



Trial Examination 2021

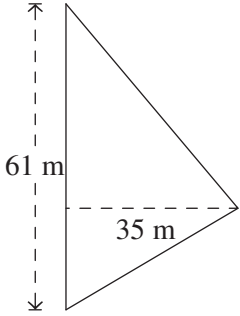
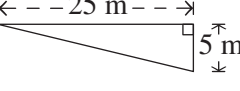
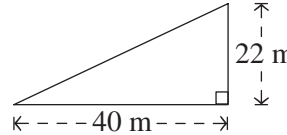
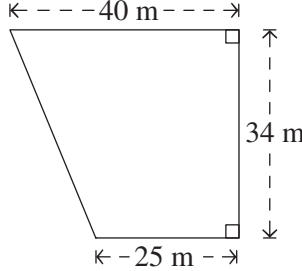
HSC Year 12 Mathematics Standard 2

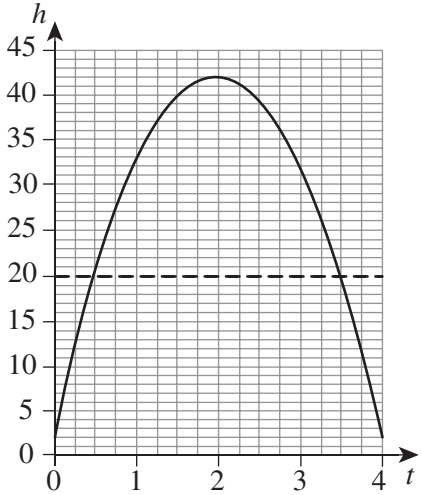
Solutions and marking guidelines

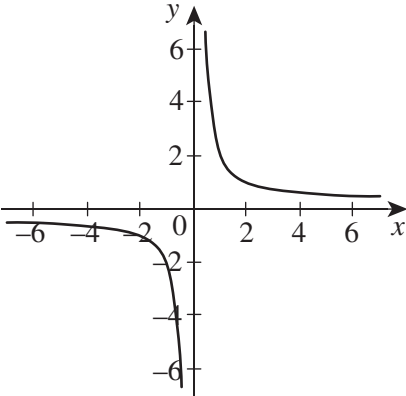
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SECTION I

Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 1 D</p> <p>Using the unitary method gives:</p> $\frac{389}{1.1} = 353.6363\dots$ $\approx \$354$	<p>MS-F1 Money Matters MS11-5 Bands 2-3</p>
<p>Question 2 B</p> <p>There are four vertices of odd degree.</p>	<p>MS-N2 Network Concepts MS2-12-8 Bands 1-2</p>
<p>Question 3 D</p> <p>D is correct. The graph represents scores with a z-score greater than -2 and a percentage of 97.5%. A is incorrect. This graph represents scores with a z-score less than -2 and scores with a z-score greater than 2. B is incorrect. This graph represents scores with a z-score less than 0. C is incorrect. This graph represents scores with a z-score between -1 and -2.</p>	<p>MS-S5 The Normal Distribution MS2-12-7 Bands 2-3</p>
<p>Question 4 B</p> $\cos \theta = \frac{48^2 + 65^2 - 89^2}{2 \times 48 \times 65}$ $\theta = \cos^{-1} \left(\frac{48^2 + 65^2 - 89^2}{2 \times 48 \times 65} \right)$ $= 102.8898\dots$ $\approx 102^\circ 53'$	<p>MS-M6 Non-right-angled Trigonometry MS2-12-4 Bands 3-4</p>

