> </tr> </thead> <tbody> <tr> <td>Sin</td> <td>12.8</td> <td></td> <td>25.6</td> <td>30°</td> </tr> <tr> <td>Cos</td> <td></td> <td>22.7</td> <td>25.6</td> <td>$27.5\dots^\circ$</td> </tr> <tr> <td>Tan</td> <td>12.8</td> <td>22.7</td> <td></td> <td>$29.4\dots^\circ$</td> </tr> <tr> <td>Sin</td> <td>22.7</td> <td></td> <td>25.6</td> <td>$62.46\dots^\circ$</td> </tr> <tr> <td>Cos</td> <td></td> <td>12.8</td> <td>25.6</td> <td>60°</td> </tr> <tr> <td>Tan</td> <td>22.7</td> <td>12.8</td> <td></td> <td>$60.58\dots^\circ$</td> </tr> </tbody> </table> <p>If comparing the sum of two angles (with 90°), the sum must be shown. Allow FT if M1 awarded. If all marks gained ISW.</p>	Ratio	Opp	Adj	Hyp	Angle	Sin	12.8		25.6	30°	Cos		22.7	25.6	$27.5\dots^\circ$	Tan	12.8	22.7		$29.4\dots^\circ$	Sin	22.7		25.6	$62.46\dots^\circ$	Cos		12.8	25.6	60°	Tan	22.7	12.8		$60.58\dots^\circ$
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<p>10. <u>Alternative method 2</u> (using the cosine rule)</p> <p>$(\cos A =) (12.8^2 + 22.7^2 - 25.6^2) / (2 \times 12.8 \times 22.7)$ (= 2377/58112 or 0.0409..)</p> <p>(A =) $87.6557\dots^\circ$</p> <p>Statement that it is NOT possible</p>	<p>M2</p> <p>A1</p> <p>A1</p>	<p><u>NOTE</u> The cosine rule is not on the intermediate tier specification, but as it is a common question, it may be seen by Higher tier candidates.</p> <p>M1 for $25.6^2 = 12.8^2 + 22.7^2 - 2 \times 12.8 \times 22.7 \times \cos A$</p> <p>If all marks gained ISW.</p>																																			

200		Penalise incorrect notation –1. e.g. '56 in 200'.
14.	$\sin(QPR) = \frac{9.6}{16.7}$ $(QPR =) \sin^{-1}(9.6/16.7)$ or $\sin^{-1}(0.57..)$ $= 35.1(^{\circ})$ or $35.09(^{\circ})$ or $35.089(...^{\circ})$	M1 m1 A1 Implies M1. Allow any answer that rounds to $35(^{\circ})$
14. <u>Alternative method.</u> Correct use of 'two-step' method. $(QPR =) \sin^{-1}(9.6/16.7) = 35.1(^{\circ})$ or $35.09(^{\circ})$ or $35.089(...^{\circ})$		M2 A1 A partial trigonometric method is M0. Allow any answer that rounds to $35(^{\circ})$

