

Section I **ANSWER ON THE SHEET PROVIDED** **22 marks**
Section I is multiple choice and each question is worth 1 mark. Select the alternative A, B, C or D that best answers the question. Allow about 30 minutes for this section.

1. The marked price of a jacket is \$150. Peta buys the jacket at a sale for \$120. Calculate the percentage discount.
- (A) 20% (B) 25% (C) 30% (D) 80%
2. The value of $\frac{\sqrt{3.85}}{2.64 + 7.8}$ correct to two decimal places is:
- (A) 0.19 (B) 0.61 (C) 5.32 (D) 8.54
3. The table shows the number of students in each year at Bleak High School.

Year	Number of Students
7	102
8	120
9	105
10	116
11	87
12	70
TOTAL	600

- If 100 students from the school are to be surveyed, on a proportional basis, how many Year 8 students should be surveyed?
- (A) 6 (B) 20 (C) 100 (D) 120
4. In 10 different soccer games, Samantha scored the following number of goals:
- 0, 1, 0, 2, 1, 2, 0, 1, 1, 1
- What was her median score?
- (A) 0.9 (B) 1 (C) 1.5 (D) 2

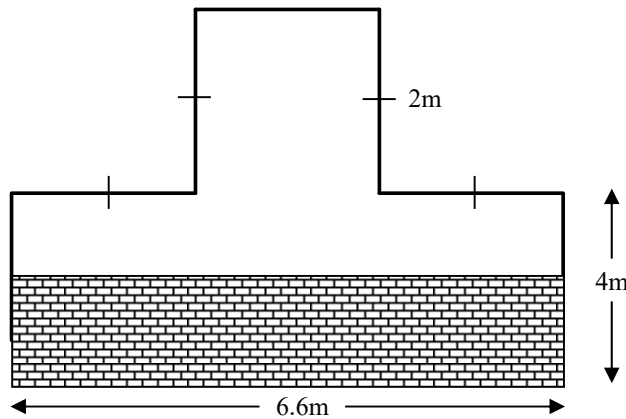
5. After five Spanish tests, Rita's mean mark was 65. In the next three Spanish tests she scored 70, 75, and 80. Calculate Rita's mean mark for all of the Spanish tests.

(A) 68.75 (B) 70 (C) 72.5 (D) 75

6. If half a litre of paint covers 3m^2 , how much paint is needed to cover 17m^2 ?

(A) $\frac{3}{34} \text{L}$ (B) $\frac{6}{17} \text{L}$ (C) $\frac{17}{6} \text{L}$ (D) $\frac{34}{3} \text{L}$

7. To build a brick wall, the number of standard bricks needed is about 50 times the surface area of the wall in square metres.

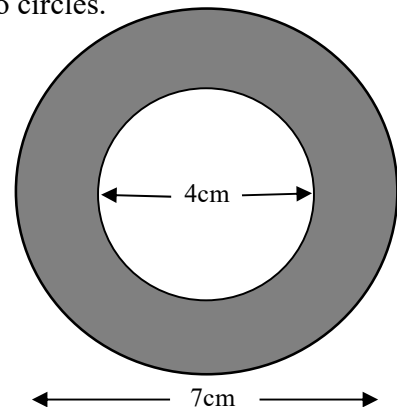


To build this wall the number of bricks needed (including those shown) is closest to:

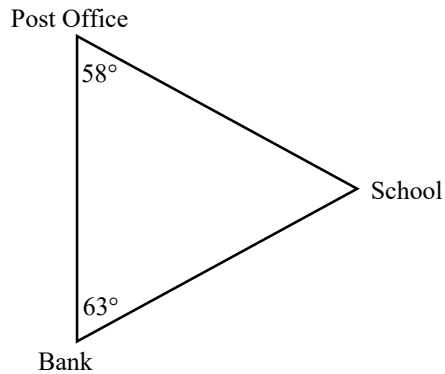
(A) 31.6 (B) 1260 (C) 1580 (D) 1980

8. Calculate the area of the shaded part between the two circles.

(A) 9.42cm^2
 (B) 25.92cm^2
 (C) 28.27cm^2
 (D) 103.67cm^2



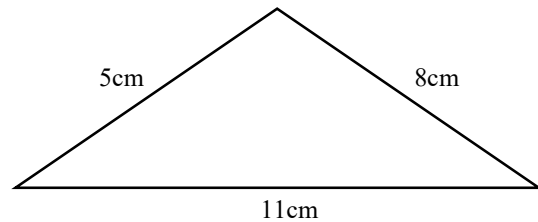
9. The diagram shows the positions of three buildings in a town.



The Post Office is due North of the bank.
What is the bearing of the school from the Post Office?

- (A) 058° (B) 059° (C) 122° (D) 302°
10. If the largest angle in this triangle is α , which equation would give the correct value for α ?

