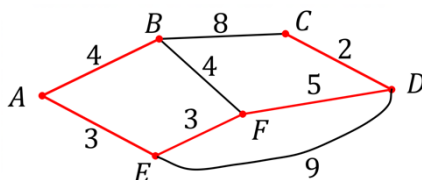
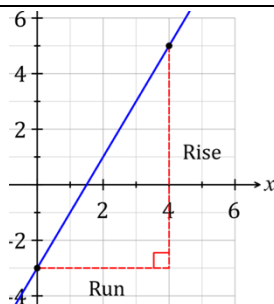
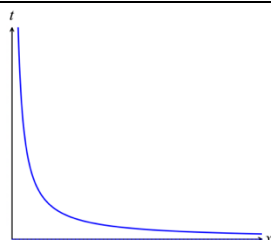
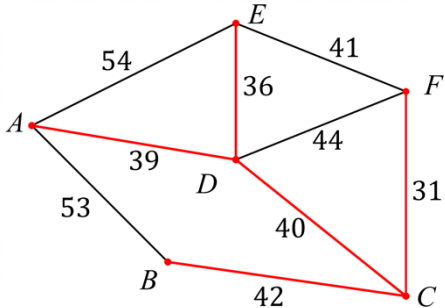
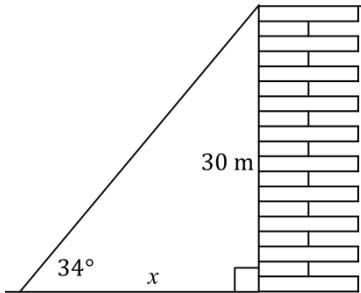
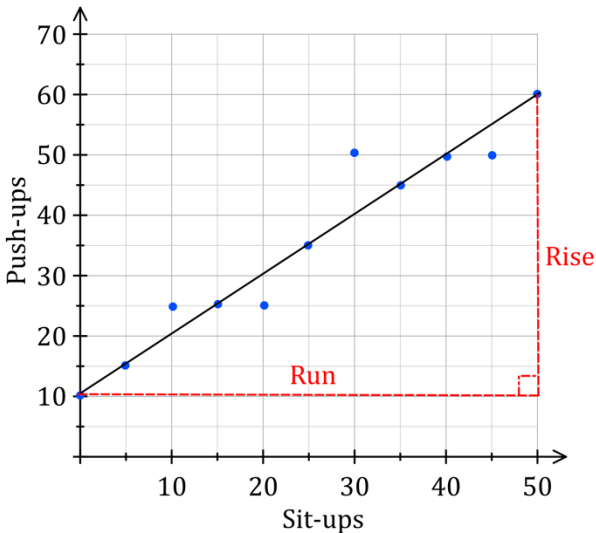


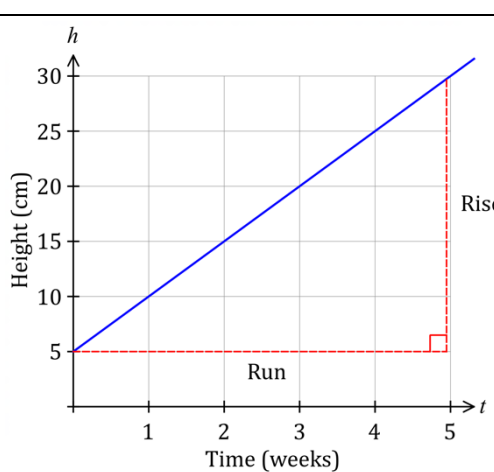
ACE Examination Paper 2
Year 12 Mathematics Standard 1 Yearly Examination
Worked solutions and marking guidelines

