Centre Number

Student Number

SCEGGS Darlinghurst

2009

HIGHER SCHOOL CERTIFICATE TRIAL EXAMINATION

General Mathematics

This is a TRIAL PAPER only and does not necessarily reflect the content or format of the Higher School Certificate Examination for this subject.

General Instructions

- Reading time – 5 minutes
- Working time – 2½ hours
- Write using black or blue pen
- Diagrams should be drawn in pencil
- Calculators may be used
- A formulae sheet is provided at the back of this paper

Total marks – 100
Assessment Weighting – 40%

Section I Pages 1–10

22 marks

- Attempt Questions 1–22
- Allow about 30 minutes for this section

Section II Pages 12–25

78 marks

- Attempt Questions 23–28
- Allow about 2 hours for this section
- Start each question in a NEW booklet

Section I

22 marks
Attempt Questions 1-22
Allow about 30 minutes for this section

Use the multiple-choice answer sheet.

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

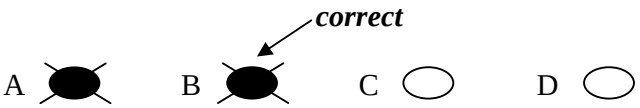
Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9



If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.



If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word ***correct*** and drawing an arrow as follows.



1 Using the formula, $r = \sqrt[3]{\dfrac{3V}{4\pi}}$, what is the value of r when $V = 400$. (Answer correct to 1 decimal place.)

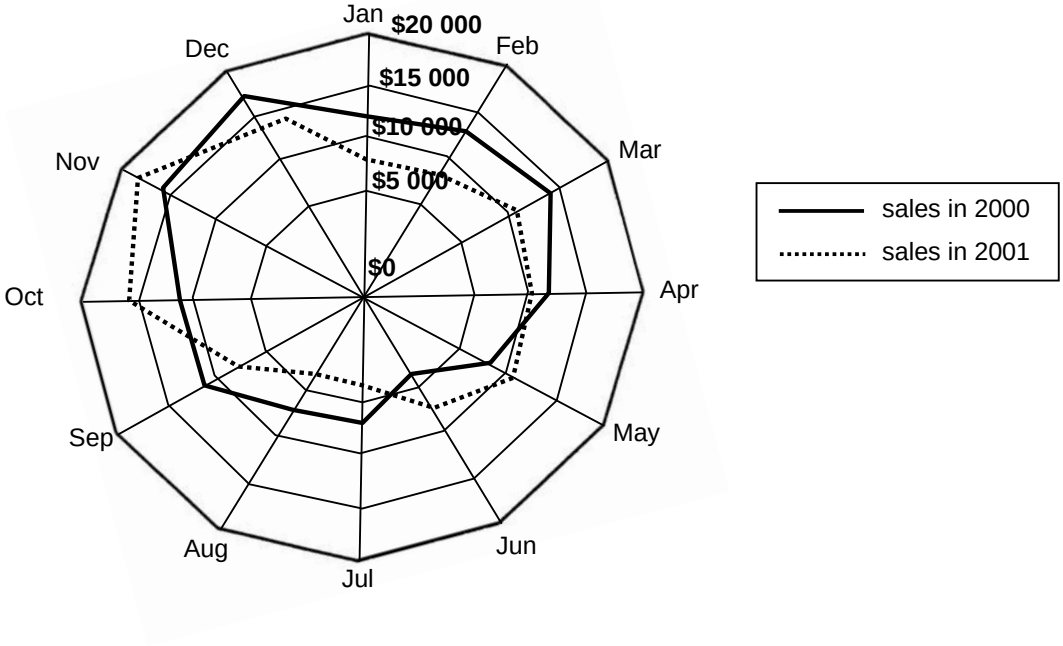
(A) 4.5
(B) 4.6
(C) 453.0
(D) 453.1

2 A sector has a radius of 5 centimetres and an angle at the centre measuring $68°$.

What is the area of the sector (answer correct to the nearest cm^2)?

(A) 15 cm^2
(B) 16 cm^2
(C) 32 cm^2
(D) 79 cm^2

3 Bicycle sales at a suburban Sydney bike shop in 2000 and 2001 are displayed on the radar chart below.



Which of the following statements is true?

(A) Bike sales in 2001 were higher than those in 2000 for 6 months.
(B) Bike sales in 2001 were generally higher than in 2000.
(C) More money was spent on bikes in the first 3 months of 2000 than 2001.
(D) Bike sales increased during the Christmas period in both 2000 and 2001.

4 Ken picks a marble at random from a tub and then replaces it before repeating the process. Over time, he picks 5 red, 7 blue, 3 green and 4 yellow marbles.

If there are 700 marbles in the tub, approximately how many blue marbles are expected to be in the tub?

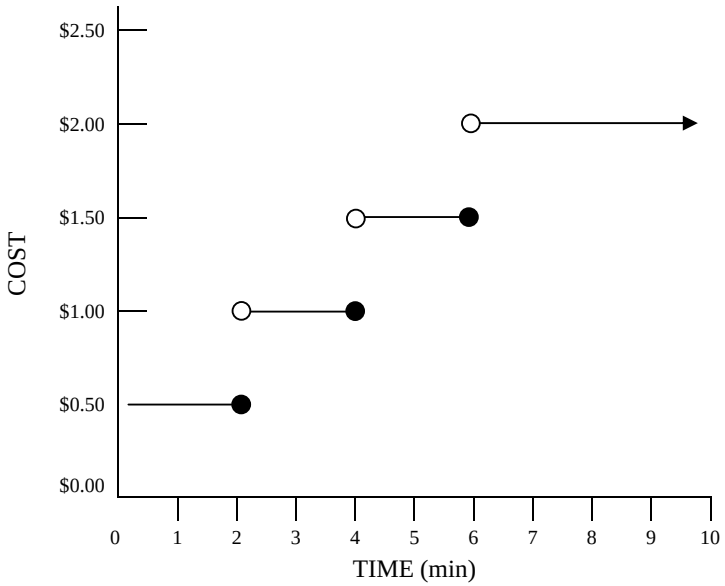
(A) 7

(B) 129

(C) 258

(D) 350

5 The graph below shows the cost of a timed telephone call.



Lucy makes two calls to a friend of length 4 minutes and 6 minutes. How much cheaper would it have been for Lucy to make a single 10 minute call?

(A) $0.50

(B) $1.00

(C) $1.50

(D) $2.00

6 Paulini's percentage marks on ten geography tests over the year are shown below.

49, 43, 27, 43, 58, 72, 68, 29, 61, 52

Paulini's friend Anthony took the same tests. The standard deviation for his test marks was 6.5.

Which student was the most consistent performer?

(A) neither

(B) both the same

(C) Paulini

(D) Anthony

7 A calculator is measured and its length recorded as 15 cm.

What is the percentage error in this measurement?

(A) $3\frac{1}{3}\%$

(B) $6\frac{2}{3}\%$

(C) 50%

(D) $96\frac{2}{3}\%$

8 Five Year 11 students are fighting it out for the positions of School Captain and School Vice-Captain. Before anyone can vote, the Year Co-ordinator needs to list the five names on a ballot paper.

How many different ways can the Year Co-ordinator list the five names?

