

1 Simplify  $\frac{12s^4x}{2x}$

- (A)  $12s^4$
- (B)  $6s^4x$
- (C)  $6s^4$
- (D)  $24s^3x$

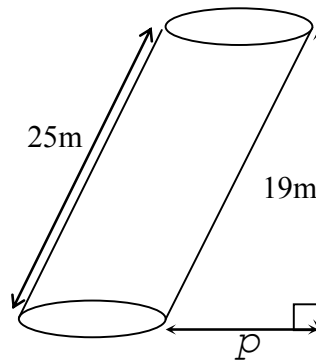
2 The number of students at Carlto High are shown in the table below. If a fair survey with a sample size of 40 is to be taken how many boys, should be surveyed?

Boys	1008
Girls	672
Total	1680

- (A) 25
- (B) 16
- (C) 24
- (D) 15

3 The leaning tower of Pisa is like an oblique cylinder. To the nearest metre what is the length of the overhang  $p$  of the Leaning tower of Pisa?

- (A) 16m
- (B) 22m
- (C) 17m
- (D) 18 m



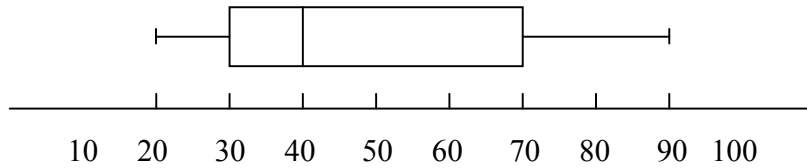
4 Gino saw a Buntings add for bark chips.

Type	Cost per 1.5 tonnes
Pine	\$ 30.00
Hardwood	\$ 29.50
Recycled wood	\$ 28.10
Redwood	\$ 32.80

How much will it cost Gino to buy 4.2 tonnes of Recycled wood?

- (A) \$100.60
- (B) \$42.15
- (C) \$118.02
- (D) \$78.68

5 Which of the following is a true statement about this box and whisker plot?



- (A) The median is 40 and the range is 40
- (B) The mean is 40 and the range is 70
- (C) The median is 40 and the range is 70
- (D) The mean is 40 and the range is 40

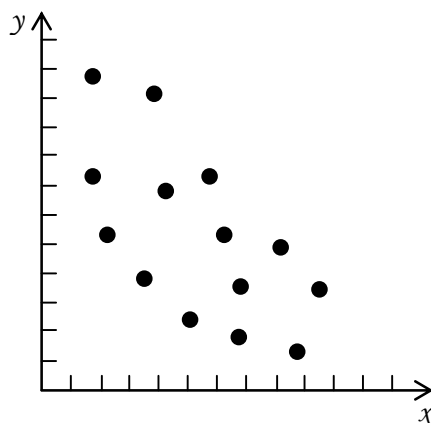
6 The distance light travels in one year (one light year) is  $9 \times 10^{12}$  km. The closest inhabitable planet Alpha Centuari is 30 light years away. The distance to Alpha Centuari in kilometres is ?

- (A)  $2.7 \times 10^{14}$  km.
- (B)  $39 \times 10^{12}$  km.
- (C)  $3.9 \times 10^{14}$  km.
- (D)  $27 \times 10^{12}$  km.

7 Sally has 3000 shares with a market value of \$2.00 per share. The shares pay a dividend of 25c per share. What is the dividend yield?

- (A) 37.50%
- (B) 12.50%
- (C) 1.25%
- (D) 6.25%

8 Which of the following best describes the correlation coefficient for this scatter plot ?



- (A) High negative
- (B) High positive
- (C) Low negative
- (D) Low positive

**9** The surface area  $A$  of a cube is directly proportional to the square of the side length  $s$ . Which of these equations correctly connects  $A$  and  $s$ ?

- (A)  $A = k s^2$
- (B)  $A^2 = k s$
- (C)  $A = s^2$
- (D)  $A^2 = s^2$

**10** Smarties are manufactured with the following relative frequencies.

Green	Yellow	Brown	Red	Blue
0.25	0.35	0.10	0.25	0.15

The expected number of red smarties in a pack of 100 is?

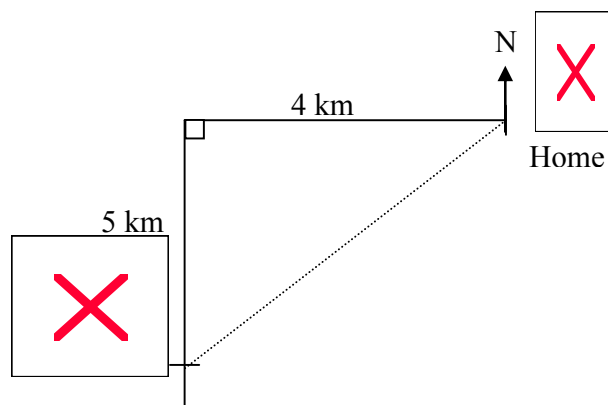
- (A) 35
- (B) 75
- (C) 15
- (D) 25

**11** Five thousand fish were caught, tagged and released back in to the lake later another sample of 300 were caught, 80 of which were found to be tagged. Which is the best estimate for the number of fish in the lake?

