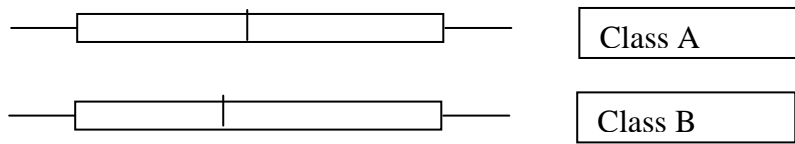


1 From the diagram below which of the following statements is correct



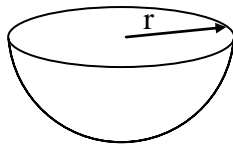
- (A) Class A is a negatively skewed distribution
- (B) Class A is a positively skewed distribution
- (C) Class B is a positively skewed distribution
- (D) Class B is an approximately normal distribution.

2 When 28% of the 5 kg of rice is used, what weight remains?

- (A) 390g
- (B) 3.6kg
- (C) 1.4kg
- (D) 40g



3 The total inside and outside surface area for the birdbath shaped as a hemisphere is :



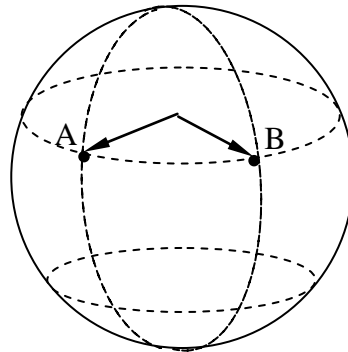
- (A) $\frac{1}{2}(4\pi)r^3$
- (B) $\pi r^2 + \frac{1}{2} \times \frac{4}{3} \pi r^2$
- (C) $2 \left[\frac{1}{2} \times 4\pi r^2 \right]$
- (D) $\pi r^2 + \frac{1}{2} \times 4\pi r^2$

4 If $a = -2$ and $b = -4$, the value of $1 - 4a + 3b^2 - a^3$ is :

- (A) 65
- (B) 32
- (C) 47
- (D) 33

- 5 Both cities A and B lie on the 33°N parallel of latitude, with longitudes 140°W and 145°E respectively as shown. When it is 6:15pm Tuesday in City A the time in city B is :

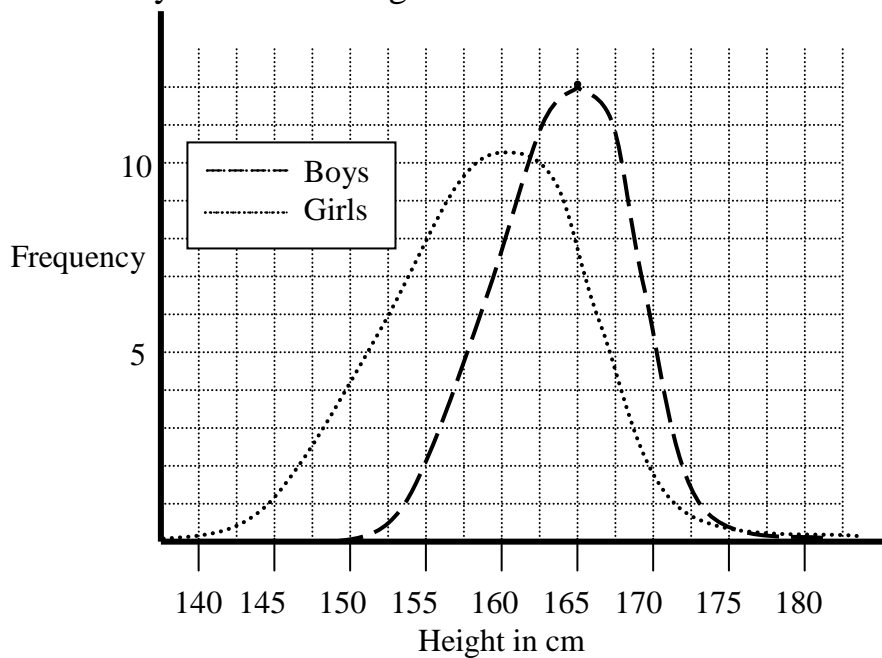
- (A) 1:15 pm Wednesday
 (B) 1:15 am Monday
 (C) 1:15 pm Monday
 (D) 1:15am Wednesday



- 6 The equation for the value of h in the formula $f = \frac{4h^2}{9}$ is:

- (A) $h = \pm \frac{2\sqrt{f}}{3}$ (C) $h = \frac{-2\sqrt{f}}{3}$
 (B) $h = \frac{\sqrt{4f}}{9}$ (D) $h = \pm \frac{3\sqrt{f}}{2}$

- 7 The graph below shows the normal distribution of heights for Year 12 boys and girls. Which is the most correct statement about the relationship between Boys and Girls heights.



- (A) Girls have a greater standard deviation
 (B) Boys have a lower median
 (C) Girls have a higher mode
 (D) Boys have a lower mean

- 8 There are 36 letters in a bag each printed with a letter of the alphabet. The vowels A,E,I,O,U occur three times each. The remaining letters appear once each. Ahmed randomly chooses letters, arranges them to spell **GENER**. The probability that the next letter selected would be an A is:

- (A) $\frac{3}{16}$
 (B) $\frac{3}{31}$
 (C) $\frac{2}{36}$
 (D) $\frac{1}{21}$



- 9 Sally's results for Semester 2 are as tabled below in her report. Her best subject performance for Semester 2 is:

Semester 2 Report	Mean %	Standard deviation	Mark %
Biology	42	12	78
English	58	15	88
General Mathematics	66	5	86
Hospitality	46	14	77

- (A) Biology
 (B) English
 (C) General Mathematics
 (D) Hospitality
- 10 Raviena's hotel bill was \$ 233.70 She is able to claim the GST component for taxation purposes, the GST component of the hotel bill is:
- (A) \$21.25
 (B) \$23.37
 (C) \$21.23
 (D) \$210.33

- 11 The taxation tables for 2003-2004 and 2004-2005 are listed below. Calculate the difference in tax payable if Kahlid's income is \$59 000 p.a. in both the 03-04 and 04-05 tax-return years.

