Barker College

**2019
YEAR 12
TRIAL HSC
EXAMINATION**

Mathematics Standard 2

Staff Involved:

- RJW*
- JZT
- AXD
- JWH
- VAB

1PM FRIDAY 9 AUGUST

Number of copies: 160

General Instructions

- Reading time - 10 minutes
- Working time - $2\frac{1}{2}$ hours
- Write using black pen only.
- NESA approved calculators may be used.
- A Reference sheet is provided.
- In Questions 16 – 20, show relevant mathematical reasoning and/or calculations.
- Write your Barker Student Number on this page and on pages 7 – 28.

Total marks – 100

(**Section I**)   Page 2 – 6

15 marks

- Attempt Questions 1 – 15
- Allow about 25 minutes for this section

(**Section II**)   Pages 7 – 26

85 marks

- Attempt Questions 16 – 20
- Allow about 2 hours 5 minutes for this section

Section I

15 marks
Attempt Questions 1 – 15
**Allow about 25 minutes for this section**

Use the multiple-choice answer sheet for Questions 1– 15.

Choose the best response and fill in the corresponding response oval completely.

1   The number of significant figures in the number 5.081×10^2 is:

    (A)   3

    (B)   4

    (C)   5

    (D)   6

2   Simplify $11x - 2(3x + 2)$.

    (A) $5x + 4$

    (B) $5x - 4$

    (C) $6x - 4$

    (D) $5 + 4x$

3   The mean of a set of three scores is 11. A fourth score is then included.
The new mean of the four scores is 10. What was the fourth score?

    (A)   9

    (B)   -1

    (C)   7

    (D)   -9

4   Marcus buys a jeep for $27 500 and the declining balance rate of depreciation is 14% p.a.
What is the salvage value of the car after six years?

    (A) $4 400.00

    (B) $11 125.60

    (C) $16 374.40

    (D) $23 100.00

5   What is the exact volume of the cone?

(A) 12π cm^3

(B) 15π cm^3

(C) 20π cm^3

(D) 60π cm^3

NOT TO SCALE

5 cm

3 cm
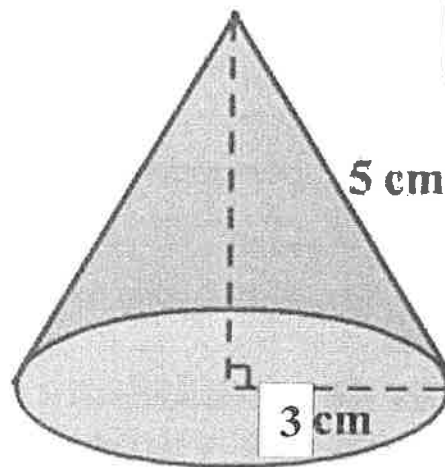
6   Lily works as a florist assistant 4 days a week for the following hours and rates:

- 8 hours on Thursday at normal rate
- 7 hours on Friday at normal rate
- 5 hours on Saturday at time-and-a-half
- 3.5 hours on Sunday at double-time

On which day does she earn the highest pay?

(A)   Thursday

(B)   Friday

(C)   Saturday

(D)   Sunday

7   Sophie measures her height to be 1.66m correct to the nearest centimetre.
What is the percentage error in her measurement?

(A)   0.003%

(B)   0.006%

(C)   0.3%

(D)   0.6%

8 The table shows the average energy used, in kilojoules per kilogram of body mass, by a person walking for 30 minutes at different speeds.

Walking speed	Energy used in 30 minutes
3 km/h	5.53 kJ/kg
5 km/h	7.37 kJ/kg

Cameron, who weighs 70 kg, drinks a regular hot chocolate made with full cream milk. It contains 83 kilocalories.

For approximately how long must Cameron walk at 5 km/h to burn off the energy contained in the hot chocolate? (1 kilocalorie = 4.184 kJ)

(A) 20 minutes

(B) 25 minutes

(C) 45 minutes

(D) 120 minutes

9 Travis bought a home entertainment system for $2500.

He paid 10% deposit and then paid 24 monthly instalments of $122.

The store charged simple interest on the balance.

Determine the rate of simple interest the store charged (in % p.a.).

(A) 14%

(B) 15%

(C) 27%

(D) 30%

10 Which equation expresses b as the subject of the formula $A = \dfrac{h}{2}(a + b)$?

(A) $b = A - \dfrac{ha}{2}$

(B) $b = A - \dfrac{h}{2} - a$

(C) $b = \dfrac{Ah}{2} - a$

(D) $b = \dfrac{2A}{h} - a$

11 The organisation of a school formal involves the activities A to L. The diagram shows these activities and their completion time in days.
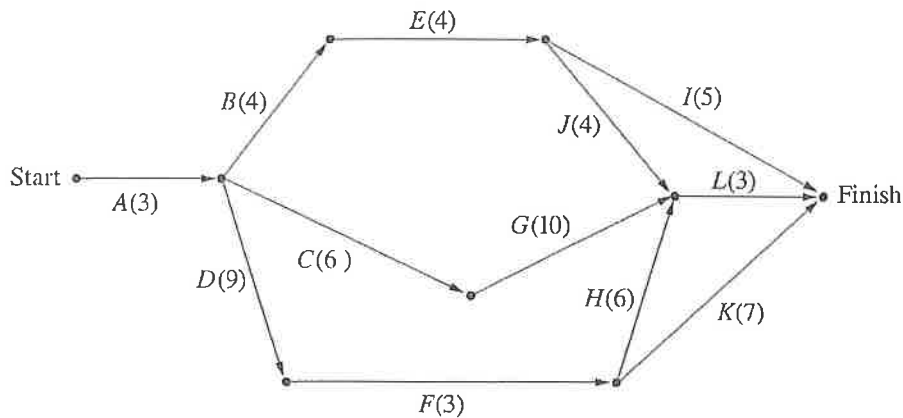
The minimum completion time for the activities is 24 days.

The critical path for the project is:

(A)   A – B – E – J – L

(B)   A – C – G – L

(C)   A – D – F – K

(D)   A – D – F – H – L

12 The table shows the **future value** of $1 compounding at various interest rates and time periods.

	Interest rate per period on $1						
Period	4%	5%	6%	7%	8%	9%	10%
1	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000
2	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100
3	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310
4	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641
5	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105
6	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716

What is the *interest* paid on $75 000 invested at 10% p.a. interest compounded half-yearly for two years?