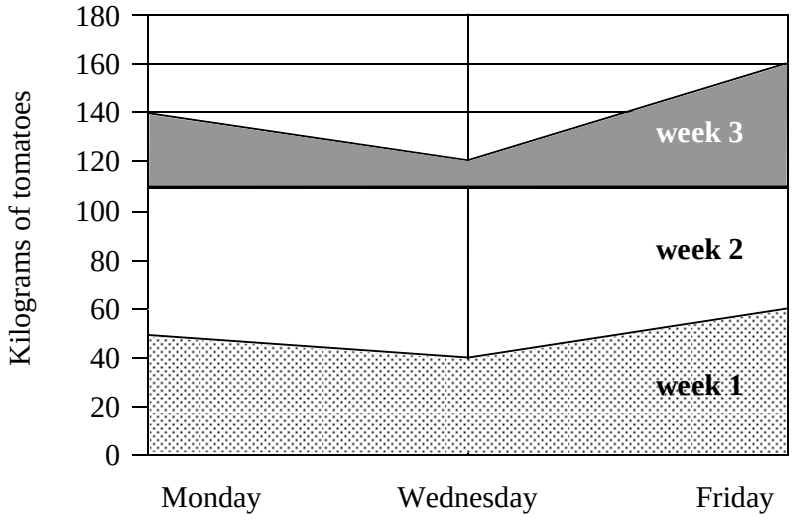
(A) 10

(B) 15

(C) 60

(D) 120

9 Alberto is a market gardener. He picks his tomatoes on Mondays, Wednesdays and Fridays. This area graph shows the number of kilograms of tomatoes he picked in the first 3 weeks in December.



What is the total number of kilograms of tomatoes Albeto picked in the first 3 weeks in December?

(A) 160 kg

(B) 340 kg

(C) 420 kg

(D) 910 kg

10 Fifty tickets are sold in a raffle. There are 2 prizes. Kylie buys 3 tickets. The probability that Kylie wins both prizes is given by the expression:

(A) $\frac{3}{50} + \frac{2}{50}$

(B) $\frac{3}{50} + \frac{2}{49}$

(C) $\frac{3}{50} \times \frac{2}{50}$

(D) $\frac{3}{50} \times \frac{2}{49}$

11 **Compound Interest Table $(1+r)^n$**
Final Amount of Investment (Per Dollar)

Interest rate per period										
Periods	**1%**	**2%**	**3%**	**4%**	**5%**	**6%**	**7%**	**8%**	**9%**	**10%**
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
2	1.020	1.040.	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594

Use the compound interest table to calculate the **interest** earned when \$2 000 is invested at 8% p.a. for two years if interest is compounded quarterly.

(A) \$164

(B) \$332

(C) \$344

(D) \$2 332

12 Jane chooses to invest \$15 000 at the end of each year into an account earning interest at 9.5% per annum compounded annually.

How long will it take for Jane to save \$300 000?

(A) 6 years

(B) 11 years

(C) 12 years

(D) 15 years

13 To estimate the number of trout in a lake, Colman's Fisheries captured 250 of them, tagged and then released the trout back into the lake. Some months later they captured 150 trout and discovered 30 of the trout tagged.

A reasonable estimate of the total number of trout that were in the lake would be:

(A) 1 250

(B) 3 675

(C) 3 750

(D) 11 250

14 A sphere has a surface area of 800 cm^2.

What is the diameter of this sphere?

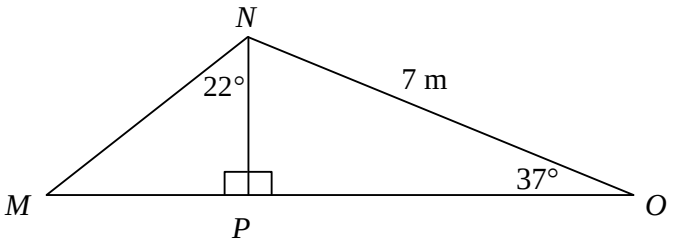
(A) 7 98 cm

(B) 14.14 cm

(C) 15.96 cm

(D) 28.28 cm

15 Calculate the length of *MP* in metres and express your answer correct to 1 decimal place.



NOT TO SCALE

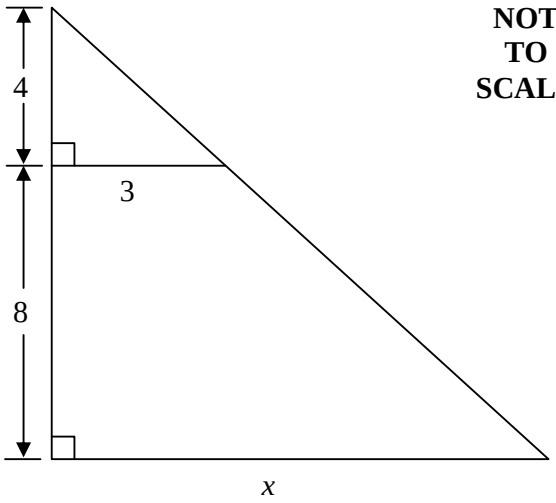
(A) 1.7 m

(B) 2.1 m

(C) 2.3 m

(D) 3.9 m

16



There is a pair of similar triangles in the diagram.

What is the length of the side marked x?

(A) 6

(B) 7

(C) 9

(D) 12

17 Allan's yearly income is \$48 875, and he also receives interest of \$175 per year. He can claim deductions of \$1050.

Calculate Allan's tax payable for the year, using the table below.

Income	Tax Payable
\$1 to \$6 000	Nil
\$6 001 to \$20 000	17 cents for each \$1 over \$6 000
\$20 001 to \$50 000	\$2 380 + 30 cents for each \$1 over \$20 000
\$50 001 to \$60 000	\$11 380 + 42 cents for each \$1 over \$50 000
\$60 001 and over	\$15 580 + 47 cents for each \$1 over \$60 000

(A) \$2 380

(B) \$10 780

(C) \$11 500

(D) \$14 400

18 What is $\frac{12x^2y}{y^3} \times \frac{5x^2y}{30x^3}$ equal to when fully simplified?

(A) $2x$

(B) $2xy$

(C) 2

(D) $\frac{2x}{y}$

19 Jill paid off a $4 000 loan in twelve monthly instalments of $410.

What was the flat rate of interest charged per annum?

(A) 10.25%

(B) 12.3%

(C) 23%

(D) 37%

20 Ben works a normal 40 hour week and is paid $18 for each of these hours. He is paid 'time and a half' for all overtime he is required to work.

In a particular week, Ben was paid $882.

How many hours of overtime did Ben work that week?

(A) 6

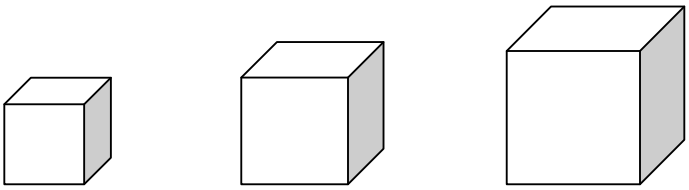
(B) 9

(C) 33

(D) 49

21 Three cubes have sides of x cm, y cm and z cm respectively.

NOT TO SCALE



x cm $\quad$ y cm $\quad$ z cm

If $y = 2x$ and $z = 3y$, then the number of cubes of side x cm that can fit into the cube of side z cm is:

(A) 6

(B) 9

(C) 27

(D) 216

22 Ruby has a 'Fastercard' credit card. There is no interest free period on purchases and the daily interest rate if 0.05%.

Here are her purchases for August:

Date	Purchase	Cost
8 Aug	GB's – clothes	$320
21 Aug	Charity donation	$50
25 Aug	VB – Petrol	$38

The bill is to be paid on 1 September.

What will be her total interest charge for this month?