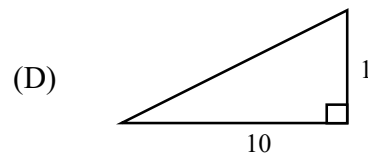
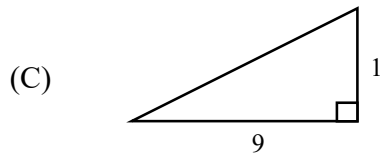
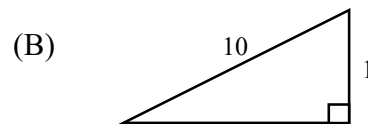
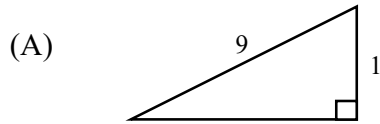
- (A) $\cos \alpha = \frac{5^2 + 8^2 - 11^2}{2 \times 5 \times 8}$
- (B) $\cos \alpha = \frac{8^2 + 11^2 - 5^2}{2 \times 8 \times 11}$
- (C) $\cos \alpha = \frac{5^2 + 11^2 - 8^2}{2 \times 5 \times 11}$
- (D) $\cos \alpha = \frac{5^2 + 8^2 - 11^2}{2 \times 8 \times 11}$



11. 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) $\frac{3}{8}$

12. Each of these diagrams represents the slope of a ramp. Which ramp is the steepest?

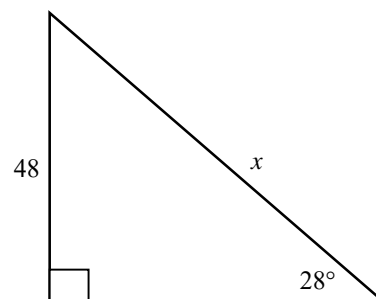


13. Given that $E = mc^2$, find c if $m = 0.05$ and $E = 4.5 \times 10^{15}$

- (A) 1.5×10^7 (B) 3.0×10^8
 (C) 1.0×10^{15} (D) 2.0×10^{16}

14. The value of x is given by:

- (A) $48 \times \cos 28^\circ$
 (B) $48 \times \sin 28^\circ$
 (C) $\frac{48}{\cos 28^\circ}$
 (D) $\frac{48}{\sin 28^\circ}$



15. Simplify $4(2x-1) - 3(x-3)$

- (A) $5x+2$ (B) $5x-4$ (C) $5x+5$ (D) $5x-13$

16. Evaluate $3^7 \times 3^{-3}$

- (A) 3^4 (B) 9^4 (C) 3^{10} (D) 9^{10}

17. Solve the equation $\frac{3m-1}{2} = 7$

- (A) $m = 1$ (B) $m = 5$ (C) $m = \frac{13}{3}$ (D) $m = \frac{4}{3}$

18. Given that $t^3 = 200000$, find t rounded off to the nearest whole number.

- (A) 58 (B) 47 (C) 36 (D) 60

19. The volume of a cylinder with diameter 5m and height 4m is closest to:

- (A) $57m^3$ (B) $69m^3$ (C) $79m^3$ (D) $89m^3$

20. Find the standard deviation, correct to two decimal places, of this set of scores.

Score (x)	Frequency (f)
6	4
7	5
8	7
9	6
10	3

- (A) 1.38 (B) 1.25 (C) 1.15 (D) 1.83

21. The simple interest on \$860 invested in a bank at 8.5% p.a. for 3 years is:

- (A) \$73.10 (B) \$219.30 (C) \$1098.47 (D) \$238.47

22. Which of the following is a linear equation?

- (A) $y = 2x^2 - 5$ (B) $y = 3 - \frac{5}{x}$ (C) $y = 2x - 7$ (D) $y = \frac{4}{x}$

Section II

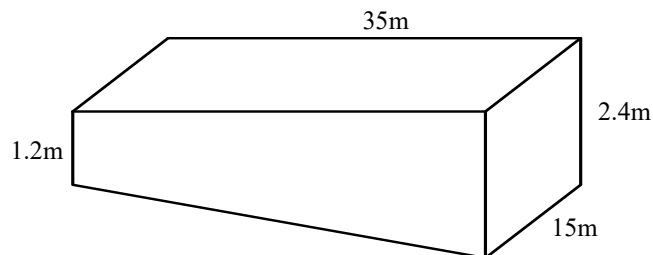
Section II is extended response, show all necessary working. The marks for each question in Section II are indicated at the start of the question. Allow approximately 2 hours for this section

Question 23*(13 marks)***Marks**

- (a) A new blood test is examined that claims to pick up a certain disease. The results are recorded in the two-way table.

	Accurate	Not Accurate	Total
Disease Present	376	36	412
Disease Not Present	200	24	224
Total	576	60	

- (i) How many patients were tested? **1**
- (ii) What percentage of the test results were not accurate? **1**
- (iii) What is the probability that a person who has the disease was tested accurately for it? **1**
- (b) A new swimming pool has the dimensions shown below:



- (i) How many square metres of tiles will be needed to cover the bottom of the pool? (Answer to the nearest square metre) **3**
- (ii) What volume, in litres, will it hold? **2**

Question 23 Continued.**Marks**

- (c) A quality control check found that out of 250 parts on an assembly line, 5 were faulty.
- (i) If 800 such parts are processed, how many would you expect to be faulty? **1**
- (ii) If 2 parts are used in a product, find the probability that:
- a) just one will be faulty **2**
- b) neither will be faulty **1**
- c) at least one will be faulty **1**

Question 24 (13 marks) Start this question on a new page.