Tax rates 2003-04

<i>Taxable income</i>	<i>Tax on this income</i>
\$0 – \$6,000	Nil
\$6,001 – \$21,600	17c for each \$1 over \$6,000
\$21,601 - \$52,000	\$2,652 plus 30c for each \$1 over \$21,600
\$52,001 – \$62,500	\$11,772 plus 42c for each \$1 over \$52,000
Over \$62,500	\$16,182 plus 47c for each \$1 over \$62,500

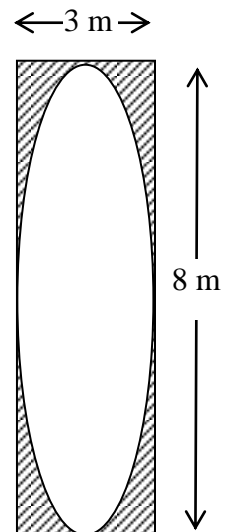
Tax rates 2004-05

<i>Taxable income</i>	<i>Tax on this income</i>
\$0 – \$6,000	Nil
\$6,001 – \$21,600	17c for each \$1 over \$6,000
\$21,601 - \$58,000	\$2,652 plus 30c for each \$1 over \$21,600
\$58,001 – \$70,000	\$13,572 plus 42c for each \$1 over \$58,000
Over \$70,000	\$18,612 plus 47c for each \$1 over \$70,000

- (A) \$840
 (B) \$2520
 (C) \$1800
 (D) \$720

- 12 The correct expression for the shaded area is :

- (A) $3 \times 8 \pi (3+8) \div 2$
 (B) $\pi(1.5 \times 4) - 24$
 (C) $3 \times 8 - \pi(1.5 \times 4)$
 (D) $24 \pi - (3+8)$

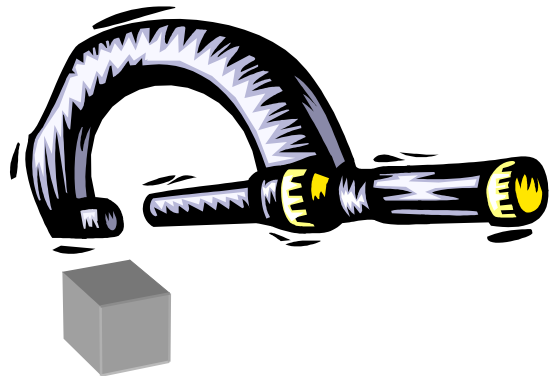


13 A real estate agent sells a property for \$400 000 and earns \$4 000.
type of earning is called:

- (A) Superannuation
- (B) Royalty
- (C) Income tax
- (D) Commission

14 A cube was measured with a micrometer and the side length was found to be 3.005 cm. The largest and smallest volume the cube may have are :

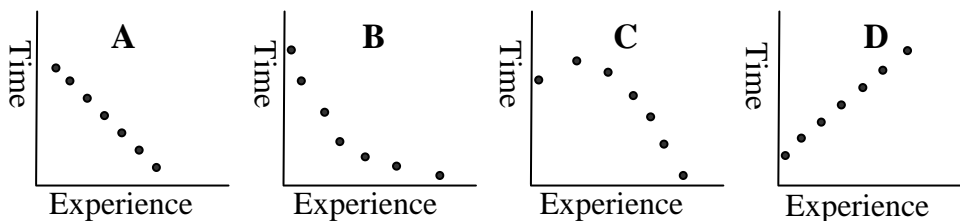
- | | Largest | Smallest |
|-----|-----------------------|-----------------------|
| (A) | 27.13 cm ³ | 27.00 cm ³ |
| (B) | 27.15 cm ³ | 27.12 cm ³ |
| (C) | 27.2 cm ³ | 27.0 cm ³ |
| (D) | 27.20 cm ³ | 27.07 cm ³ |



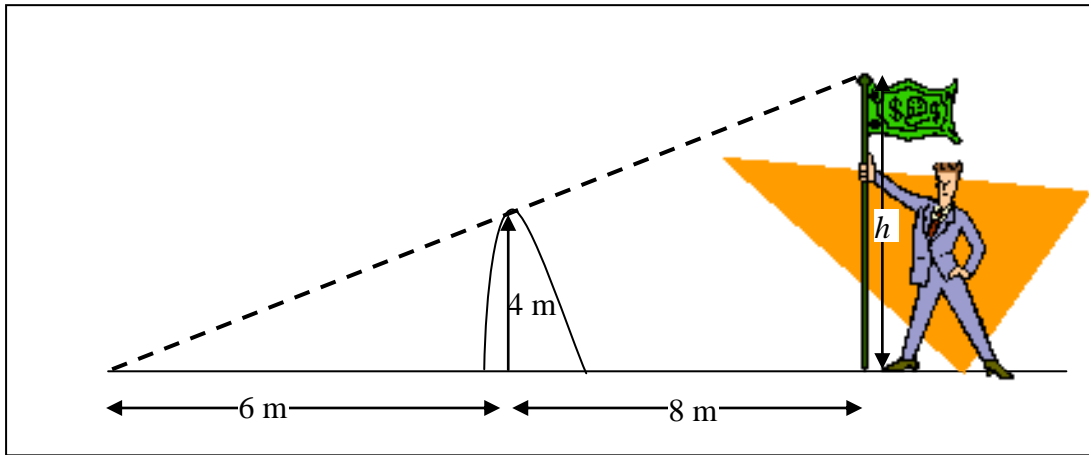
15 Jannine went to Ceeapest Bank for a loan.
She applied for a simple interest loan of \$18 000 for two years @ 5.6% pa.
Her total repayments are :

- (A) \$ 38 016
- (B) \$ 2 016
- (C) \$ 1 008
- (D) \$ 20 016

16 The time taken to mark mathematics papers varies in inverse proportion to the teacher's marking experience.
Which graph best represents this relationship.



- 17 The correct expression for the height, h , of the flag pole in the diagram below is:



- (A) $h = \frac{44}{3}$
 (B) $h = \frac{32}{6}$
 (C) $h = \frac{28}{3}$
 (D) $h = \frac{44}{3}$

- 18 Ishmail worked for 38 hours as shown on his pay slip. Unfortunately an ink spill occurred. What is his hourly rate of pay ?

- (A) \$ 17.68
 (B) \$ 14.89
 (C) \$ 13.80
 (D) \$ 12.86

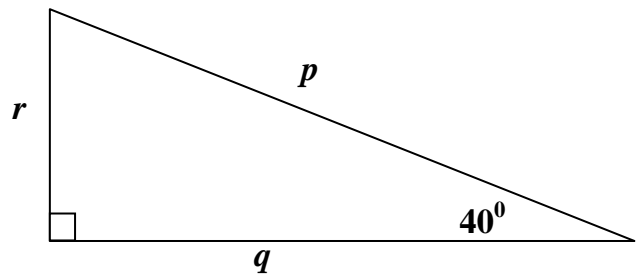
PAY SLIP	
Total Pay	\$ 565.80
Hourly rate of pay	\$
Hours worked at	32
- Normal time	6
- Overtime (time-and-a-half)	38
Total Hours worked	38

- 19 A racing car driver can average about 220 km/ h in a car race.
He started the 1700 km race at 9.15 am. If he finished the race what is the earliest time he would complete the race.

- (A) 4:59 pm
(B) 2:59 am
(C) 6:50 pm
(D) 5:59 pm

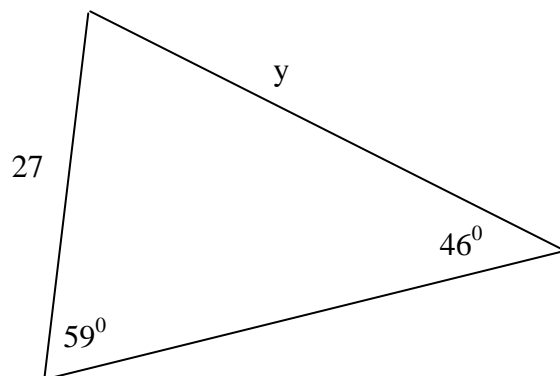
- 20 What is the correct expression for $\tan 40^\circ$ in this triangle?