(A) $4.04

(B) $4.25

(C) $20.40

(D) $424.80

End of Section I

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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.

Marks

Question 23 (13 marks)

(a) Simplify $3ab + 7a^2 - 8ba - 9a + 9a^2$. **2**

(b) Lyn made two errors in her solution to the following equation:

$$\begin{aligned} 4(1-x) - 3(2+x) &= 20 \\ 4 - 4x - 6 + 3x &= 20 \quad \text{Line 1} \\ -2 - x &= 20 \quad \text{Line 2} \\ -x &= 18 \quad \text{Line 3} \\ x &= -18 \quad \text{Line 4} \end{aligned}$$

(i) Which two lines do not follow correctly from the previous line? **1**

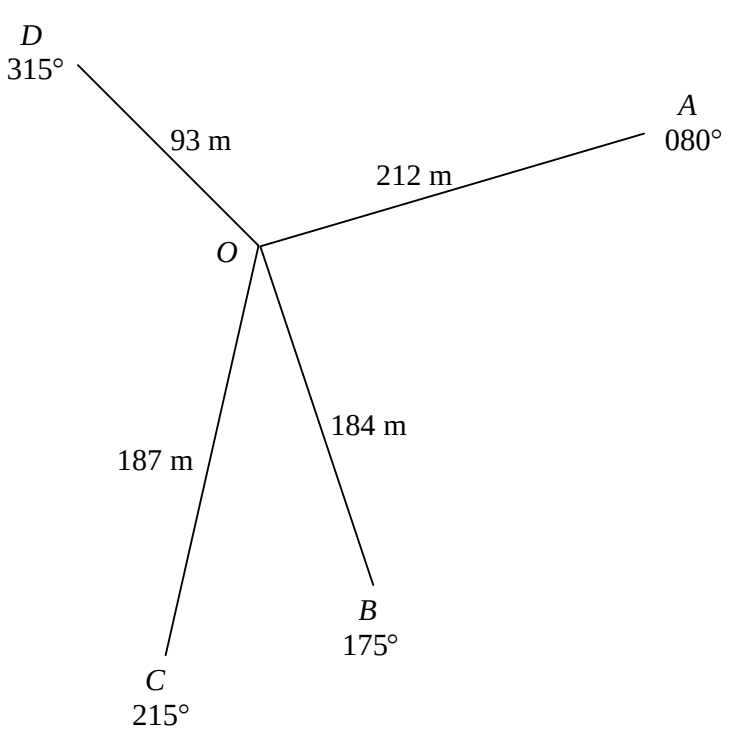
(ii) Rewrite the correct solution. **2**

Question 23 continues on page 13

Marks

Question 23 (continued)

(c) A radial survey of a disused tip was taken and the following diagram was produced.



NOT TO SCALE

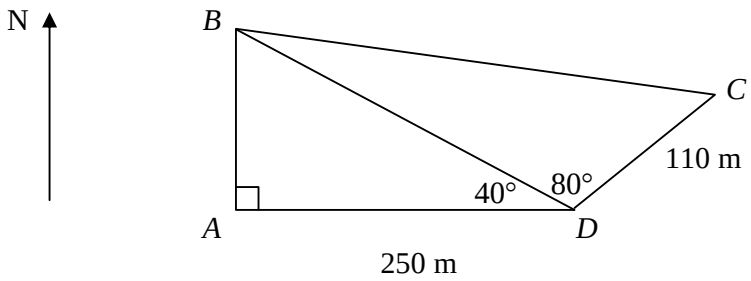
(i) Find the size of $\angle AOD$. **1**

(ii) Calculate the area of ΔAOD to the nearest m^2. **2**

Question 23 continues on page 14

Question 23 (continued)

(d) A Sketch of a paddock *ABCD* is shown below.



NOT TO SCALE

(i) Show that the length of *BD* is 326 m (correct to the nearest metre). **1**

(ii) Calculate the length of the side *BC* (correct to 2 significant figures). **2**

(iii) If the bearing of *C* from *D* is $030°$ write down the bearings of *B* and *A* from *D*. **2**

End of Question 23

Marks

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

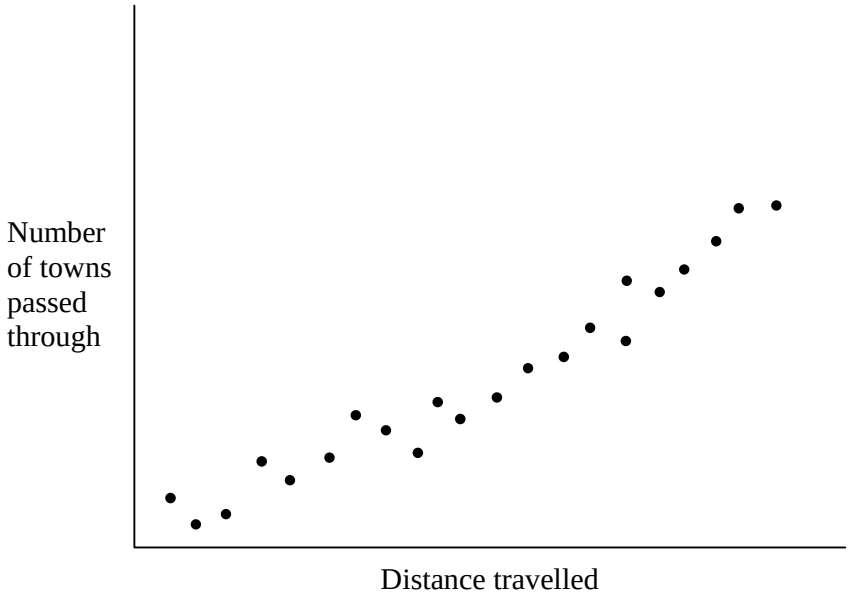
(a) Sue and Tim had the results of their Geometry test given to them as *z*-scores.
Sue received a *z*-score of 0 and Tim received a *z*-score of –1.
The test had a mean of 70 and a standard deviation of 5.

(i) Sue's friend Georgie received a mark of 82 in the test. **1**
What was Georgie's *z*-score?

(ii) Who performed better in the test? Explain your answer. **2**

(iii) What is the approximate percentage of students in the class who scored less than Tim in the test? **1**

(b) This scatter graph was plotted to determine whether there is a relationship between the distance travelled by a car and the number of towns passed through.



(i) Write a sentence about the relationship between the distance travelled and the number of towns passed through. **1**