- (A) 1333
- (B) 18750
- (C) 2400
- (D) 400000

**12** From home Tina walks 4 km west and then 5 km south to school. To the nearest degree what is the bearing of Tina's school from home?

- (A)  $243^\circ$
- (B)  $231^\circ$
- (C)  $219^\circ$
- (D)  $233^\circ$



- 13** Bigpayne Accountants are completing Bob the Builders tax return and need to determine how much GST to claim from the taxation department.

Income	\$ 180 000 .00
* Bills Timber	\$ 19 067 .00
* Hadwharehouse	\$ 900 .00
Wendy's wages	\$ 28 000 .00
* Insurance premiums	\$ 4 000 .00
Bobs wages	\$ 34 000 .00
* Replaced Muck and Dizzy	\$ 33 000 .00

\* GST inclusive Items.

What is the amount of GST included in the total, to the nearest cent?

- (A) \$ 5228.13 (B) \$ 5696.70 (C) \$ 5178.82 (D) \$ 5778.28
- 14** Zabrov measured the side of a square and found it to be 11 cm.  
The minimum and maximum areas are :
- (A)  $10.9^2 \text{ cm}^2$ ,  $11.1^2 \text{ cm}^2$   
(B)  $10.5^2 \text{ cm}^2$ ,  $11.5^2 \text{ cm}^2$   
(C)  $10^2 \text{ cm}^2$ ,  $12^2 \text{ cm}^2$   
(D)  $10.95^2 \text{ cm}^2$ ,  $11.15^2 \text{ cm}^2$
- 15** Sielei's Upaylots credit card charges 0.065 % per day.  
She purchased a \$500 airfare for her schoolies week holiday on 28/03/04. Determine the interest charges payable on 15/04/04.

- (A) \$61.75 (B) \$58.50 (C) \$ 0.59 (D) \$5.85

**16** The surface area of a sphere is  $88\text{cm}^2$ .

The volume is closest to?

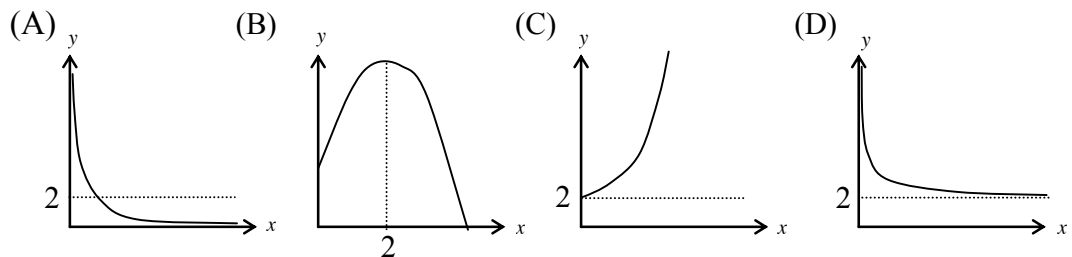
- (A)  $233\text{ cm}^3$  (B)  $29\text{ cm}^3$  (C)  $78\text{ cm}^3$  (D)  $1412\text{ cm}^3$

**17** In a mathematics test the class average was 50% and the standard deviation was 4.

What is the likely-hood that Jane has a score  $\leq 54\%$  in the same test.

- (A) 0.84 (B) 0.16 (C) 0.68 (D) 0.54

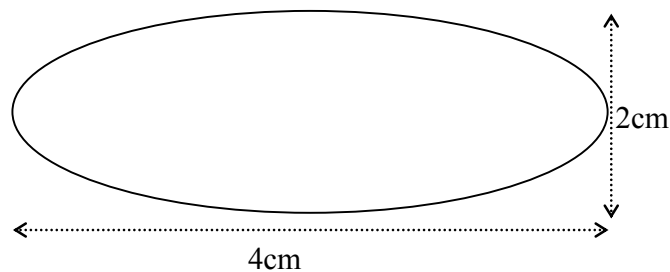
**18** Which of the following best represents  $y = \frac{a}{x} + 2$



**19** A plastic template for schools in the shape of an ellipse has the following major and minor axes.

Faulty manufacturing causes an increase in the minor axis by 10%.

Find the area to two decimal places?