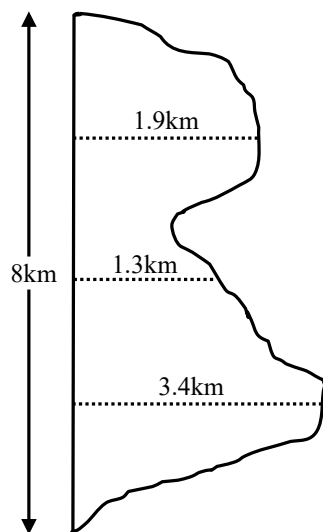
- (a) Given $P = M(1-r)^n$, find the value of M when $P = 3000$, $r = 0.08$ and $n = 3$. **1**
- (b) Solve the equation $2(x+1) - 3(x-1) = 4$ **2**
- (c) The formula $V = 1800(1.02)^t$ can be used to find the approximate value of a piece of jewellery which has been increasing in value since it was purchased at the beginning of 1970. V is the value in dollars and t is the time since 1970.
- (i) What was the value of the jewellery in 1970? **1**
- (ii) What was the approximate value of the jewellery in 2000? **1**
- (iii) How many years after it was purchased would you expect the piece of jewellery to have doubled in value? **2**

Question 24 continued.**ANSWER THE FOLLOWING QUESTION ON THE SEPARATE ANSWER SHEET PROVIDED.**

- (d) Given the equation $y = \frac{x}{2} + 1$
- (i) Complete the table of values for the above equation on the separate answer sheet provided 2
- | | | | | |
|-----|----|---|---|---|
| x | -2 | 0 | 1 | 4 |
| y | | | | |
- (ii) On the grid paper provided on the separate answer sheet provided, plot the points from the table and draw the line representing the equation. 2
- (iii) Find the gradient and y-intercept of the line. 2

Question 25 (13 marks) Start this question on a new page.

- (a) Write $(9.6 \times 10^{-7}) \div (2.4 \times 10^9)$ in scientific notation. 1
- (b) If Y varies directly with X , and if $Y = 24$ when $X = 10$,
- (i) State the relationship between X and Y as an equation. 1
- (ii) Find Y when $X = 25$ 1
- (c) Measurements were taken 2 km apart across the area of a community.



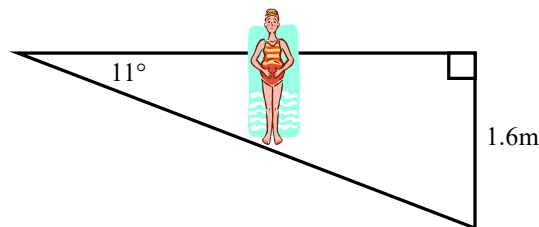
- (i) Using two applications of Simpson's Rule, approximate the area of this community to the nearest km^2 3
- (ii) Find the area in hectares. 1
- (iii) If 1253 people lived in the community in the year 2000, what was the population density per km^2 ? 1
- (iv) If the population increases at 5%p.a., estimate the population in the year 2020. 1

Question 25 Continued.**Marks**

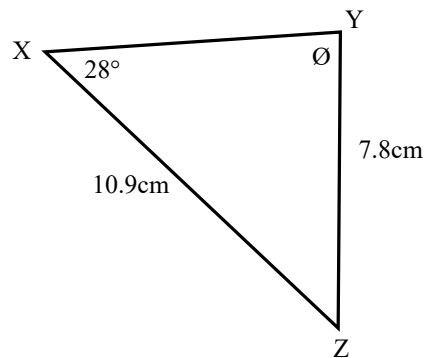
- (d) Results for a general knowledge test are given as z-scores. In this test, Klein gains a z-score of 1. Interpret Klein's score with reference to the mean and standard deviation of the test. **2**
- (e) A new car depreciates 22% of its previous year's value each year. If the car was initially worth \$51 000, how old will it be before it is worth less than \$15 000. **2**

Question 26 (13 marks) Start this question on a new page.

- (a) At a lakeside resort, the beach slopes down steadily at an inclination of 11 degrees to the horizontal. How far would you have to walk down the incline for the depth of water to be 1.6 metres? (Answer to 1 decimal place) **2**



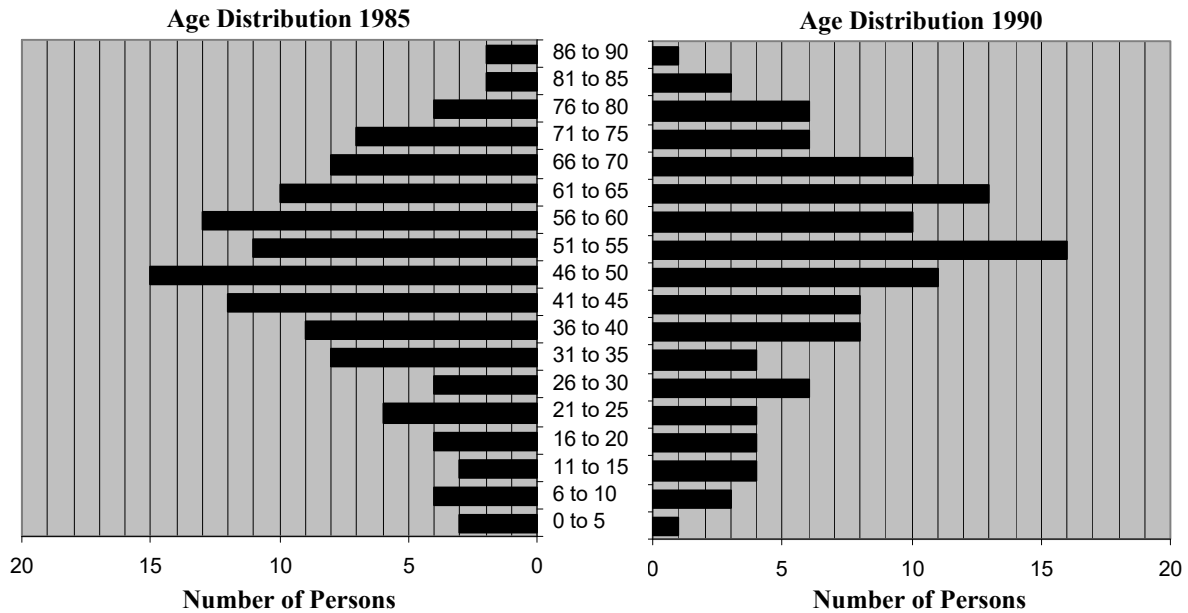
- (b) Using the Sine Rule, find the value of \emptyset , correcting your answer to the nearest degree. **2**