- (A) $\frac{q}{p}$
(B) $\frac{r}{p}$
(C) $\frac{p}{r}$
(D) $\frac{r}{q}$



- 21 In the triangle shown, the side marked y is given by the expression:

- (A) $\frac{27 \sin 46^\circ}{\cos 59^\circ}$
(B) $\frac{27 \sin 59^\circ}{\sin 46^\circ}$
(C) $\frac{\sin 46^\circ}{27 \sin 59^\circ}$
(D) $\frac{\cos 59^\circ}{27 \sin 59^\circ}$



- 22 A couple arrange a business loan of \$66 000 at 14 % p.a. interest. to be repaid over 20 years.
Using the table, determine the monthly repayment.

Loans: Monthly repayment per \$ 10 000				
Interest rate p.a.	Time period yrs			
	10	15	20	25
12%	143.47	120.02	110.11	105.32
13%	149.31	126.52	117.16	112.78
14%	155.27	133.17	124.35	120.38
15%	161.33	139.96	131.68	128.08
16%	167.51	146.87	139.13	135.89

- (A) \$ 773.26
(B) \$ 869.09
(C) \$ 794.51
(D) \$ 820.71

Section II

78 Marks

Attempt Questions 23 - 28

Allow about 2 hours for this section.

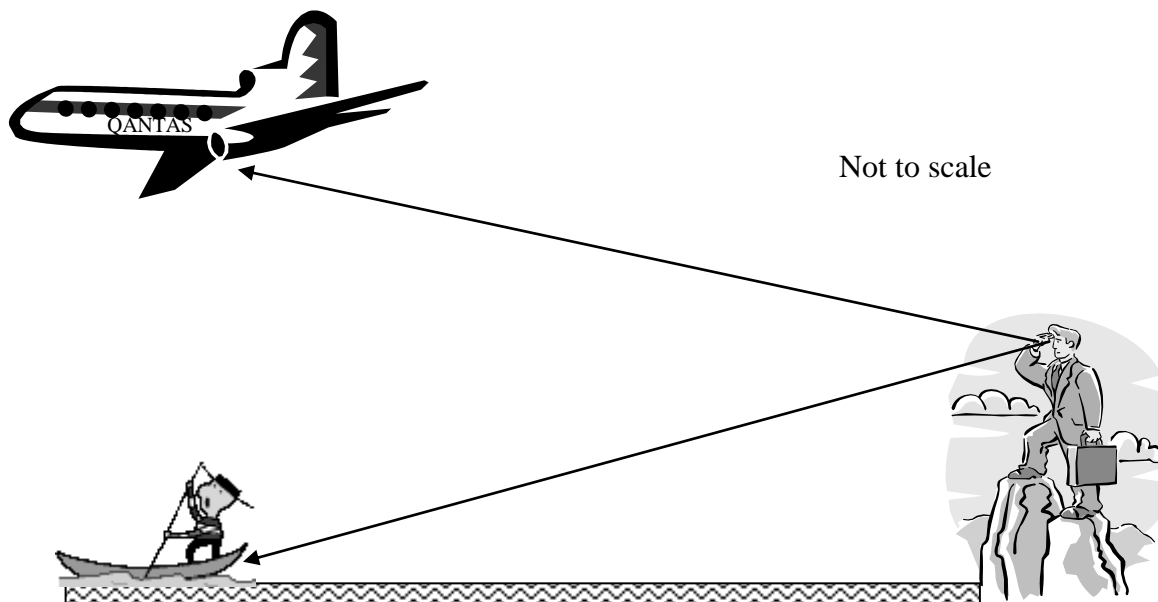
Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

All necessary working should be shown in every question.

Question 23 (13 marks)

Marks

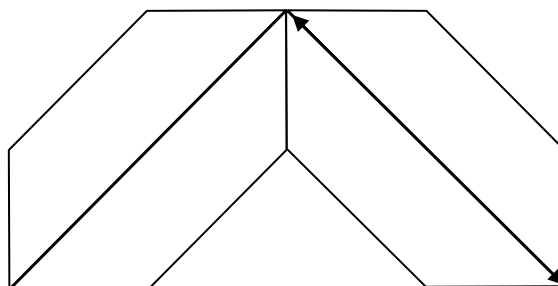
- (a) Jim is standing on the top of a cliff and his eyes are 145m above sea level. He sights a boat with an angle of depression 15° .



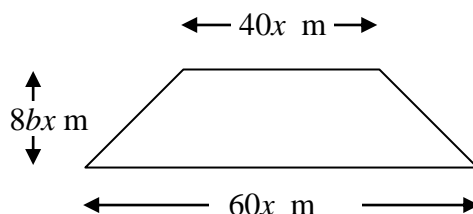
- (i) Find the horizontal distance between Jim and the boat to three significant figures. 2
- (ii) If the height of the Qantas jet above sea level is 600 m and directly above the boat find the angle of elevation from Jim to the plane, to the nearest minute. 2

Question 23 continued on page 10

- (b) A new concrete apartment block is to be constructed with a flat roof in the shape of four identical trapezia. A birds eye view of the roof is shown below.



One of the trapezia is shown below



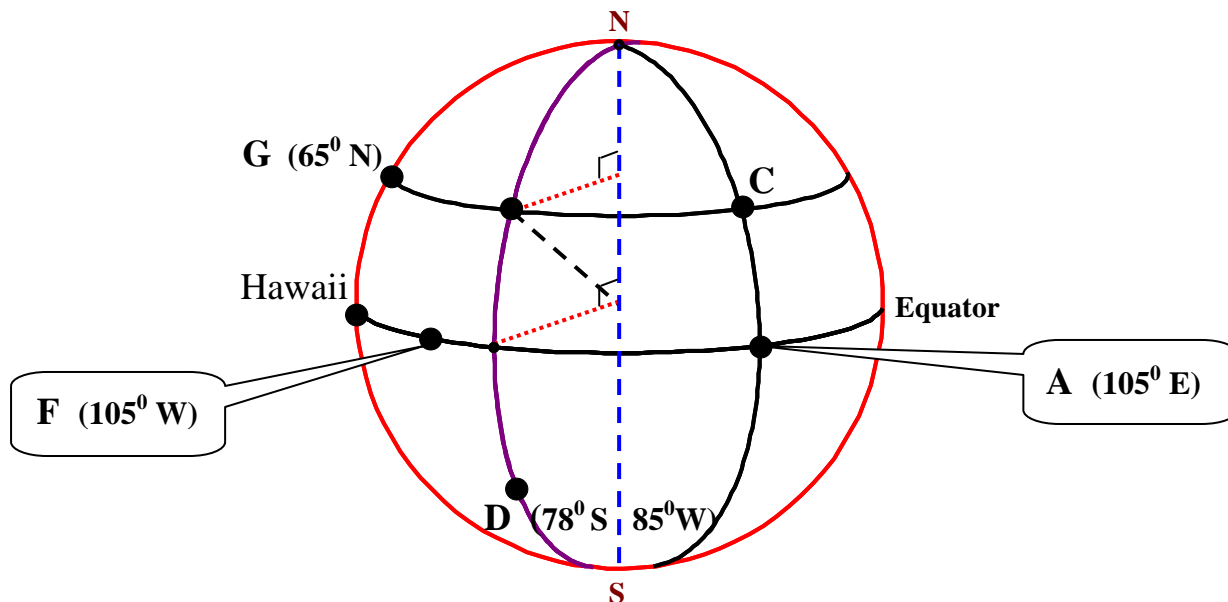
- (i) Show that the area (A) of each trapezium may be written as $400bx^2$ square metres. 2
- (ii) If the total roof area is 4800 m^2 and $b = 2$ determine the value of x to two decimal places. 2
- (iii) There are three identical 0.4m thick slabs on each of the ground floor, first floor and roof.
1. Find the total volume of concrete. 1
 2. Find the total capacity in kilolitres. 1
- (c) The blood alcohol level (A), of a woman drinking alcohol, varies inversely to the square of her weight W in kilograms.
- (i) If a woman weighing 65.0 kg has a blood alcohol reading of $A = 0.0480$ after 3 standard alcoholic drinks, calculate the constant of variation to three significant figures. 1
- (ii) Determine the blood alcohol content of a 56.0 kg woman also consuming three standard drinks. 2