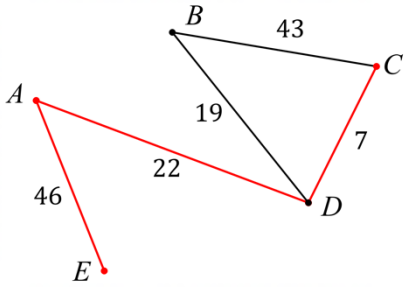
Section I			
	Solution	Criteria	
1.	$\tan 56^{\circ} = \frac{\text{Opposite side}}{\text{Adjacent side}} = \frac{c}{a}$	1 Mark: D	
2.	 <p>Minimal spanning tree is shown above, last vertex was C.</p>	1 Mark: B	
3.	Association has a negative slope with a moderate scatter. Moderate negative.	1 Mark: A	
4.	Intersection value is 7.88 (8.25% and 25 years) Repayment = 7.88×320 = \$2521.60	1 Mark: C	
5.	$7.25 \text{ L} = 100 \text{ km}$ $0.725 \text{ L} = 10 \text{ km}$ $0.725 \times 31 \text{ L} = 310 \text{ km}$ $22.475 \text{ L} = 310 \text{ km}$	1 Mark: C	
6.	$A = 600 \times 1.1^t$ $= 600 \times 1.1^0$ $= \$600$	1 Mark: A	
7.	$\text{Area} = 20 \times 10 + 8 \times 4$ $= 232 \text{ m}^2$	1 Mark: D	
8.	$m = \frac{\text{Rise}}{\text{Run}} = \frac{8}{4} = 2$ $y\text{-intercept} : -3$ $\therefore \text{Equation of the line}$ $y = mx + c$ $y = 2x - 3$		1 Mark: A
9.	Reciprocal function.		1 Mark: D
10.	$I = A - P$ $= 5952 - 4800$ $= \$1152$	$I = Prn$ $1152 = 4800 \times r \times 4$ $r = \frac{1152}{4800 \times 4}$ $= 0.06$ $= 6.0\%$	1 Mark: C

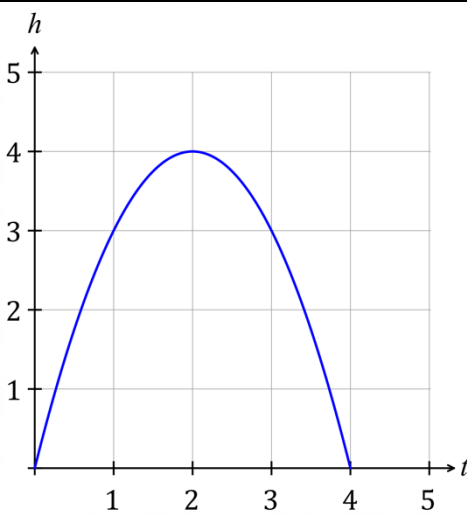
Section II		
	Solution	Criteria
11(a)	Actual distance = $2.5 \times 400\,000$ cm = $1\,000\,000$ cm = 10 km	1 mark: Correct answer.
11(b)	Drawing length = $\frac{60 \times 100 \times 1000}{4\,000\,000}$ cm = 15 cm	1 mark: Correct answer.
12(a)	Current value = 3000×2.25 = \$6750 ∴ Current value of the shares is \$6750.	1 mark: Correct answer.
12(b)	Dividend yield = $\frac{\text{Annual dividend}}{\text{Market price}} \times 100\%$ = $\frac{0.07}{2.25} \times 100\%$ = 3.1111... $\approx 3\%$ ∴ Dividend yield is 3%.	1 mark: Correct answer.
13(a)	$\tan 55^\circ = \frac{h}{1.5}$ $h = 1.5 \times \tan 55^\circ$ = 2.1422... ≈ 2.14 m ∴ Ladder reaches up the wall 2.14 m.	1 mark: Correct answer.
13(b)	$\cos 55^\circ = \frac{1.5}{x}$ $x = \frac{1.5}{\cos 55^\circ}$ = 2.6151... ≈ 2.62 m ∴ Length of the ladder is 2.62 m.	1 mark: Correct answer.
13(c)	$\sin \theta = \frac{2.1422... - 0.5}{2.6151} \dots$ $\theta = 38.8997...$ $\approx 39^\circ$ ∴ Ladder makes an angle of 39° with the ground.	1 mark: Correct answer.
14(a)	Vertices with an odd degree are <i>C</i> , <i>F</i> , <i>G</i> and <i>J</i> .	1 mark: Correct answer.