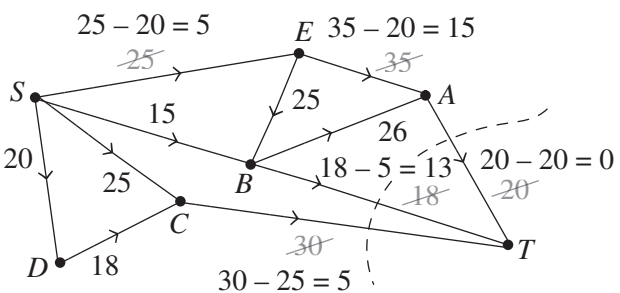
Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 5 A</p> $AC = 5 + 14 + 20 + 22$ $= 61 \text{ m}$ <p>triangle 1 = $\frac{1}{2} \times 61 \times 35$</p> $= 1067.5 \text{ m}^2$  <p>triangle 2 = $\frac{1}{2} \times 25 \times 5$</p> $= 62.5 \text{ m}^2$  <p>triangle 3 = $\frac{1}{2} \times 40 \times 22$</p> $= 440 \text{ m}^2$  <p>trapezium = $\frac{34}{2} \times (25 + 40)$</p> $= 1105 \text{ m}^2$  <p>Therefore, the total area of the field $ABCDE$ is 2675 m^2 ($1067.5 + 62.5 + 440 + 1105$).</p>	<p>MS–M1 Applications of Measurement MS11–3 Bands 2–3</p>
<p>Question 6 C</p> $100 \text{ m} = \frac{100}{1000}$ $= 0.1 \text{ km}$ $1 \text{ hour} = 60 \times 60$ $= 3600 \text{ seconds}$ $\frac{0.1}{9.58} \times 3600 = 37.5782 \dots$ $\approx 37.6 \text{ km/h}$	<p>MS–M7 Rates and Ratios MS2–12–3 Bands 2–3</p>
<p>Question 7 C</p> <p>C is correct. It is both a spanning tree and a path for the network diagram. All vertices can be visited once on the walk A to E. A and B are incorrect. They are not spanning trees as they each have a cycle. D is incorrect. It is a spanning tree but not a path.</p>	<p>MS–N2 Network Concepts MS2–12–8 Bands 2–3</p>

Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 8 B</p> $\text{market price per share} = \frac{25200}{1400}$ $= \$18$ <p>dividend per share = \$1.35</p> $\text{dividend yield per share} = \frac{\text{dividend per share}}{\text{market price per share}} \times 100$ $= \frac{1.35}{18} \times 100$ $= 7.5\%$	<p>MS–F4 Investments and Loans MS2–12–5 Bands 3–4</p>
<p>Question 9 C</p>  <p>Reading from the graph, the ball is approximately 20 metres above the ground at 0.5 seconds and 3.5 seconds</p>	<p>MS–A4 Types of Relationships MS2–12–6 Band 3–4</p>
<p>Question 10 D</p> <p>City X is located 40° to the South of 38°N. latitude = $38^\circ\text{N} - 40^\circ$ = 2°S</p> <p>City X is located 50° to the East of 122°W. longitude = $122^\circ\text{W} - 50^\circ$ = 72°W</p> <p>Therefore, the coordinates of City X are $(2^\circ\text{S}, 72^\circ\text{W})$.</p>	<p>MS–M2 Working with Time MS11–3 Bands 3–4</p>
<p>Question 11 C</p> $\text{combinations} = 26 \times 26 \times 10 \times 1$ $= 26^2 \times 10$	<p>MS–S2 Relative Frequency and Probability MS11–8 Bands 4–5</p>
<p>Question 12 C</p> <p>profit or loss = sold price less cost price</p> $= (x - 25) - (x + 15)$ $= x - 25 - x - 15$ $= -40$ <p>Therefore, Hana made a loss of \$40.</p>	<p>MS–A4 Types of Relationships MS2–12–6 Bands 4–5</p>

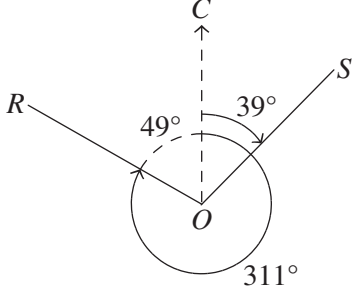
Answer and explanation	Syllabus content, outcomes and targeted performance bands
<p>Question 13 A deposit = 0.2×1480 = \$296 balance borrowed = $1480 - 296$ = \$1184 interest = $1184 \times 12\% \times 2$ = \$284.16 total loan to be repaid = $1184 + 284.16$ = \$1468.16 fortnightly repayment = $\frac{1468.16}{2 \times 26}$ = \$28.23</p>	<p>MS–F3 Depreciation and Loans MS1–12-5 Bands 4–5</p>
<p>Question 14 A $y = \frac{2}{x}$ is a hyperbola and passes through (2, 1).</p> 	<p>MS–A4 Types of Relationships MS2–12-6 Bands 4–5</p>
<p>Question 15 B $V = \frac{k}{P}$, where V is volume and P is pressure. Let $P = 3$ and constant $k = 3$. $V = \frac{3}{3}$ = 1 If P is tripled, this gives: $V = \frac{3}{9}$ = $\frac{1}{3}$ Therefore, V is one-third of the original volume (that is, the original volume is divided by 3).</p>	<p>MS–A4 Types of Relationships MS2–12-6 Band 5–6</p>

