



SAINT IGNATIUS' COLLEGE

Trial Higher School Certificate

2007

GENERAL MATHEMATICS

Directions to students

- Reading time: 5 minutes
- Time Allowed 2 ½ hours
- Attempt ALL questions
- Questions 23 – 28 are of equal value
- Board approved calculators may be used.
- A separate formula sheet is provided
- Answer each question in the booklets provided and clearly label with your name and your teacher's name

Total Marks **100**

Section 1 : Multiple Choice (22)

Attempt questions 1 – 22

Allow about 30 minutes for this section

Section 2: Answer in booklets (78)

Attempt Questions 23 – 28

Allow about 2 hours for this section

Section I

Marks available – 22

Spend about 30 minutes on this section.

Attempt all questions.

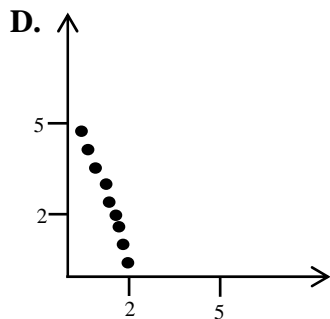
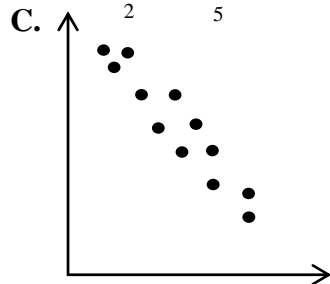
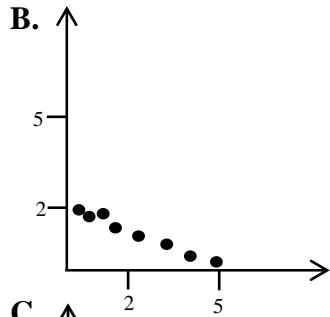
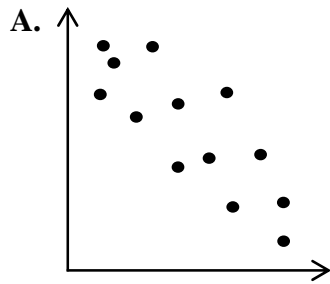
- John is planning to invest \$1500 at the end of each year at 7% p.a. interest.
What will the future value of this annuity be worth after 10 years?
 - \$2950
 - \$10 535
 - \$20 725
 - \$42 986
- Vicki scored 78 in a maths test. The maths test had a mean of 62 and a standard deviation of 8. A recent English test had a mean of 58 and a standard deviation of 11.
What mark in the English test would have been equivalent to Vicki's maths mark?
 - 74
 - 76
 - 78
 - 80
- For a loan of \$20 000 a deposit of \$1600 is made and payments of \$564 per month are paid for 4 years.
The total repaid is:
 - \$2256
 - \$3856
 - \$27 072
 - \$28 672
- Mr Dogood represented the results from his class's test as a stem-and-leaf plot.

Females						Males						
			8	7	0					9		
9	7	6	4	3	1	1	3	5	7	8		
		8	7	5	1	2	1	3	6	6	7	9
			7	4	3	1	3	1	1	2		

The difference in the median for the females and males is:

- 1
- 2
- 5
- 6

5. Which scattergram below has a correlation of approximately -0.4 ?

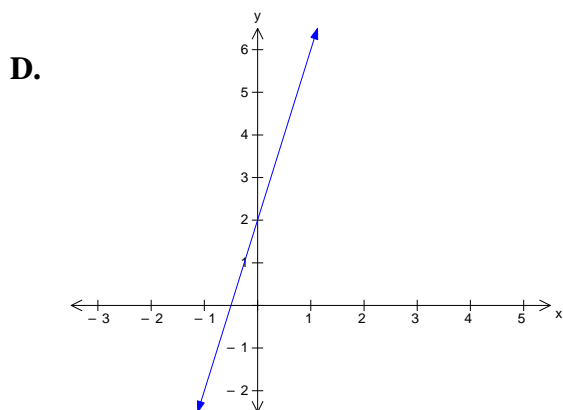
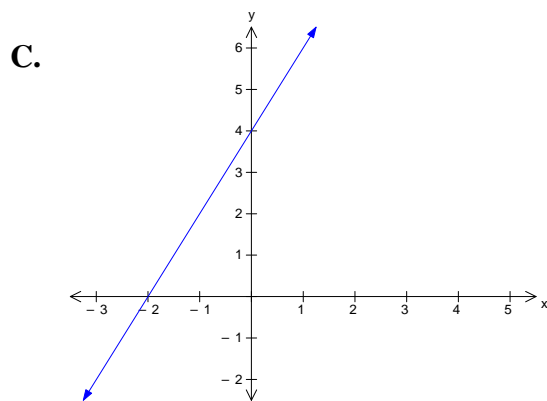
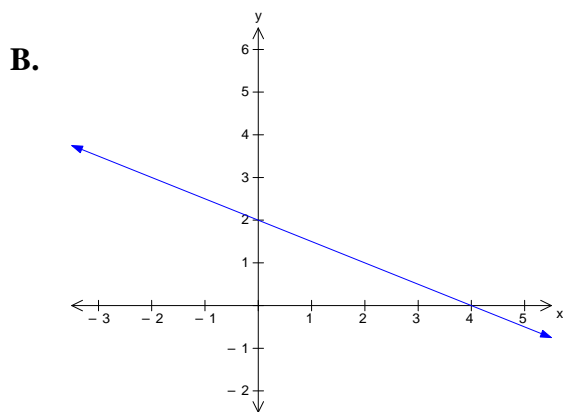
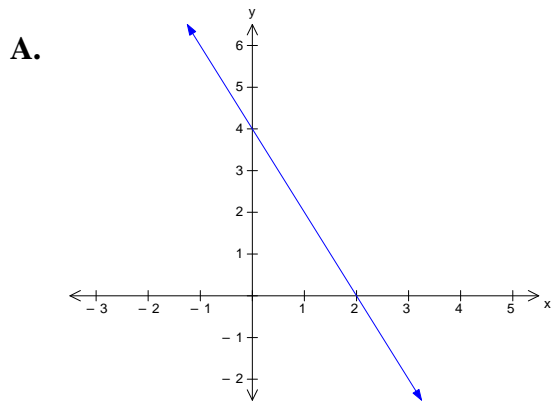