End of Question 23

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

Marks

- (a) In this question use $R = 6367$ km to be radius of the earth and 1 nautical Mile (M) = 1.852 km



- (i) Find the difference in latitude between C and D 1
- (ii) What is the latitude and longitude of F? 1
- (iii) Find the distance in nautical miles between A and C.
To the nearest nautical mile. 2
- (iv) Adrianna and Nancy are entering the *Amazing Race* challenge. The first leg of the race starts at **F** on Monday 30/8/05 and finishes at **A**. Your challenge is to arrive at the destination before them. Determine the route you will take. Justify your answer. 3
- (v) Small circle radii are determined using trigonometry. The radius (r) of a small circle at any latitude is calculated using the following equation:

$$r = R \cos \theta \text{ kilometres,}$$

where θ is the angle of latitude and R the radius of the earth.

Show that the small circle radius (r) on which C lies is 2691 km to nearest kilometre. 2

- (b) Researchers at the Vanuatau Ecological Turtle Research Centre have been studying the growth of young turtles. They suggest that the time taken for young turtles to be n times their birth weight can be estimated using the formula $n = 2.1(1.02)^t$, where t is in months.
- (i) Determine the time to the nearest month, for a baby turtle to reach 20 times its birth weight. **2**
- (ii) The Ecological research centre will be undergoing expansion and needs to borrow \$210 000 from the world bank . The lending terms are over 20 years at 0.95% per quarter, compounded quarterly. Determine the quarterly repayment. **2**

End of Question 24

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

Marks

- (a) The number of parking fines issued in Burwood and Strathfield by the local police and parking officers have been sampled over a four week period and recorded below in the back to back stem and leaf plot.

Number of parking fines issued				
Burwood		Strathfield		
0	1	4	4	
8	2	0	1	4 6
6	2	3	2	3 4 5 6
7	6 6	4	3	4 4 5 7
9	8 6 4	5	2	6 7
8	8 6 4 1	6	1	
2	1 0	7		

- (i) A statistical summary for the fines in Burwood is shown in the table below.

Number of fines issued	Burwood	Strathfield
Minimum No.fines	10	
Lower Quartile (Q1)	46	
Median (Q2)	58.5	
Upper quartile (Q3)	67	
Maximum No.fines	72	
Mean	53.6	
Standard deviation	16.6	

Copy the table in your exam book and complete the five number summary, mean and standard deviation for Strathfield.

3

- (ii) Compare and contrast the number fines issued in Burwood and Strathfield

3

- (iii) Which statistical measure would assist you in deciding how many parking fines were more likely issued on any particular day? Justify your answer.

2

Question 25 continued on page 14

- (b) Darshana is saving for a holiday and has decided to invest her school holiday earnings of \$3000. She has chosen an account that offers 14.5% per annum compounded monthly, but will only invest the money for 4 months. She drew up a table to check her investment.

Darshana's Savings \$3000 at 14.5% p.a. compounded monthly (end of month)			
Month	\$P	\$Interest	\$(P+I)
1	3000.00	36.25	3036.25
2	3036.25	36.69	3072.94
3	3072.94	37.13	3110.07
4	3110.07	A	B

- (i) Calculate the values that would appear after 4 months in the table marked A and B, **label and write your answers in your exam book.** **2**
- (ii) Darshana could have invested her earnings in another account offering 1.25% per month simple interest for a fixed term of 3 months only. **3**
Which loan or combination of loans should she choose?
Justify your answer.

