

# REVISE

.wales

## 2.05 – Surds

*Mark schemes for the 2.05 question pack*

*Spec 1.9.4, 1.9.5, 1.9.7 – Unit 2*

SOLUTIONS · 2025 SPECIFICATION

*Mark schemes for the 11 questions in the corresponding revise.wales question pack (47 marks total). Sources: legacy WJEC GCSE papers, WJEC SAM, and custom-authored mark schemes. Pack layout © revise.wales.*

17.	$(5\sqrt{3})^2 = 25 \times 3 (= 75)$	✓	B1	For first three marks, accept a correct product of integers in each case, e.g. $2 \times 2 \times 2 (=8)$ .
	$\frac{2\sqrt{18}}{\sqrt{2}} = 2 \times \sqrt{9} (= 2 \times 3 = 6)$	✓	B1	
	$\sqrt{32} \times \sqrt{2} = \sqrt{64} (= 8)$	✓	B1	
	(Answer =) $69/8$ or equivalent.	✓	B1	C.A.O. Equivalent answer must be simplified. So B0 for $(75 - 6) / 8$ . ISW.
	Rational	✓	B1	F.T. 'their final answer' provided at least 2 out of first 3 B1s are awarded.

15. (a) $x = 0.37777\dots$ $10x = 3.7777\dots$ <u>with</u> an attempt to subtract $34/90$ or $17/45$ or equivalent e.g. $374/990$	M1 A1	Or $10x$ and $100x$ , or equivalent. Or an alternative method. An answer of $3.4/9$ gains M1 only. Mark final answer. Do not ignore incorrect cancelling.
<u>Alternative method</u> $0.3 + 0.07777\dots = 3/10 + 7/90$ or equivalent  $34/90$ or $17/45$ or equivalent	M1 A1	Mark final answer. Do not ignore incorrect cancelling.
15. (b) (i) $\sqrt{8}\sqrt{8} - \sqrt{8}\sqrt{2} - \sqrt{8}\sqrt{2} + \sqrt{2}\sqrt{2}$ or $\sqrt{64} - \sqrt{8}\sqrt{2} - \sqrt{8}\sqrt{2} + \sqrt{4}$ or equivalent $(= 8 - 4 - 4 + 2)$  $= 2$	M1 A1	Mark final answer.  If no marks, award SC1 for 3 correctly evaluated terms.
<u>Alternative method:</u> $(2\sqrt{2} - \sqrt{2})^2$  $= 2$	M1 A1	An answer of $(\sqrt{2})^2$ gains M1A0 only Mark final answer.
15. (b) (ii) $2\sqrt{10}$	B2	B1 for $\sqrt{40}$ or $\sqrt{2} \times 2\sqrt{5}$ or $2 \times \sqrt{30} / \sqrt{3}$
15. (c) $1/64$	B2	B1 for $64^{-1}$ or $1/4^3$ or $(1/4)^3$ or $1/\sqrt{4096}$ or $1/4096^{1/2}$ or $(1/4096)^{1/2}$ or $\sqrt{(1/4096)}$  or SC1 for $-1/64$  Allow $\pm 1/64$ for B2