Question 26 Continued.

Marks

- (c) The census in 1985, then in 1990, recorded the ages in years of the people living in a small country town. The results are illustrated in the graph below.

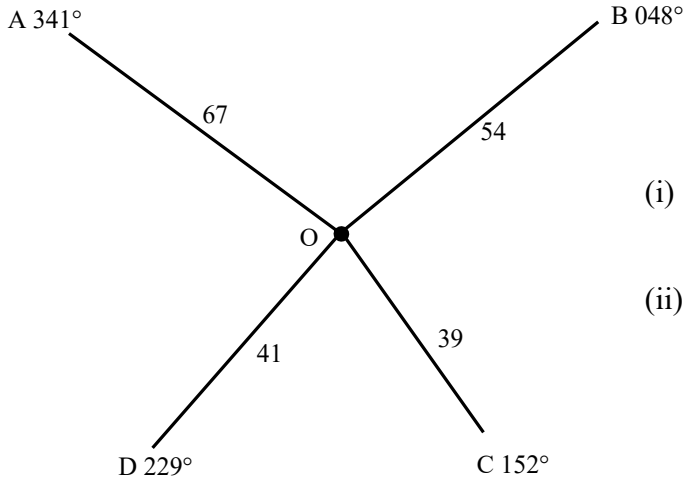


- (i) What is the difference in the 41 to 45 age group from 1985 to 1990? **2**
- (ii) No one aged 50 or over left or came to live in the town between the two censuses. How many people who were 81 to 85 in 1985 were still alive in 1990? **1**
- (iii) There were 118 people in the town in 1990. In what group was the median age of the town in 1990? **1**
- (iv) What was the modal age group in 1985? **1**
- (v) From these graphs, is the population likely to decline, stay steady or grow? Give reasons for your answer, **2**

Question 26 Continued.

Marks

(d) A radial survey of a property ABCD is shown. All lengths are in metres.



(i) Find the size of angle AOB 1

(ii) Find the area of the triangle AOB 1

Question 27 (13 marks) Start this question on a new page.

(a) On a three wheel poker machine there are 10 symbols on each wheel. 2
 There are 5 lemons on the first wheel, 3 on the second and 2 on the last.
 What is the probability that 3 lemons will show across the dial?

(b) Use the table below to find the value of the following annuities:

Future values of \$1

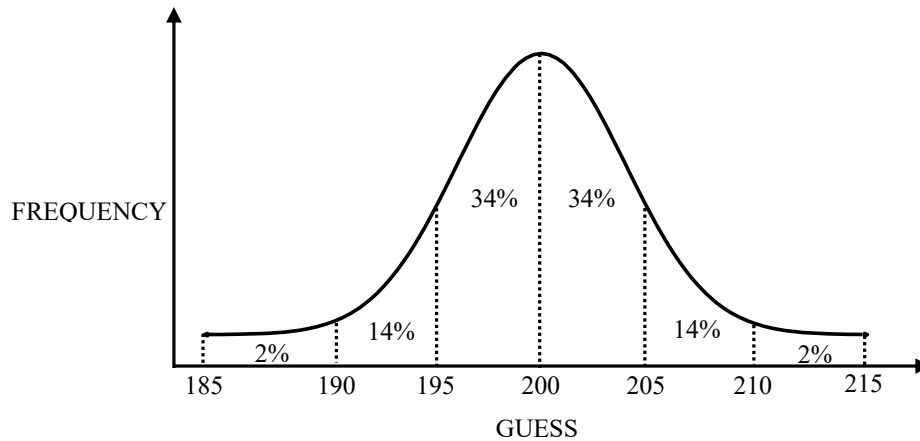
Period	Interest Rate					
	1%	2%	3%	4%	5%	6%
1	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
2	2.01000	2.02000	2.03000	2.04000	2.05000	2.06000
3	3.03010	3.06040	3.09090	3.12160	3.15250	3.18360
4	4.06040	4.12161	4.18363	4.24646	4.31013	4.37462
5	5.10101	5.20404	5.30914	5.41632	5.52563	5.63709
6	6.15202	6.30812	6.46841	6.63298	6.80191	6.97532
7	7.21354	7.43428	7.66246	7.89829	8.14201	8.39384
8	8.28567	8.58297	8.89234	9.21423	9.54911	9.89747
9	9.36853	9.75463	10.15911	10.58280	11.02656	11.49132
10	10.46221	10.94972	11.46388	12.00611	12.57789	13.18079

(i) \$6000 invested at the end of each year at 5% p.a. for 6 years. 1

(ii) \$210 invested in an annuity each month paying at 12% p.a. for 9 months. 1

Question 27 Continued.**Marks**

- (c) In a guessing competition, 3780 contestants were asked to guess how many lollies there were in a jar. The results are recorded in the following graph.