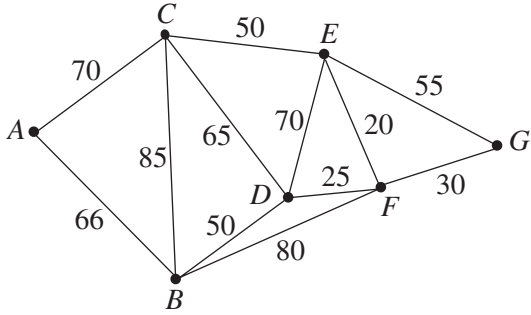
SECTION II

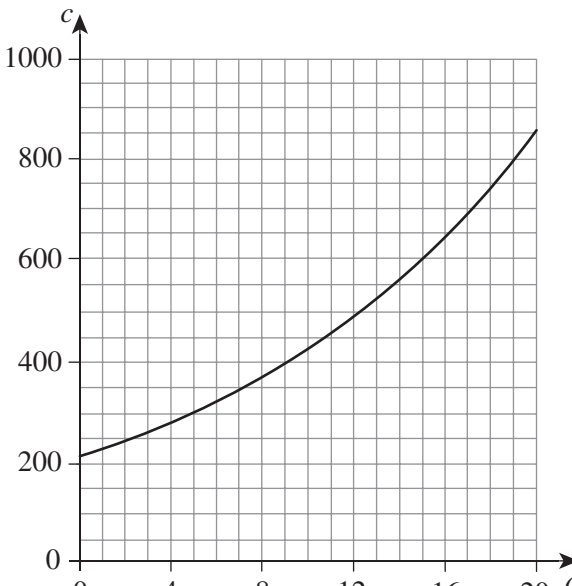
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 16	
$\frac{y}{3} - 13 = 8$ $\frac{y}{3} = 8 + 13$ $\frac{y}{3} = 21$ $y = 63$	MS–A1 Formulae and Equations MS11–1 Bands 1–2 • Gives the correct solution 1
Question 17	
$r = \frac{15}{2}$ $= 7.5 \text{ cm}$ $V = \frac{4}{3} \times \pi \times 7.5^3$ $= 1767.1458 \dots$ $\approx 1770 \text{ cm}^3$	MS–M1 Applications of Measurement MS11–4 Bands 2–3 • Shows correct substitution AND gives the correct solution 2 <hr/> • Makes significant progress 1
Question 18	
(a) $80 \times 250 = 20\,000 \text{ mm}$ $= 20 \text{ metres}$	MS–M5 Scale Drawings MS1–12–3 Bands 2–3 • Gives the correct solution 1
(b) $\frac{130}{250} = 0.52 \text{ cm}$ $0.52 \text{ cm} \times 10 = 5.2 \text{ mm}$ Therefore, the dimensions are $5.2 \text{ mm} \times 5.2 \text{ mm}$.	MS–M5 Scale Drawings MS1–12–3 Bands 3–4 • Gives the correct solution 1
Question 19	
(a) $7:30 \text{ pm} - 11:30 \text{ pm} = 4 \text{ hours}$ $\text{BAC}_{\text{male}} = \frac{10 \times (3 \times 1.6 + 0.8) - (7.5 \times 4)}{6.8 \times 78}$ $= 0.0490 \dots$ ≈ 0.049	MS–A1 Formulae and Equations MS11–1 Bands 3–4 • Shows correct substitution AND gives the correct solution 2 <hr/> • Shows substitution with ONE error (such as incorrect calculation of the number of standard drinks) . . 1
(b) $\text{time} = \frac{0.049}{0.0015}$ $= 3.26 \text{ hours}$ $= 3 \text{ hours and } 16 \text{ minutes}$	MS–A1 Formulae and Equations MS11–1 Bands 3–4 • Shows correct substitution AND gives the correct solution 2 <hr/> • Shows substitution with ONE error 1