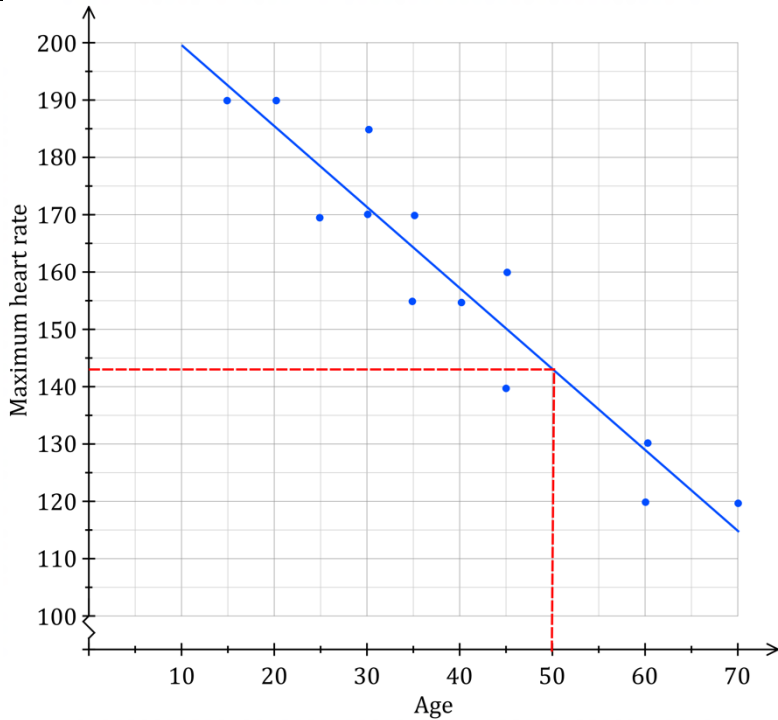
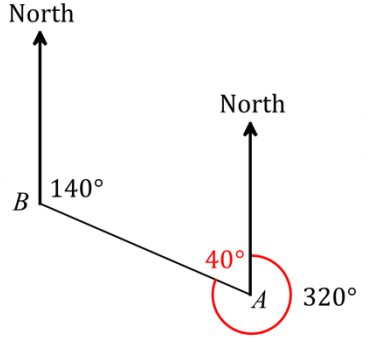
14(b)	<div><p>Shortest path is A-C-F-G-J Length = 8 + 7 + 4 + 3 = 22</p></div>	2 marks: Correct answer. 1 mark: Finds the shortest path or shows some understanding.
15(a)	<div>$m = \frac{\text{Rise}}{\text{Run}} = \frac{4}{2} = 2$<p>y-intercept : 0 $y = mx + c$ $I = 2n$</p></div> <div></div>	1 mark: Correct answer.
15(b)	<div>$m = \frac{\text{Rise}}{\text{Run}} = \frac{8}{8} = 1$<p>y-intercept : 3 $y = mx + c$ $C = n + 3$</p></div>	1 mark: Correct answer.
15(c)	Profit = $(2 \times 7) - (7 + 3)$ = \$4	1 mark: Correct answer.
15(d)	$n = 3$ (Point of intersection on the graph) \therefore Three sandwiches are required to break-even	1 mark: Correct answer.
16	$V = Ah$ = $20 \times 16 \times 0.015$ = 4.8 m^3 Capacity = $4.8 \times 1000 \text{ L}$ = 4800 L \therefore Volume of rainfall is 4800 L.	2 Marks: Correct answer. 1 Mark: Finds the volume in m^3 or makes some progress.
17(a)	Daily interest rate = $\frac{15.7\%}{365}$ = $0.043013... \approx 0.0430\%$	1 mark: Correct answer.
17(b)	12 days (30,31,1,2,3,4,5,6,7,8,9,10) Interest = $1240 \times 0.043013... \% \times 12$ = $6.4004... \approx \$6.40$ Total paid = $1240 + 6.40$ = \$1246.40 \therefore Total amount paid for the entertainment unit is \$1246.40	2 Marks: Correct answer. 1 Mark: Calculates the interest.
18(a)	Boys : Girls = 6 : 7 = 12 : 14 = 12 : 15 (increase in the girls) = 4 : 5	1 mark: Correct answer.
18(b)	There are 12 boys and 15 girls. Total number is 27. Boys : Total number = 12 : 27 = 4 : 9	1 mark: Correct answer.