- (i) What kind of distribution does this appear to be? **1**
- (ii) What was the mean of the guesses? **1**
- (iii) The standard deviation was 5. What percentage of the guesses was within 2 standard deviations of the mean? **1**
- (iv) Approximately how many people thought that there were more than 205 lollies in the jar. **2**
- (d) A ship travels from (93°E) to (123°E) along the Equator.
- (i) Find the distance travelled in nautical miles. **1**
- (ii) Find the average speed of the ship if the journey took 80 hours. **1**
- (e) A plane leaves Sydney (151°E) at 0900 hours bound for Mauritius (58°E), arriving there 13.5 hours later. At what local time does it arrive? **2**

Question 28 (13 marks) **Start this question on a new page.** **Marks**

- (a) Kapra borrows \$40 000 from his uncle and repays it in equal monthly instalments over 8 years. The interest rate is 1.5% per month.
- (i) What is the amount of each instalment? **2**
- (ii) How much in total does Kapra repay? **1**
- (iii) His uncle takes the interest that Kapra has paid and invests it for a further 4 years at 8% p.a. interest compounded monthly before returning it to Kapra as a present. How much will Kapra receive? **3**
- (b) Twelve students did two short tests, one on capitals of the world and the other on algebra. The results, out of 10, are found in the following table.

CAPITALS	10	6	6	8	10	4	8	2	5	1	7	4
ALGEBRA	7	7	10	7	10	4	6	1	5	3	9	3

ON THE ANSWER SHEET PROVIDED

- (i) Plot each pair of scores on a scatter plot. Place the CAPITALS mark on the horizontal axis. **2**
- (ii) Draw in the median regression line. **3**
- (iii) Determine the equation of this line. **1**
- (iv) Does there appear to be any correlation between the CAPITALS mark and the ALGEBRA mark? Explain your answer. **1**

End of Paper.

2006 YR 12 GENERAL TRIAL HSC SOLUTIONS

1. $\frac{30}{150} \times 100 = 20\%$
A.

2. 0.1879... A.

3. $\frac{120}{600} \times 100$
 $= 20$ students B.

4. 0, 0, 0, 1, 1, 1, 1, 2, 2

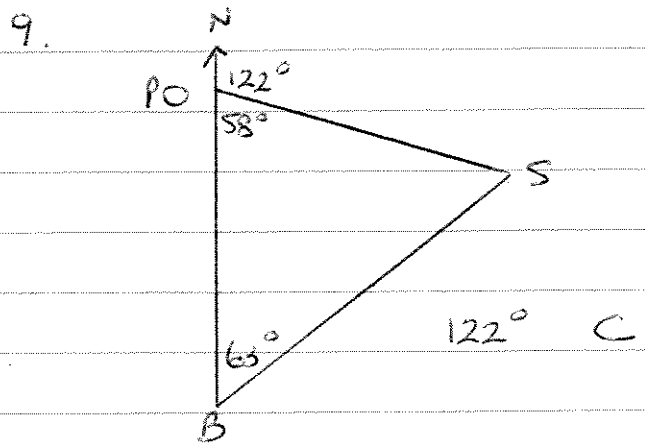
median is 1 B

5. $\frac{325 + (70 + 75 + 80)}{8} = \bar{x}$
 $\bar{x} = 68.75$ A.

6. $1L \rightarrow 6m^2$
 $1m^2 \rightarrow \frac{1}{6}L$
 $\therefore 17m^2 \rightarrow 17 \times \frac{1}{6}L$
 $= \frac{17}{6}L$ C.

7. Area of wall
 $= 6.6 \times 4 + 2 \times 2.6$
 $= 31.6m^2$
 \therefore Bricks needed
 $= 31.6 \times 50$
 $= 1580$ Bricks C.

8. $A = \pi \times 3.5^2 - \pi \times 2^2$
 $= 25.92 \text{ cm}^2$ B



10. $\cos \alpha = \frac{5^2 + 8^2 - 11^2}{2 \times 5 \times 8}$ A.

11. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ C

12. A $m = \frac{1}{150}$
B $m = \frac{1}{199}$
C $m = \frac{1}{9}$
D $m = \frac{1}{10}$ A.

13. $4.5 \times 10^{15} = 0.5c^2$
 $c = \sqrt{\frac{4.5 \times 10^{15}}{0.5}}$
 $= 300000000$
 $= 3 \times 10^8$ B.

14. $\sin 28^\circ = \frac{48}{x}$
 $x = \frac{48}{\sin 28^\circ}$ D.