6. The depreciated value of a colour laser printer is \$1500.

If the printer was depreciated at a rate of 5% pa for 5 years, then the original value of the printer was:

- A. \$375
- B. \$1875
- C. \$1914
- D. \$1939

7. Which graph below represents the line $y = 2x + 4$?



8. The probability of an event occurring is $\frac{89}{100}$

Which statement best describes the probability of this event occurring?

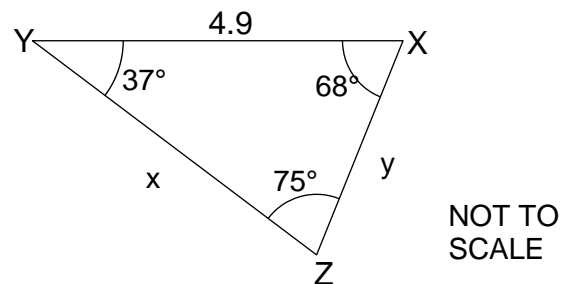
- A. The event is likely to occur
 B. The event is certain to occur
 C. The event is unlikely to occur
 D. The event will NOT occur
9. The area, A , of a trapezium is given by the formula

$$A = \frac{h}{2}(a + b)$$

Calculate the area when $h = 12$, $a = 7$ and $b = 9$.

- A. 51
 B. 96
 C. 121
 D. 192
10. The value of y , correct to one decimal place is:

- A. 2.4
 B. 3.1
 C. 3.2
 D. 4.7



11. The table below shows the monthly repayments per \$1000 on a bank home loan.

Term of Loan (years)	6.00%	6.25%	6.50%	6.75%	7.00%	7.25%	7.50%
5	\$19.33	\$19.45	\$19.57	\$19.68	\$19.80	\$19.92	\$20.04
10	\$11.10	\$11.23	\$11.35	\$11.48	\$11.61	\$11.74	\$11.87
15	\$8.44	\$8.57	\$8.71	\$8.85	\$8.99	\$9.13	\$9.27
20	\$7.16	\$7.31	\$7.46	\$7.60	\$7.75	\$7.90	\$8.06
25	\$6.44	\$6.60	\$6.75	\$6.91	\$7.07	\$7.23	\$7.39

Determine the monthly repayment for a loan of \$120 000 at 6.5% p.a. interest rate over 20 years.

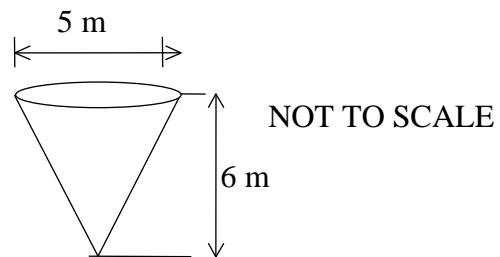
- A. \$7.46
 B. \$89.52
 C. \$895.20
 D. \$7460

12. In a family of three children, the probability of having three boys is:

- A. $\frac{1}{2}$
- B. $\frac{1}{3}$
- C. $\frac{1}{8}$
- D. $\frac{3}{8}$

13. Evaluate the volume of the cone.

- A. 39 m^3
- B. 118 m^3
- C. 157 m^3
- D. 471 m^3



14. Two coins are tossed together 20 times.

Which calculation below illustrates the expected number of times you would get 2 heads?

- A. $\frac{1}{4} \times 20$
- B. $\frac{1}{2} \times 20$
- C. $\frac{1}{4} \times 40$
- D. $\frac{1}{2} \times 40$

15. The speed limit in the Harbour Tunnel is 80 km/h. This is equivalent to

- A. 2.2 m/sec
- B. 22.2 m/sec
- C. 222.2 m/sec
- D. 2222.2 m/sec

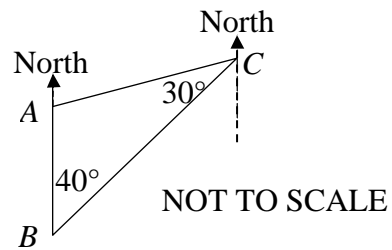
16. A group of 6 students completed a spelling quiz. Their average score was recorded as 13, but one of the scores had been incorrectly recorded as 8 instead of 18.

Find the real average.

- A. 5.2
- B. 14.7
- C. 15.5
- D. 16.0

17. Determine the true bearing of A from C.

- A. 030° T
- B. 110° T
- C. 250° T
- D. 290° T



18. If $7x^5 = 2.2$, then x is closest to:

- A. 0.0031
- B. 0.16
- C. 0.79
- D. 7.36

19. From a fridge containing 8 different cans of soft drink, Marco chooses two cans of soft drink.

How many different possible choices could he make?

- A. 2
- B. 16
- C. 28
- D. 56

20. The depreciation on my new laptop computer worth \$4000 can be found using the declining balance method. The table below shows the value of the laptop after a number of years.