(A) $15 750.00

(B) $16 162.50

(C) $90 750.00

(D) $91 162.50

13   What is a correct expression for x in triangle ABC?

Not to scale

(A) $x = \dfrac{36}{sin61°} \times sin78°$

(B) $x = \dfrac{36}{sin61°} \times sin41°$

(C) $x = \dfrac{27}{sin41°} \times sin61°$
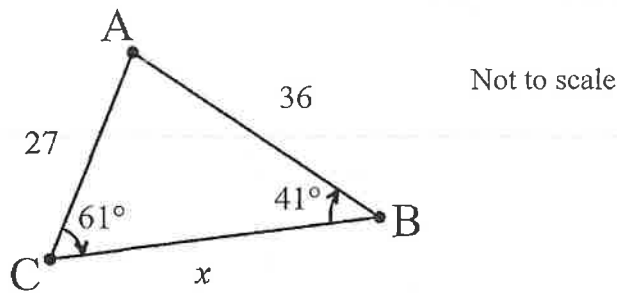
(D) $x = \dfrac{27}{sin78°} \times sin41°$

14   What is the gradient of the following line?

(A) $-\dfrac{3}{4}$

(B) -4

(C) $-\dfrac{4}{3}$

(D) $\dfrac{4}{3}$
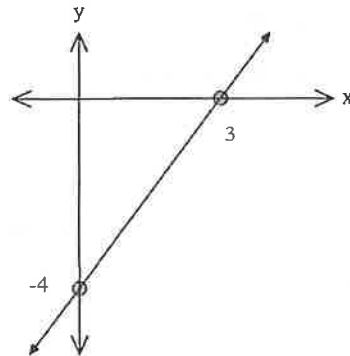
15   Rhys is in hospital and is to receive a dose of 5g of a drug. The concentration of the drug in a hospital drip is 2mg/mL.

How many millilitres of the drug will the doctor need to administer to Rhys?

(A)   2.5 mL

(B)   25 mL

(C)   250 mL

(D)   2 500 mL

End of Section I

6

Barker
College

2019
TRIAL HSC
EXAMINATION

Mathematics Standard 2

Section II

85 marks

Attempt Questions 16 – 20

**Allow about 2 hours and 5 minutes
for this section.**

Answer the questions in the spaces
provided.

Your responses should include relevant
mathematical reasoning and / or
calculations.

Extra writing space is provided on pages 27
and 28. If you use this space, clearly
indicate which question you are answering.

Write your Barker student number at the
top of each page.

Please turn over

Question 16 (20 marks)

(a)   A can of coke currently costs $1.80.   **1**

If inflation averages 3% p.a, what will a can of coke cost in 20 years?

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(b)   Serena is driving on the freeway. Her reaction time is 0.70 seconds and she travels   **1**
at the speed limit of 100 km/h. Determine her stopping distance on the freeway
correct to 1 decimal place.

$$d = \frac{5Vt}{18} + \frac{V^2}{170}$$

| d = stopping distance in metres |
| V = velocity in km/h |
| t = reaction time in seconds |

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(c)   Solve $\dfrac{2x+5}{3} = x - 1$ **2**

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Student Number

(d) Sam decides to host a "Lord of the Rings" trilogy marathon. 2
The Fellowship of the ring has a runtime of 178 minutes.
The Two Towers has a runtime of 2 hours and 59 minutes.
The Return of the King has a runtime of 200 minutes.

If Sam and his mates start watching at 7:15 pm on Friday and there are no interlude breaks between films, what day and time will the marathon finish?

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(e) Calculate the dividend on 4800 shares with a market price of $2.10 per share if the 1
dividend yield is 3.8%.

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(f) The results of a survey of the number of males and females who smoke are shown below.

	Males	Females	Total
Smokers	4027	4426	8453
Non-smokers	8321	7462	15 783
Total	12 348	11 888	24 236

(i) What percentage of the surveyed females are smokers? (Correct to 2 d.p.) 1

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(ii) What percentage of smokers are female? (Correct to 2 d.p.) 1

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Question 16 continues on page 10

Question 16 (continued)

(g) Tai took out a loan of $120 000 at an interest rate of 6% p.a. compounded monthly.
He made monthly repayments (R) of $1250. The table shows the progression of Tai's balance for the first 5 months.

Months	Principal (P)	Interest (I)	$P + I$	$P + I - R$
1	120 000.00	600.00	120 600.00	119 350.00
2	119 350.00	596.75	119 946.75	118 696.75
3	118 696.75	593.48	119 290.23	118 040.23
4	118 040.23	590.20	118 630.43	117 380.43
5	A	B		C

(i) What is the monthly interest rate? **1**

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(ii) Calculate the values of A, B and C. **3**

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(iii) By what percentage had Tai reduced the principal of the loan at the end of 5 months? (Correct to 1 decimal place) **2**

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Question 16 (continued)

(h) The network diagram below shows the distances between seven villages in a valley.
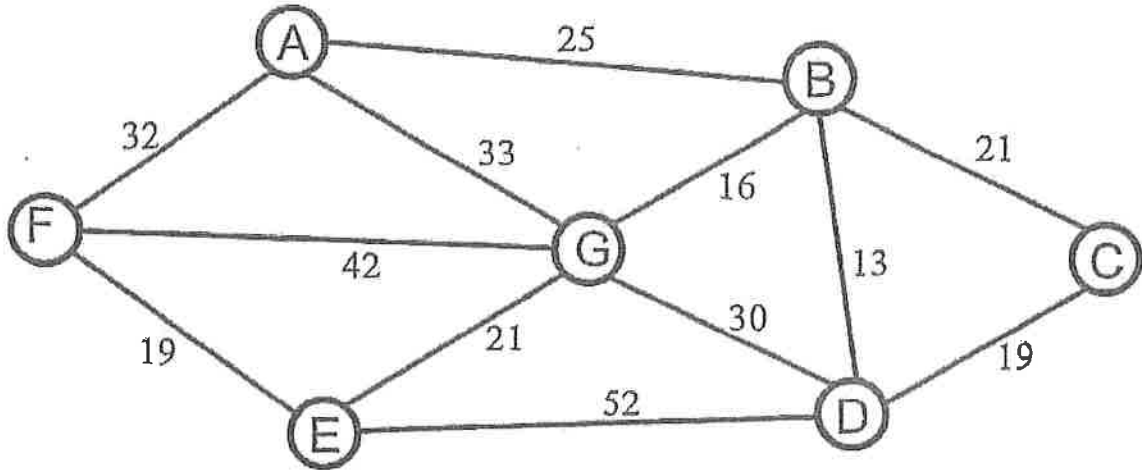
(i)   Complete the unshaded spaces in the table to represent this network.   1