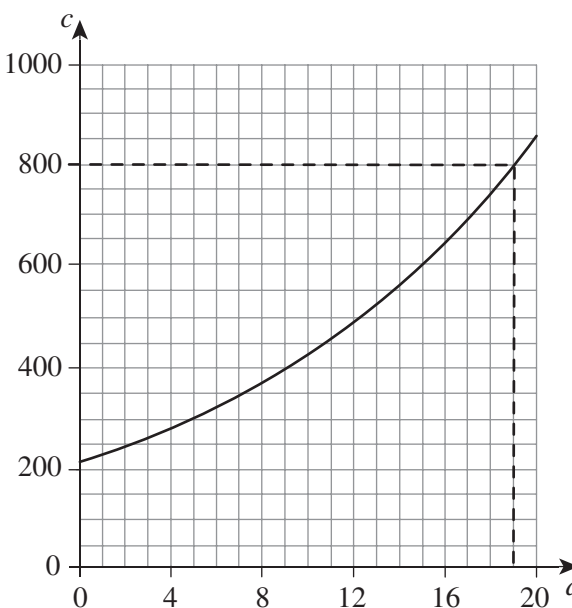
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 20	
(a) $30 + 18 + 20 = 68$	MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3 • Gives the correct solution 1
(b) The flows that give a maximum are as follows. <ul style="list-style-type: none"> • <i>SEAT</i>: 20 • <i>SEBT</i>: 5 (Since <i>SE</i> is $25 - 20 = 5$ from path <i>SEAT</i>.) • <i>SBT</i>: 13 (Since <i>BT</i> is $18 - 5 = 13$ from path <i>SEBT</i>.) • <i>SCT</i>: 25 • <i>SDCT</i>: 5 (Since <i>CT</i> is $30 - 25 = 5$ from path <i>SCT</i>) $20 + 5 + 13 + 25 + 5 = 68$ Therefore, the maximum flow is equal to the minimum cut. Note: <i>SEBAT</i> and <i>SBAT</i> are not considered as they contain an edge with a flow of zero (<i>AT</i>). 	MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3 • Gives the correct solution AND justification 2 • Shows some understanding of the problem 1
(c) possible outflow at <i>B</i> = $26 + 18 = 44$ inflow at <i>B</i> = $15 + 25 = 40$ Therefore, the outflow at <i>B</i> is 40 (the maximum outflow of the vertex is the smaller of the inflow or outflow of the vertex).	MS–N3 Critical Path Analysis MS2–12–8 Bands 3–4 • Gives the correct solution 1
Question 21	
(a) $\frac{21}{365} = 0.0575 \dots$ $\approx 0.058\%$	MS–F4 Investments and Loans MS2–12–5 Bands 2–3 • Gives the correct solution 1

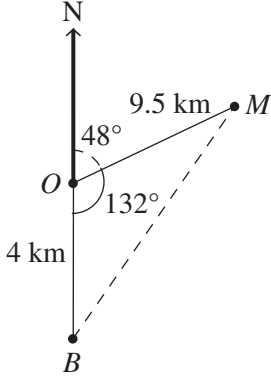
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(b) $13 \text{ Jan} - 9 \text{ Feb} = (31 - 13 + 1) + 9$ $= 28 \text{ days}$ $18 \text{ Jan} - 9 \text{ Feb} = (31 - 18 + 1) + 9$ $= 23 \text{ days}$ total interest $= (30 \times 28 \times 0.058\%) + (89 \times 23 \times 0.058\%)$ $= 0.4872 + 1.18726$ $= 1.67446$ $\approx \\$1.67$</p>	<p>MS-F4 Investments and Loans MS2-12-5 Bands 3-4</p> <ul style="list-style-type: none"> • Gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Makes significant progress with ONE error 1
Question 22	
<p>$A = \pi \times d \times h$ $= \pi \times 9 \times 4$ $= 113.0973 \dots$ $\approx 113 \text{ cm}^2$</p>	<p>MS-M1 Applications of Measurement MS11-3 Bands 2-3</p> <ul style="list-style-type: none"> • Shows correct substitution AND gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Makes significant progress with ONE error OR incorrect rounding . . 1
Question 23	
<p>(a) $P = 3x + 4y + x + 30$ $= 4x + 4y + 30$</p>	<p>MS-A1 Formulae and Equations MS11-1 Bands 4-5</p> <ul style="list-style-type: none"> • Gives the correct solution 1
<p>(b) Substituting $P = 102$ into the perimeter equation from part (a) gives: $3x + 4y + x + 30 = 102$ $3x + 4y + x = 102 - 30$ $4x + 4y = 72$ $4(x + y) = 72$ ← factorise $x + y = \frac{72}{4}$ ← solve $x + y = 18$ $y = 18 - x$</p>	<p>MS-A1 Formulae and Equations MS11-1 Bands 5-6</p> <ul style="list-style-type: none"> • Shows correct substitution AND gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Makes some progress substituting $P = 102$ into the perimeter equation 1
Question 24	
<p>(a)</p>	<p>MS-S2 Relative Frequency and Probability MS11-8 Bands 3-4</p> <ul style="list-style-type: none"> • Writes the correct probability on each branch 2 <hr/> <ul style="list-style-type: none"> • Completes diagram with ONE error 1