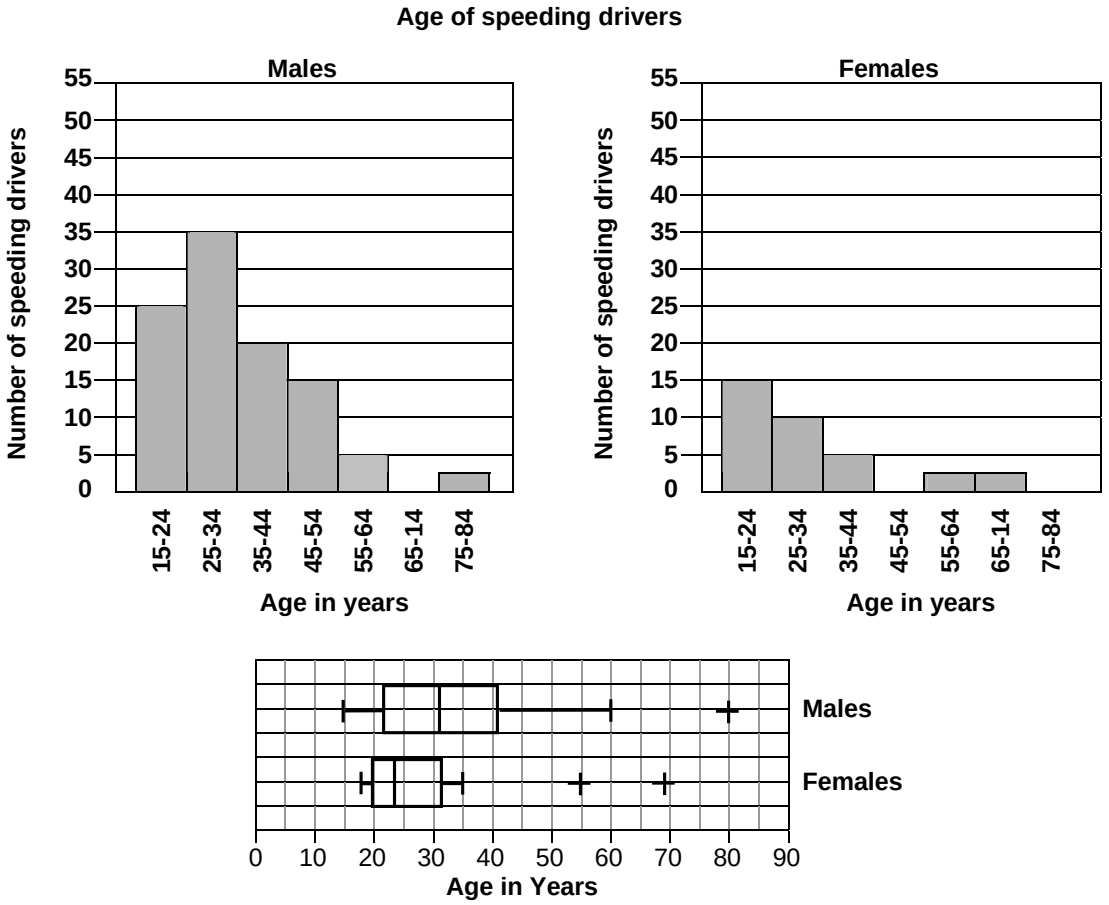
(ii) Describe the type of correlation shown in the scatterplot above. **1**

Question 24 continues on page 16

Marks

Question 24 (continued)

(c) The community is becoming increasingly concerned about speeding cars and trucks on the freeway. The histograms and box plots show the ages of male and female drivers caught speeding on the freeway during a holiday weekend.



(i) Determine the interquartile range of the ages of women caught speeding. **1**

(ii) What can you say about the youngest male driver caught speeding? **1**

(iii) Compare and contrast the displays of the ages of male and female drivers caught speeding on the freeway. Describe the main differences and similarities between the two sets of data in terms of the shape of the distribution, skewness and measures of location and spread. **4**

(iv) Use your answer to part (iii) to either support or reject this statement. **1**

'Essentially, the two sets of data have the same spread and shape, indicating that there is little difference between the ages of male and female drivers caught speeding on the freeway.'

End of Question 24

Marks

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

(a) Georgia bought a new machine costing $121 000 for her confectionary factory

If she depreciates this machine by the straight-line method it is worth nothing after 8 years.

(i) Calculate the annual depreciation rate. **1**

(ii) Hence, find the value of the machine after 3 years using this method. **1**

Alternatively, she could depreciate the machine by the declining-balance method using an annual depreciation rate of 9%.

(iii) Find the value of the machine after 3 years using this method. **1**

(iv) How many years would it take for the machine to halve in value using the declining-balance method? **1**

(b) James owned 5 600 shares with a total market value of $21 360.
James later sold his shares.

(i) Calculate the brokerage if his broker charges 1.5% of the first $15 000 value of shares and 0.5% thereafter. **2**

(ii) Find the stamp duty if the charge was 35c per $100 of share value or part thereof. **1**

(iii) What amount did James receive from the sale of the shares after costs? **1**

Question 25 continues on page 18

Question 25 (continued)

(c) A group of Year 12 students were surveyed to investigate the importance of doing practice papers in the weeks immediately preceding the Trial HSC.
The results are listed in the table below.

Number of practice papers completed (P)	Mark in the Trial HSC (M)
4	50
5	48
6	56
7	64
8	62
9	75
10	80
11	84
12	88

A scatter plot of this data is attached at the end of this paper.

(i) On the graph provided, draw the median regression line for this data. **2**

(ii) Find the equation of the median regression line. **2**

(iii) Use your answer in part (ii) to predict the trial mark if two past papers had been completed. **1**

End of Question 25

Marks

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

(a) When Ali returned from America he had $370 American dollars. **1**
If the exchange rate was $1 Australian = 59.2 cents American, how many Australian dollars did he receive when he changed his money?

(b) A club has 12 members on its executive, three of whom are Joe, Sue and Ian.

(i) In how many ways can the President, Secretary and Treasurer be chosen from these 12 people? **1**

(ii) A sub-committee of 3 people is to be chosen from the executive. How many distinct sub-committees are possible? **1**

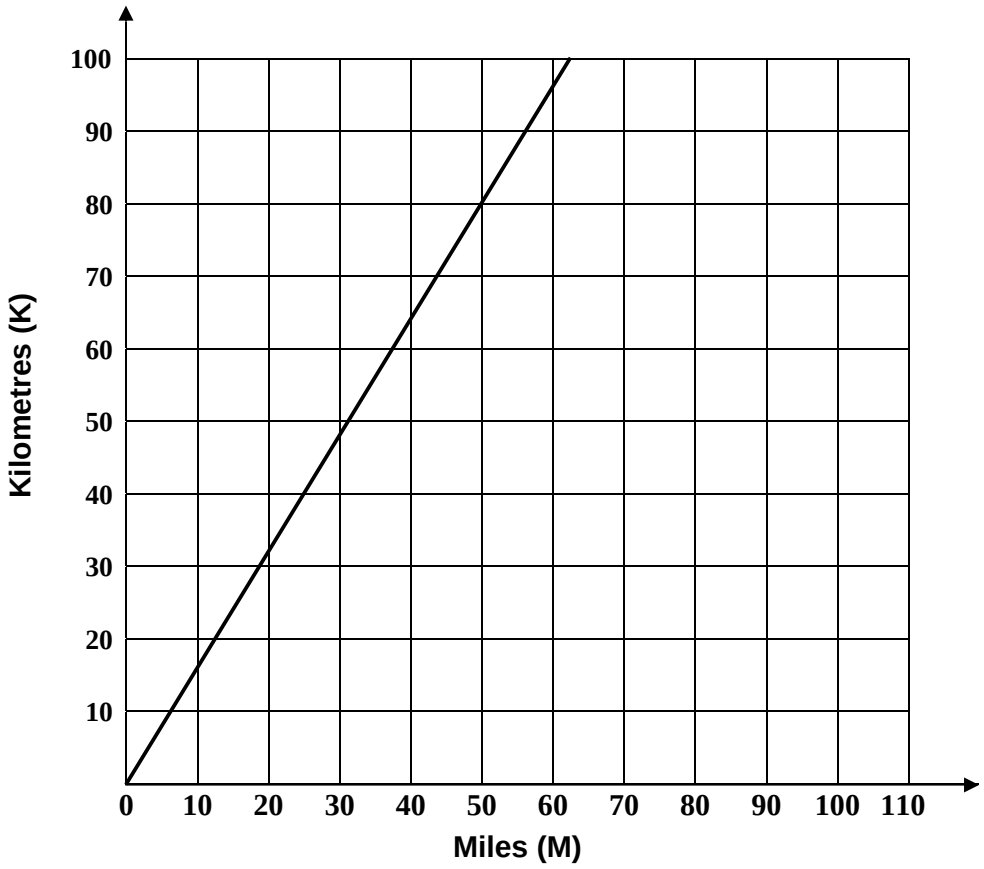
(iii) What is the probability that Joe, Sue and Ian will fill the positions on the sub-committee. **2**

Question 26 continues on page 20

Marks

Question 26 (continued)

(c) Britain measures distance using miles instead of the metric system of kilometres. The graph below shows the relationship between miles and kilometres.



