Section II

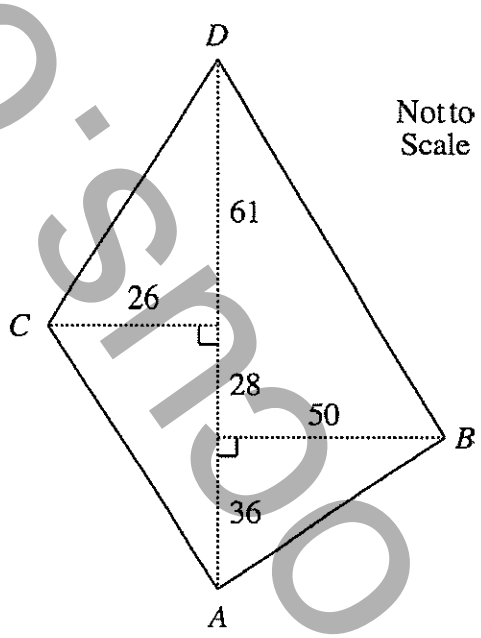
78 marks
Attempt Questions 23–28
Allow about 2 hours for this section

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

All necessary working should be shown in every question.

Question 23 (13 marks) Use a SEPARATE writing booklet. **Marks**

(a)



The diagram above shows the details of a survey of a council park. All dimensions are in metres.

(i) In your answer booklet, record the details of this survey as a notebook entry. **2**

(ii) Find the area of the park (area *ABDC*). **2**

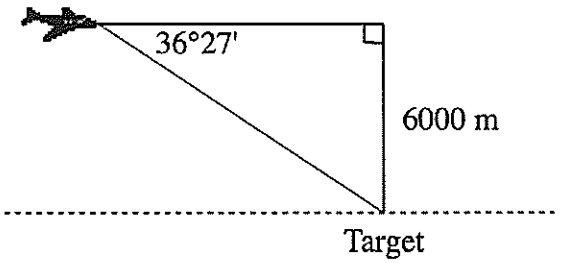
(b) Hayden has a combination lock with three dials. Each dial is numbered from 1 to 16. **2**

- He remembers that the number for the first dial is less than 10.
- He remembers that the number for the second dial is even.
- He can't remember anything about the third dial.

Based on what Hayden can remember, how many different combinations are possible?

Question 23 continues on Page 12

(c) A skydiver in an aircraft, flying at a height of 6000 m at a speed of 140 m/s, observes her target ahead at an angle of depression of 36°27'.



(i) Calculate the horizontal distance from the aircraft's current location to the point directly above the target. Give your answer correct to the nearest metre. **2**

(ii) How long will the aircraft take to reach the point directly above the target? Give your answer correct to the nearest second. **1**

(d) The table below shows the destinations for Australian tourists. **2**

Outbound Tourists by Country of Destinations (2001-02)

Country/Region	Departures	Proportion of Total (%)
New Zealand	592 200	17.6
United Kingdom	308 000	9.1
United States	276 000	8.2
Indonesia	270 900	8.1
Other Europe	305 900	9.1
Other Asia	772 300	22.9
Other Oceania	138 200	4.1
Rest of the World	704 400	20.9
Total	**3 367 900**	**100.0**

(Source: Australian Bureau of Statistics)

What type of graph would be most appropriate to display this data? Justify your answer.

(e) The price of a loaf of bread is $3.60. The price increases at the same rate as inflation. If the inflation rate is 2.5% p.a., what would you expect to pay for a loaf of bread in 3 years time? **2**

End of Question 23

Question 24 (13 marks) Use a SEPARATE writing booklet. **Marks**

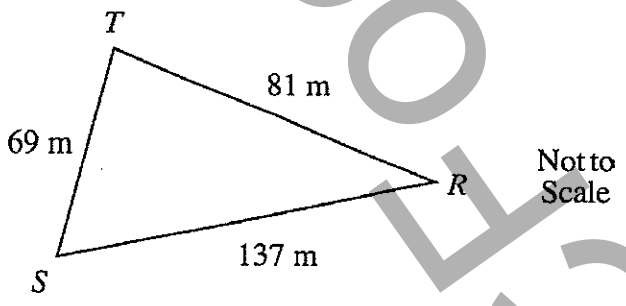
(a) The daily maximum temperature for Sydney was recorded at Observatory Hill on every day in January. The information is summarised in the frequency distribution table below.