End of Question 25

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

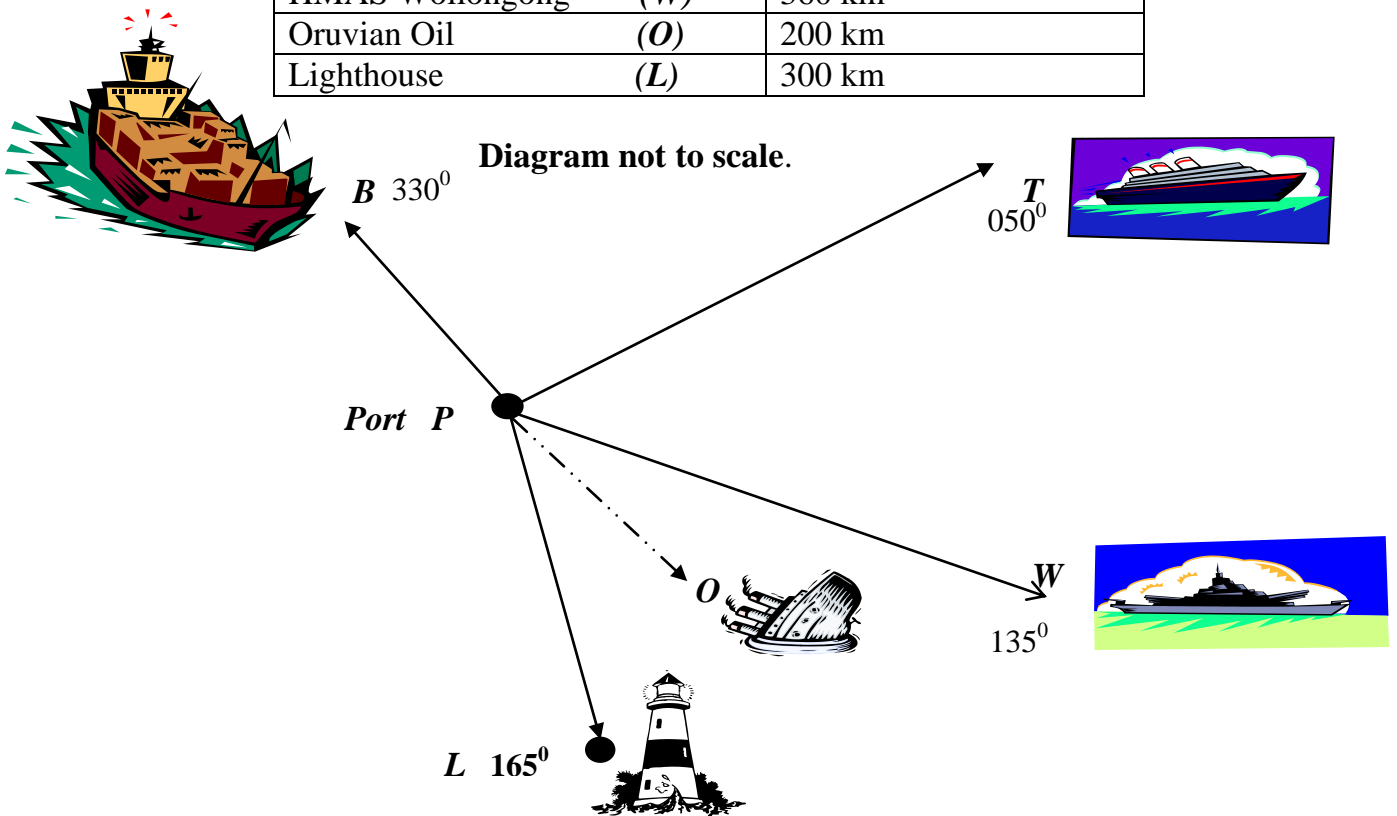
Marks

- (a) The Bank SGHS offers Tian an investment option with an **effective interest rate** of 8.8% per annum paid quarterly. Determine the interest rate per annum.

3

- (b) The diagram below shows three ships travelling in different directions. The table indicates the distance of each ship eight hours after leaving port *P*.

Ship		Distance from port <i>P</i>
Bandaid Bulk	(<i>B</i>)	240 km
Tasmanian Express	(<i>T</i>)	320 km
HMAS Wollongong	(<i>W</i>)	360 km
Oruvian Oil	(<i>O</i>)	200 km
Lighthouse	(<i>L</i>)	300 km



- (i) Determine $\angle BPT$. **1**
- (ii) Show that $TW = 460\text{km}$ to the nearest kilometre. **3**
- (iii) The Tasmanian Express 8 hours after leaving the port, urgently needs to head towards HMAS Wollongong, determine $\angle PTW$. **1**
- (iv) Draw a diagram in your exam book showing all relevant information and determine the bearing of Port *P* from the lighthouse *L*. **2**
- (v) If the Oruvian Oil (*O*) was on a bearing of 140° before hitting an iceberg and sinking determine the search area ΔPWL giving your answer in scientific notation. **3**

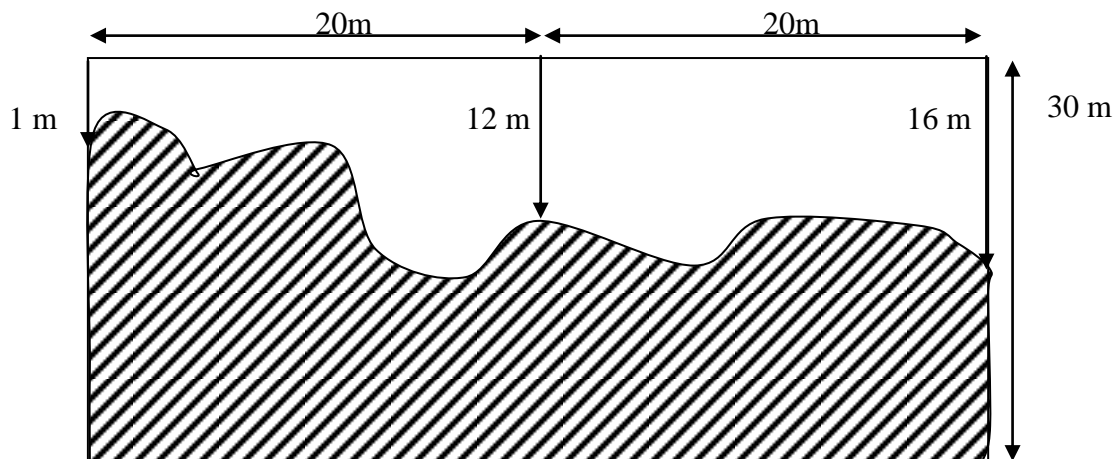
End of Question 26

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

Marks

- (a) Engineers have measured offset distances from a horizontal line between two buildings, for the new Citylink expressway.
The material to be excavated is basically a prism with a shaded cross section as shown below.

Diagram not to scale. **Offset** measurements indicated.



- (i) By using one application of Simpson's rule determine the cross-sectional area of the hill. **2**
- (ii) The cross section of the hill (prism) extends for 0.989 km determine the volume of material to be excavated to the nearest cubic metre. **2**

Question 27 continued on page 17

Marks

(b) The number of days (**D**) and trucks (**T**) required to complete the excavation has been modelled as $D = 50 + 5T - 0.1T^2$

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

number of trucks T	0	10	20	30	40	50	60
days D							

- (ii) In your exam book draw a sketch of the above model data. **1**
- (iii) Find the number of trucks **T** to complete the excavation in the least number of days. **2**
- (iv) Using the model, determine the maximum number of days (**D**) required to complete the excavation and the number of trucks (**T**) needed. **2**
- (v) For what values of **T** is this model valid. Justify your answer. **2**

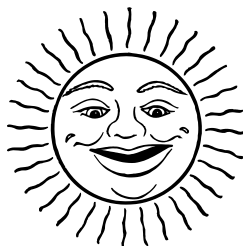
End of Question 27

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

Marks

- (a) Marie has decided, at the end of Year 7 to do Medicine at university when she leaves school. Her parents have projected that they will need approximately \$50 000. They have chosen to invest \$ 164 per week for 5 years in an annuity compounding weekly, earning 6.24% per annum.
- (i) What will the value of the annuity be at the end of this time? **2**
- (ii) How much interest will they earn. **1**
- (iii) If Marie's parents waited until she left school and took out a loan for \$ 50 000 at 9.24 % p.a. compounded monthly and could only afford to repay \$1300 per month how many months before the loan is repaid? **2**
- (b) **Use the attached sheet for part (i)**
The graph on the following page shows the number of hours (H) spent partying per week in year 12 against General Mathematics HSC Exam results (M).
- (i) Construct a median regression line on the graph
Detach the graph from the exam paper and attach to your solutions for Question 28 b. **3**
- (ii) Describe the correlation, if any, that exists between the two variables. **1**
- (iii) Determine the equation of the median regression line. **2**
- (iv) Predict the General Mathematics result of a student who party's for about 5 hrs per week. **1**
- (v) Explain the meaning of the initial condition of 0 hours of partying in the context of this question. **1**