19(a)		<p>2 marks: Correct answer.</p> <p>1 mark: Shows some understanding.</p>
19(b)	<p>Length = $39 + 36 + 40 + 42 + 31$ $= 188 \text{ km}$ \therefore Minimum length of pipes is 188 km.</p>	1 mark: Correct answer.
20	<p>$I = Prn$ $= 30\,000 \times 0.12 \times 5$ $= \\$18\,000$ \therefore Billie pays \$18,000 in interest.</p>	<p>2 marks: Correct answer.</p> <p>1 mark: Substitutes one correct value into the formula.</p>
21(a)	When $h = 20 \text{ m}$ then $d \approx 30 \text{ km}$ (Read from the graph)	1 mark: Correct answer.
21(b)	When $d = 35 \text{ km}$ then $h \approx 50 \text{ m}$ (Read from the graph)	1 mark: Correct answer.
22	<p> $\tan 34^\circ = \frac{30}{x}$ $x = \frac{30}{\tan 34^\circ}$ $= 44.4768\dots$ $\approx 44 \text{ m}$ </p>  <p>\therefore The car is about 44 metres from the foot of the building.</p>	<p>2 Marks: Correct answer.</p> <p>1 Mark: Labels the diagram or uses the correct trig ratio.</p>
23(a)	 <p> $m = \frac{\text{Rise}}{\text{Run}} = \frac{50}{50} = 1$ \therefore Gradient is 1. </p>	<p>2 marks: Correct answer.</p> <p>1 mark: Finds the line of best fit or shows some understanding.</p>

23(b)	When $s = 36$ then $p = 46$ (from the scatterplot) Alyssa should score 46 on the push-up test.	1 mark: Correct answer.
24	Drip rate = $\frac{1.5 \times 1000}{8}$ = 187.5 mL/h	1 mark: Correct answer.
25(a)	Intersection value is \$1580.75 (20 years) Total paid = $1580.75 \times 12 \times 20$ = \$379 380 \therefore Total amount to be repaid is \$379 380	1 mark: Correct answer.
25(b)	Intersection value is \$1364.35 (30 years) Total paid = $1364.35 \times 12 \times 30$ = \$491 166 Extra paid = $491\,166 - 379\,380$ = \$111 786 \therefore Extra paid is \$111 786	2 marks: Correct answer. 1 mark: Finds the total paid if the loan is taken out for 30 years.
26	Dimensions of the extension are 8 m by 7 m. $A = lb = 8 \times 7 = 56 \text{ m}^2$ Cost = 56×570 = \$31 920 \therefore Cost of the extension is \$31 920	2 Marks: Correct answer. 1 Mark: Finds the area of the extension.
27(a)	Initial height is 5 cm.	1 mark: Correct answer.
27(b)	$m = \frac{\text{Rise}}{\text{Run}}$ $= \frac{25}{5}$ $= 5$ <p>Gradient is 5.</p> 	1 mark: Correct answer.
27(c)	y-intercept : 5 \therefore Equation of the line $y = mx + c$ $h = 5t + 5$	1 mark: Correct answer.