- (A)  $6.91\text{ cm}^2$  (B)  $25.13\text{cm}^2$  (C)  $27.65\text{ cm}^2$  (D)  $6.28\text{ cm}^2$

**20** Rewrite the formula  $B = 9m^3 + 18$  with  $m$  as the subject

- (A)  $m = \sqrt[3]{B+18}$  (B)  $m = \sqrt[3]{\frac{B+18}{9}}$  (C)  $m = \frac{\sqrt[3]{B+18}}{9}$  (D)  $m = \sqrt[3]{\frac{B-18}{9}}$

**21** Macintosh ipods are available with two colours on each model.

There are 6 possible colours available. How many different two colour models are available?

- (A) 26 (B) 36 (C) 30 (D) 75

**22** A solid consisting of a hemisphere and cone at each end, has a radius  $r$ .

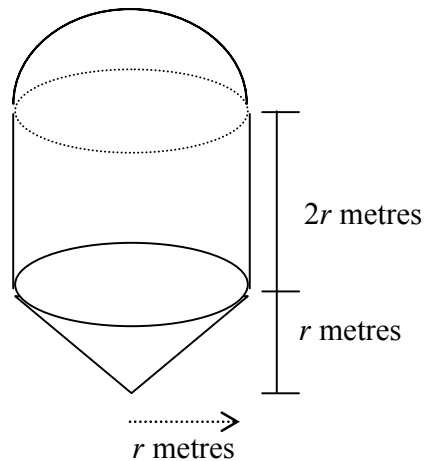
Which is the correct expression for the volume of the solid?

(A)  $\frac{4}{3}\pi r^3 + 2\pi r^3 + \frac{2}{3}\pi r^2$

(B)  $\frac{4}{3}\pi r^3 + 2\pi r^2 + \frac{1}{3}\pi r^3$

(C)  $\frac{2}{3}\pi r^3 + 2\pi r^3 + \frac{1}{3}\pi r^3$

(D)  $\frac{2}{3}\pi r^2 + 2\pi r^2 + \pi r^3$



## 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.

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### Question 23 (13 marks)

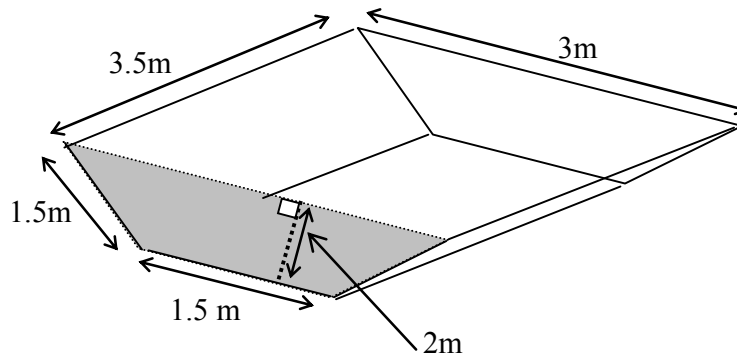
**MARKS**

- (a) Solve the equation  $\frac{g+3}{2} - 3 = \frac{3g}{2}$  **2**
- (b) Scientists at University of Malaysia have been studying the growth of turtles. They have modelled an average turtle's length  $\ell$  in centimetres at time  $t$  in years to be  $\ell = 6.5 \times 2^t$ .
- (i) Determine the average length of a turtle when born. **1**
- (ii) A mature turtle has a length of 80 cm calculate the approximate age in years of a mature turtle, to nearest year. **2**
- (iii) Every mature female turtle lays 310 eggs. **2**  
Only 29% of these hatch.  
Then only 18 % of these reach the water.  
Calculate the number of turtles that reach the water to the nearest whole number.
- (iv) Surveys show that on average 2760 turtles are eaten each year. **2**  
Malaysia's Department of Ecology has determined the local mature female turtle population to be 175.  
In this question assume that all mature female turtles lay eggs.

Use this information and your answer from parts ii) and iii) to give reason/s why the Malaysian Government should consider making turtles a protected species and ban their consumption.

Question 23 continued on page 9

- (c) A fibreglass swimming pool ready for installation needs to be finished with “Pool blue” paint.



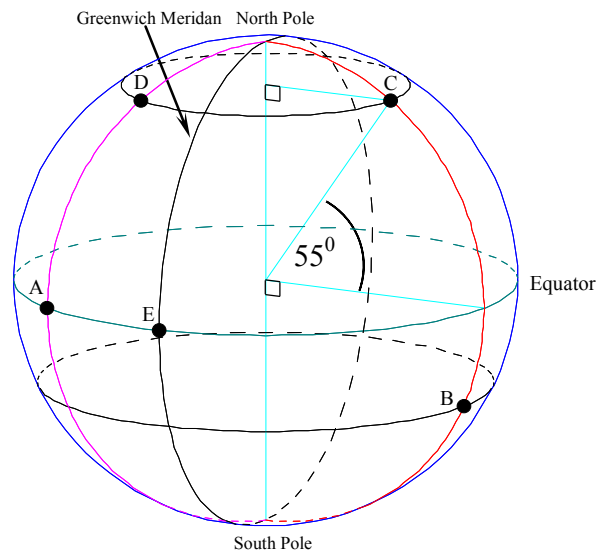
- (i) Calculate the inside surface area. **2**
- (ii) If two coats of paint are required and a 10 L can covers  $40\text{m}^2$ , calculate how many tins of “Pool blue” paint are needed to paint the inside of the pool. **2**