Years	Salvage Value
0	\$4000
1	\$3200
2	\$2560
3	\$2048
4	\$1638.40
5	\$1310.72
6	\$1048.58
7	\$838.86
8	\$671.09
9	\$536.87
10	\$429.50

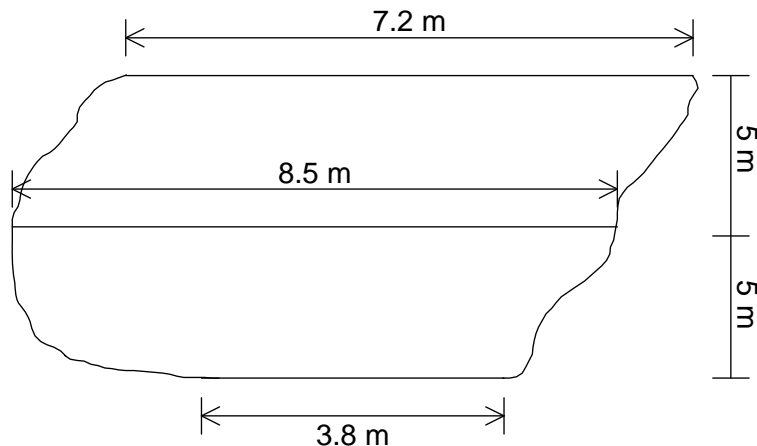
In which year will the laptop first be worth half of its original value?

- A. 2nd
B. 3rd
C. 4th
D. 5th
21. What is the angular distance between Perth (32°S , 116°E) and Beijing (40°N , 116°E)?
- A. 0°
B. 8°
C. 72°
D. 116°
22. The results of a Biology exam were normally distributed. Alison gained a z -score of -1 .
What percentage of students scored better than Alison?
- A. 16%
B. 34%
C. 68%
D. 84%

End of Section I

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

- a. As part of a school garden project to beautify the grounds, the P and C are considering the construction of a fish pond. A sketch is shown below.



- i. Use Simpson's Rule to calculate the area of the pond's surface. 2
- ii. The pond has an even depth of 1.5 metres. Each fish introduced into the pond requires 1.75 m^3 of water.
- What is the maximum number of fish that can successfully be introduced into the pond? 2

- b. At Harry's Car Repair Shop the cost \$ c of car repairs is given by the formula:

$$c = 50 + p + 18t$$

where p is the cost in dollars of new parts and t is the time in hours spent on completing the repairs.

- i. Find the cost of repairs if new parts cost \$254 and the repairs take 2 hours. 1
- ii. If new parts cost \$222 and the total cost is \$351, how long did it take (to the nearest minute) to complete the repairs? 1
- iii. What does the garage charge per hour for time spent on repairs? 1

Question 23 continues on page 10

- c. The table shown below can be used to calculate home loan repayments.

Interest rate	Monthly repayments on a \$1000 loan over			
	10 years	15 years	20 years	25 years
8.25% p.a.	\$12.27	\$9.70	\$8.52	\$7.88
8.50% p.a.	\$12.40	\$9.85	\$8.68	\$8.05
8.75% p.a.	\$12.53	\$9.99	\$8.84	\$8.22
9.00% p.a.	\$12.67	\$10.14	\$9.00	\$8.39
9.25% p.a.	\$12.80	\$10.29	\$9.16	\$8.56
9.50% p.a.	\$12.94	\$10.44	\$9.32	\$8.74

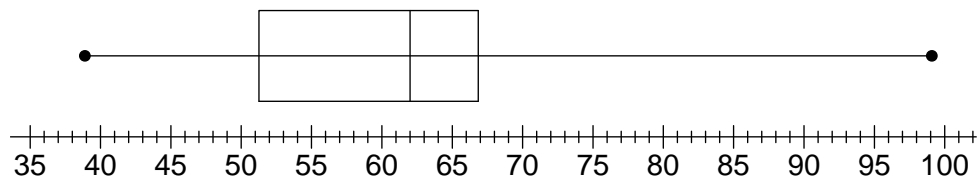
Joanne's gross weekly income is \$700.

- i. Show that her monthly income, correct to the nearest dollar, is \$3033. **1**
- ii. The bank will not allow loan repayments to be more than 30% of a customer's gross monthly income.
What is the maximum amount Joanne can repay per month? **1**
- iii. What is the maximum amount (to the nearest \$1000) Joanne can borrow at 9.25% p.a. interest? **1**
- iv. Joanne decides to purchase a unit worth \$105 000. She settles on a loan at 9.25% over 25 years.
Calculate her monthly repayment. **1**
- v. How much in interest will Joanne pay over the term of the loan? **1**
- vi. Approximately how many times more than the amount she borrowed will she have to repay the bank? **1**

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

- a. Anna wants to retire in 5 years time. She plans to set up a small business from her home. She estimates that this will cost around \$20 000 to set up. How much must she invest today, at 12% p.a., compounding monthly, so that she will have \$20 000 after 5 years? 3

- b. The following box and whisker plot shows the results that a class of 20 students achieved on their English test.



- i. What is the range of the scores? 1
 ii. Calculate the interquartile range 1

The results from the same class of students for a Mathematics test are displayed in the following stem and leaf plot:

4	6 9
5	1 5 7 9
6	2 3 6 8
7	0 2 5 7 7
8	1 4 7
9	4 7

- iii. Find the median, lower quartile, upper quartile and the interquartile range for these results. 2
- iv. James scored 75 for Mathematics and 70 for English. Which is the better mark, relative to the class results? Explain. 2
- c. The same class sat two Science tests. The mean was 60% and the standard deviation was 8% for the first test. Cindy scored 78%.
- i. What z-score is equivalent to Cindy's mark? 1
- ii. If John scored a mark of 52%, what percentage of students scored more than John on this test? 1
- iii. On her next test, Cindy scored 82%. This test had a mean of 65% and a standard deviation of 9%. On which test did Cindy perform the best? Give a reason for your answer 2

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

- a. The number of crimes during a 1 month period in two suburbs is recoded in the two-way table shown here.