End of Trial HSC Exam 2005



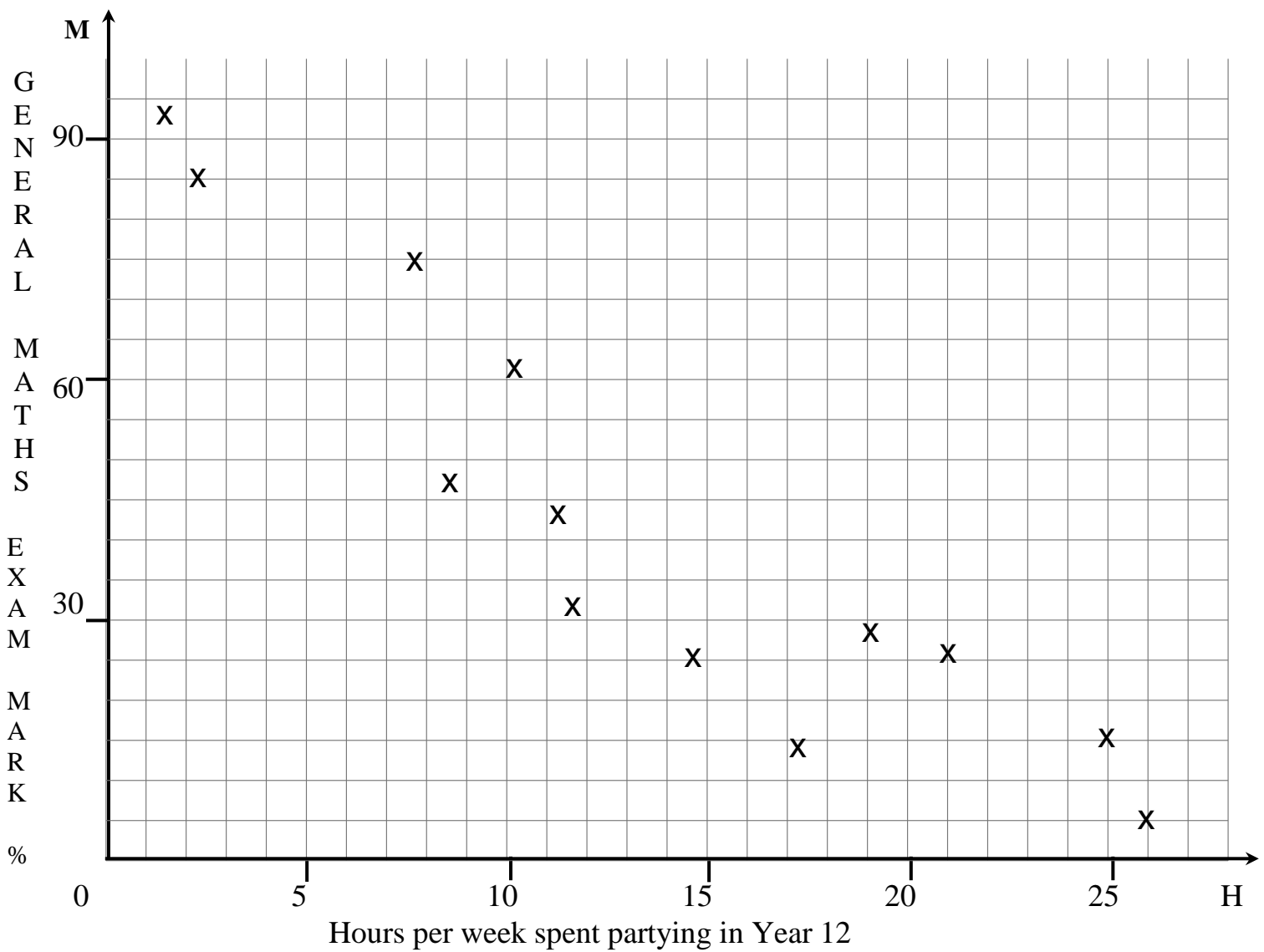
Good luck !

Graph for Q 28 (b) (i)

Detach and hand in with your exam

Student Name: _____ Teacher : _____

School name: _____



Marks

- (c) The number of parking fines issued in Burwood and Strathfield by the local police and parking officers have been sampled and recorded below.

Number of parking fines issued		
Burwood	Strathfield	
	1	4
8	2	0 1 4 6
8 6 2	3	2 3 4 5 6
9 7 6 6	4	3 4 4 5 7
9 9 8 6 4	5	2 6 7
8 6 4 1	6	1
2 1 0	7	

- (i) The five number summary for the fines in Burwood is shown in the table below.

Number of fines issued	Burwood	Strathfield
Minimum No.fines	28	
Lower Quartile (Q1)	46	
Median (Q2)	57	
Upper quartile (Q3)	65	
Maximum No.fines	72	

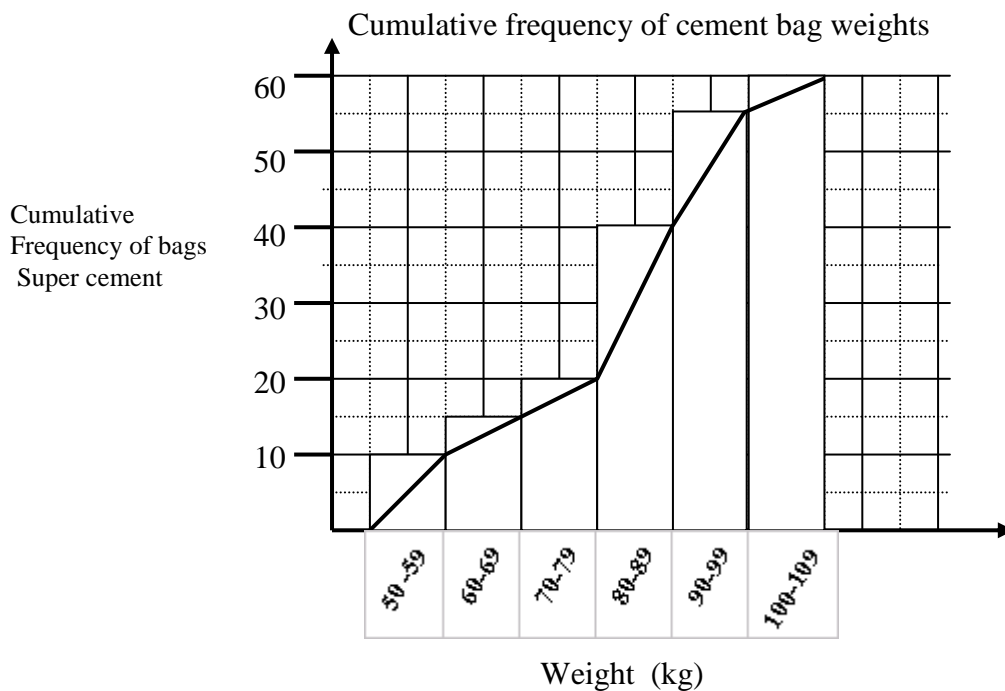
- (ii) Copy the table in your exam book and complete the five number summary for Strathfield. **3**
- (iii) Compare and contrast the number fines issued in Burwood and Strathfield **3**
- (iv) Which measure of central tendency would assist you in deciding which suburb you were more likely to receive a parking fine ? **1**
- (d) Police speed camera data are recorded below. They compare speeding vehicles in a 60 km/h speed zone in Burwood and Strathfield.

	Burwood	Strathfield
Mean	66	62
Median	70	75
Standard Deviation	5	8
Upper Quartile	80	79
Lower Quartile	64	69
Highest Speed	100	85
Lowest Speed	60	65

i) Draw a double Box and Whisker plot to show this information. 2

ii) Give one difference between the two sets of data. 1

(e) Arvind sampled the weight of Super cement bags and drew a cumulative Frequency graph below.