15. $8x - 4 - 3x + 9$
 $= 5x + 5$ C

16. 3^4 A

17. $3m - 1 = 14$
 $3m = 15$
 $m = 5$ B

18. $t = \sqrt[3]{200000}$
 ≈ 58 A

19. $V = \pi \times 2.5^2 \times 4$
 $\approx 79 \text{ m}^3$ C

20. 1.248
 ≈ 1.25 B

21. $I = 860 \times 0.085 \times 3$
 $= \$219.30$
 B

22. C

QUESTION 23

(a) (i) 636 1

(ii) $\frac{60}{636} \times 100 = 9.43\%$ 1

(iii) $\frac{376}{412} = \frac{94}{103}$ 1

(b) (i) Find the length of the (diagonal) bottom

$D^2 = 35^2 + 1.2^2$

$D = \sqrt{1226.44}$

$= 35.017$ 2

∴ AREA OF BOTTOM

$= 35.017 \times 15$

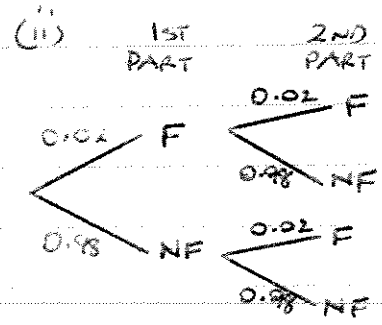
$= 525.308$

$\approx 525 \text{ m}^2$ 1

(ii) $VOL = \frac{1}{2} \times 35 \times (1.2 + 2.4) \times 15$
 $= 945 \text{ m}^3$ 1

∴ Capacity = 945 000 Litres

(c) (i) $\frac{5}{250} \times 800 = 16 \text{ FAULTS}$ 1



(a) $P(\text{just 1 fault})$
 $= P(F, NF) + P(NF, F)$
 $= 0.02 \times 0.98 + 0.98 \times 0.02$
 $= 0.0392$ 2
 $(\frac{2450}{62500} = \frac{49}{1250})$

(b) $P(NF, NF) = 0.98 \times 0.98 = 0.9604$
1 $(\frac{2401}{2500})$

(c) $P(\text{at least 1 fault}) = 1 - 0.9604 = 0.0396$ 1 $(\frac{99}{2500})$

QUESTION 24

(a) $3000 = M(1 - 0.08)^3$

$M = \frac{3000}{(1 - 0.08)^3} = 3852.63$

(b) $2x + 2 - 3x + 3 = 4$

$-x + 5 = 4$

$x = 1$

(c) (i) Value = \$1800

(ii) $V = 1800 \times 1.02^{30}$
 $= \$3260.45$

(iii) $3600 = 1800(1.02)^n$
 $1.02^n = 2$

$30 < n < 40$	$n = 35$	1.99
	$n = 36$	2.03

∴ it would take 36 years for the piece of jewellery to double in value

(d) SEE ANSWER SHEET

QUESTION 25

(a) 4×10^{-16}

(b) (i) $Y = kX$

$24 = k \times 10$

$k = \frac{24}{10} = 2.4$

∴ $Y = 2.4X$

(ii) $Y = 2.4 \times 25$

$= 60$

(c) (i) $A = \frac{2}{3} [0 + 4 \times 1.9 + 1.3] +$

$\frac{2}{3} [1.3 + 4 \times 3.4 + 0]$

$= 15.87 \text{ km}^2 \approx 16 \text{ km}^2$

(ii) $1 \text{ ha} = 10000 \text{ m}^2$

$1 \text{ km}^2 = 100 \text{ hectares}$

∴ $16 \text{ km}^2 = 1600 \text{ hectares}$

(iii) $\frac{1253}{15.87} = 78.95$

$\approx 79 \text{ people per km}^2$

(iv) Population = $1253(1 + 0.05)^{20}$
in 20 yrs = 3324.58

$\approx 3325 \text{ people}$

(d) Klein's score is one

standard deviation above the mean, lies within 34% of scores above the mean.