10. Lines $x = -2$ , $y + x = 1$ and $2y = x$ all correct.  Correct region identified.	B2  B1	<del>Incorrect algebra work.</del> B1 for any 2 correct lines. If $x = -2$ and any other vertical or horizontal line shown e.g. $y = \pm 2$ or $x = 2$ , do not award a mark unless $x = -2$ is selected for the region or clearly labelled.  FT provided region is closed and B1 awarded. Accept indication by 'shading out'.
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<p>14.(a) <math>x = 0.4757575\dots</math> <math>100x = 47.5757575\dots</math> <u>with an attempt to subtract</u></p> <p style="text-align: center;"><math>471/990</math> or <math>157/330</math> ISW</p>	<p>M1</p> <p>A1</p>	<p>Or correct values <math>1000x</math> and <math>10x</math>, or equivalent. M0 for use of <math>x = 0.475475475\dots</math></p> <p>An answer of <math>47.1/99</math> gains M1 only.</p>
<p><u>Alternative method</u> (<math>0.4 + 0.07575\dots =</math>) <math>4/10 + 75/990</math> or equivalent <math>471/990</math> or equivalent ISW</p>	<p>M1</p> <p>A1</p>	
<p>14.(b) <math>\frac{1}{8}</math></p>	<p>B1</p>	
<p>15. <math>9 + 4\sqrt{5}</math></p> <p style="text-align: center;">(-) 2</p> <p style="text-align: center;"><math>7 + 4\sqrt{5}</math> AND irrational</p>	<p>B2</p> <p>B2</p> <p>B1</p>	<p>If not B2, award B1 for 3 or 4 correct terms within <math>4 + 2\sqrt{5} + 2\sqrt{5} + 5</math> or <math>4 + 2\sqrt{5} + 2\sqrt{5} + \sqrt{25}</math> (without subsequent correct collection of terms) (<math>4\sqrt{5}</math> is equivalent to 'two correct terms')</p> <p>B1 for (numerator of) <math>10\sqrt{5}</math> or B1 for (denominator of) <math>5\sqrt{5}</math> or <math>\sqrt{125}</math> or B1 for appropriate factorisation of both numerator and denominator e.g. <math>\frac{\sqrt{5} \times \sqrt{100}}{\sqrt{5} \times \sqrt{25}}</math> or <math>\frac{\sqrt{5} \times \sqrt{5} \times \sqrt{5} \times \sqrt{4}}{\sqrt{5} \times \sqrt{5} \times \sqrt{5}}</math></p> <p>Mark final answer. FT for equivalent difficulty (requiring collection of terms) AND either B2 awarded AND final answer is irrational.</p>
<p>16.(a) (Area=) <math>\frac{1}{2} \times 1 \times [16+0+2(15+12+7)]</math> or equivalent <math>= 42</math></p>	<p>M2</p> <p>A1</p>	<p>Award M1 if only one y-value incorrect.</p> <p>F.T. from M1.</p> <p>If no marks, SC1 for an answer of 420 (from mis-reading horizontal scale).</p>
<p><u>Alternative method</u> <math>\frac{(16+15)}{2} + \frac{(15+12)}{2} + \frac{(12+7)}{2} + \frac{(7+0)}{2}</math></p> <p style="text-align: center;"><math>= 42</math></p>	<p>M2</p> <p>A1</p>	<p>Individual areas are: 15.5, 13.5, 9.5, 3.5.</p> <p>M1 if only one y-value incorrect or M1 for any 2 (out of 4) correctly evaluated areas (of a complete 'strip').</p> <p>(Each area of a trapezium may be seen as the sum of the area of a rectangle and a triangle.)</p> <p>F.T. from M1 (provided 4 'strips' considered).</p> <p>If no marks, SC1 for an answer of 420 (from mis-reading horizontal scale).</p>
<p>16.(b) 'Greater than' WITH valid reason e.g. trapezium rule gives an underestimate in this case and increasing the number of strips improves accuracy; less (shaded area) left out; more of the area (under curve) included; tops of strips are closer to the curve.</p>	<p>E1</p>	<p>Allow e.g. increasing the number of strips improves accuracy.</p>