Temperature C° (x)	(fx)	Cumulative Frequency (cf)
23	115	5
24	48	7
25	125	12
26	130	17
27	N	24
28	112	28
29	29	29
30	30	30
31	31	31

(i) Find the median temperature for January. **1**

(ii) Find the value of N in the table above. **1**

(b) **2**



Find, correct to the nearest degree, the size of $\angle STR$ in the diagram above.

(c) Solve: $\frac{x+1}{3}-\frac{2x-8}{5}=1$ **3**

Question 24 continues on Page 14

Question 24 (continued) **Marks**

(d) Wade has secured a flat rate car loan of \$12 000 for the full price of his new car with Southern Stone Building Society at an interest rate of 9.25% p.a. over 4 years.

(i) Show that Wade's monthly repayment is \$342.50. **3**

(ii) Wade's monthly repayment represents 35% of his net monthly income. Calculate his net monthly income. **1**

(iii) Wade's new car depreciates at a rate of 15% per year. Find the value of the car at the completion of the loan. **2**

End of Question 24

Question 25 (13 marks) Use a SEPARATE writing booklet. **Marks**

(a)

Taxable Income	Tax Payable on Taxable Income
\$0 – \$6000	Nil
\$6001 – \$30000	15¢ for each \$1 over \$6000
\$30001 – \$75000	\$3600 plus 30¢ for each \$1 over \$30000
\$75001 – \$150000	\$17100 plus 40¢ for each \$1 over \$75000
Over \$150000	\$47100 plus 45¢ for each \$1 over \$150000

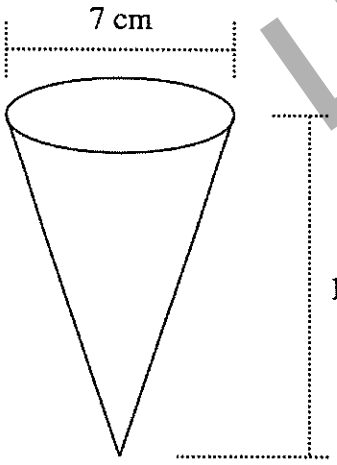
(i) Lynne earns an annual salary of \$86 458 from her job with a law firm. Use the tax table above to calculate the tax payable on her taxable income if she has allowable deductions of \$2500. **2**

(ii) Lynne must also pay the Medicare Levy of 1.5% of her taxable income. Calculate the amount that Lynne must pay. **1**

(iii) Throughout the year, Lynne has \$833.97 tax per fortnight deducted from her salary. Will Lynne receive a refund or will she need to pay an additional amount in tax? What is the amount of her refund or tax bill? **2**

(b) Daisy is about to travel from London (52°N,0°) to Ho Chi Minh City, Vietnam (11°N,105°E), for a working holiday. Her flight departs London at 6:40 pm. The duration of the flight, which includes a brief stopover in Hong Kong, is given as 16 hours 15 minutes. What is the estimated local time of arrival in Ho Chi Minh City? **4**

(c) During a hot day, Tim buys an ice-cream cone. Cones are 12 cm high and have an internal diameter of 7 cm.



(i) Show that the volume of the cone is 154 cm^3, correct to the nearest cubic centimetre. **2**

(ii) A spherical scoop of ice-cream, with the same radius as the top of the cone is placed at the top of the cone. Show that the volume of this scoop is 180 cm^3, correct to the nearest cubic centimetre. **2**

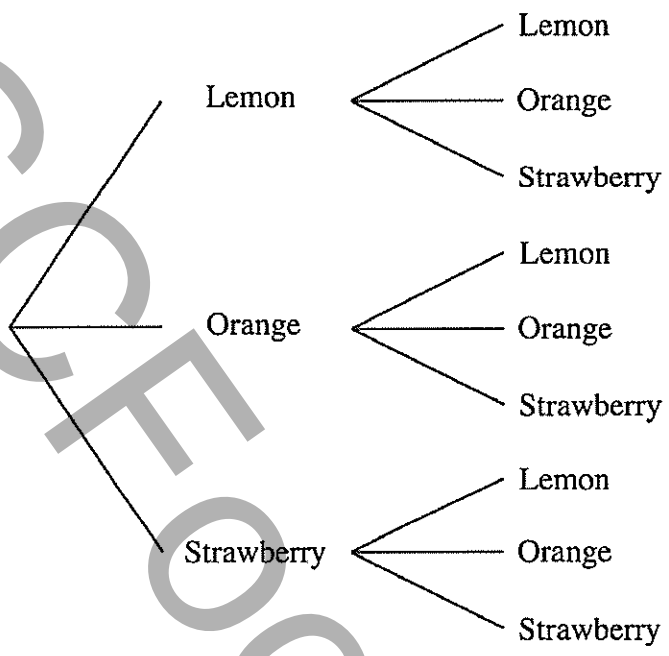
End of Question 25

Question 26 (13 marks) Use a SEPARATE writing booklet. **Marks**

(a) A packet of 40 jubes contains 25 lemon, 10 orange and 5 strawberry jubes. Chanelle takes a packet into the movies and randomly chooses jubes throughout the movie.