End of Question 23



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

- (a) In this question the radius of the earth to be 6367 km,  
1 nautical Mile = 1.852 km

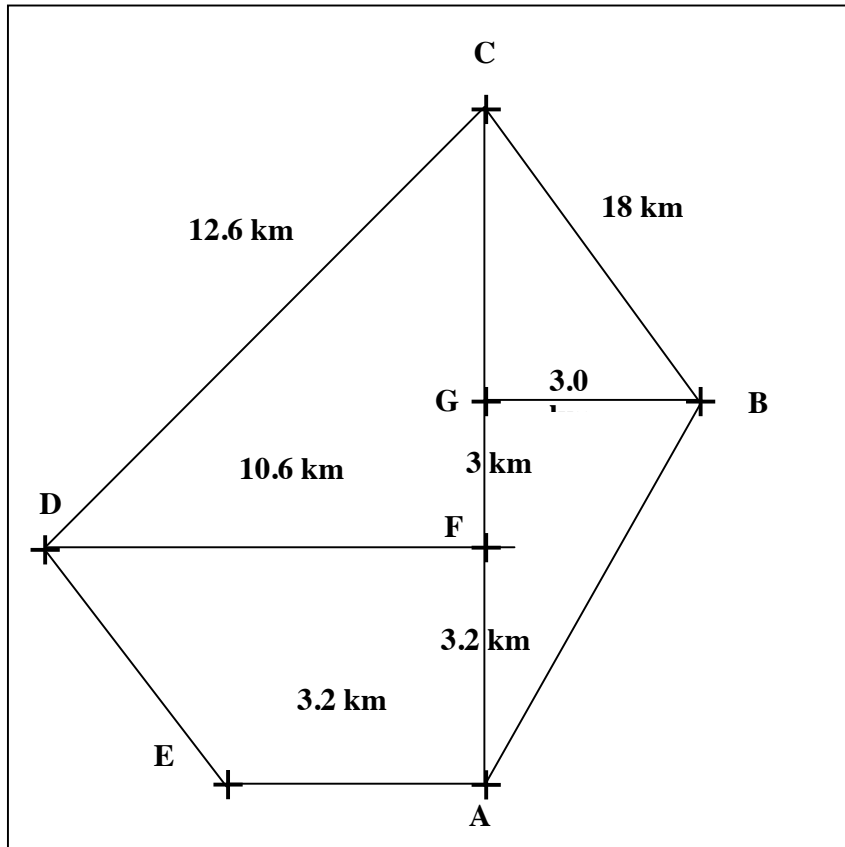


- (i) What is the time difference between A ( $35^{\circ}\text{W}$ ,  $0^{\circ}$ ) and B ( $85^{\circ}\text{E}$ ,  $20^{\circ}\text{S}$ ), (ignoring time zones)? **1**
- (ii) What is the longitude and latitude of C? **1**
- (iii) Small circle radii are determined using trigonometry. The radius ( $r$ ) of a small circle at any latitude is calculated using the following equation,  $r = R \cos \theta$  kilometres, where  $\theta$  is the angle of latitude,  $R$  the radius of the earth. Show that the small circle radius on which C lies is 3562 km to nearest kilometre. **2**
- (iv) (1) Find the distance in nautical miles between D and C To the nearest nautical mile. **2**
- (2) Jane wishes to travel from D to C. If she travels by boat at 60 knots, calculate her travelling time. **1**
- (v) Contrast Jane's trip (from D to C) and Jim's trip (from A to E) if Jim took a plane travelling at 300 Knots. **2**

Question 24 continued on page 11

- (b) The following is a scale diagram (offset survey sketch) by William Cox, one of Australia's early surveyors.

Diagram not to scale



- (i) Determine the length between  $A$  and  $B$ . 2  
All measurements are in kilometres.
- (ii) Using trigonometry determine  $\angle CBG$  to the nearest minute. 2