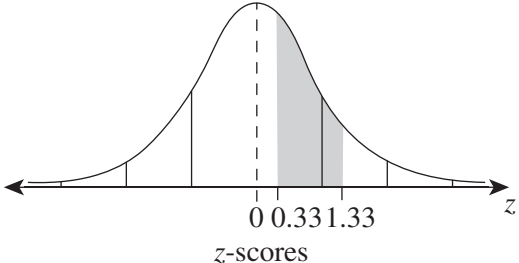
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(b) $P(\overline{\text{bushfire}}, \overline{\text{bushfire}}) = 0.3 \times 0.3$ $= 0.09$ $= 9\%$</p>	<p>MS–S2 Relative Frequency and Probability MS11–8 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Gives the solution as a decimal OR makes ONE error in the calculation1
Question 25	
<p>(a) Let C be due North of O.</p>  <p>$\angle COS = 39^\circ$ $\angle COR = 360 - 311$ $= 49^\circ$ $\therefore \angle ROS = 39 + 49$ $= 88^\circ$</p>	<p>MS–M1 Applications of Measurement MS11–4 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution1
<p>(b) $A = \frac{1}{2}ab \sin C$ $= \frac{1}{2} \times 55 \times 32 \times \sin 88$ $= 879.4639 \dots$ $\approx 879 \text{ m}^2$</p>	<p>MS–M6 Non-right-angled Trigonometry MS2–12–3 Bands 3–4</p> <ul style="list-style-type: none"> • Shows correct substitution AND gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Makes significant progress with incorrect substitution OR incorrect rounding1
<p>(c) 20 cm = 0.2 metres (Conversion must be done first.) $V = A \times d$ $= 879 \times 0.2$ $= 175.8$ $\approx 176 \text{ m}^3$</p>	<p>MS–M1 Applications of Measurement MS11–4 Bands 3–4</p> <ul style="list-style-type: none"> • Shows correct conversion, uses formula correctly AND gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Makes ONE error in the calculation1

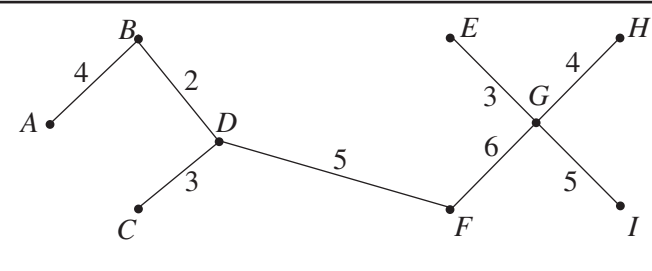
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
Question 26	
<p>(a) Using two points on the line ((30, 120) and (90, 30)) gives:</p> $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{30 - 120}{90 - 30}$ $= -\frac{3}{2} \text{ OR } -1.5$	<p>MS–S4 Bivariate Data Analysis MS2–12–7 Bands 1–2</p> <ul style="list-style-type: none"> • Gives the correct solution1
<p>(b) strong negative correlation</p>	<p>MS–S4 Bivariate Data Analysis MS2–12–7 Bands 2–3</p> <ul style="list-style-type: none"> • Identifies the strength AND direction of the data correctly2 <hr/> <ul style="list-style-type: none"> • Identifies the strength OR the direction of the data correctly1
Question 27	
<p>(a) Let y be Hara’s taxable income. Using the bracket \$120 001–\$180 000 gives:</p> $29467 + 0.37(y - 120000) = 33167$ $0.37(y - 120000) = 33167 - 29467$ $y - 120000 = \frac{3700}{0.37}$ $y = 10000 + 120000$ $= \$130000$	<p>MS–F1 Money Matters MS11–5 Bands 4–5</p> <ul style="list-style-type: none"> • Shows correct working and substitution AND gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Gives the correct solution without working and substitution OR makes significant progress1
<p>(b) allowable tax deduction = income – taxable income = 145000 – 130000 = \$15000</p>	<p>MS–F1 Money Matters MS11–5 Bands 4–5</p> <ul style="list-style-type: none"> • Gives the correct solution1
Question 28	
<p>(a)</p> 	<p>MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3</p> <ul style="list-style-type: none"> • Draws the weighted network diagram correctly with all vertices and edges labelled correctly.2 <hr/> <ul style="list-style-type: none"> • Draws the weighted network diagram with some error1
<p>(b) shortest path = ACEFG</p>	<p>MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3</p> <ul style="list-style-type: none"> • Gives the correct solution1