	A	B	C	D	E	F	G
A	-	25	-	-	-	32	
B		-			-	-	16
C			-		-	-	-
D				-		-	
E					-		21
F						-	
G							-

(ii) Is the network traversable? Justify your answer.   1

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Question 16 continues on page 12

11

Question 16 (continued)

(i) Harriet earned $106 000 as a lawyer. She also earned $8 450 through bank interest and her various investments. She claimed $14 800 in tax deductions for the year.

Taxable income	Tax on this income
0 – $18,200	Nil
$18,201 – $37,000	19c for each $1 over $18,200
$37,001 – $90,000	$3,572 plus 32.5c for each $1 over $37,000
$90,001 – $180,000	$20,797 plus 37c for each $1 over $90,000
$180,001 and over	$54,097 plus 45c for each $1 over $180,000

(i) Calculate her taxable income.   **1**

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(ii) Using the table above, calculate her income tax payable for the year.   **1**

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(iii) Harriet paid $22 450 in PAYG tax instalments throughout the year.   **1**
      Can she expect to have a tax refund or tax debt at the end of the year?
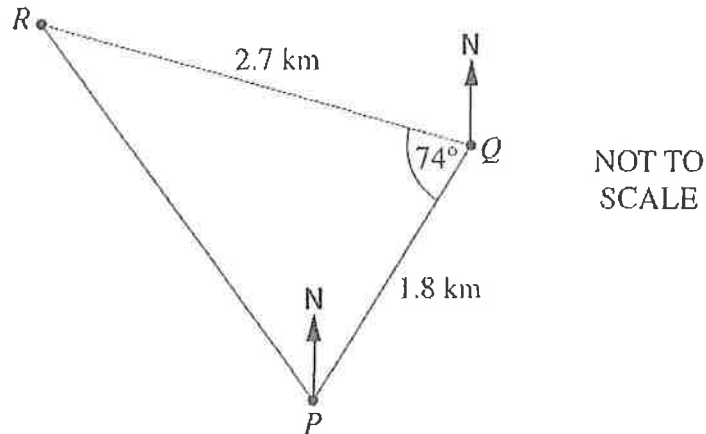   How much will it be? Assume there is no Medicare Levy to be paid.

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End of Question 16

(a) A yacht race follows the triangular course shown in the diagram below. The course from P to Q is 1.8 km on a bearing of 058°. At Q the course changes direction. The course from Q to R is 2.7 km and $\angle PQR = 74°$

NOT TO SCALE

(i) Indicate on the diagram the 058° bearing from P to Q and use it to determine the bearing of P from Q?   1

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(ii) What is the distance from R to P? (correct to 2 decimal places)   2

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(iii) The area inside this course is set as a 'no-go zone' for the other boats while the race is on. What is the area of the 'no-go zone'? (correct to 2 decimal places)   1

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13

Question 17 (continued)

(b)   Adam is attending a function, which goes from 8 pm until midnight. He plans to have five standard drinks throughout the evening. Adam is 68 kg and is on his full license.

$$BAC_{male} = \frac{10N - 7.5H}{6.8M}$$

or

$$BAC_{female} = \frac{10N - 7.5H}{5.5M}$$

N is number of standard drinks consumed
H is number of hours of drinking
M is person's mass in kilograms

(i)   What would Adam's blood alcohol content (BAC) be at midnight?   **2**
Answer correct to three decimal places.

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(ii)   The legal BAC limit for full license drivers is 0.05.   **3**
Adam wants to know the earliest time he could drive in the situation above.
By rearranging one of the above equations, determine (to the nearest minute)
at what time is the earliest he can drive.

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Question 17 (continued)

(c)   The weekly rental on a house is shared by a number of people. The rent per person (R) varies inversely with number of people (N) living in the house and is given by:

$$R = \frac{k}{N}$$

(i)   There are currently 3 occupants who each pay \$280 per week.   **1**

Determine the constant of variation *(k)*.

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(ii)   How much would each person pay if there were 5 occupants?   **1**

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(d)   What is the future value of \$1650 if it is invested for 3 years at 8% p.a. interest   **2**

compounded quarterly? Answer correct to the nearest dollar.

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Question 17 (continued)

(e) The scale diagram shows the aerial view of a block of land bounded on one side by a road. The length of block, *AB*, is known to be 90 metres.
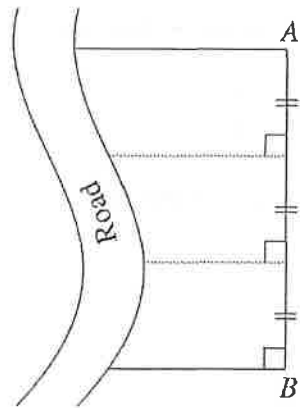
DIAGRAM
TO
SCALE

(i) Show the scale is 1:2000.   1

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(ii) Show that the approximate area of the block of land, using **three applications** of the trapezoidal rule is 4350 square metres.   3

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End of Question 17

Question 18 (17 marks)

(a)   A senior basketball team went on an intensive training camp. At the beginning of the camp each player was given 50 attempts to shoot goals. The number of successful shots were recorded. At the end of the camp each player was again given 50 shots at goal and the number of successful shots was recorded.