Computer Number: SOLUTIONS

ANSWER SHEET FOR QUESTION 24

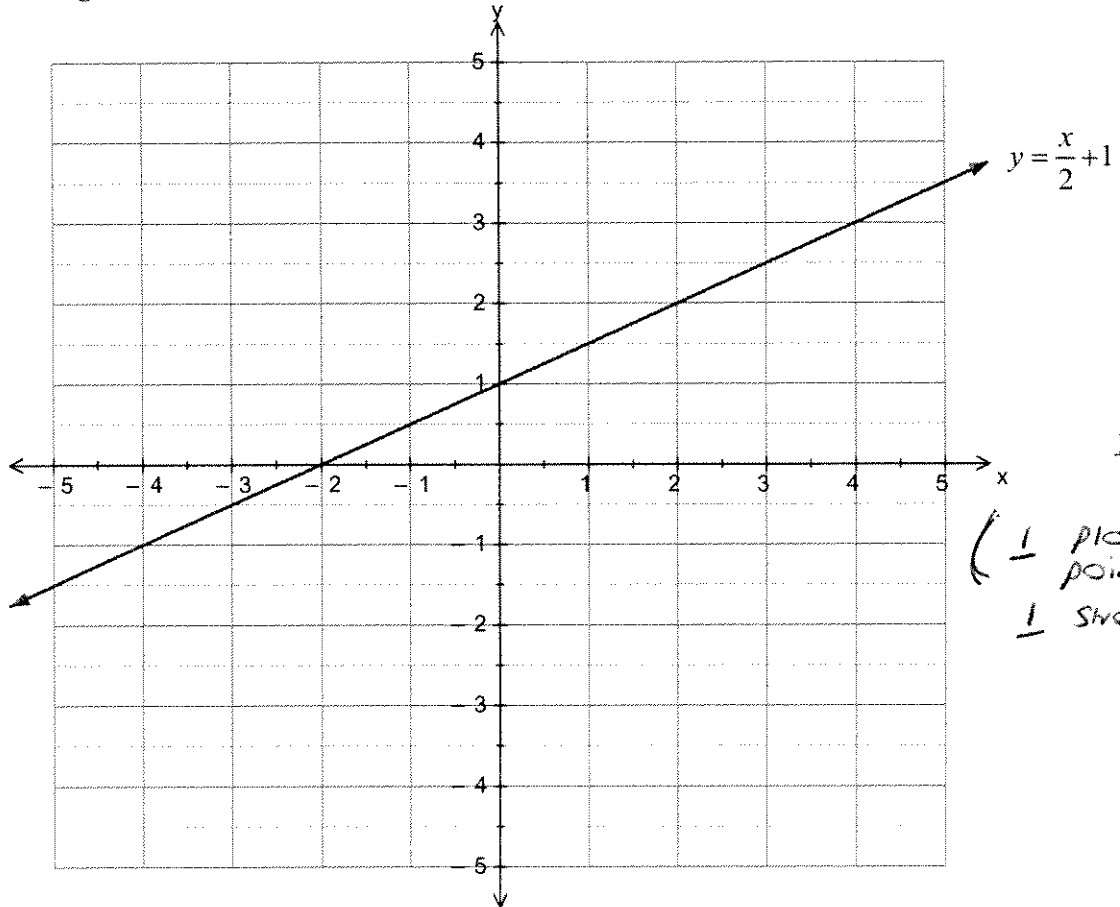
QUESTION 24

Table of Values – Question 24 (d) (i)

x	-2	0	1	4
y	0	1	1.5	3

2 all correct
 (1/2 mark for 2 or 3 correct)

Use the grid below to answer Question 24 (a) (ii)



2
 (1 plotting points
 1 straight line)

(iii) Gradient = $\frac{1}{2}$

y-intercept = 1

2
 (1 each)

QUESTION 25 continued

(e) $15000 = 51000(1 - 0.22)^n$
 $15000 = 51000(0.78)^n$ ✓
 $0.78^n = \frac{15000}{51000}$
 $0.78^n = 0.29$

n=10	0.08	} ∴ About 5 years ✓ after.
n=8	0.13	
n=6	0.23	
<u>n=5</u>	0.288	
n=4	0.37	

QUESTION 26

(a) $\sin 11^\circ = \frac{1.6}{x}$ ✓
 $x = 1.6 \div \sin 11^\circ$
 $= 8.385$
 $\approx 8.39 \text{ m}$ ✓

(b) $\frac{\sin \Theta}{10.9} = \frac{\sin 28^\circ}{7.8}$ ✓
 $\sin \Theta = \frac{10.9 \sin 28^\circ}{7.8}$ ✓
 $\sin \Theta = 0.656$
 $\Theta = 40^\circ 59'$
 $\approx 41^\circ$ ✓

(c) (i) 1985 - 12 ✓
 1990 - 8 ✓

∴ Difference is 4 ✓

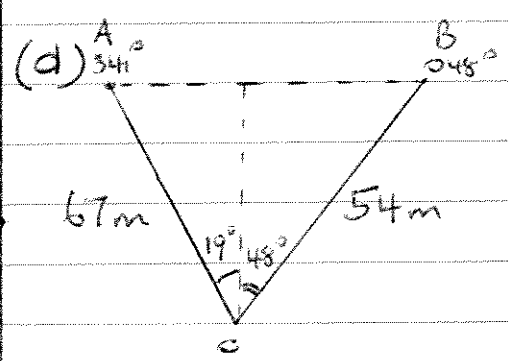
(ii) Only 1 person
 (They must be over 85 yrs old
 by 1990 ∴ 1 out of 4) ✓

(iii) Between 57th - 60th
 ∴ 51 - 55 age group ✓

(iv) 46 - 50 age group ✓

(v) Decline ✓
 1985 → 12 1990 → 118 ✓

- population older
- more older age groups compared to young age groups. ✓



(i) $19^\circ + 48^\circ = 67^\circ$ ✓

(ii) $A = \frac{1}{2} \times 67 \times 54 \times \sin 67^\circ$

$= 1665.19328$

$\approx 1665.19 \text{ m}^2$ (convert to 2 dec pl) ✓

QUESTION 27

(a) $\frac{5}{10} \times \frac{3}{10} \times \frac{2}{10} \quad \underline{1}$

$= \frac{30}{1000} = \frac{3}{100} \quad \underline{1}$

(b) (i) Value = 6000×6.80191
 $= \$40811.46 \quad \underline{1}$

(ii) Rate = 12% p.a.
 $= 1\%$ per month

Value = $\$210 \times 9.36853$
 $= \$1967.39 \quad \underline{1}$

(c) (i) Normal $\underline{1}$

(ii) 200 $\underline{1}$

(iii) 96% $\underline{1}$

(iv) $16\% \times 3780$ $\underline{1}$
 $= 604.8$

≈ 605 loaves $\underline{1}$

(d) (i) Traveled 30°
 \therefore Distance = $30^\circ \times 60$
 $= 1800$ n miles $\underline{1}$