(i) What is the probability that the first jube she chooses is lemon flavoured? **1**

The tree diagram below represents the possibilities of her first two choices.



(ii) Copy or trace the tree diagram into your writing booklet. Complete your tree diagram by writing the correct probability on each branch. **2**

(iii) Calculate the probability that Chanelle chooses two jubes with the same flavour. **2**

(b) The weights of packets of rice are normally distributed. The mean is 1.03 kg and the standard deviation is 0.015 kg.

(i) What is the weight of a packet that has a z-score of 2.5? **1**

(ii) What is the z-score of a packet of rice with a weight of 1 kg? **1**

(iii) Rice packets are labelled as having a weight of 1 kg. What percentage of packets will have a weight greater than 1 kg? **2**

(c) The volume of a sphere is given by $V = \frac{4}{3}\pi r^3$.

(i) Find an expression for r in terms of V and π. **2**

(ii) Hence, or otherwise, find the radius of a sphere with a volume of 1767 cm^3. Give your answer correct to 2 significant figures. **2**

End of Question 26

Question 27 (13 marks) Use a SEPARATE writing booklet. **Marks**

(a) Adam needs $25 000 to take Eve on a dream holiday to the Virgin Islands in 3 years from now. He has found an account which pays interest at 9.6% p.a., compounded monthly. What amount of money will Adam need to contribute each month so he will have enough money for the holiday? **3**

(b) Bill owns a pet shop. The shop sells two types of fish food, *Gobble* and *Munch*. Both types of fish food sell at the same price. He decides to discontinue selling one of the brands. Over a 10 week period, he surveys his customers to see which brand they preferred.

The table below shows his results for each of the 10 weeks.

Week	1	2	3	4	5	6	7	8	9	10
Number of customers who prefer *Gobble*	14	26	33	14	33	56	40	26	11	28
Number of customers who prefer *Munch*	22	24	37	34	31	29	33	18	17	36

(i) Display the information above in an **ordered** back-to-back stem-and-leaf plot. **2**

Bill performs the following calculations.

	Mean	Standard Deviation (σ_n)
Number of customers who prefer *Gobble*	28.1	12.9
Number of customers who prefer *Munch*	28.1	

(ii) Calculate the standard deviation of the data for *Munch*. **1**

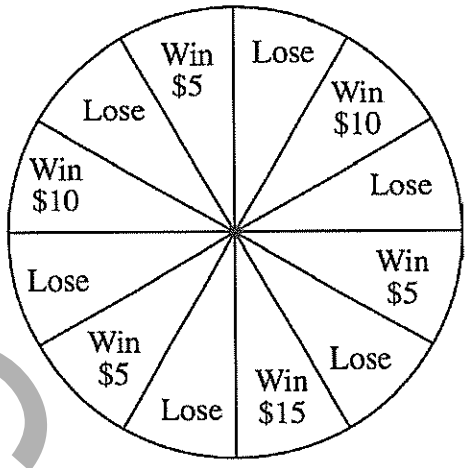
(iii) Compare and contrast the two data sets by commenting on the shape and skewness of the distributions, and the measures of the location and spread. **3**

(iv) Which brand of fish food would you advise Bill to discontinue? Give reasons for your answer. **1**

Question 27 continues on Page 18

Question 27 (continued) **Marks**

(c) James creates a betting game where a player spins a pointer on a wheel with the outcomes shown below.