(i) Use the graph to form an equation to determine a relationship between miles and kilometres. **1**

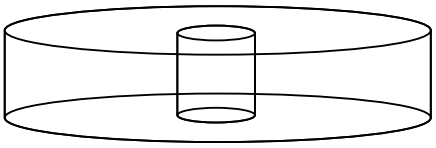
(ii) The distance from Sydney to Perth is 4 100 kilometres. **2**
How many miles is this distance? Answer to the nearest mile.

Question 26 continues on page 21

Marks

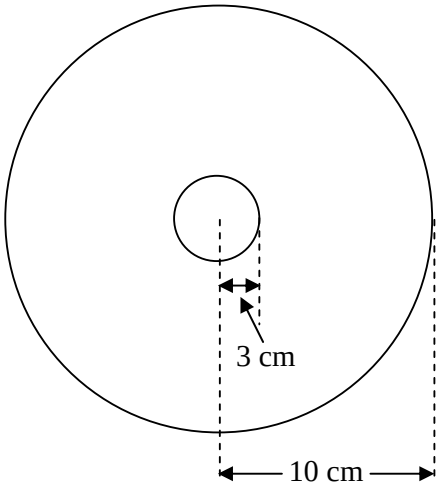
Question 26 (continued)

(d) A solid in the shape of a cylinder has a smaller cylinder drilled through its centre.



NOT TO SCALE

The cross-sectional area of the solid is in the shape of an annulus with an outer radius of 10 cm and an inner radius of 3 cm.

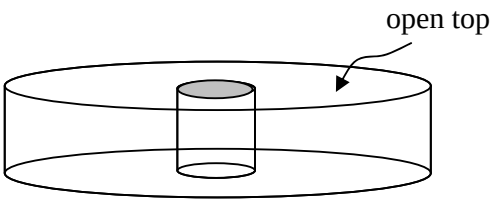


NOT TO SCALE

(i) Find the cross-sectional area of the solid. (To the nearest cm^2.) **2**

(ii) If the height of the solid is 5 cm, find the volume of the solid. **1**

(iii) A ring pan which is used to bake cakes in, is identical in shape and dimensions to the solid but has an open top as shown below. **2**



ring pan

NOT TO SCALE

Julie needs a ring pan with a 2 litre capacity. Will this ring pan be suitable? Explain your answer using a calculation.

End of Question 26

Marks

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

(a) Rewrite the formula $A = \pi r(r + S)$ to make S the subject. **2**

(b) When training "sniffer" dogs used for drug detection, a trial was set up. The results are shown below.

	Drugs Detected	**Drugs Not Detected**	**Total**
Bags with drugs	64	16	80
Bags without drugs	21	49	70
Total	85	65	150

(i) What percentage of bags containing drugs was correctly detected? (To the nearest %.) **1**

(ii) What was the overall accuracy rate throughout the trial as a percentage? (To the nearest %.) **2**

(iii) Assume that the dogs maintained the same degree of accuracy after the trial. If three bags containing drugs are brought past the dogs, what is the probability that the drugs in at least one of the bags will be detected? (To the nearest %.) **2**

Question 27 continues on page 23

Marks

Question 27 (continued)

(c) Sydney (Australia) is located at (34ºS, 151ºE). Los Angeles is located at (34ºN, 119ºW).

(i) On a diagram show the positions of Sydney and Los Angeles relative to the prime meridian and the Equator. **1**

(ii) What is the difference in longitude between the two cities? **1**

(iii) It is 11.30 pm in Los Angeles on a Saturday. What is the day and time in Sydney? **2**

(iv) A plane leaves Los Angeles at 11.30 pm on Saturday and flies non-stop to Sydney, arriving after being 15 hours in the air. What is the day and time the plane arrives in Sydney? **1**

(v) Find the distance between Sydney and the Equator. Give you answer to the nearest kilometre. $(1° = 60 \text{ nautical miles}; 1 \text{ nautical mile} = 1.852 \text{ km})$. **1**

End of Question 27

Marks

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

(a) Luke invests $520 at the end of each quarter into an annuity which compounds quarterly with an annual interest rate of 4%.

(i) Show that after five years the value of Luke's annuity is $11 450 (to the nearest dollar). **2**

(ii) Calculate how much Luke's sister, Jane, needs to invest today to have a total amount of $11 450 after five years at 4% interest per annum compounding quarterly. **2**

(iii) Explain who invests more to achieve a return of $11 450 after 5 years and state how much more is invested. **1**

(iv) Write down the main advantage of Luke's investment over Jane's. **1**

(v) Explain how Luke could have increased the return on his investment without changing the amount he invested or the time over which he invested it. Give reasons for your answer. **1**

Question 28 continues on page 25

Marks

Question 28 (continued)

(b) Jo and David took out a housing loan of $160 000 at an interest rate of 7.2% per annum, compounding monthly. As part of their contract, they agreed to pay a monthly repayment of $2 000. Details of the first two months of the loan are shown on the statement below.

Month	Balance on first day of the month	Monthly Interest	Monthly Repayment	Balance on last day of month
1	$160 000.00	$960.00	$2 000.00	$158 960.00
2	$158 960.00	$953.76	$2 000.00	$157 913.76

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

(ii) Jo and David find themselves unable to make any repayments on their housing loan during the third month. According to their contract that they have with the bank, if a repayment is not made during a particular month, then a penalty fee of 18% of the monthly repayment is to be made during the following month together with the late monthly repayment which was due as well as the current monthly repayment. Note that the penalty fee that they pay is not deducted from the balance of their loan.

(1) How much do Jo and David have to pay the bank during the fourth month? **1**

(2) Copy and complete for the third and fourth months of the housing loan below into your writing booklet. **4**

Month	Balance on first day of the month	Monthly Interest	Monthly Repayment	Balance on last day of month
1	$160 000.00	$960.00	$2 000.00	$158 960.00
2	$158 960.00	$953.76	$2 000.00	$157 913.76
3	$157 913.76		$0.00	
4			$4 000.00	