<p>13. $5x - 17 + 2x + 9 + x + 20 = 180$ $8x = 168$ $x = 21$</p> <p>Substituting $x = 21$ into at least one expression. $(5x - 17 =) 88(^{\circ})$ $(2x + 9 =) 51(^{\circ})$ $(x + 20 =) 41(^{\circ})$ (So not a right-angled triangle)</p>	<p>M1 A1 A1</p> <p>M1 A1</p>	<p>F.T. from $ax = b$. Allow all 3 marks for $x = 21$.</p> <p>If $x \neq 21$ FT 'their <u>derived</u> value of x'. F.T. for this A1 if $x \geq 4$. Any two of these expressions correctly evaluated with no incorrect evaluation, provided the sum of the two found is > 90. (statement not required). <u>Note</u> If further work indicates that the values found are not treated as angles (e.g. showing $51^2 + 41^2 \neq 88^2$) then award final MOA0.</p>
<p><u>Alternative method</u> $5x - 17 = 90$ OR $2x + 9 = 90$ OR $x + 20 = 90$ $x = 21.4$ AND $x = 40.5$ AND $x = 70$</p> <p>Then verifying: If $x = 21.4$: $5x - 17 + 2x + 9 + x + 20 = 183.2$ AND If $x = 40.5$: $5x - 17 + 2x + 9 + x + 20 = 336$ AND If $x = 70$: $5x - 17 + 2x + 9 + x + 20 = 572$ (So not a right-angled triangle)</p>	<p>M1 A2</p> <p>A2</p>	<p>Award A1 for any one of these: $x = 21.4$ OR $x = 40.5$ OR $x = 70$</p> <p>Award A1 for any one of these: If $x = 21.4$: $5x - 17 + 2x + 9 + x + 20 = 183.2$ OR If $x = 40.5$: $5x - 17 + 2x + 9 + x + 20 = 336$ OR If $x = 70$: $5x - 17 + 2x + 9 + x + 20 = 572$</p>
<p>14. $(AB =) 13.8 \times \cos 41$ OR $13.8 \times \sin 49$ $= 10.4(\dots)$ (cm)</p>	<p>M2 A1</p>	<p>M1 for $\cos 41 = \frac{AB}{13.8}$ OR $\sin 49 = \frac{AB}{13.8}$</p>
<p><u>Alternative method:</u> Correct use of 'two-step' method. $(AB) = 10.4(\dots)$(cm)</p>	<p>M2 A1</p>	<p>A partial trigonometric method is M0. Accept an answer that rounds to 10.4(cm)</p>
<p>15.a(i) $x^3 + 7x$</p>	<p>B2</p>	<p>B1 for sight of $x^3 + \dots$ OR $\dots + 7x$. Do not accept $x \times x \times x + x \times 7$ etc. Mark final answer.</p>
<p>15(a)(ii) $3x^2 - 4x - 15x + 20$ $3x^2 - 19x + 20$</p>	<p>B1 B1</p>	<p>Must be an expression. FT from an error in only one term (out of 4) only if of the form $ax^2 \pm bx \pm cx \pm d$.</p>
<p>15.(b)(i) $5n - 27 < n$ OR $n > 5n - 27$</p>	<p>B2</p>	<p>Allow B2 for an equivalent correct inequality. e.g. $4n - 27 < 0$. B1 if \leq or \geq used in a 'correct' inequality. OR B1 for $5n - 27 > n$ OR $n < 5n - 27$</p>
<p>15.(b)(ii) $4n < 27$ $n < \frac{27}{4}$ (Greatest number of clocks =) 6</p>	<p>B1 B1 B1</p>	<p>FT 'their inequality' if of equivalent difficulty. FT only from an $< b$ OR an $\leq b$ OR an $> b$ OR an $\geq b$. FT only from $n < c$ where c is positive OR $n \leq d$ where d is positive and not an integer An answer of 6 gains all 3 marks.</p>

<p>11. (Smallest number = $\frac{2}{5} \times 200 = 120$)</p> <p>(Largest number = $120 + 4 = 124$)</p> <p>The three numbers are) 120, 122, 124</p>	<p>B3</p>	<p>Award B2 for a final answer of <u>three</u> numbers which satisfies the following conditions:</p> <ul style="list-style-type: none"> • the three numbers are different • the three numbers are even • the range of the three numbers is 4 • the smallest number is greater than or equal to 40. <p>Award B1 for sight of 120 or a final answer of three different numbers with a range of 4.</p>
<p>Organisation and Communication.</p>	<p>OC1</p>	<p>For OC1, candidates will be expected to:</p> <ul style="list-style-type: none"> • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
<p>Accuracy of writing.</p>	<p>W1</p>	<p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working

20.(a) $5(\cdot 0) \times 10^6$	B2	Mark final answer. Award B1 for one of the following: <ul style="list-style-type: none"> • sight of 0.5×10^7 • sight of 5 000 000 • equivalent correct value but not in standard form • sight of 30 000 AND 0.006 • 5×10^n ($n \geq 3$, but not 6), following one place value error in one of the given numbers.
20.(b) $4.795(0) \times 10^4$	B2	Mark final answer. B1 for one of the following: <ul style="list-style-type: none"> • sight of $479.5(0) \times 10^2$ • $4.8(0) \times 10^4$ • sight of 47 950 • equivalent correct value but not in standard form • sight of 47800 AND 150 • 'their 47 950' is written correctly in standard form, following one place value error in one of the given numbers or in the addition of 47800 AND 150.
21.(a) $x = \sqrt{25^2 - 10^2}$	B1	
21. (b) $\sin 40^\circ = \frac{y}{25}$	B1	