(i) Calculate the financial expectation in James' game. **2**

(ii) What entry fee does James need to charge so he will make a profit on this game? **1**

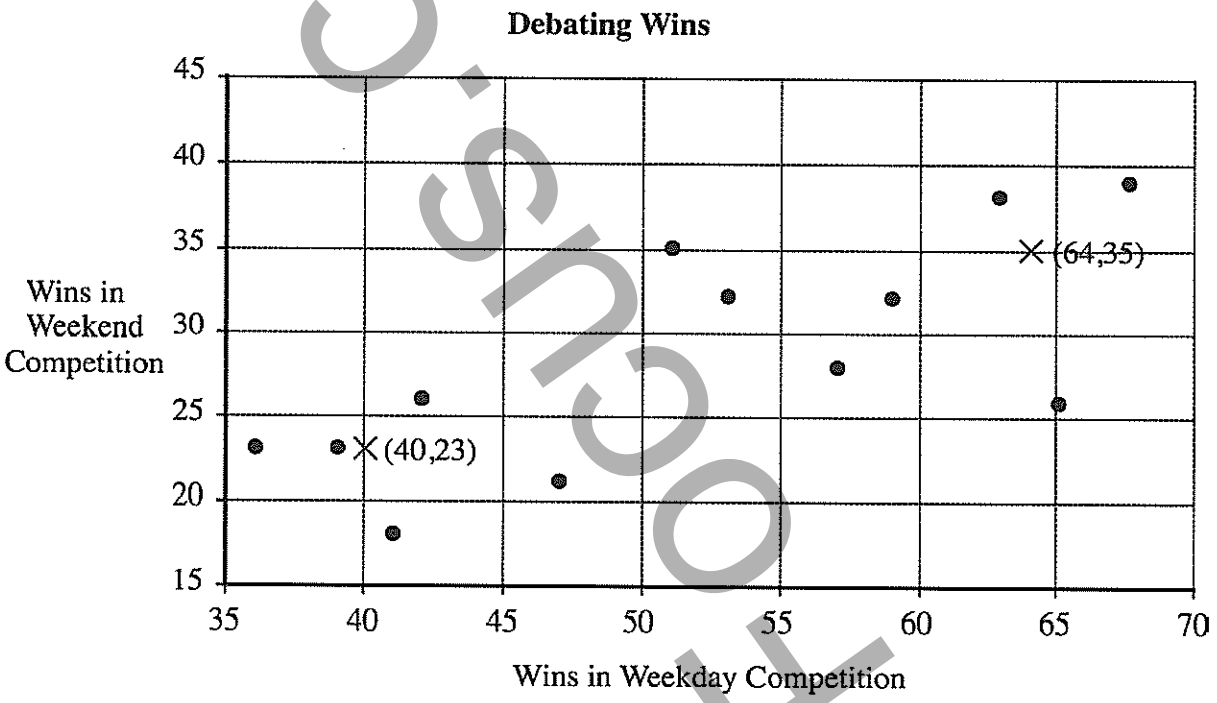
End of Question 27

Question 28 (13 marks) Use a SEPARATE writing booklet. **Marks**

(a) Twelve schools take part in two different debating competitions. One competition runs during the week and the other takes part on weekends. Karen wanted to analyse the results from this year's competition. She collated the number of wins by each school in each of the competitions.

School	A	B	C	D	E	F	G	H	I	J	K	L
Wins in Weekday Competition	36	39	41	42	47	51	53	57	59	63	65	67
Wins in Weekend Competition	23	23	18	26	21	35	32	28	32	38	26	39

The data in the table above is also shown in the graph below.



(i) To construct a median regression line, three median points must first be found. The first median point has co-ordinates (40,23) and the third median point has co-ordinates (64,35), as shown in the graph above. What are the co-ordinates of the second median point? **1**

(ii) Find the gradient of the median regression line. **1**

(iii) Karen proposes that if a school performs well in one competition then it will also perform well in the other competition. Do you agree or disagree with her proposal? Use information in the table and graph to support your answer. **2**

Question 28 continues on Page 20

(b) Lauren is going to invest the 21st birthday gift from her grandmother. She has found an investment account which pays 7% p.a., compounded annually. In which year will her investment first double in value? Support your answer with relevant calculations. **2**

(c) The temperature of a star (T°C) is given by the formula $T = 15000(0.864)^t$, where t is the star's age in millions of years.

(i) What was the initial temperature of the star? **1**

(ii) Copy and complete the following table in your answer booklet. **2**

t (millions of years)	0	1	2	3	4
T (°C)		12960		9675	

(iii) Using half a page, draw a neat graph of the temperature of the star against time. Use the horizontal axis for time (from $t = 0$ to $t = 4$) and use the vertical axis for temperature (from $T = 0$ to $T = 15000$). **2**

(iii) Which type of graph is this? Briefly describe some of the features of the graph. **2**

END OF EXAMINATION

EXAMINERS

Bill Waddell (Convenor)	St Patrick's Marist College, Dundas
Patrick Curteis	Kambala, Rose Bay
Neila Darrough	Bethany College, Hurstville
Julie MacDougal	Rosebank College, Five Dock