End of paper

FORMULAE SHEET

Area of an annulus

$A = \pi\left(R^2 - r^2\right)$

R = radius of outer circle

r = radius of inner circle

Area of an ellipse

$A = \pi ab$

a = length of semi - major axis

b = length of semi - minor axis

Area of a sector

$$A = \frac{\theta}{360}\pi r^2$$

θ = number of degrees in central angle

Arc length of a circle

$$l = \frac{\theta}{360}2\pi r$$

θ = number of degrees in central angle

Simpson's rule for area approximation

$$A \approx \frac{h}{3}\left(d_f + 4d_m + d_l\right)$$

h = distance between successive measurements

d_f = first measurement

d_m = middle measurement

d_l = last measurement

Surface area

Sphere $A = 4\pi r^2$

Closed cylinder $A = 2\pi rh + 2\pi r^2$

r = radius

h = perpendicular height

Volume

Cone $V = \frac{1}{3}\pi r^2 h$

Cylinder $V = \pi r^2 h$

Pyramid $V = \frac{1}{3}Ah$

Sphere $V = \frac{4}{3}\pi r^3$

r = radius

h = perpendicular height

A = area of base

Sine rule

$$\frac{a}{Sin\,A} = \frac{b}{Sin\,B} = \frac{c}{Sin\,C}$$

Area of a triangle

$$A = \frac{1}{2}ab\,Sin\,C$$

Cosine Rule

$$c^2 = a^2 + b^2 - 2ab\,\mathrm{Cos}\,C$$

or

$$\mathrm{Cos}\,C = \frac{a^2 + b^2 - c^2}{2ab}$$

Simple Interest

$I = Prn$
$P =$ initial quantity
$r =$ percentage interest rate per period, expressed as a decimal
$n =$ number of periods

Compound Interest

$$A = P(1 + r)^n$$

$A =$ final balance
$P =$ initial quantity
$n =$ number of compounding periods
$r =$ percentage interest rate per compounding period, expressed as a decimal

Future value (A) of an annuity

$$A = M\left\{\frac{(1 + r)^n - 1}{r}\right\}$$

$M =$ contribution per period, paid at the end of the period

Present value (*N*) of an annuity

$$N = M\left\{\frac{(1 + r)^n - 1}{r(1 + r)^n}\right\}$$

or

$$N = \frac{A}{(1 + r)^n}$$

Straight-line formula for depreciation

$$S = V_0 - Dn$$

$S =$ salvage value of asset after n periods
$V_0 =$ purchase price of the asset
$D =$ amount of depreciation apportioned per period
$n =$ number of periods

Declining balance formula for depreciation

$$S = V_0 (1 - r)^n$$

$S =$ salvage value of asset after n periods
$r =$ percentage interest rate per period, expressed as a decimal

Mean of a sample

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum fx}{\sum f}$$

$x =$ individual score
$\bar{x} =$ mean
$n =$ number of scores
$f =$ frequency

Formula for a *z*-score

$$z = \frac{x - \bar{x}}{s}$$

$s =$ standard deviation

Gradient of a straight line

$$m = \frac{\text{vertical change in position}}{\text{horizontal change in position}}$$

Gradient-intercept form of a straight line

$y = mx + b$
$m =$ gradient
$b =$ y-intercept

Probability of an event

The probability of an event where outcomes are equally likely is given by:

$$P(\text{event}) = \frac{\text{number of favourable outcomes}}{\text{total number of outcomes}}$$

SECTION I – MULTIPLE CHOICE ANSWER SHEET

Total Marks (22)
Attempt Questions 1 – 22
Allow about 30 minutes for this part

Centre Number

Student Number

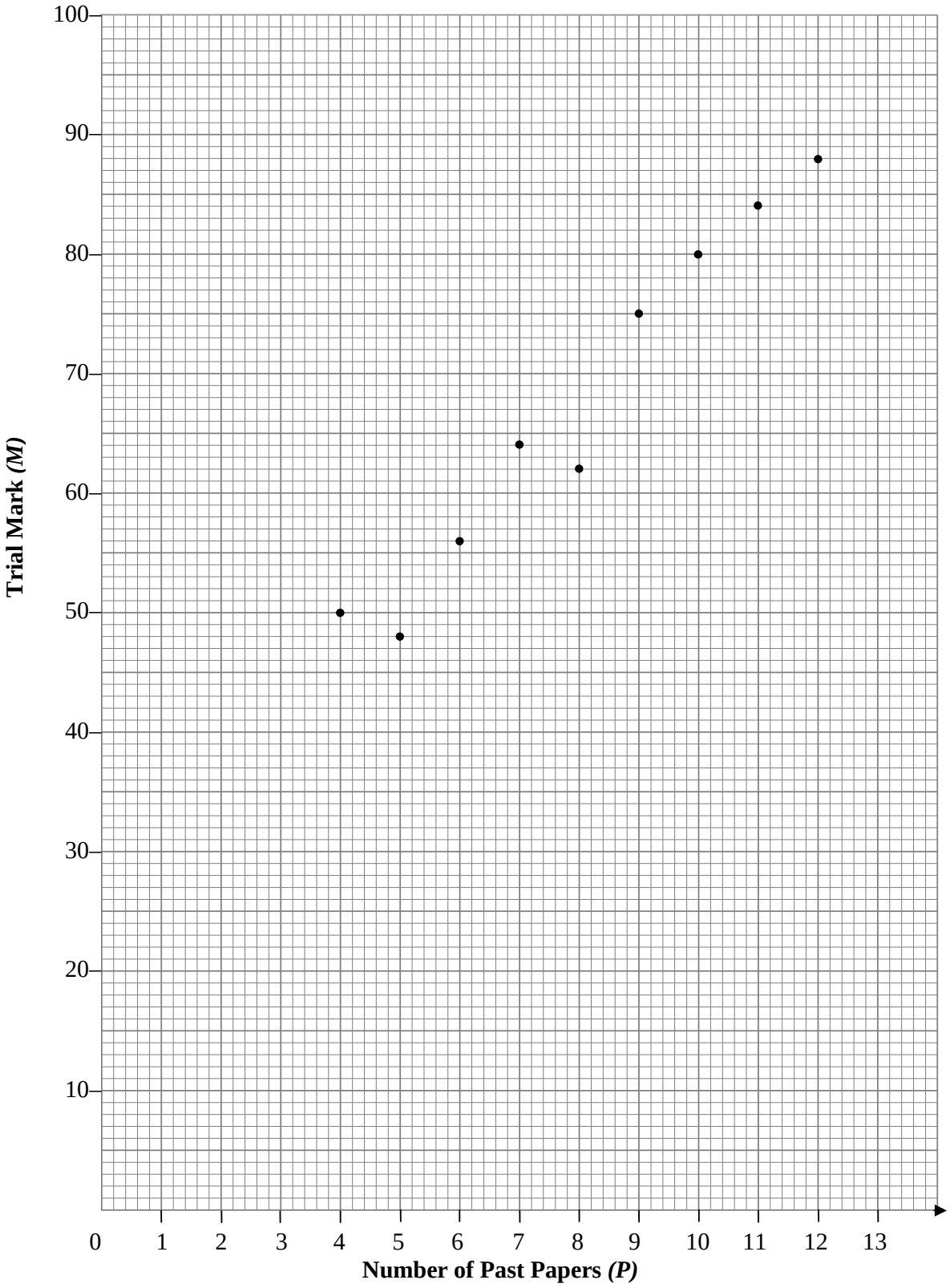
1	A ⬭	B ⬭	C ⬭	D ⬭
2	A ⬭	B ⬭	C ⬭	D ⬭
3	A ⬭	B ⬭	C ⬭	D ⬭
4	A ⬭	B ⬭	C ⬭	D ⬭
5	A ⬭	B ⬭	C ⬭	D ⬭
6	A ⬭	B ⬭	C ⬭	D ⬭
7	A ⬭	B ⬭	C ⬭	D ⬭
8	A ⬭	B ⬭	C ⬭	D ⬭
9	A ⬭	B ⬭	C ⬭	D ⬭
10	A ⬭	B ⬭	C ⬭	D ⬭
11	A ⬭	B ⬭	C ⬭	D ⬭
12	A ⬭	B ⬭	C ⬭	D ⬭
13	A ⬭	B ⬭	C ⬭	D ⬭
14	A ⬭	B ⬭	C ⬭	D ⬭
15	A ⬭	B ⬭	C ⬭	D ⬭
16	A ⬭	B ⬭	C ⬭	D ⬭
17	A ⬭	B ⬭	C ⬭	D ⬭
18	A ⬭	B ⬭	C ⬭	D ⬭
19	A ⬭	B ⬭	C ⬭	D ⬭
20	A ⬭	B ⬭	C ⬭	D ⬭
21	A ⬭	B ⬭	C ⬭	D ⬭
22	A ⬭	B ⬭	C ⬭	D ⬭

Centre Number

Student Number

Question 25

(c) (i)



H.S.C. Trial 2009 General Maths

1. $r = \sqrt[3]{\frac{3\times400}{4\times\pi}} = 4.6$

B

2. $A = \frac{68}{360} \times \pi \times 5^2 \doteq 15\ cm^2$

A

3. C

4. Blue marbles $= \frac{7}{19} \times 700$

$= 258$

C

5. $\$1 + \$1.50 = \$2.50$

or. $\$2$

$\therefore$ 50c cheaper.