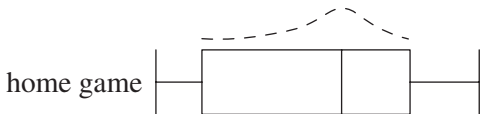
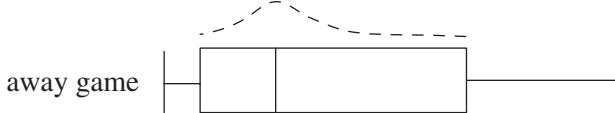
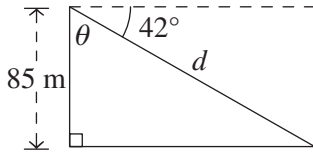
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
(c) $\text{weight} = 70 + 50 + 20 + 30$ $= 170 \text{ metres}$	MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3 • Gives the correct solution1
Question 29	
(a) When $d = 20$: $c = 220(1.07)^{20}$ $= 851.3305 \dots$ $\approx 851 \text{ cases}$	MS–A4 Types of Relationships MS2–12–6 Bands 2–3 • Gives the correct solution1
(b) 	MS–A4 Types of Relationships MS2–12–6 Bands 2–3 • Draws the curve with all points plotted correctly2 • Draws the curve with no more than TWO errors1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(c) Reading the graph obtained in part (b) gives approximately 19 days.</p>  <p>Alternatively, substituting in the number of days gives: $220(1.07)^{20} = 851.3305 \dots$ $220(1.07)^{19} = 795.6360 \dots$ Therefore, it takes approximately 19 days for the number of cases to reach 800.</p>	<p>MS–A4 Types of Relationships MS2–12–6 Bands 2–3</p> <ul style="list-style-type: none"> • Gives the correct solution 1
Question 30	
<p>(a) To calculate stamp duty, the purchase price must be rounded up to the nearest \$100. purchase price = 34850 $\approx \\$34900$ stamp duty = $3\% \times 34900$ $= \\$1047$</p>	<p>MS–F1 Money Matters MS11–5 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Makes some progress with ONE error 1
<p>(b) $S = V_0(1 - r)^n$ $= 34900(1 - 18\%)^5$ $= \\$12938.82$</p>	<p>MS–F3 Depreciation and Loans MS1–12–5 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Shows substitution into the declining-balance formula with ONE error 1
Question 31	
<p>(a) $d = \sqrt{\frac{4}{6.5}}$ $= 0.7844 \dots$ $\approx 0.78 \text{ km}$</p>	<p>MS–A1 Formulae and Equations MS11–1 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(b) $d = \sqrt{\frac{h}{6.5}}$ $d^2 = \frac{h}{6.5}$ $h = 6.5d^2$</p>	<p>MS–A1 Formulae and Equations MS11–1 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Makes some progress with ONE error1
Question 32	
<p>(a)</p>  <p>Angles MON and MOB are supplementary angles. $\angle MON = 48^\circ$ $\therefore \angle MOB = 180 - 48$ $= 132^\circ$</p>	<p>MS–M6 Non-right-angled Trigonometry MS2–12–3 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct solution1
<p>(b) $c = \sqrt{9.5^2 + 4^2 - 2 \times 9.5 \times 4 \times \cos 132}$ $= 12.5341 \dots$ $\approx 13 \text{ km}$</p>	<p>MS–M6 Non-right-angled Trigonometry MS2–12–3 Bands 4–5</p> <ul style="list-style-type: none"> • Shows correct substitution into the cosine rule AND gives the correct solution2 <hr/> <ul style="list-style-type: none"> • Shows substitution into the cosine rule with ONE error.1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>Question 33</p> $z = \frac{x - \bar{x}}{s}, \text{ where } \bar{x} = 42 \text{ and } s = 3.$ <p>When $x = 43$, $z = \frac{43 - 42}{3}$ $= 0.3333 \dots$ ≈ 0.33 (correct to two decimal places)</p> <p>When $x = 46$, $z = \frac{46 - 42}{3}$ $= 1.3333 \dots$ ≈ 1.33 (correct to two decimal places)</p>  <p style="text-align: center;">z-scores</p> $P(0.33 < z < 1.33) = P(z < 1.33) - P(z < 0.33)$ $= 0.90824 - 0.62930 \text{ (from the table)}$ $= 0.27894$ ≈ 0.279	<p>MS–S5 The Normal Distribution MS2–12–7 Bands 5–6</p> <ul style="list-style-type: none"> • Gives the correct solution3 <hr/> <ul style="list-style-type: none"> • Shows evidence (recognising z-scores) AND subtraction of probabilities from the table with some error2 <hr/> <ul style="list-style-type: none"> • Shows evidence (recognising z-scores) AND makes some progress1
<p>Question 34</p> <p>(a) Reading from the graph, the solution is (70, 700). This point of intersection is the break-even point where the revenue and cost of Willow’s business are equal.</p>	<p>MS–A4 Types of Relationships MS2–12–6 Bands 3–4</p> <ul style="list-style-type: none"> • Gives the correct point of intersection. <p>AND</p> <ul style="list-style-type: none"> • Gives the correct explanation of significance2 <hr/> <ul style="list-style-type: none"> • Any ONE of the above points1