	Use Sunscreen	Don't use sunscreen	Totals
Had a Melanoma during past year	14	?	60
No Melanoma during past year	?	4	?
Totals	60	50	?

- i. Copy the table into your answer booklet and fill in the missing entries **1**
 - ii. What percentage of people use sunscreen? **1**
 - iii. What is the probability that a person surveyed used sunscreen and did not have a melanoma during the last year? **1**
 - iv. "Using sunscreen prevents a person from developing a melanoma"
Comment on this statement. **1**
- b. The following graph shows the number of years that people of various ages are expected to survive.



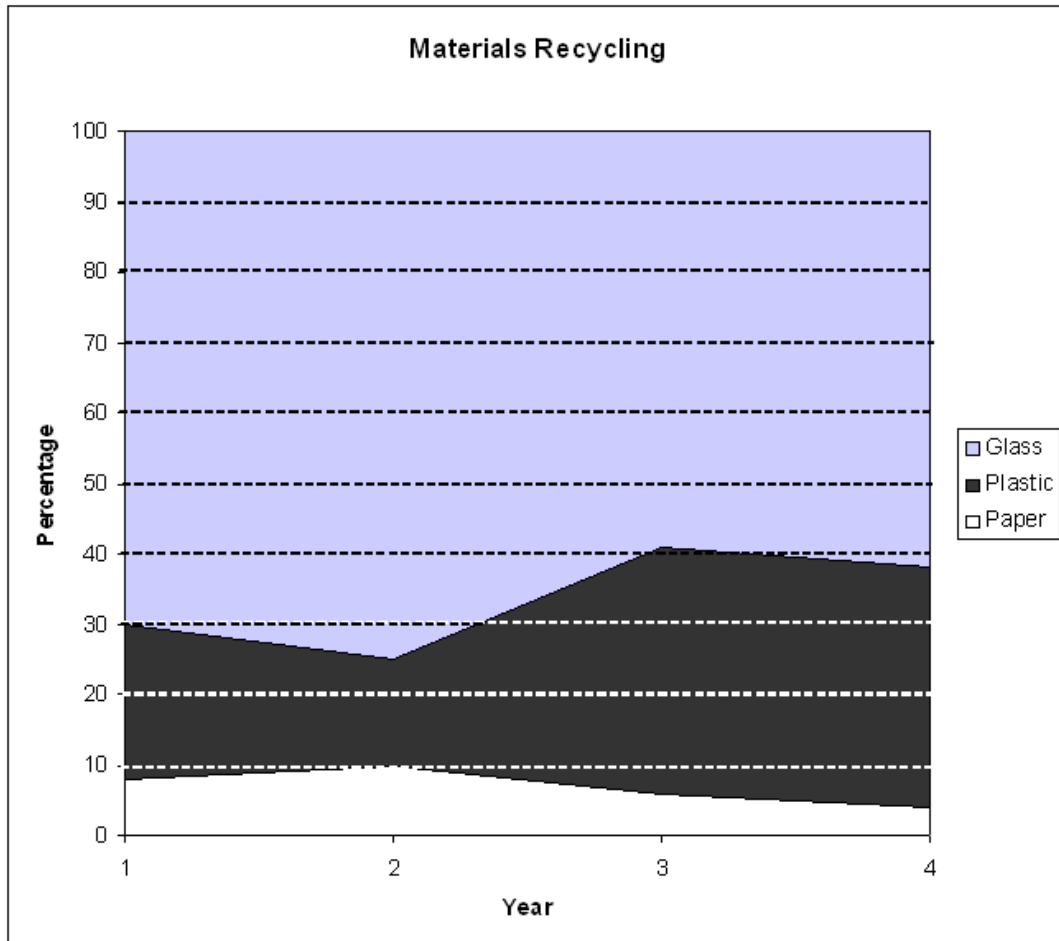
- i. Suggest an appropriate correlation coefficient? **1**
- ii. Estimate the number of years a 16 year old is expected to survive.
[Use the line of best fit or other appropriate method] **1**
- iii. John has been told he can expect to live for another 15 years. What would you expect his current age to be? **1**

Question 25 continues on page 13

c. Simplify $3x(y + x) - x(y - 3x)$.

2

d. The chart below shows the percentage of the total recycled materials for glass, plastic and paper over a four year period.



i. What percentage of plastic was recycled in the second year?

1

ii. Which material makes up most of the total recycled material?

1

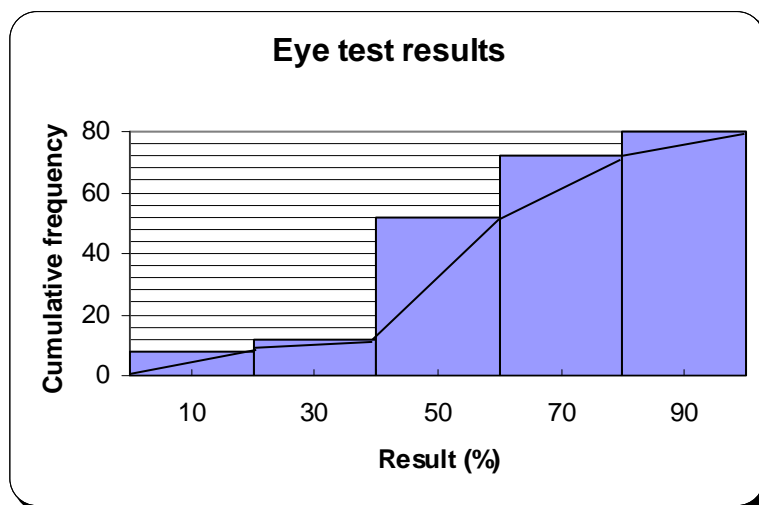
iii. Describe what has happened to the percentage of glass being recycled over the four year period.