A

6. $\sigma_{\text{Paulini}} = 15.1$

$\therefore$ Anthony with the smaller S.D.

D

7. $\frac{0.5}{15} \times 100 = 3\frac{1}{3}\%$

A

8. $5\times4\times3\times2\times1 = 120$

D

9. $140 + 120 + 160 = 420\ kg$

C

10. $\frac{3}{50} \times \frac{2}{49}$

D

11. Trial amount $= \$1.172x$

$2000 = \$234.4$

$\therefore I = \$2344 - \$2000$

$= \$344$

C

12. $300\,000 = 15000\left\{\frac{(1.095)^n - 1}{0.095}\right\}$

$\therefore n = 11.73$ $\therefore$ 12 yrs

C

13. $\frac{N}{250} = \frac{150}{30}$

$N = \frac{150}{30} \times 250$

$= 1250$

A

14. $800 = 4\pi r^2$

$r = \sqrt{\frac{800}{4\pi}}$

$= 7.9788$

$\therefore d = 15.96\ cm$

C

15. $\sin 37^\circ = \frac{NP}{7}$

$NP = 7\sin37^\circ$

$\tan 22^\circ = \frac{MP}{NP}$

$\therefore MP = 7\sin37^\circ \times \tan22^\circ$

$\therefore MP = 7\sin37^\circ$

$= 1.7\ m$

A

16. $\frac{x}{3} = \frac{12}{4}$

$x = \frac{12\times3}{4}$

$= 9$

C

17. Taxable income =
$48 875 + $175 − $1050
= $48 000
∴ Tax payable
= 2380 + 0·3 × 28 000
= $10780
B

18. $\frac{60x^4y^2}{30x^3y^3} = \frac{2x}{y}$
D

19. Total paid = 410 × 12
= $4920
$I = \$4920 - 4000$
$= \$920$
$I = \frac{P r t}{100}$
$920 = \frac{4000 \times r \times 1}{100}$
$r = \frac{920}{40} = 23\%$
C

20. Pay for 40 hrs =
40 × $18 = $720
∴ Amount of overtime
= $160
Pay for 1 hr overtime
= $18 × 1·5 = $27
∴ no. of hours overtime
= $160 ÷ 27
≈ 6 hrs
A

21. $z = 3 \times 2x = 6x$
∴ V of cube of side 2 cm
$= (6x)^3 = 216x^3$
∴ 216 cubes
D

22. $I = 320 \times \frac{0{\cdot}05}{100} \times 24$
$+ 50 \times \frac{0{\cdot}05}{100} \times 11 + 38 \times \frac{0{\cdot}07}{100}$
$= \$4{\cdot}25$
B.

23

a) $-5ab + 16a^2 - 9a$

b) (i) line 1 and line 3

(ii) $4 - 4x - 6 - 3x = 20$
$-2 - 7x = 20$
$-7x = 22$
$x = -3\frac{1}{7}$

c) (i) $\angle AOD = 45° + 80°$
$= 125°$

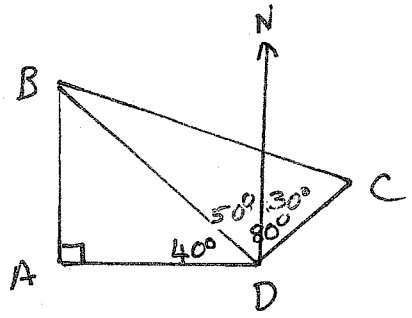
(ii) Area $\triangle AOA = \frac{1}{2} \times 212 \times 93 \times \sin 125° = 8075$ m

d) (i) $\cos 40° = \frac{250}{BD}$

$BD = \frac{250}{\cos 40°}$
$= 326{\cdot}35$
$\doteq 326$ m

(ii) $BC^2 = 110^2 + 326^2 - 2 \times 110 \times 326 \cdot \cos 80°$
∴ BC = 330 m

(iii)



The bearing of B from D is 310° T
The bearing of A from D is 270° T or due W.

---

24 a)(i) Georgie's z score
$= \frac{82-70}{5}$
$= 2.4$

(ii) Georgie performed the best as he had the highest z score ∴ higher above the mean

(C2) (iii) 16% exactly.

b)(i) As the distance travelled increases so does the number of towns passed through. (C1)

(ii) Positive correlation

c)(i) I.Q. = 31 − 20
= 11

(ii) He was 15 years of age so was driving illegally. (C1)

(iii) The 2 sets of data have different modes (shape) Both sets of data have (C4)

outliers
Both sets of data are +ve skewed
The median for males is higher (location) than females
The range (spread) and interquartile range is greater for males

(iv) This is not correct
The 2 sets of data have the same shape but different spread. (C1)

25.