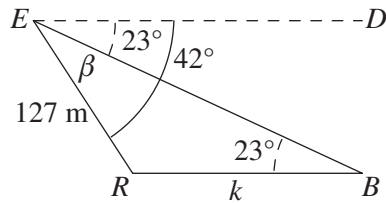
Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(b) Reading from the graph, Willow would need to sell 35 masks.</p> <p>Alternatively, where R is revenue and N is the number of masks:</p> $R = 10N$ $N = \frac{R}{10}$ $= \frac{350}{10}$ $= 35$	<p>MS–A4 Types of Relationships MS2–12–6 Bands 4–5</p> <ul style="list-style-type: none"> • Gives the correct solution 1
<p>(c) Where R is revenue, N is the number of masks, and C is cost:</p> <ul style="list-style-type: none"> • $R = 10N$ • $C = 420 + 4N$ <p>For 100 masks:</p> $R = 10 \times 100$ $= \$1000$ $C = 420 + 4 \times 100$ $= \$820$ <p>(Alternatively, revenue and cost can be obtained from the graph.)</p> $\therefore \text{profit} = 1000 - 820$ $= \$180$	<p>MS–A4 Types of Relationships MS2–12–6 Bands 4–5</p> <ul style="list-style-type: none"> • Shows working AND gives the correct solution 2 <hr/> <ul style="list-style-type: none"> • Makes some progress. 1
<p>Question 35</p>	
<p>(a)</p> 	<p>MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3</p> <ul style="list-style-type: none"> • Draws the minimum spanning tree correctly with all vertices and edges labelled 2 <hr/> <ul style="list-style-type: none"> • Draws part of the minimum spanning tree correctly with vertices and edges labelled 1
<p>(b) $4 + 2 + 3 + 5 + 6 + 3 + 4 + 5 = 32$</p> <p>The network diagram shows the cost in hundreds of dollars. Therefore, the minimum cost is \$3200.</p>	<p>MS–N3 Critical Path Analysis MS2–12–8 Bands 2–3</p> <ul style="list-style-type: none"> • Gives the correct solution 1
<p>Question 36</p>	
<p>(a) From the table, the annuity factor is 7.3359.</p> $FV = 8500 \times 7.3359$ $= \$62355.15$	<p>MS–F5 Annuities MS2–12–5 Bands 4–5</p> <ul style="list-style-type: none"> • Gives the correct solution 1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
<p>(c) The home game scores are negatively skewed.</p>  <p>home game</p> <p>The away game scores are positively skewed.</p>  <p>away game</p> <p>The home game scores have a higher median (65) compared to the away game scores (35). The interquartile range (IQR) in home game scores is $80 - 35 = 45$. The IQR in away game scores is $60 - 25 = 35$. The range for home game scores is 70, and the range for away game scores is 60.</p> <p>Therefore, although the home games have higher scores, there is more consistency and less spread in the away game scores.</p>	<p>MS–S1 Data Analysis MS11–7 Bands 4–5</p> <ul style="list-style-type: none"> Compares and contrasts THREE aspects correctly3 <hr/> <ul style="list-style-type: none"> Compares and contrasts TWO aspects correctly2 <hr/> <ul style="list-style-type: none"> Provides some relevant comments .1
<p>Question 39</p>	
<p>(a)</p>  <p>θ and 42° are complementary angles.</p> $\theta = 90 - 42$ $= 48^\circ$ $\cos 48 = \frac{85}{d}$ $d = \frac{85}{\cos 48}$ $= 127.0305 \dots$ $\approx 127.0 \text{ metres}$ <p>Alternatively:</p> $\sin 42 = \frac{85}{d}$ $d = \frac{85}{\sin 42}$ $= 127.0305 \dots$ $= 127.0 \text{ metres}$	<p>MS–M6 Non-right-angled Trigonometry MS2–12–4 Bands 4–5</p> <ul style="list-style-type: none"> Shows working AND gives the correct solution1