2

Question 26 (13 marks)

Use a SEPARATE answer booklet.

- a. In a large city hospital 80 patients had their eyesight tested. The results are summarised in the graph below.

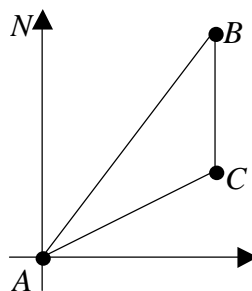


- i. Use the graph to estimate the median mark and the interquartile range of the 80 patients tested. 2

The lowest score was 19% and the highest score was 91%.

- ii. Construct a box-and-whisker plot to show the results. 2

- b. A man travels 30 km by train, from his home, *A*, into the city, *B*, on a bearing of 040° T. He then changes trains and travels due South for 16 km, to reach his place of work, *C*.



NOT TO SCALE

- i. Copy the diagram onto your answer sheet and **clearly** mark in all the given information. 1
- ii. Determine the angle ABC . 1
- iii. Calculate the length of the shortest distance between home and work. 2
- iv. On what true bearing would he have to travel to take the direct route from *A* to *C*? 1

Question 26 continues on page 16

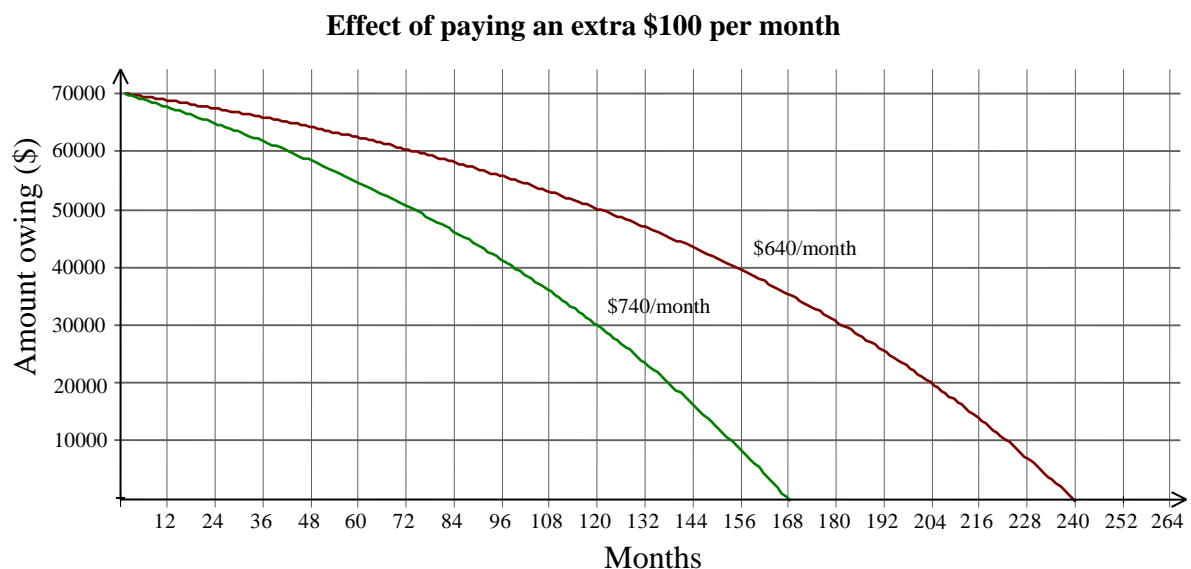
- c. The table below shows the approximate co-ordinates for several world cities.

City	Latitude	Longitude
Tokushima (Japan)	34°N	133°E
Sydney (Australia)	32°S	151°E
New York (USA)	41°N	74°W
Denver (USA)	40°N	105°W

- i. If it is 3 am in Tokushima, what time is it in Sydney? 2
- ii. A car race between New York and Denver takes 31 hours.
A car leaves Denver at 7 am on Wednesday morning.
- Find the day and local time this car arrives in New York. 2

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

- a. Franco knows his bank PIN (Personal Identification Number) has four digits and he knows the digits are 1, 3, 7 and 8, but he cannot remember the order.
- i. How many different four-digit PINs are possible? **1**
- ii. What is the probability that Franko will be able to correctly guess his PIN? **1**
- b. Mark needs to borrow some money to purchase a house. He has arranged a bank loan at 9.25% p.a. to be repaid over 20 years at \$640 per month.
- Mark has some extra money and decides to increase his monthly repayment by \$100 per month to \$740 per month.
- The graphs below show how his increased repayment per month shortened the length of the loan.