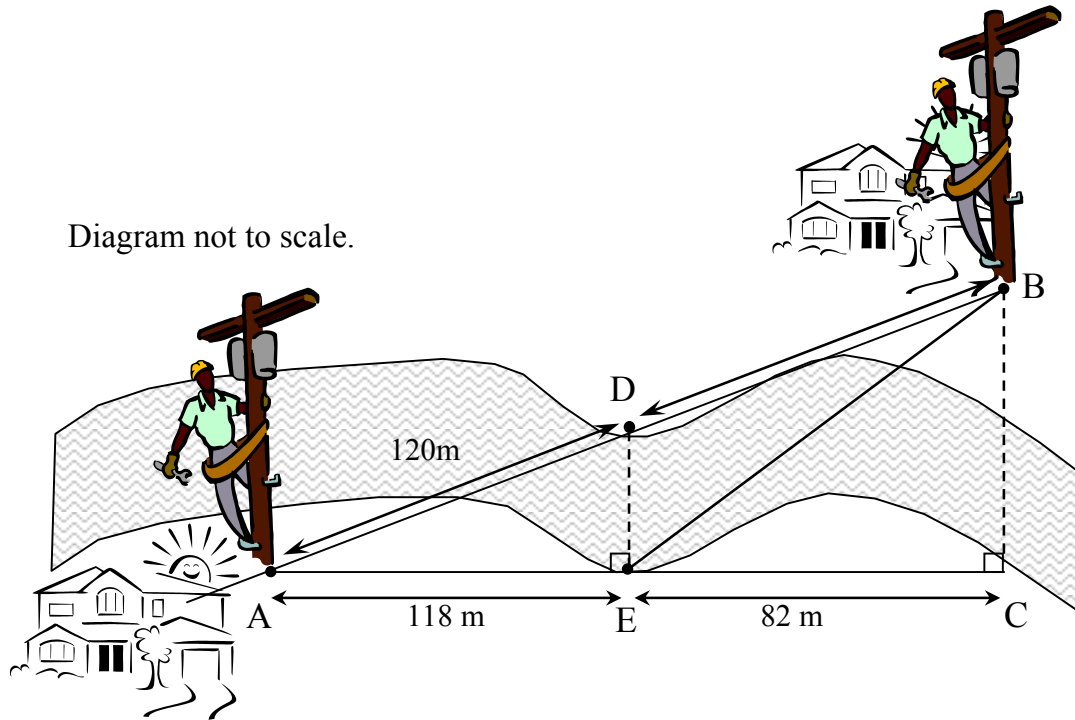
End of Question 24

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

- (a) Ying is offered a home loan for \$85 000 at 7.7% p.a. reducible interest to be repaid over 25 years at \$639.24 per month.
- i) Determine the total amount of interest paid. **1**
- ii) Show that the equivalent flat rate of interest is 5.02% p.a. **1**
- (b) Jane needs a loan of \$100 000 and needs help determining the best of two possible loan options.
- Westpac:** 6% p.a. over 25 years with a fixed monthly repayment of \$644.30. No extra repayments are possible with this loan.
- Commbank :** 7.5% p.a. over 25 years with a minimum monthly payment of \$739.00. Jane estimates that she can afford to repay \$800 per month on this loan. If she does the loan will be repaid in 20 years 4 months.
- i) Calculate the total repayments on each loan. **2**
- ii) Justifying your answer, make a loan recommendation to Jane. **1**
- (c) Kane has an ANZ credit card with an interest free period and an annual interest rate of 18% p.a. on any outstanding balance.  
Kane purchases a holiday for \$1200 and pays \$600 by the due date.  
If Kane makes no more purchases, his next months interest charge was \$9.00.
- i) Determine the interest owing when his second months bill arrives. **2**

- (d) Teltra wishes to cross a river from A to B to provide a new customer with internet access. The river is 23 metres wide, between D and E.

Information found by Electrical workers from their first installation and their site inspection has been added to the diagram below.



Draw diagrams on your exam paper for part (1) and (2).

- (i) (1) Determine the length of a new fibre optic cable run from A to B to the nearest metre. **1**
- (2) Find the distance between B and D to the nearest metre. **1**
- (ii) Teltra charge \$2.20 /m for internet cable installation plus \$400 connection charge. Determine the total charge for the installation A to B using your answer in (i). **1**
- (iii) Otus charges are \$4.00/m with no connection charge, however the cable path must be from A to E then to B. Their inspectors have determined  $\angle CBE = 67^{\circ} 40'$ . Choose which company gives the best value for the installation. Justify your answer. **3**

End of Question 25

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

(a) Until recently the table below applied for Australian personal income tax.

Taxable income	Tax on the income
\$1- \$5 400	nil
\$ 5 401 - \$20 700	20 cents for each \$1 over \$5400
\$ 20 701 - \$38 000	\$3 060 + 34 cents for each \$1 over \$20 700
\$ 38 001 - \$50 000	\$8 942 + 43 cents for each \$1 over \$38 000
\$ 50 001 and over	\$14102 + 47 cents for each \$1 over \$50 000