(i) How many bags were weighed in the 80-89 class 1

(ii) Estimate the median weight of the bags surveyed. 1

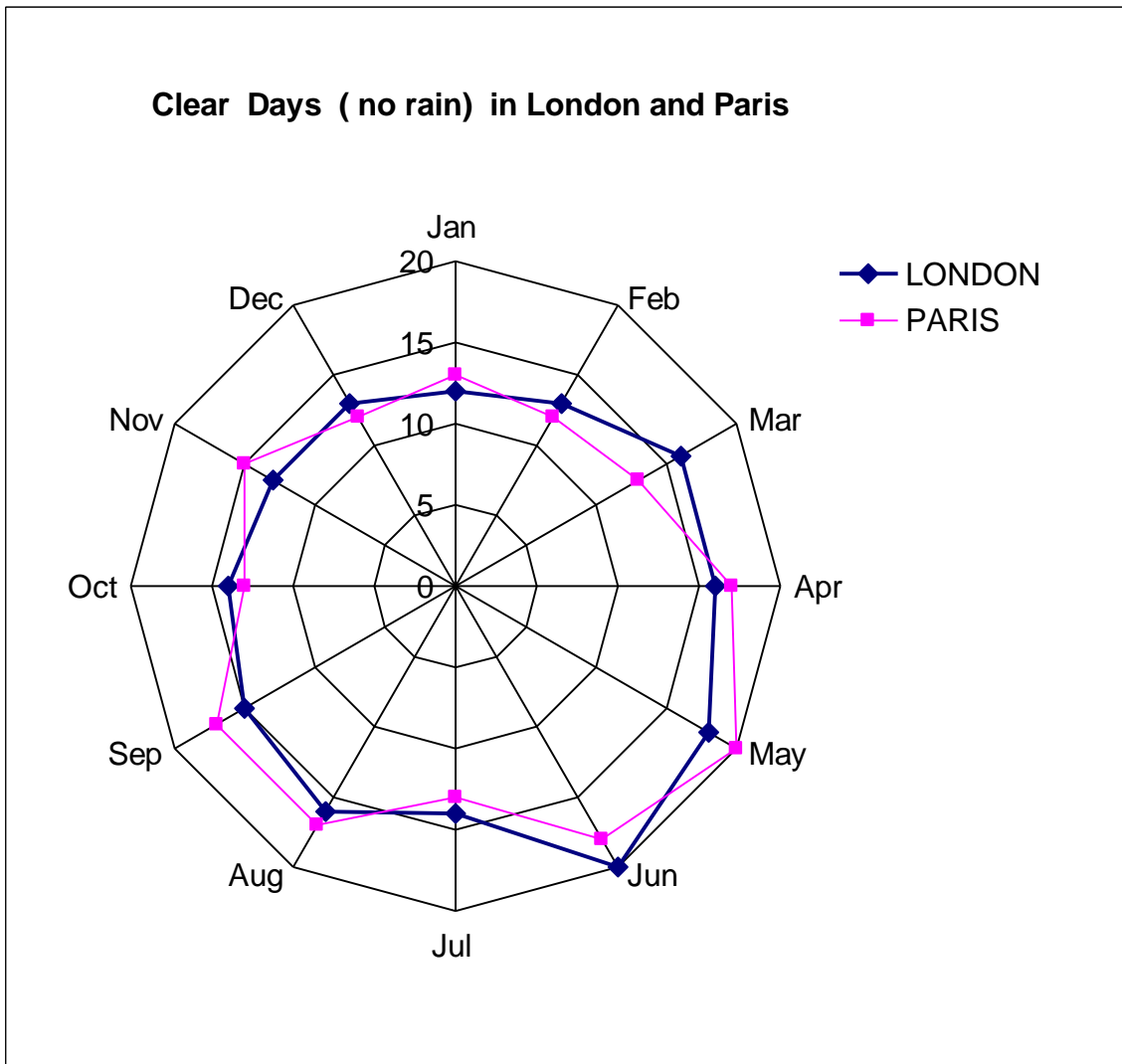
(iii) If 2400 bags were weighed individually, how many would you expect to weigh less than 80 kg? 1

(iv) Usually when the cement bags are delivered they arrive evenly distributed on fifty pallets on the back of a semi trailer.

Arvind's employer suggested to him that it would be easier to do the sampling by just recording the weights of the bags on the first pallet taken off the semi trailer.

- 1 Why is this sampling method, the employer suggested not appropriate? 1
- 2 Describe a method that could be used to select a random sample of bags. 1

- (f) Francois and Jean are planning to travel to London and Paris for a two month visit of both of their Grandparents. The grandparents live in London and Paris
 Find two consecutive months that give them the best possible chance of having a visit to both grandparents without rain. 1



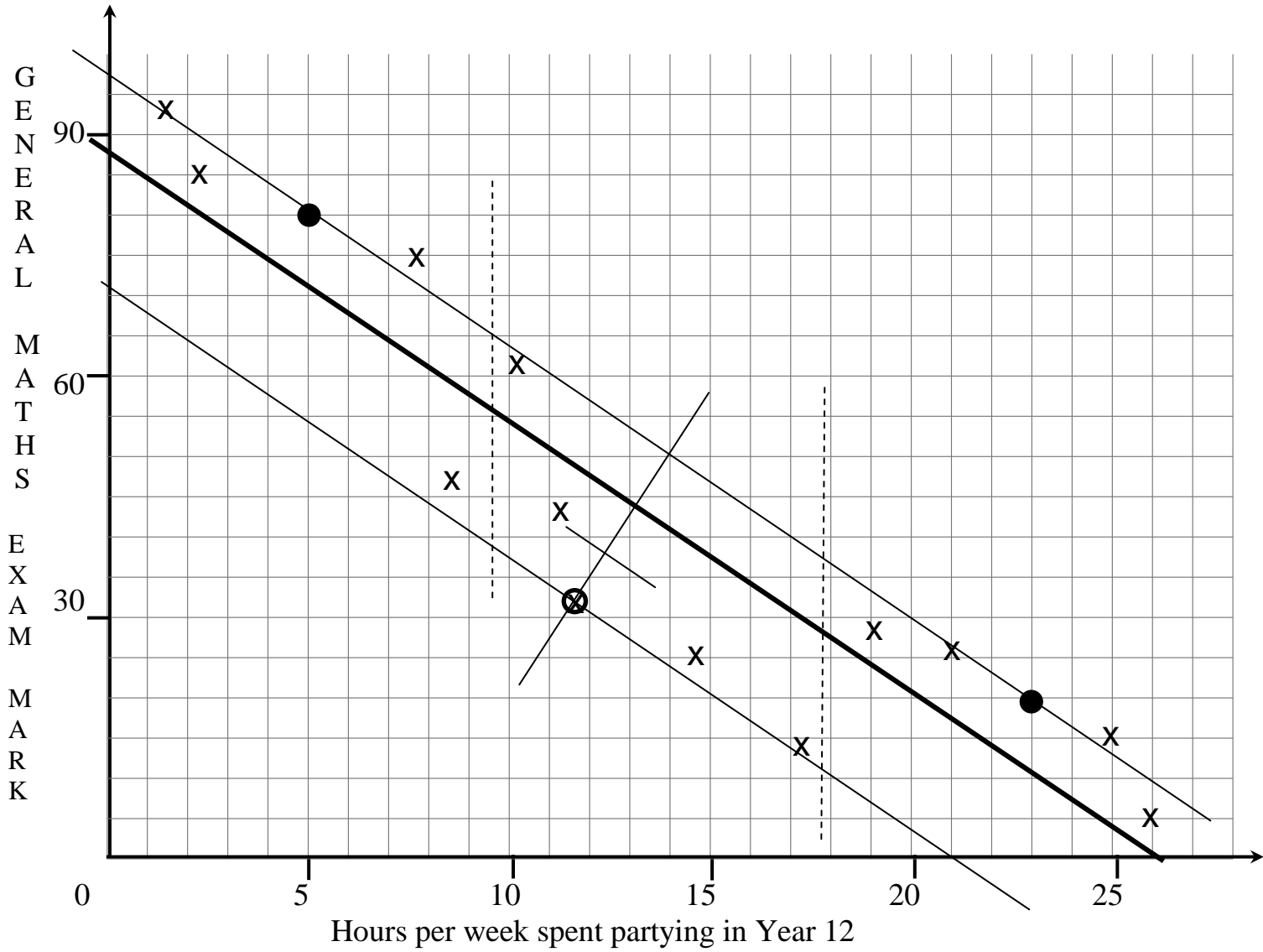
Student Name: _____ Teacher : **Solution**