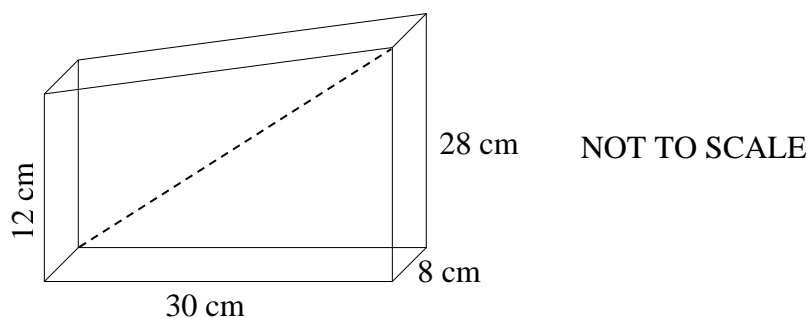
- i. How much did Mark borrow? **1**
- ii. How much would Mark owe after 13 years of paying \$640/month? **1**
- iii. How many years earlier than the bank's predicted 20 years did Mark have the loan repaid? **1**
- iv. How much did Mark save by repaying \$740 rather than \$640 per month? **2**

Question 27 continues on page 17

- c.** A photo copier is purchased new for \$7500, this includes delivery and installation. The copier depreciates at a rate of 28% per annum.
- i.** Use the declining balance method of depreciation to calculate the Salvage Value of the copier after five years. (to the nearest dollar) **1**
 - ii.** Use the guess, check and refine method to calculate how long it will take to be worth less than \$3000 (in years correct to 1 decimal place). **2**
- d.** Red-green colour blindness occurs in 8% of Australian males.
- i.** What is the probability that an Australian male selected at random does not suffer from red-green colour blindness? **1**
 - ii.** Two Australian men are selected at random.
What is the probability that neither of them suffers from red-green colour blindness? **2**

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

- a. Charlie is making a magazine holder for his home office. The holder has 4 sides and a base and is open at the top. The dimensions of the holder are shown on the diagram below.



- i. Draw a neat sketch of a possible net of the magazine holder. 1
 - ii. Calculate the surface area of the holder. 2
 - iii. The cost of making such a holder is based on the external surface area of the holder.
If the cost of heavy duty coloured cardboard is \$2.99 per square metre, calculate the cost of making one of these magazine holders. 2
- b. Tim is a local primary school teacher. His gross annual salary from teaching during 2006 was \$56 250. During this last financial year he paid \$8521 in PAYG tax. Tim also earned an extra \$580 from tutoring and interest payments. He had a total of \$2350 in allowable tax deductions.

Current Australian Income tax rates are shown in the table below.

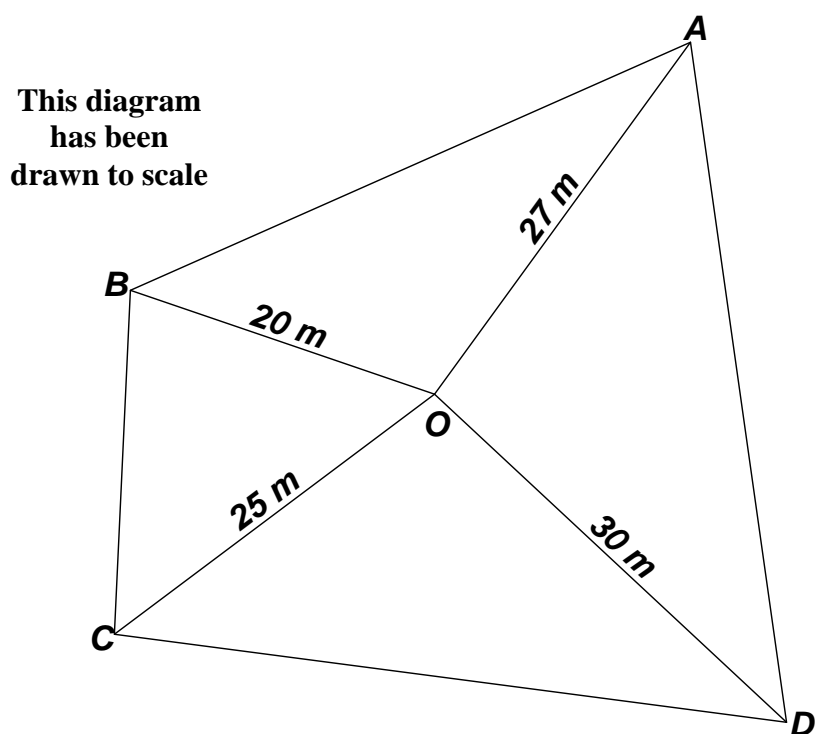
Taxable Income	Tax on Taxable Income
\$1 - \$6000	Nil
\$6001 - \$25 000	15c for each \$1 over \$6000
\$25 001 - \$75 000	\$2850 plus 30c for each \$1 over \$25 000
\$75 001 - \$150 000	\$17 850 plus 40c for each \$1 over \$75 000
\$150 001 and over	\$47 850 plus 45c for each \$1 over \$150 000

Medicare levy is 1.5% of taxable income.

- i. Calculate Tim's taxable income. 1
- ii. Calculate the total tax payable on Tim's taxable income, including the Medicare levy. 2
- iii. Determine the amount that Tim should receive as a tax refund or the amount of Tim's tax debt.
Clearly indicate your final answer as refund or debt. 1

Question 28 continues on page 19

- c. Alison drew a scale drawing of a plane table survey.