(i) Find the tax payable by Joanne Smith with the following two incomes. **3**

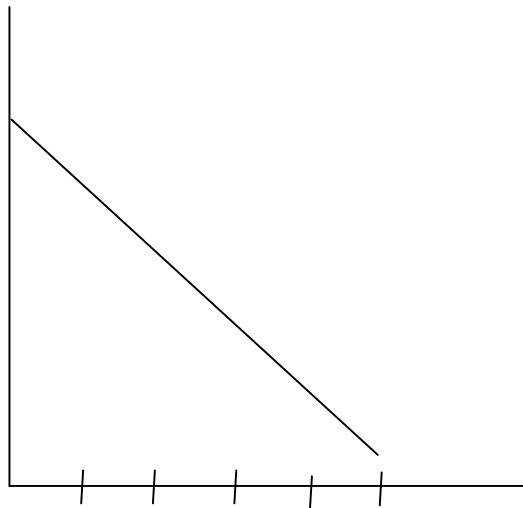
**Job 1** Part time bookkeeping position: **income** \$25 678

**Job 2** Part time pizza delivery: **income** \$ 7 600

She has total allowable deductions of \$856.

(ii) Sally brings home \$24 600 after tax for working 30 weeks in a year. **1**  
 If she works a 44 hour week.  
 What is her hourly rate of pay?

(iii) A computer system purchased at \$4 500 is worth \$470 after 5 years.  
 This is called depreciation and can be modelled as a linear relationship.



(1) Using your sketch, determine the rate of depreciation in dollars per annum. **2**

(3) Show that the computer is worthless after 5 years 7 months. **2**

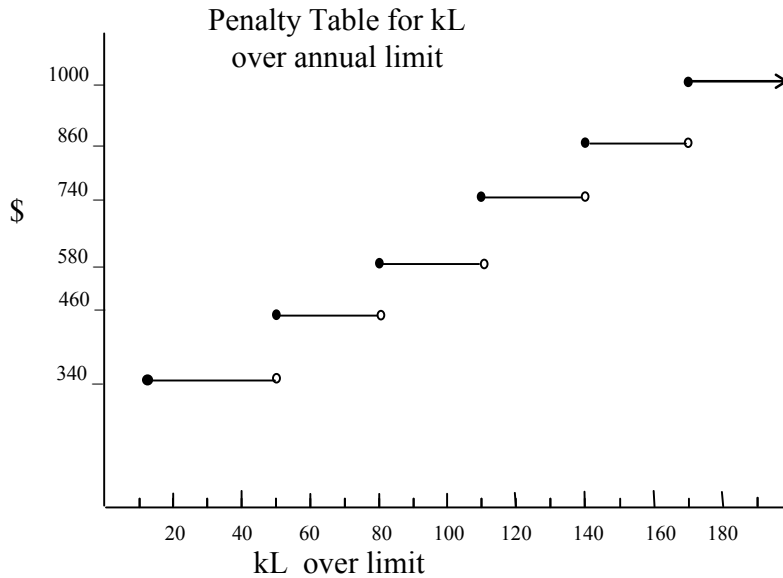
- (b) There are 7 people living in the big brother household, four of whom are female. One by one they are chosen to leave the household, either a male or a female.

If two people are to be randomly selected to leave the house.

- (i) Draw a probability tree showing a first and second selection, indicating the probabilities on each branch. **2**
- (ii) Calculate the probability that the selection includes one male and one female. **1**
- (iii) Before the two selections are made Paul, one of the house mates reckons it is likely that he will stay in the house!  
Do you agree justify your answer. **2**

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

- (a) Water restrictions are in place in Sydney .  
The Drout's have used excess water by filling their pool and have been issued with a penalty.



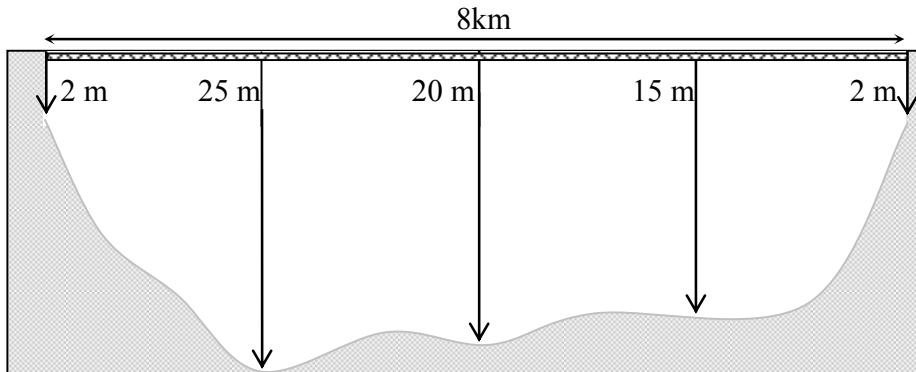
<b>Sydney WATER</b>	
<b>Annual Account</b> D & D Drout 14 Dry street. Strawtown.	<b>Account number.</b> 167.328.284 <b>Billing Year</b> 2003/2004
<b>Water restriction are in force Save water !</b>	
<b>Annual water allowance now reduced to 350kL</b>	
<b>Charges- GST Free</b>	
Water service	\$ 76.54
Sewerage service	\$ 338.56
Stormwater drainage area	\$ 24.10
Water usage charge 385kL at 98.00 cents per kL	
Water consumed 385kL.	\$ 377.30
<b>Exceeded limit</b>	
Amount Due: \$	_____
<b>***Penalty fine ***</b>	
\$	_____
<b>Due Date 23/10/04.</b>	
Total Amount Due: \$	_____