28	$\begin{aligned} \text{MHR} &= 220 - \text{AGE (years)} \\ &= 220 - 17 = 203 \\ \text{Heart rate} &= 0.60 \times 203 \\ &= 121.8 \text{ bpm} \\ \therefore \text{Holly's heart rate is } 121.8 \text{ bpm.} \end{aligned}$	<p>2 Marks: Correct answer.</p> <p>1 mark: Finds the MHR.</p>
29(a)	<p>Weight edge: $AD = 22, AE = 46, BC = 43, BD = 19, CD = 7$</p> 	<p>2 marks: Correct answer.</p> <p>1 mark: Draws the vertices with at least one correct edge.</p>
29(b)	<p>Shortest path from E to C. $E-A-D-C$</p>	1 mark: Correct answer.
29(c)	<p>Longest path $= 46 + 22 + 19 + 43$ $= 130 \text{ km}$ \therefore Distance of the longest path is 130 km.</p>	1 mark: Correct answer.
30(a)	$\begin{aligned} S &= V_0(1 - r)^n \\ &= 120\,000 \times (1 - 0.16)^3 \\ &= \$71\,124.48 \\ \therefore \text{Salvage value of the car is } \$71\,124.48 \end{aligned}$	1 mark: Correct answer.
30(b)	$\begin{aligned} \text{Loss} &= 120\,000 - 71\,124.48 \\ &= \$48\,875.52 \\ \text{Percentage loss} &= \frac{48\,875.52}{120\,000} \times 100 \\ &= 40.7296 \\ &\approx 41\% \end{aligned}$	<p>2 Marks: Correct answer.</p> <p>1 Mark: Finds the loss.</p>
31(a)	$\begin{aligned} FV &= PV(1 + r)^n \\ &= 10\,000 \times (1 + 0.05)^4 \\ &= 12\,155.0625 \\ &\approx \$12\,155.06 \\ \therefore \text{Future value is } \$12\,155.06 \end{aligned}$	1 mark: Correct answer.
31(b)	$\begin{aligned} I &= FV - PV \\ &= 12\,155.06 - 10\,000 \\ &= \$2\,155.06 \\ \therefore \text{Aaron will receive } \$2\,155.06 \text{ in interest.} \end{aligned}$	1 mark: Correct answer.

31(c)	$PV = \frac{FV}{(1+r)^n}$ $= \frac{8389}{(1+0.05)^6}$ $= 6260.0009.....$ $\approx \$6260$ <p>\therefore Bonnie invested \$6260.</p>	1 mark: Correct answer.												
32(a)	<table border="1"><tr><td>t</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>h</td><td>0</td><td>3</td><td>4</td><td>3</td><td>0</td></tr></table>	t	0	1	2	3	4	h	0	3	4	3	0	1 mark: Correct answer.
t	0	1	2	3	4									
h	0	3	4	3	0									
32(b)		1 mark: Correct answer.												
32(c)	Maximum height reached is 4 metres.	1 mark: Correct answer.												
32(d)	Maximum height is reached after 2 seconds.	1 mark: Correct answer.												
33	Blood pressure (systolic) = $0.75 \times 180 = 135$ Blood pressure (diastolic) = $0.75 \times 132 = 99$ \therefore Blood pressure is 135/99 after taking the drugs.	1 mark: Correct answer.												
34	Length of fence = $10 + 6 - 1$ $= 15 \text{ m}$ Cost = $15 \times 73.50 + 255$ $= \$1357.50$ \therefore Cost of completing the pool enclosure is \$1357.50.	2 Marks: Correct answer. 1 Mark: Finds the length of the fence or shows some understanding.												

35	$y = mx + c$ $y = -1x + 2$ \therefore Gradient is -1 .	1 mark: Correct answer.
36	Lists four correct points $(4, 1)$ $(2, 2)$ $(1, 4)$ $(-4, -1)$ $(-2, -2)$ $(-1, -4)$	2 Marks: Correct answer. 1 Mark: Lists one correct point.
37(a)		1 mark: Correct answer.
37(b)	See line of best fit drawn above.	1 mark: Correct answer.
37(c)	Maximum heart rate is approximately 143 bmp. (Accept answers in the range 141 to 146) Predicting values within the dataset range is interpolation.	2 Marks: Correct answer. 1 Mark: Finds the maximum heart rate or stating the process involves interpolation.
38	 <p>\therefore Bearing of B from A is 320°.</p>	2 Marks: Correct answer. 1 Mark: Shows some understanding.