Number of successful shots		
Beginning of camp		**End of camp**
	0	
9 4 2 2 1	1	7
5 5 4 2 2	2	9
5 5 4 2 0	3	1 4 8 9 9
	4	1 1 1 2 4 4 6 8

(i)   State the mode for the **end of camp** data set.   1

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(ii)   State the median for the **beginning of camp** data set.   1

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(iii) What is the IQR for the **end of camp** data set?   2

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(iv)   Is 17 an outlier for the **end of camp** data set?   1
        Justify your answer with appropriate calculations.

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Question 18 continues on page 18

17

Question 18 (continued)

(b)   Charlotte plays a game involving a spinner that can land on one of three colours, as shown. Red occupies half of the spinner.
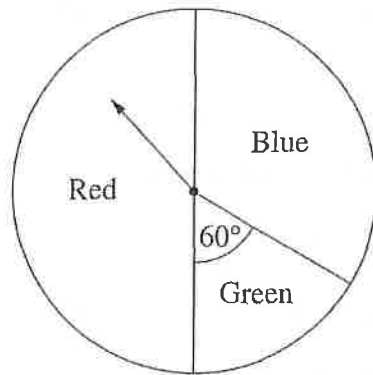
(i)   Determine the probability of spinning blue twice.   **2**

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(ii)   What is the expected number of greens in 72 spins?   **1**

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Question 18 (continued)

(c) The network below shows the road distances in kilometres between seven towns labelled **A, B, C, D, E, F, G**. To establish a cable network for communications, it is proposed to put the cable underground beside the existing roads.
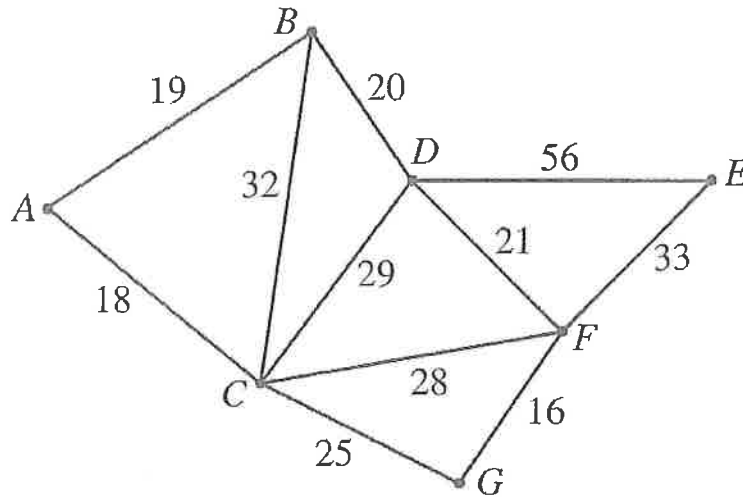
(i) Show the minimum spanning tree on the diagram (by highlighting or emboldening)   **1** that ensures all the towns are connected to the network and minimises the amount of cable used.

(ii) What is the minimum length of cable required here if back-up links are not   **1** considered necessary; that is, there are no loops in the cable network?

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(iii) A worker is at town *A* and needs to get to town *E*. Determine the shortest path.   **1**

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Question 18 continues on page 20

19

Question 18 (continued)

(d) Mr Plummer makes pastries. The fixed cost of production is $a per day whilst the production cost is $b per pastry. The maximum daily production is 120 pastries a day.
The graph representing the daily **production costs** ($) for **n** pastries is shown below:
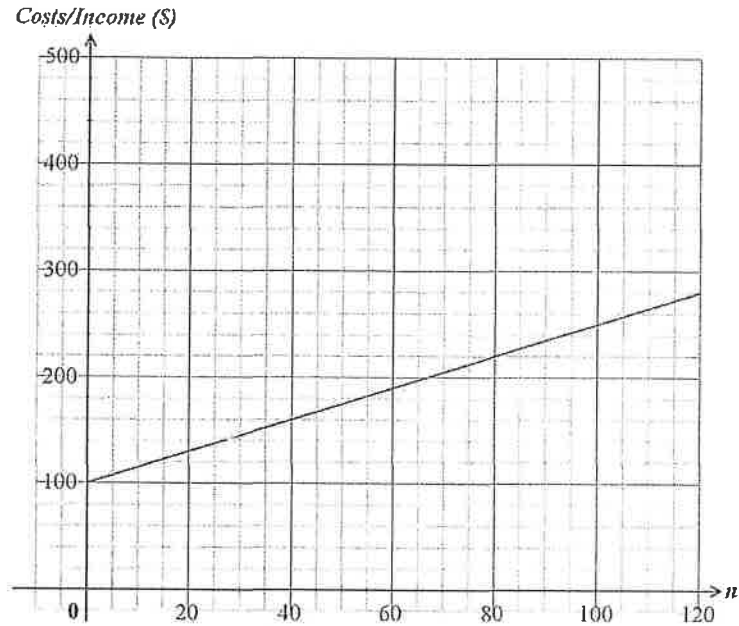
(i) By referring to the graph, state the values of **a** and **b**. 2

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(ii) Mr Plummer sells the pastries for $4 each. Write an equation representing the income $**I** made for selling **n** pastries.

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(iii) Draw the line of income on the graph. 1

(iv) How many pastries must be sold each day to break even? 1

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(v) How many pastries must be sold to make $100 profit? 1

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End of Question 18

20

Question 19 (20 marks)

(a) The network diagram shows the traffic flow capacity, in vehicles per hour, along roads when travelling from Pymble (*P*) to Wahroonga (*W*) in morning peak hour.
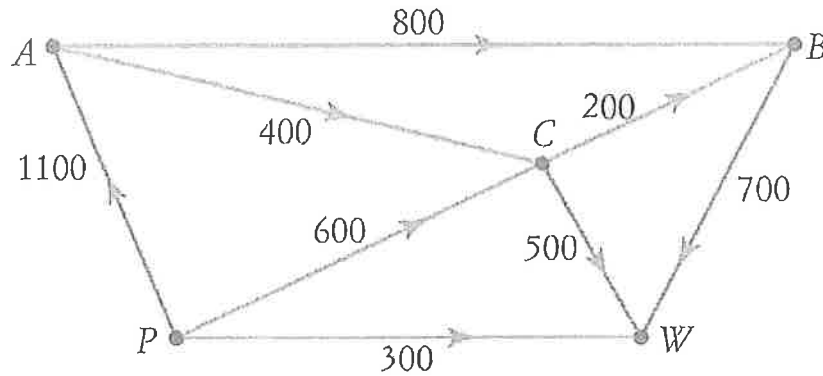
(i) Find the maximum flow from *P* to *W*

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(ii) Show the flow along the edges to achieve the maximum flow.