17. $\sqrt{20} = 2\sqrt{5}$ $(\sqrt{5})^3 = 5\sqrt{5}$ $(\frac{2\sqrt{5} + 5\sqrt{5} + 11\sqrt{5}}{3} = )$ $6\sqrt{5}$	B1 B1  B1	FT provided B1 already awarded AND provided all terms are of the form $a\sqrt{5}$ (and the answer is $b\sqrt{5}$ where b is an integer). $18\sqrt{5}$ (with no contradictory working) implies B2. $6\sqrt{5}$ (with no contradictory working) implies B3.
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<p>9(a)</p> $5 \times \frac{240}{100} \quad \text{or} \quad \times 2.4 \quad \text{or equivalent}$ $\times \frac{4}{3} \quad \text{or} \quad \times 1.333\dots \quad \text{or equivalent}$ <p style="text-align: right;">= 16 (delivery vans)</p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p><u>A table method altering all 3 in the same manner at the same time is M0</u></p> <p>M marks may be seen in either order e.g. <math>\frac{\text{Time}}{4} \quad \frac{\text{Houses}}{240} \quad \frac{\text{Vans}}{12}</math></p> <p>FT from M0 previously awarded Must be from use of 5 e.g. if this calculation is performed first <math>\frac{\text{Time}}{3} \quad \frac{\text{Houses}}{100} \quad \frac{\text{Vans}}{6.66\dots}</math></p> <p>CAO</p>								
<p>9(a) <u>Alternative method 1:</u></p> $\frac{100}{4 \times 5} \quad (=5 \text{ houses per hour per van})$ $\frac{240}{100 \div (4 \times 5) \times 3} \quad \text{or} \quad \frac{240}{5 \times 3}$ <p style="text-align: right;">= 16 (delivery vans)</p>	<p>M1</p> <p>m1</p> <p>A1</p>	<p>CAO</p>								
<p>9(a) <u>Alternative method 2:</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"><math>\frac{\text{Time}}{3}</math></td> <td style="text-align: center;"><math>\frac{\text{Houses}}{75}</math></td> <td style="text-align: center;"><math>\frac{\text{Vans}}{5}</math></td> <td style="text-align: center;">OR</td> </tr> <tr> <td style="text-align: center;">9.6 (or 9h36m)</td> <td style="text-align: center;">240</td> <td style="text-align: center;">5</td> <td></td> </tr> </table> $5 \times \frac{240}{75} \quad \text{OR} \quad 5 \times \frac{9.6}{3} \quad \text{or} \quad 5 \times 3.2 \quad \text{or equivalent}$ <p style="text-align: right;">= 16 (delivery vans)</p>	$\frac{\text{Time}}{3}$	$\frac{\text{Houses}}{75}$	$\frac{\text{Vans}}{5}$	OR	9.6 (or 9h36m)	240	5		<p>M1</p> <p>M1</p> <p>A1</p>	<p>FT from 3 (time), n houses, 5 vans for <math>5 \times \frac{240}{n}</math></p> <p>FT from n (time), 240 houses, 5 vans for <math>5 \times \frac{n}{3}</math></p> <p>CAO</p>
$\frac{\text{Time}}{3}$	$\frac{\text{Houses}}{75}$	$\frac{\text{Vans}}{5}$	OR							
9.6 (or 9h36m)	240	5								
<p>9(b)</p> <p>Sight of <math>\frac{\text{angle}}{360} \times \pi \times 3^2</math> or equivalent</p> $\frac{140 \times \pi \times 3^2}{360} + \frac{110 \times \pi \times 3^2}{360} + \frac{70 \times \pi \times 3^2}{360} \quad \text{or equivalent}$ <p style="text-align: center;">(7π/2)      (11π/4)      (7π/4)</p> $+ 3 \times 12 \times 3 + 22 \times 3$ <p style="text-align: right;">= 8π + 174 (cm<sup>2</sup>)</p>	<p>B1</p> <p>M2</p> <p>m1</p> <p>A2</p>	<p>Allow use of π = 3.14 to 3.142 for B and M marks, but not for A marks</p> <p>For any of the angles 140(°), 110(°), 70(°), 140+110+70 or 320</p> <p>e.g. <math>\frac{(140+110+70) \times \pi \times 3^2}{360}</math> or <math>\frac{320 \times \pi \times 3^2}{360}</math> or 8π</p> <p>M1 for the sum of any 2 correct terms OR M1 for <math>\frac{x}{360} \times \pi \times 3^2</math> where <math>300 \leq x &lt; 360</math> if 140+110+70 not seen</p> <p>The award of M2 or M1 implies the previous B1</p> <p>FT from M1</p> <p>CAO. Mark final answer A1 (does not depend on m1 being awarded) for any one of the following seen</p> <ul style="list-style-type: none"> <li>• <math>\frac{2880\pi}{360} + \dots</math> or equivalent</li> <li>• <math>7\pi/2 + 11\pi/4 + 7\pi/4 + \dots</math></li> <li>• <math>3.5\pi + 2.75\pi + 1.75\pi + \dots</math></li> <li>• 8π</li> </ul>								

9(c)	$\sqrt{9} \times \sqrt{5} + \sqrt{5}$	or	$3\sqrt{5} + \sqrt{5}$	M2	M1 for $\sqrt{45} + \sqrt{5}$ or M1 for sight of $3\sqrt{5}$
			$= 4\sqrt{5}$ (cm)	A1	CAO