Sample answer

Syllabus content, outcomes, targeted performance bands and marking guide

(b) Let E be the eagle, R be the rabbit and B be the burrow.



$$\beta = 42 - 23$$

$$= 19^\circ$$

(Note: Angles DEB and RBE are alternate angles and are therefore equal.)

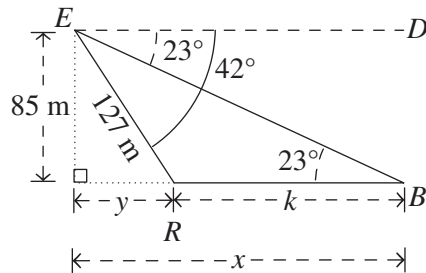
Using the sine rule gives:

$$\frac{k}{\sin 19} = \frac{127}{\sin 23}$$

$$k = 105.8199 \dots$$

$$\approx 106 \text{ metres}$$

Alternatively:



$$y^2 = 127^2 - 85^2 \quad \tan 23 = \frac{85}{x}$$

$$y = \sqrt{8904} \quad x = \frac{85}{\tan 23}$$

$$k = x - y$$

$$= \frac{85}{\tan 23} - \sqrt{8904}$$

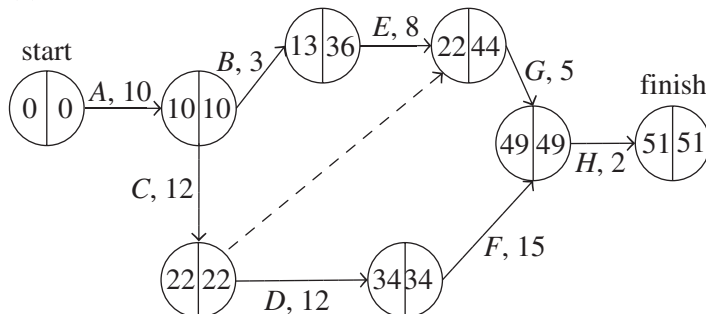
$$= 105.8864 \dots$$

$$\approx 106 \text{ metres}$$

- MS–M6 Non-right-angled Trigonometry
MS2–12–4 Bands 5–6
- Shows working AND gives the correct solution3
 - Makes significant progress2
 - Makes some progress.1

Question 40

(a)



- MS–N3 Critical Path Analysis
MS2–12–8 Bands 5–6
- Completes the diagram with all the correct earliest starting times (ESTs) and latest starting times (LSTs)2
 - Makes some progress.1

Sample answer	Syllabus content, outcomes, targeted performance bands and marking guide
(b) The critical path is $A \rightarrow C \rightarrow D \rightarrow F \rightarrow H$.	MS–N3 Critical Path Analysis MS2–12–8 Bands 5–6 • Gives the correct solution 1
(c) float time of activity $G = LST - EST$ $= 44 - 22$ $= 22$ hours Alternatively, since activity G has other paths leading to the next activity: float time of activity $G = LST_{\text{next}} - EST - \text{activity time}$ $= 49 - 22 - 5$ $= 22$ hours	MS–N3 Critical Path Analysis MS2–12–8 Bands 5–6 • Gives the correct solution 1