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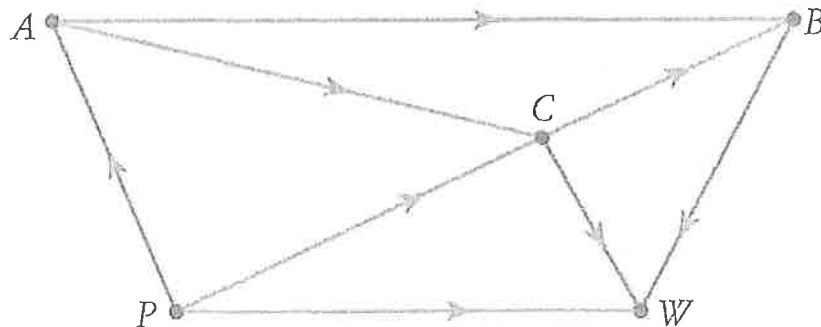
(iii) One road is to be widened to increase its capacity, but the direct road from *P* to *W* (with 300 vehicles per hour capacity) cannot be changed. Which other road's capacity should be increased and by how much will it increase the maximum flow? Give reasons.   2

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Question 19 continues on page 22

21

Question 19 (continued)

(b)   The area (A) of a rectangular yard with a length of x metres is given by the formula:

$A = 30x(15-x)$ where A is in square metres. The graph of A against different values of x is shown below.

$$A = 30x(15 - x)$$
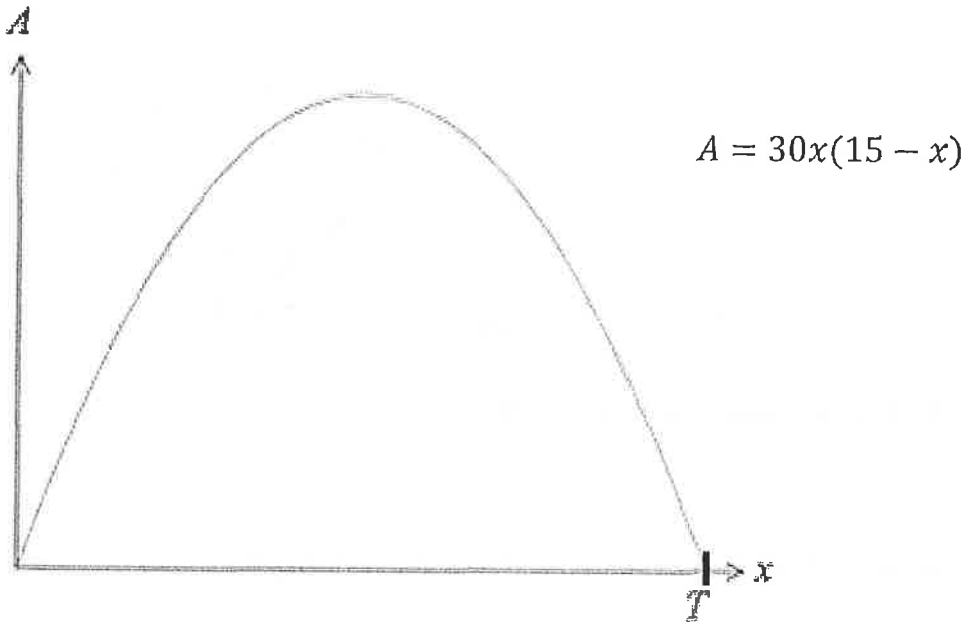
(i)   Complete the following table of values.   2

x	0	5	10	15
A				

(ii)   What is the value of T on the graph?   1

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(iii) Calculate the maximum area of the yard.   2

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Question 19 continues on page 23

22

(c)   A cup of coffee is made from freshly boiled water. It quickly cools such that its temperature T is given by the formula:

$$T = 20 + 75 \times (1.5)^{-0.2t}$$

where t is time in minutes and T is the temperature in degrees Celsius.
A graph of its temperature is given below.

DIAGRAM NOT TO SCALE
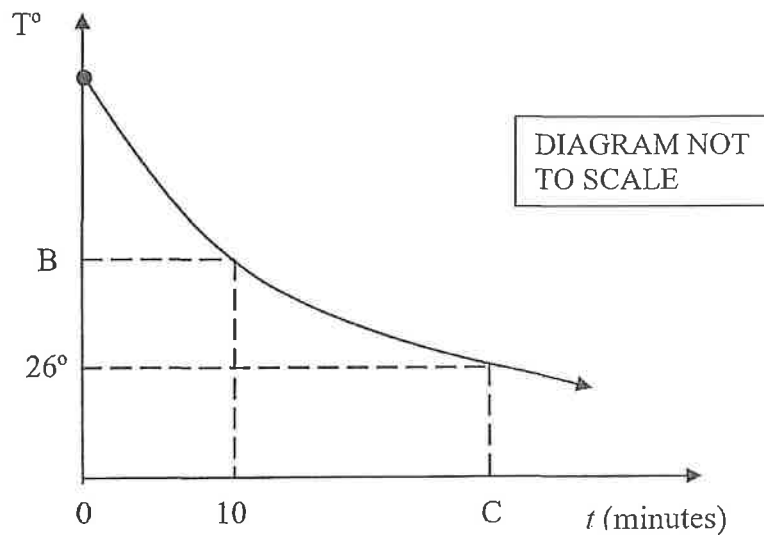
(i)   Determine the value of **B** to the nearest degree.   **2**

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(ii)   Using guess and check, determine the value of **C** to the nearest minute.   **2**

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Question 19 (continued)

(d) Connor is renovating a house. The renovation involves activities **A** to **L**.