a)(i) Annual depreciation rate = 121000 ÷ 8
= $15125 or 12½%

(ii) Value after 3 yrs
= $121000 − 3 × 15125
= $75625

(iii) Value after 3 years
$= 121000(1-0.09)^3$
= $91182.09

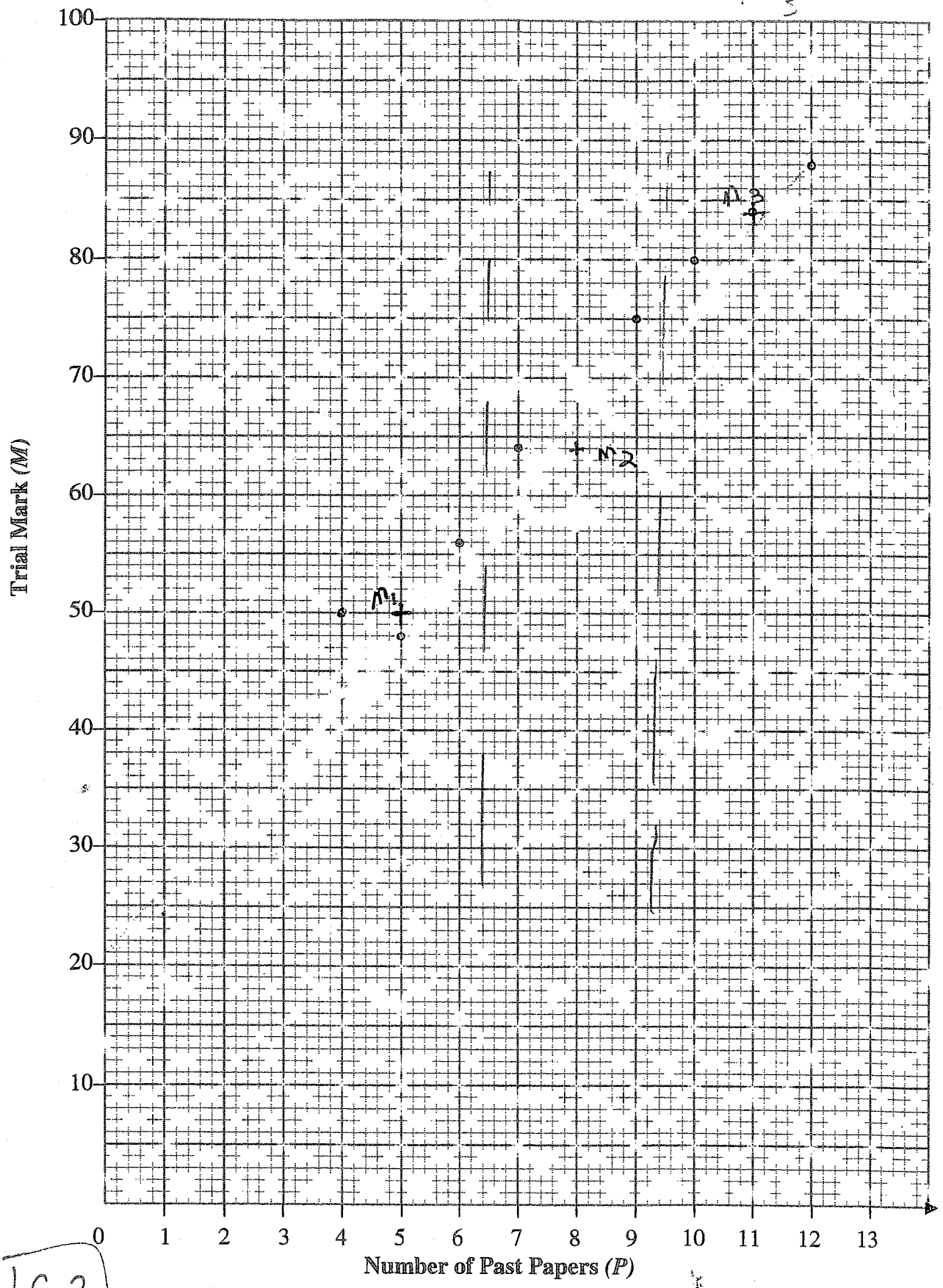
(iv) $60500 = 121000(1-0.0^n$
∴ $n = 7.3496$
ie. 8 years.

b)(i) Brokerage
$= 15000 \times \frac{1.5}{100} + 6360$
$\frac{0.5}{100}$ = $256.80

(ii) Stamp duty
= $21360 ÷ 100 × 0.35
= $74.76.

Question 25

(c) (i)



C 2

(iii) Amount James receives
= $21360 ÷ $256.80
− $74.76 = $21028.44

c) (i) $M_1 = (5, 50)$
$M_2 = (8, 64)$
$M_3 = (11, 84)$

(ii) $m = \frac{67}{12} \div 5.58$

$M = 5.58P + 21$

(iii) $M = 5.58 \times 2 + 21$
$= 32\%$.

---

26 a) $\$A = 37000 \div 59.2$
$= \$625$

b) (i) $12 \times 11 \times 10 = 1320$

(ii) $\frac{1320}{3 \times 2 \times 1} = 220$

(iii) $P(J, S, I) = \frac{3 \times 2 \times 1}{220}$

$= \frac{3}{110}$

c) (i) $m = \frac{80}{50} = 1.6$
$\therefore K = 1.6M$

(ii) $4100 = 1.6M$
$\therefore M = \frac{4100}{1.6} = 2563$ mls

d) (i) $A = \pi(10^2 - 3^2)$
$= 286 \text{ cm}^2$

(ii) $V = 286 \times 5$
$= 1430 \text{ cm}^3$

(iii) capacity = 1430 mls
$\therefore$ 1.43 litres $\therefore$ this ring pan is not big enough.

C 2

27 a) $A = \pi r^2 + \pi r S$
$\pi r S = A - \pi r^2$
$S = \frac{A - \pi r^2}{\pi r}$

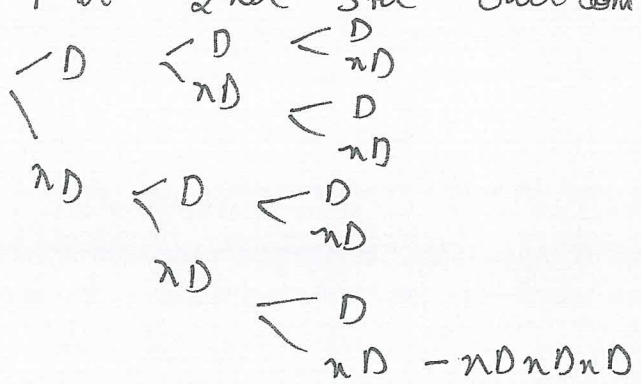
or $S = \frac{A}{\pi r} - r$

b) (i) $\frac{64}{80} \times 100 = 80\%$

(ii) P (accuracy) $= \frac{64 + 49}{150}$

$= 75\%$.

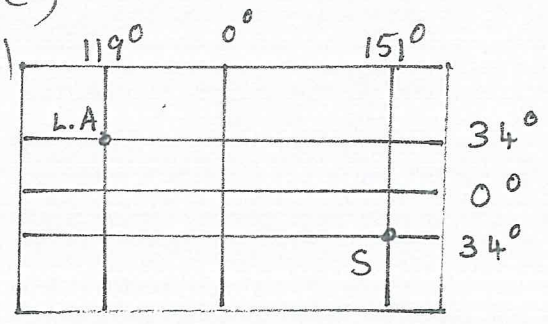
(iii)



P(at least 1D)
$= 1 - P(nD\ nD\ nD)$
$= 1 - 0.25 \times 0.25 \times 0.25$
$\doteq 98\%$.

c)

(i)



(ii) diff long = 119 + 151
$= 270°$.

(iii) $\therefore$ time diff $= 270 \times 4 \div 6$

= 18 hrs.
∴ Time in Sydney is 5.30 p.m. Sunday
(iv) 8.30 am Monday the plane arrives in Sydney
(v) Dist. between Sydney & the Equator = 34 × 60 × 1.852 = 3778 kms.

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28. a) (i) $A = 520\left\{\frac{(1+0.01)^{20}-1}{0.01}\right\}$

$= \$11449.88$
$= \$11450$

(ii) $N = \frac{11450}{(1+0.01)^{20}}$

$= \$9383.78$
$= \$9384$

(iii) Jane invests now $9383.78 but Luke invests $520 × 20 = $10400 over 5 years.
∴ Luke invests $1016.22 more than Jane.

C1

(iv) Luke does not have to send $10400 immediately and so can use the rest of his money over the 5 yrs except $520 each quarter.

C1

(v) Luke could have got a better interest rate per quarter eg: 5%

C2

b) (i) Monthly interest rate = 7.2 ÷ 12 = 0.6%

(ii) Amount to be paid in 4th month
$= \frac{18}{100} \times 2000 + \$4006$
$= \$4360$

(iii)

Month	Balance on 1st day of the month	Monthly interest	Monthly Repayment	Balance on last day of month
1.				$9413.76
2.	$9413.76	$56.48	$520.00	$8947.48
3.	$8947.48	$53.68	$520.00	$8481.16
4.	$8481.16	$50.89	$520.00	$8012.05