- i) Determine the Drout's penalty during the restrictions. **1**
- ii) Calculate the Total Amount Due. **1**

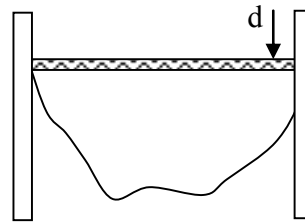
Question 27 continued on page 17

- (b) Engineers have recorded an average depth measurements of a new dam at Wolinily.

Diagram not to scale. Depth measurements are taken at equidistant points.



- (i) By using two applications of Simpson's rule determine the cross sectional area of the dam. 3
- (c) Engineers have modelled Wolinily dam's volume  $V$  (where  $V$  is in Billions of litres) compared to the number of metres the water is below its maximum water level to be  $V = 0.1d^2 - 4d + 42$ .



- (i) Copy and complete the table of values in your exam booklet. 2

d metres	0	6	12	18	24	30
V						

- (ii) Find the minimum volume of the dam. 2
- (iii) For what values of  $d$  is this model valid. Why? 2
- (d) The drought causes the inflation of household commodities, typically fruit vegetables and meat. 2

If the rising price of commodities is modelled like appreciation and the inflation rate is 11.9% p.a.

Determine the value of farmer Jims 500 lambs, if he keeps the flock for another 8 months. Lambs are currently valued at \$ 2.80 per head.

End of Question 27



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

(a) Raffle tickets at the local netball club sell for \$2. 800 tickets were sold and there are three prizes in the raffle: \$320, \$240, \$160.

(i) Determine the financial expectation of 1 raffle ticket. **2**

(ii) Explain why this is not a fair game. **1**

(iii) Calculate the cost of a raffle ticket for it to be a fair game. **1**

Fals e neg Q

(b) Gograss sell two types of grass seed. Jane a part-time employee suggests to her employer they only need to stock one type of grass. She has recorded the last 10 weeks sales.

Supergrow	12	26	13	56	39	14	49	26	39	28
Nowater	22	23	25	42	31	33	34	44	39	43

(i) Display this information in a back to back stem and leaf plot. **2**

(ii) Copy and complete the table below showing mean, median range and standard deviation for each brand of grass seed. **4**

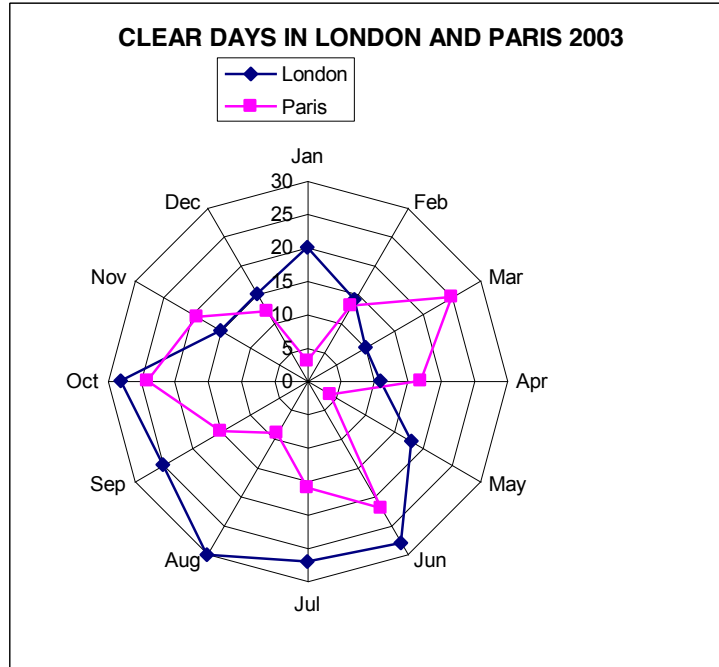
	Mean	Median	Range	Standard deviation $\sigma_{n-1}$
Supergrow	30.2			15.3
Nowater				

(iii) Help Jane convince her employer by choosing the only grass seed to be sold give reasons for your answer. **3**

End of Question 28

- (c) Francois and Jean are travelling to London and Paris on a two month visit of their Grandparents. 2

Explain which two consecutive months would be best for a clear day visit.