- i. Measure the side OD to determine what scale Alison used to draw the diagram. 1
- ii. Use a protractor to measure the size of angle AOD . 1
- iii. Calculate the actual length of AD correct to the nearest metre. 1
- iv. Calculate the area of triangle AOD to the nearest square metre. 1

End of paper

Formula Sheet

Area of an annulus

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

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

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

θ = number of degrees in central angle

Arc length of a circle

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

θ = number of degrees in central angle

Simpson's rule for area approximation

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

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

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

$$c^2 = a^2 + b^2 - 2ab \cos C$$

or

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

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Simple interest

$$I = Prn$$

P = principal

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 = principal

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 = initial value

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

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

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

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:

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

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Multiple Choice Answer Sheet

Candidate Name: _____ Teacher's Name: _____

Instructions: Circle the letter which corresponds to the answer of your choice

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

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Section 1: Multiple Choice (22 marks)

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

Section II (78 marks)

Question 23 (13 marks)

Criteria	Marks
(a) i. Area of pond = $\frac{5}{3}(7.2 + 4 \quad 8.5 + 3.8) = 75 \text{ m}^2$	1
ii. Volume of pond = $Ah = 75 \times 1.5 = \mathbf{112.5 \text{ m}^3}$	1
Maximum number of fish = $112.5 \div 1.75 = 64.29$	1
Hence, the maximum number of fish that can placed into the pond successfully is 64 .	1
(b) i. $c = 50 \text{ m} + 254 + 18 \times 2$ $c = 340$ Cost of repairs is \$340	1
ii. $351 = 50 + 222 + 18t$ $18t = 79$ $t = 4.4$ It took 4.4 hours to complete the repairs	1
iii. Hourly charge is \$18	1
Criteria	Marks

(c) i.	Monthly income = $700 \times 52 \div 12 = \3033 as required	1
ii.	Maximum she can repay = $3033 \times 0.30 = \$909.90$	1
iii.	Max. she could borrow would be \$106 000 over 25 years at 9.25%	1
iv.	Monthly repayment = $105\ 000 \div 1000 \times 8.56 = \898.80	1
v.	Total paid over loans term = $898.80 \times 12 \times 25 = \$269\ 640$ Interest paid = $269\ 640 - 70\ 000 = \$164\ 640$	1
vi.	$269\ 640 \div 105\ 000 = 2.568$ i.e. she repaid almost 2.5 times as much as she initially borrowed	1

Question 24 (13 marks)

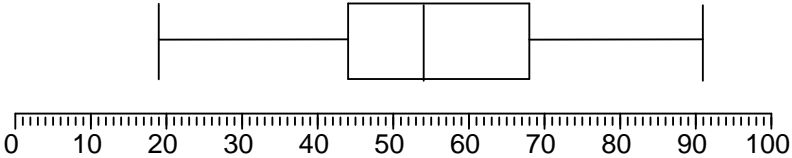
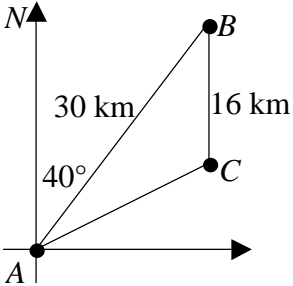
Criteria		Marks
(a)	$N = \frac{A}{(1+r)^n}$ here we use $A = 20\ 000$, $r = 12 \div 100 \div 12 = 0.01$ $n = 5 \times 12 = 60$ Hence, $N = \frac{20000}{(1+0.01)^{60}} = \$11\ 009$	1 correct form 1 correct value 1 final ans.
(b) i.	Range = $99 - 39 = 60$ (Each end point ± 0.5)	1
ii.	Interquartile range = $67 - 51.5 = 15.5$ (Each quartile ± 0.5)	1
iii.	Median = 69 Q1 = 58 Q3 = 79 Interquartile range = 21	} $\frac{1}{2}$ mark each
iv.	John scored better in English . His English mark was above the upper quartile value , meaning that he is in the top 25% of the class. In mathematics he is just less than the upper quartile value .	

Criteria	Marks
<p>c. i. Cindy's mark is equivalent to: $z = \frac{x - \bar{x}}{s}$</p> $z = \frac{78 - 60}{8}$ $z = 2.25$ <p>ii. John : $z = \frac{52 - 60}{8} = -1$</p> <p>Therefore $34 + 50 = \mathbf{84\%}$ of scores higher</p> <p>iii. $z = \frac{82 - 65}{9} = 1.8$</p> <p>Cindy performed better on her first test as the score was more than 2 standard deviations above the mean, whilst in her second test it was less than 2 standard deviations above the mean.</p>	<p>1</p> <p>1</p> <p>½ mark calculating z-score</p> <p>½ mark stating first test better</p> <p>1 mark reason</p>

Question 25 (13 marks)

Criteria				Marks
(a) i.				1
	Use Sunscreen	Don't use sunscreen	Totals	
Had a Melanoma during past year	14	46	60	
No Melanoma during past year	46	4	50	
Totals	60	50	110	
ii. 60% use sunscreen				1
iii. 46% used sunscreen and did not have a melanoma				1
iv. Using sunscreen does seem to help prevent melanomas. The largest % of those surveyed who had a melanoma were among those who did not use sunscreen (46%). Those who used sunscreen were much less likely to develop a melanoma (14%)				1
(b) i. Accept coefficient greater than -1 and less than -0.5				1
ii. Approx 58 years \pm 2 years				1
iii. Approximately 65 years old \pm 2 years				1
(c) $3x(y + x) - x(y - 3x) = 3xy + 3x^2 - xy + 3x^2$ $= \mathbf{6x^2 + 2xy}$				1 1
(d) i. approx. 16%				1
ii. Paper				1
iii. The percentage of glass being recycled increased slightly in the second year but has fallen every year since.				2

Question 26 (13 marks)