The network diagram shows these activities and their completion time in **days**.
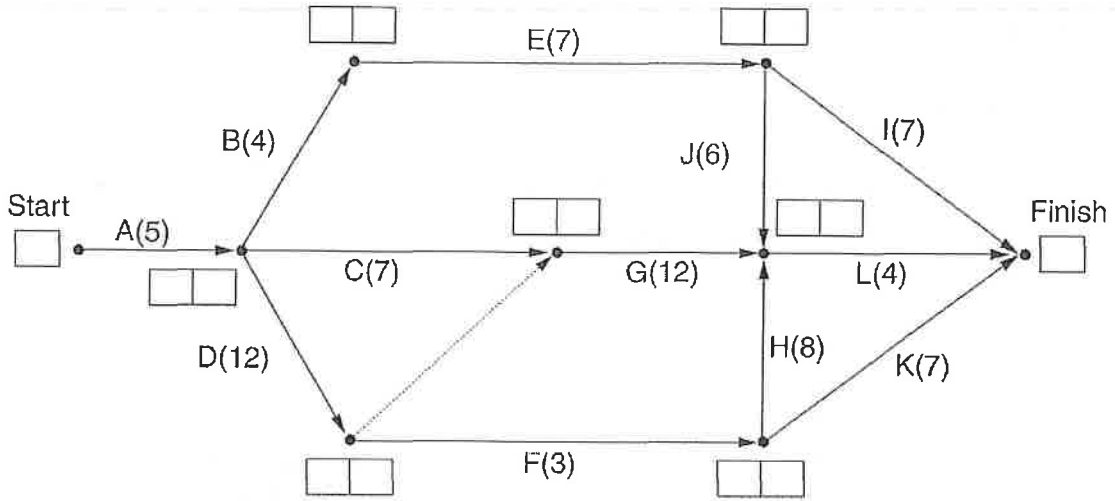
(i) Which activities *immediately* precede activity **L**?   **1**

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(ii) By completing the diagram above, calculate the minimum time required   **2**
to complete the renovation.

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(iii) Determine the critical path and list the activities.   **1**

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(iv) Connor wants to shorten the project duration by 4 days and proposes to crash   **2**
activity **G** from 12 days duration to 8 days.

Will this have the desired effect? Justify your response.

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End of Question 19

24

Question 20 (11 marks)

(a)   Harry is looking to get a loan of $220 000.

   (i)   He finds he is able to borrow $220 000 at 8% p.a. compounded annually and make   **2**
          repayments of $19 500 at the end of each year. Calculate the balance of the loan
          after 3 years. (You may find a recurrence relationship helpful)

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   (ii)   An alternative is to borrow $220 000 at 5.4% p.a. compounded monthly.   **2**
           Use the table of Present Value Interest Factors below to find the amount of his
           monthly repayment on this alternative loan if he were to repay it in full over 5 years.

Present value of an annuity with a contribution of $1 at the end of each period							
Period	Interest Rate per period						
	0.004	0.0045	0.005	0.0055	0.006	0.0065	0.007
52	46.86398	46.27170	45.68975	45.11790	44.55596	44.00373	43.46101
53	47.67329	47.05993	46.45746	45.86564	45.28425	44.71309	44.15195
54	48.47937	47.84463	47.22135	46.60929	46.00820	45.41787	44.83808
55	49.28224	48.62582	47.98145	47.34887	46.72784	46.11811	45.51944
56	50.08191	49.40350	48.73776	48.08440	47.44318	46.81382	46.19607
57	50.87840	50.17770	49.49031	48.81592	48.15425	47.50503	46.86799
58	51.67171	50.94843	50.23911	49.54343	48.86109	48.19179	47.53525
59	52.46186	51.71571	50.98419	50.26696	49.56370	48.87411	48.19786
60	53.24887	52.47956	51.72556	50.98653	50.26213	49.55202	48.17337

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Question 20 continues on page 26

25

Question 20 (continued)

(b) The height and weight of 10 elite sportswomen are shown in the table.

Height (cm)	196	190	178	184	175	191	168	173	180	180
Weight (kg)	78	72	65	79	73	94	64	71	67	82

(i) Complete the table of values below (to 2 decimal places):   **2**

	Mean	**Population Standard Deviation (σ_x)**
Height *(x)*		8.32
Weight *(y)*	74.50	
	Correlation coefficient $r =$	

(ii) Determine the equation of the least-squares line of best fit for this data   **2**
(using values correct to 2 decimal places).

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Least-squares line of best fit

$$y = \text{gradient} \times x + y\text{-intercept}$$

$$\text{gradient} = r \times \frac{\text{standard deviation of } y \text{ scores}}{\text{standard deviation of } x \text{ scores}}$$

$$y\text{-intercept} = \bar{y} - (\text{gradient} \times \bar{x})$$

r is correlation coefficient

$\bar{x}$ is mean of x scores

$\bar{y}$ is mean of y scores

(iii) Using the equation of the least-squares line of best fit, predict the height of an elite   **3**
sportswoman with a weight of 85kg. Justify the accuracy of your prediction.

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End of Paper

MATHS STANDARD 2
2019 TRIAL HSC EXAMINATION

Section 1

(1) 4 significant figures   (B)

(2) $11x - 6x - 4 =$

$5x - 4$ (B)

(3) Mean $= \dfrac{\text{sum of scores}}{\text{number of scores}}$

$11 = \dfrac{\text{sum}}{3} \quad \therefore \text{sum} = 33$

$10 = \dfrac{\text{sum}}{4} \quad \therefore \text{sum} = 40$

Sum difference $= 40 - 33$

$= 7$

fourth score $= 7$ (C)

(4) $S = \$27500(1 - 0.14)^6$

$S = \$11125.60$ (B)

(5) Volume $= \dfrac{1}{3}Ah$

$h^2 = 5^2 - 3^2$

$h = 4\,cm$

5 cm, h, 3 cm
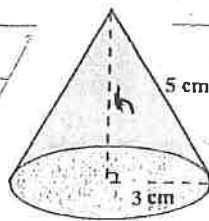
Volume $= \dfrac{1}{3}\pi r^2 h$

$= \dfrac{1}{3}\pi (3)^2 (4)\ cm^3$

$= 12\pi\ cm^3$ (A)

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(6) Thursday = 8 hours normal time