Question 28 continued on page 19

- (d) Blood alcohol level (A), of a woman drinking alcohol varies inversely to her weight W kg. 1
- (i) Write this as an equation. 1
- (ii) If a 65 kg woman has a blood alcohol reading of 0.048 after 3 standard drinks. Calculate the constant of variation to three significant figures. 1

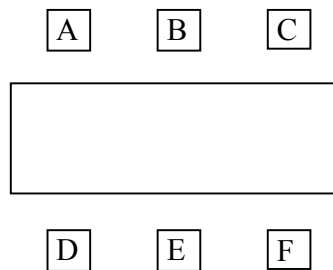
- (iii) Determine the blood alcohol content of a 56 kg woman also consuming three standard drinks. **2**
- (iv) **In this question** assume the constant of variation is 3.1.  
Jelika, a 63.50 kg woman, drank three standard drinks. She began to argue with friends, if she was breath tested and had a reading of 0.05 she could get off the fine on the basis of significant figures.  
“My blood alcohol reading must be quoted to as many significant figures as my weight, weight is very important!”  
Do you agree , Explain your reasons. **2**
- (e) i) How many 4 letter arrangements can be made from the word GENERAL ? **1**
- ii) What is the probability that on of the arrangements begins with E ? **1**

End of Examination

- (f) Sydneys water consumption is increasing , drought conditions are causing water restrictions, the dams capacity (C) is inversly proportional to the square of the depth below maximum water level (b) of the dam
- (i) Write this as an expression. **1**
- (ii) If the capacity is  $2.5 \times 10^6$  megalitres when the dam was 1.5m below maximum water level. Determine the constant of proportionality. **1**
- (iii) The drought disaster plan comes into effect when the dams capacity falls below  $4 \times 10^3$  megalitres. Determine the distance to the water below the maximum water height. **2**
- (iv) If the dam extends back 60 km calculate the percentage increase in the dams volume. **1**
- (g) Using the table calculate the monthly repayments for a loan of \$25 000 at 9.5%p.a for 20 years. **1**

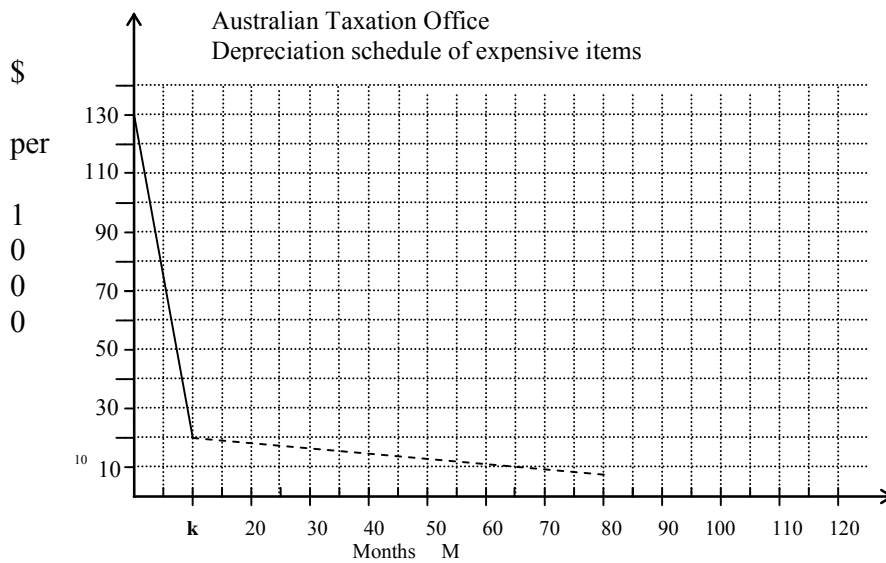
	8%	9%	10%	11%
Period years	\$	\$	\$	\$
15	95.50	101.40	107.50	113.40
20	83.60	89.50	96.50	103.20
25	77.20	83.90	90.80	97.30

- (h) If 6 people sit down to dinner how many different couples, (2 people) are possible?



- (i) Write this as an expression. **1**
- (ii) If the capacity is  $2.5 \times 10^6$  megalitres when the dam was 1.5m below maximum water level. Determine the constant of proportionality. **1**
- (iii) The drought disaster plan comes into effect when the dams capacity falls below  $4 \times 10^3$  megalitres. Determine the distance **2**

- (i) The Australian Taxation Office allows expensive items to be depreciated as a tax deduction for the annual Taxation return. This value decreases according to the graph below. The equation of both linear segments of the graph are of the form  $D = -aM + c$  (for  $M \geq 0$ )



- (i) Explain what happens at  $k$ ? **1**
- (ii) For  $M < k$  determine a value for  $c$ . **1**
- (iii) Explain the meaning of  $c$ . **1**
- (j)
- (i) Determine a model for the depreciation when  $M \geq k$  months **2**
- (ii) Rearrange the formula  $D = -aM + c$  to make  $M$  the subject. **1**
- (iii) Predict the time to the nearest month, when you can only claim \$0 per 1000. **1**