Criteria	Marks
<p>(a) i. Median is approx. 54 IQR is approx. = $68 - 44 = \mathbf{24}$</p> <p>ii.</p> 	<p>1 1</p> <p>1 to scale 1 accuracy</p>
<p>(b) i.</p>  <p>ii. $\angle ABC$ is 40° (alternate angles parallel lines NA and BC)</p> <p>iii. $AC^2 = 30^2 + 16^2 - 2 \times 30 \times 16 \times \cos 40^\circ$ $AC = \sqrt{420.5973346}$ $AC = \mathbf{20.5 \text{ km}}$</p> <p>iv. Need to find $\angle BAC$, using sine rule</p> $\frac{\sin \angle BAC}{16} = \frac{\sin 40^\circ}{20.5}$ $\angle BAC = 30^\circ$ <p>Hence, true bearing is $\mathbf{070^\circ T}$ ($30 + 40$)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>

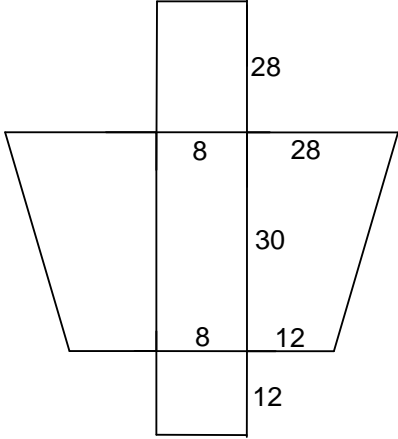
Criteria	Marks
(c) i. Angular difference = $151 - 133 = 18^\circ$ \therefore time difference is = $18 \times 4 = 72$ minutes Now, Sydney is East of Tokushima, so ADD time on. Hence, time in Sydney is 4:12 am	1 1
ii. Angular difference = $105 - 74 = 31^\circ$ \therefore time difference is = $31 \times 4 = 124$ minutes (2 hr 4 min) Now, New York is East of Denver, so ADD time on. Now, adding on 31 hours driving time gives 2 pm Thursday. Hence, time in New York will be 4:04 pm on Thursday.	1 1

Question 27 (13 marks)

Criteria	Marks
(a) i. $4 \times 3 \times 2 \times 1 = 24$ ways PIN are possible	1
ii. $P(\text{get correct PIN}) = \frac{1}{24}$	1
(b) i. \$70 000	1
ii. Owes \$40 000 ($13 \times 12 = 156$ months)	1
iii. Approx. 6 years 240 months is 20 years, 168 months is 14 years	1
iv. Saving = \$640/month repayments – \$740/month repayments $= 640 \times 12 \times 20 - 740 \times 12 \times 14$ $= 153\,600 - 124\,320$ $= \mathbf{\$29\,280}$	1 1

Criteria	Marks
<p>(c) i.</p> $S = V_0(1 - r)^n$ $S = 7500(0.72)^5$ $S = \$1451.19$ <p>To nearest \$, S = \$1451</p> <p>ii. $S = V_0(1 - r)^n$</p> <p>Try n = 3, S = 0.37 n = 2, S = 0.52</p> $3000 = 7500(0.72)^n$ <p>Between 2 and 3</p> $0.4 = 0.72^n$ <p>n = 2.5, S = 0.44 n = 2.8, S = 0.40</p> $n = 2.8$ <p>∴ n = 2.8 years</p>	<p>1</p> <p>2</p>
<p>(d) i. $\frac{23}{25}$ or 92 %</p> <p>ii. $P(\text{neither suffer}) = \frac{23}{25} \times \frac{23}{25}$</p> $= \frac{529}{625} \text{ or } \mathbf{0.8464} \text{ or } \mathbf{84.64\%}$	<p>1</p> <p>1</p> <p>1</p>

Question 28 (13 marks)

Criteria	Marks
<p>(a) i.</p> 	<p>1</p>
<p>ii. TSA = 2 trapeziums left and right + rectangle on bottom + rectangle at front + rectangle at back</p> $= 2 \times \frac{30}{2} (28 + 12) + 30 \times 8 + 8 \times 12 + 8 \times 28$ $= 1200 + 240 + 96 + 224$ $= \mathbf{1760 \text{ cm}^2}$ <p>iii. Costing = $1760 \div 10000$ (for m^2) \times \$2.99</p> $= \mathbf{\$0.53}$	<p>1</p> <p>1</p> <p>1 conversion 1 answer</p>
<p>(b) i. Taxable income = $56\,250 + 580 - 2350$</p> $= \mathbf{\$54\,480}$ <p>ii. Medicare levy = $54\,480 \times 1.5 \div 100 = \\817.20</p> <p>Tax payable = $2850 + (54\,480 - 25\,000) \times 0.30$</p> $= 2850 + 29\,480 \times 0.30$ $= 2850 + 8844$ $= \$11\,694$ <p>Hence, total tax payable is $\mathbf{\\$12\,511.20}$ ($11\,694 + 817.20$)</p> <p>iii. Tim owes in tax \$12 511.20, only paid \$8521 so $(12\,511.20 - 8521)$ leaves Tim with a tax debt of \$3990.20.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>(c) i. By measurement, OD is 60 ± 5 mm</p> <p>60 mm : 30 m</p> <p>2 mm : 1 m</p>	

	<p>2 mm : 1000 mm</p> <p>1 : 500</p>	1
ii.	$\angle AOD \approx 97^\circ$	1
iii.	$AD^2 = 27^2 + 30^2 - 2 \times 27 \times 30 \times \cos 97^\circ$ $AD = \sqrt{1826.428}$ $AD = \mathbf{43 \text{ m}}$	1
iv.	$\text{Area } \triangle AOD = \frac{1}{2} ab \sin C$ $= \frac{1}{2} \times 27 \times 30 \times \sin 97^\circ$ $= \mathbf{402 \text{ m}^2}$	1