School name: _____

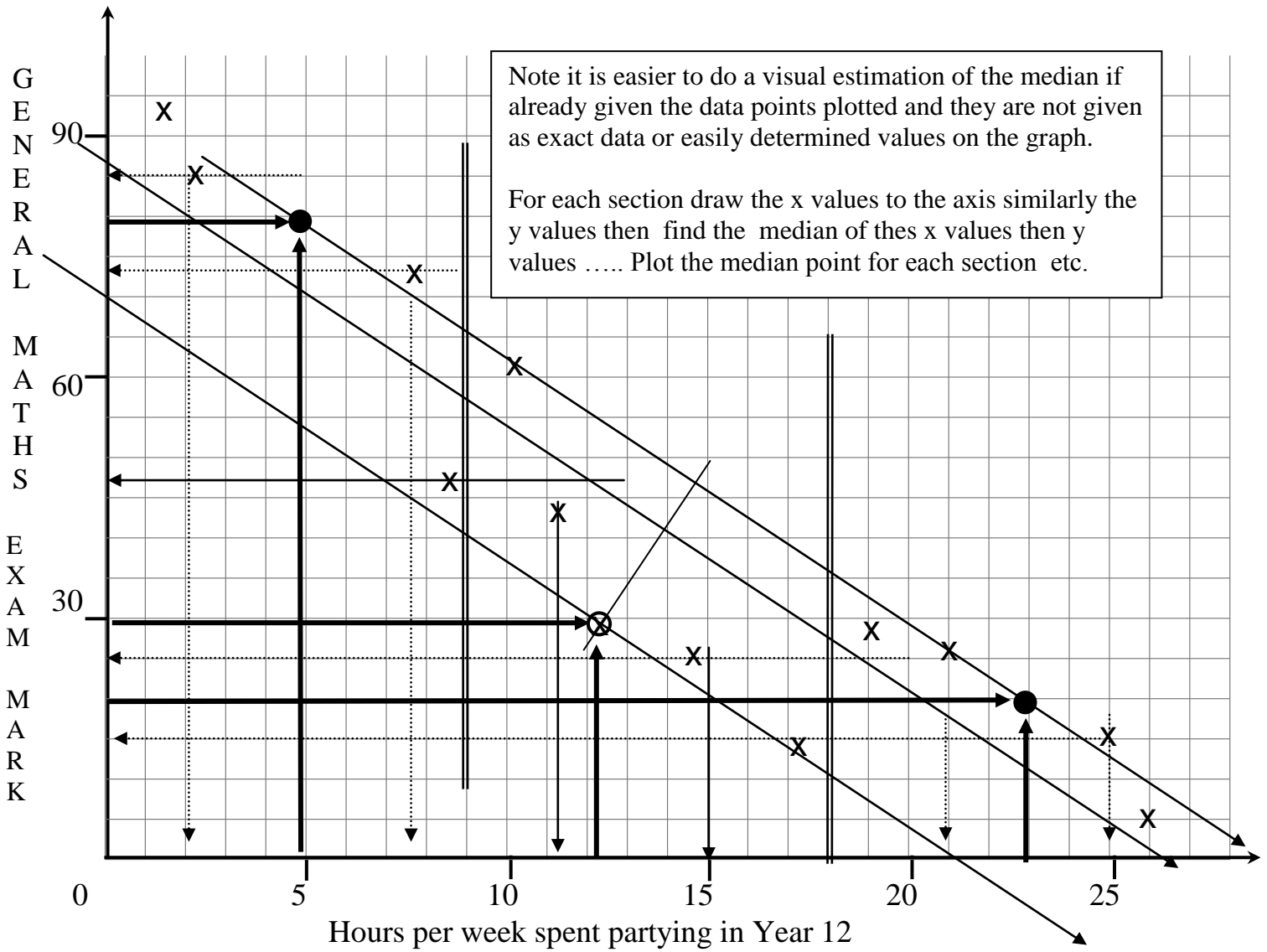
Graph

for Q 28 (b) (i)

Detach and hand in with your exam



Solution Q28b equation of the median regression line.



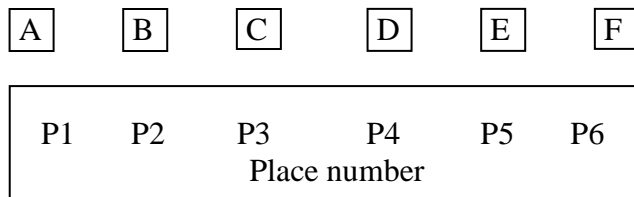
Sally is considering investing in shares. If she decides to invest, she has a 60% chance of making \$30 00, and a 40 % chance of losing \$ 40 000.

- (i) Calculate the expected profit of the investment sally is considering. **1**

Would you advise Sally to invest in shares? Explain you answer.

- (iv) What single amount could she invest now at the same rate and compounding time to ensure she has \$ 50 000 after ten years.

- (g) If 6 people sit down to dinner how many ways, may (2 people) sit in place P1 and P2? **1**



- (h) What is the probability that A will sit beside B? **1**

- (i) was determining the effectiveness of a new household alarm system. If an intruder is detected an alarm is activated.

In 83% of the 100 nights tested, the alarm activated and intruders had occurred.

Of the 300 nights of testing with **No** intruders 3% had the alarm activated.

Test results			
	Alarm activated	Not activated	Total
Intruders			100
No intruders			300
Total			

- (i) Copy and complete the table in your exam book. **2**
- (ii) What is the probability that the alarm system indicated an intruder when there was **No** intruder? **1**
- (iii) Professor S. Park wishes to advertise his new alarm system. **1**
 " My new alarm system is% accurate .
 What is the percentage accuracy of the alarm.