Friday = 7 hours normal time

Saturday = $5 \times 1.5 = 7.5$ hours normal

Sunday = $3.5 \times 2 = 7$ hours normal

Highest pay = Thursday   (A)

(7) $1.66\,m = 166\,cm$

Absolute error $= \pm0.5\,cm$

Percentage error $= \dfrac{\pm0.5}{166} \times 100$

$= 0.30\%$ (C)

(8) 83 kcals $= 347.272\,kJ$

Energy used by Cameron $= 7.37 \times 70$

$= 515.9\,kJ$

$\dfrac{347.272}{515.9} = 0.6731\cdots$

Time needed $= 0.6731\cdots \times 30\ mins$

$= 20.19\cdots\ mins$

$\approx 20\ mins$ (A)

(9) Balance owing $= \$2500 - \text{deposit}$

$= \$2250$

Repayments $= 24 \times \$122$

$= \$2928$

Interest paid $= \$2928 - \$2250$

$= \$678$

Using $I = Prn$

$\$678 = \$2250 \times r \times 2$

$r = 15.06\%\ p.a$

$r \approx 15\%\ p.a$ (B)

⑩ $A = \dfrac{h}{2}(a+b)$

(×2) $2A = h(a+b)$

(÷h) $\dfrac{2A}{h} = a+b$

(−a) $\dfrac{2A}{h} - a = b$ (D)

⑪
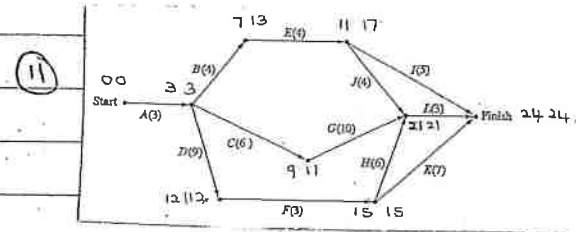
Critical Path (no float time) is

A − D − F − H − L   (D)

⑫ $FV = \$75\,000 \times 1.2155$

$= \$91\,162.5$

Interest $= \$91\,162.5 - \$75\,000$

$= \$16\,162.5$ (B)

⑬ $\dfrac{x}{\sin 78^\circ} = \dfrac{36}{\sin 61^\circ} = \dfrac{27}{\sin 41^\circ}$

Either $x = \dfrac{36}{\sin 61} \times \sin 78^\circ$

or $x = \dfrac{27}{\sin 41^\circ} \times \sin 78^\circ$ (A)

⑭ $m = \dfrac{Rise}{Run}$

$m = \dfrac{4}{3}$ (D)

⑮ $2\,mg \mid 1\,mL$

$5g = 5000\,mg$

$5000\,mg \mid 2500\,mL$ (D)

Section II

⑯

(a) $Cost = \$1.80(1+0.03)^{20}$

$= \$3.25$

(b) $d = \dfrac{5 \times 100 \times 0.7}{18} + \dfrac{100^2}{170}$

$d = 78.3\,m$

(c) $\dfrac{2x+5}{3} = x-1$

$2x+5 = 3(x-1)$

$2x+5 = 3x-3$

$-x = -8$

$x = 8$

(d) Total run time = 9 hours 17 mins

Finish time = 7:15 p.m Friday

$+\ 9:17$

Finish time = 4:32 a.m on Saturday

(e) Dividend $= 4800 \times \$2.10 \times 0.038$

$= \$383.04$

(f) (i) $\dfrac{4426}{11888} \times 100 = 37.23\%$

(ii) $\dfrac{4426}{8453} \times 100 = 52.36\%$

(g) (i) $\dfrac{6\%}{12} = 0.5\% \ (0.005)$

(ii) $A = \$117\,380.43$

$B = \$117\,380.43 \times 0.005 = \$586.90$

$C = \$(117\,380.43 + 586.9) - \$1250$

$= \$116\,717.33$

(iii) Loan reduction $= \$120\,000 - \$116\,717.33$

$= \$3282.67$

$\dfrac{\$3282.67}{\$120\,000} \times 100 = 2.7\%$

(h) (i)

	A	B	C	D	E	F	G
A	-	25				32	33
B		-	21	13			16
C			-	19			
D				-	52		30
E					-	19	21
F						-	42
G							-

(ii) Not transversable; Has more than 2 odd vertices

(i) Taxable Income = \$(106000 + 8450) - \$14800
$$= \$99650$$

(ii) Tax payable = \$20797 + (99650 - 90'000) × \$0·37
$$= \$24367·50$$

(iii) Tax DEBT of \$(24367·5 - 22450)
$$= \$1917·50$$

(17) (a) (i)
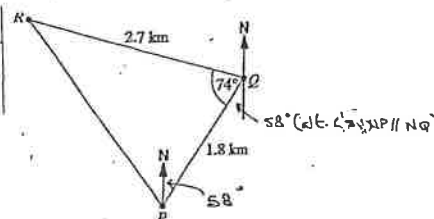
Bearing of P from Q = 180° + 58°
$$= 238°$$

(ii) $RP^2 = 1·8^2 + 2·7^2 - 2(1·8)(2·7) \times \cos 74°$
$RP = \sqrt{7·85080490}$
RP = 2·80 Km (correct to 2 decimal places)

(iii) Area = $\frac{1}{2}(1·8)(2·7)\sin 74°$
Area = 2·34 Km² (correct to 2 d·p)

(b) (i) $BAC = \dfrac{10(5) - 7·5(4)}{6·8 (68)}$

BAC = 0·04325259516
BAC = 0·043 (correct to 3 d. p)

(ii) $0·05 = \dfrac{10(5) - 7·5(H)}{6·8(68)}$

23·12 = 50 - 7·5H
3·584 = H
3 hours 35 mins = H
Earliest drive time = 8 p·m + 3h 35 mins
$= 11:35 p·m$

(c) (i) $280 = \dfrac{K}{3}$
K = 840

(ii) $R = \dfrac{840}{N}$
$R = \dfrac{840}{5}$
R = \$168

(d) $FV = \$1650(1 + 0·02)^{12}$
FV = \$2092·598···
FV = \$2093 (to nearest \$)

(e) (i) AB measures 4·5 cm
AB is 90 m = 9000 cm
Scale is 4·5 : 9000
1 : 2000

(ii) $A_1 = \dfrac{30}{2}(60 + 50) = 1650 m^2$
$A_2 = \dfrac{30}{2}(50 + 40) = 1350 m^2 +$
$A_3 = \dfrac{30}{2}(40 + 50) = 1,350 m^2$
Total area = 4350 m²

(18)

(a)

$Q_2 = 24$
$Q_1 = 34$
$Q_3 = 44$
Q_2

(c)

(i) Mode = 41 successful shots

(ii) Median = 24 successful shots

(i) see above for minimum spanning tree.