<p>15. Formally identifying (in writing) two appropriate pairs of equal angles e.g. <math>BAC = DAE</math> and <math>BCA = DEA</math> (<math>CA = AE</math> given) or <math>BAC = 79^\circ</math> and <math>DEA = 27^\circ</math> (<math>CA = AE</math> given) <u>AND</u> Explanation that the triangles are congruent due to angle, side, angle or ASA or equivalent.</p>	<p>E2 (Check diagram) If all three angles are <u>used</u>, they must all be correct. For reference:</p> <table border="1" data-bbox="868 259 1337 403"> <tr> <td><math>BAC = DAE = 79^\circ</math> (vertically opposite angles)</td> </tr> <tr> <td><math>BCA = DEA = 27^\circ</math> (alternate angles)</td> </tr> <tr> <td><math>ABC = ADE = 74^\circ</math> (angles in a triangle with alternate angles)</td> </tr> </table> <p>Award E1 for one of the following:</p> <ul style="list-style-type: none"> <li>formally identifying at least one correct pair of angles <u>AND</u> explanation that the triangles are congruent due to angle, side, angle or ASA or equivalent.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>a correctly completed diagram (at least two pairs of angles) <u>AND</u> Explanation that the triangles are congruent due to angle, side, angle or ASA or equivalent.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>formally identifying (in writing) two pairs of matching angles (with no incorrect angles) e.g. <math>BAC = DAE</math> and <math>BCA = DEA</math> (<math>CA = AE</math> given) or <math>BAC = 79^\circ</math> and <math>DEA = 27^\circ</math> (<math>CA = AE</math> given)</li> </ul>	$BAC = DAE = 79^\circ$ (vertically opposite angles)	$BCA = DEA = 27^\circ$ (alternate angles)	$ABC = ADE = 74^\circ$ (angles in a triangle with alternate angles)
$BAC = DAE = 79^\circ$ (vertically opposite angles)				
$BCA = DEA = 27^\circ$ (alternate angles)				
$ABC = ADE = 74^\circ$ (angles in a triangle with alternate angles)				



<p>12. (Slant height of cone <math>= \sqrt{6^2 + 8^2}</math>)</p> <p style="text-align: center;"><math>= 10</math> (cm)</p> <p>(Curved surface area of cone <math>=</math>)</p> <p style="text-align: center;"><math>\pi \times 6 \times 10</math></p> <p style="text-align: center;"><math>= 60\pi</math> (cm<sup>2</sup>) or equivalent</p> <p style="text-align: center;"><math>(\pi r^2 = \pi \times 6 \times 10)</math></p> <p style="text-align: center;"><math>r^2 = 60</math> or <math>r = \sqrt{60}</math> or equivalent</p> <p style="text-align: center;"><math>(r =) 2\sqrt{15}</math></p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Method for finding hypotenuse. Accept use of (3,4,5) x 2.</p> <p>FT 'their derived slant height' (not 8). CAO [For reference, <math>60\pi = 188.4</math>] <math>60\pi</math> may be implied by later working (e.g. sight of <math>r^2 = 60</math>)</p> <p>For calculating the total surface area of the cone, award M1 A1 SC1 for an answer of <math>96\pi</math> (cm<sup>2</sup>) [= 301(.44)] (from including the area of the base of the cone)</p> <p>Isolating <math>r^2</math> or <math>r</math>. FT for 'their <math>r^2 = 60</math>' or 'their <math>r = \sqrt{60}</math>' from <math>\pi r^2 =</math> 'their <math>60\pi</math>'</p> <p>FT from <math>r^2 = k</math>, provided equivalent difficulty (with <math>r</math> in the form <math>a\sqrt{b}</math>, where <math>a</math> and <math>b</math> are integers, and <math>b</math> is as small as possible).</p> <p>SC1 for <math>r = \sqrt{6L}</math> (where <math>L =</math> slant height)</p> <p>Note: after M0A0M0A0 for use of 8 as the slant height <math>r^2 = 48</math> or <math>r = \sqrt{48}</math> M1 <math>(r =) 4\sqrt{3}</math> A1</p>
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