(iii) IQR = $Q_3 - Q_1$

= 44 - 34

= 10

(ii) $16 + 18 + 19 + 20 + 21 + 33 = 127$ km

(iv) $Q_1 - 1.5 \times IQR =$

34 - 1.5 × 10 = 19

scores less than 19 are outliers

so 17 is an outlier

(iii) shortest path is

A - C - F - E   (79 km)

(b)(i) $\frac{120}{360} \times \frac{120}{360} = \frac{1}{9}$

(d)

(ii) $\frac{60}{360} \times 72 = 12$ greens

12 greens are expected in 72 spins
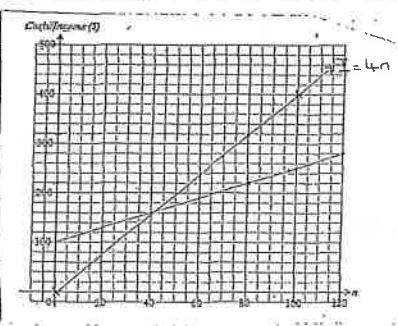
(i) a = 100

b = $\frac{3}{2}$

(ii) $I = 4n$

(iii) see graph above

(iv) 40 pastries

(v) 80 pastries

(19) (a)
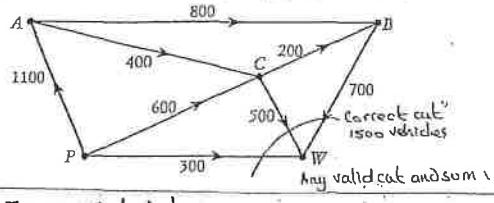
(i) 1500 vehicles

(ii) Two possible solutions below
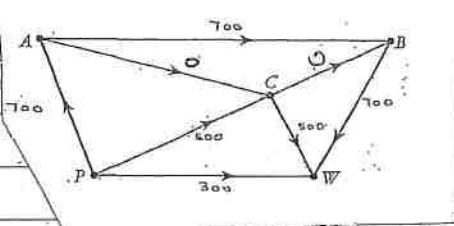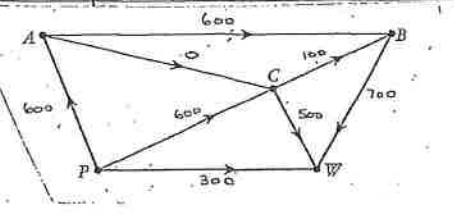
(iii) Widen CW to increase capacity to 1000 vehicles which results in an increase of 500 vehicles

(b) (i)

x	0	5	10	15
A	0	1500	1500	0

(ii) $T = 15$ metres

(iii) $Area = 30 (7.5)(15-7.5) \, m^2$

$Area = 1687.5 \, m^2$

(c)

(i) $T = 20 + 75 \times (1.5)^{-0.2 \times 10}$

$T = 20 + 75 \times (1.5)^{-2}$

$T = 53.\dot{3} \, °C$

$T = 53° \; (\text{to nearest } °)$

(ii)

when $C = 30$, $T = 26.58 °C$

when $C = 31$, $T = 26.07 °C$

when $C = 32$, $T = 25.6 °C$
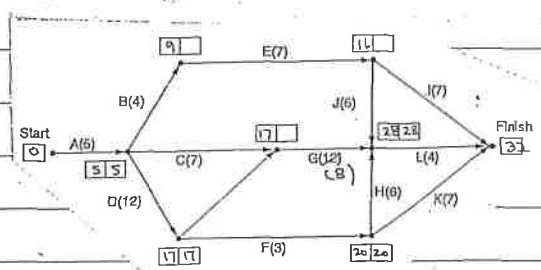
$C \approx 31 \, mins$

(d)

(i) Activities G, H and J

(ii)
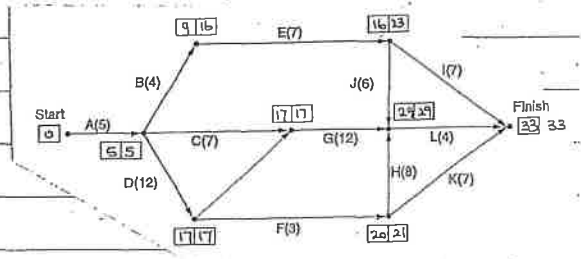
(iii) A - D - G - L

(iv)

(Refer to network above)

Crashing G will not have the desired effect.

Crashing G only results in a 1 day decrease.

(20)

(a)
(i)
$$220\,000 = x \cdot 1.08 - 19560$$
$$= \$218\,100$$
$$= \$216\,048$$
$$= \$213\,831.84$$

Balance of loan = $\$213\,831.84$

(ii) $r = \dfrac{0.054}{12}$

$r = 0.0045$

$n = 5 \times 12$

$n = 60$

Factor from table = 52.47956

Monthly repayment = $\dfrac{\$220\,000}{52.47956}$

$$= \$4192.11$$

(b) (i)

	Mean	Population Standard Deviation (σ_x)
Height (x)	181.5	8.32
Weight (y)	74.50	8.64
	Correlation coefficient $r = 0.61$	

(ii)

gradient $= 0.61 \times \dfrac{8.64}{8.32} = 0.63$

y-intercept $= 74.5 - (0.63 \times 181.5)$
$$= -39.85$$

Equation is $y = 0.63x - 39.85$

(iii)

$y = 0.63x - 39.85$ becomes
$$85 = 0.63(x) - 39.85$$
$$x = 198.17 \text{ cm}$$

Height of 198.17 cm

We are extrapolating and as the correlation coefficient is not strong, this prediction is unreliable, not accurate