(ii) Speed = $\frac{1800}{80} = 22.5$ knots $\underline{1}$

(e) $1^\circ = 4$ minutes
There are 93° between the
cities. $\therefore 93 \times 4 = 372$ min $\underline{1}$
 $= 6.2$ hours difference.

if plane takes 13.5 hours gets to mauritius
at 10.30pm Sydney time. If mauritius is
6h 12 minutes behind, then plane arrives $\underline{1}$
in mauritius at 4:18 pm on same day

QUESTION 28

(a) (i) $40000 = m \left\{ \frac{(1 + 0.015)^{96} - 1}{0.015(1.015)^{96}} \right\} \quad \underline{1}$

$40000 = M \times 50.7016 \dots \quad \underline{1}$

$M = 788.928$

\therefore Each instalment = $\$788.93 \quad \underline{1}$

(ii) Total Repaid = 788.93×96
 $= \$75737.28 \quad \underline{1}$
 $[0.475737.14]$

(iii) Interest = $\$75737.28 - 40000$
 $= \$35737.28 \quad \underline{1}$

Interest rate = $8\% \div 12$
 $= 0.006$

Total Investment $\underline{1}$
 $= 35737.28 (1 + 0.0066)$
 $= \$49162.37 \quad \underline{1}$

(b) SEE ATTACHED
ANSWER SHEET

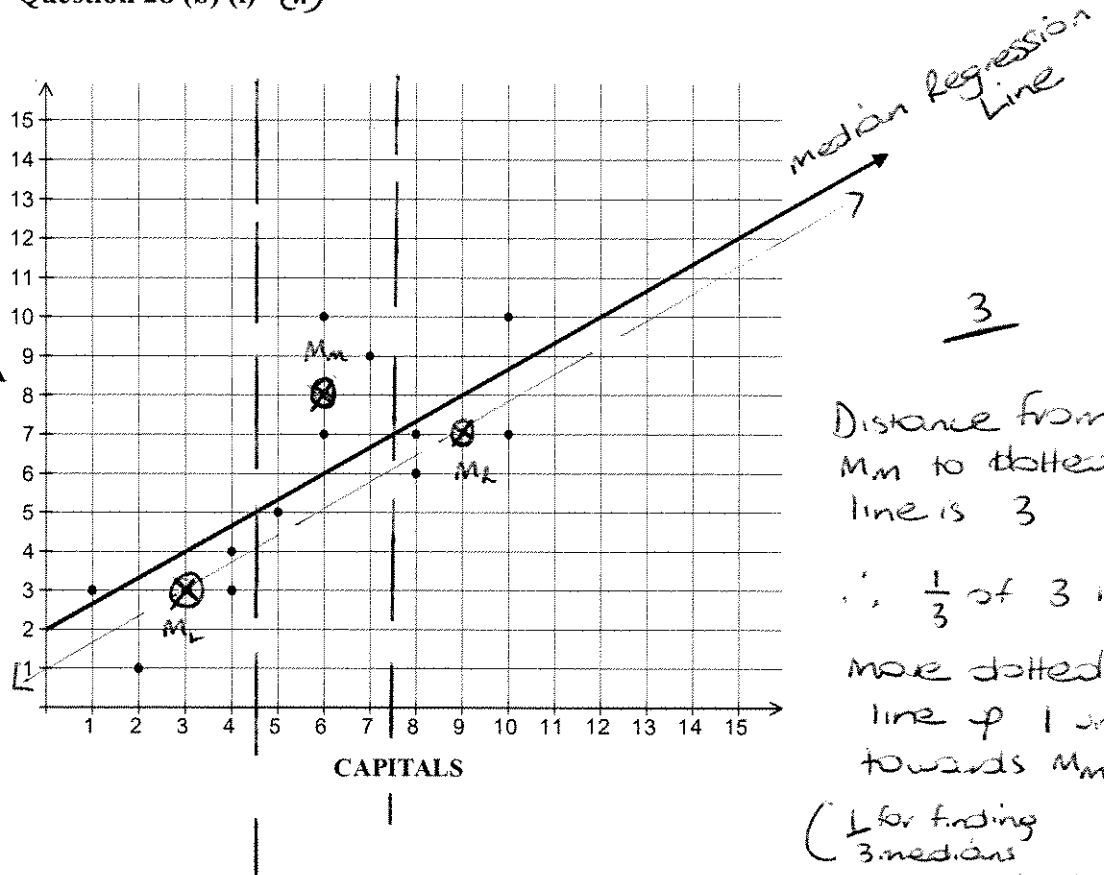
Computer Number: SOLUTIONS

ANSWER SHEET FOR QUESTION 28

QUESTION 28

Scatter Plot – Question 28 (b) (i) (ii)

2 MARKS
Plot all points
correctly ALGEBRA



Distance from M_M to dotted line is 3
 $\therefore \frac{1}{3}$ of 3 is 1
move dotted line up 1 unit towards M_M
($\frac{1}{3}$ for finding 3 medians
 $\frac{1}{3}$ drawing line
 $\frac{1}{3}$ drawing correct median regression line)

(iii) Equation of Median Regression Line $y = \frac{2}{3}x + 2$

1

(iv) Does there appear to be any correlation between the CAPITALS mark and the ALGEBRA mark? Explain your answer.

* Yes, there does seem to be a positive correlation between the CAPITALS mark and the ALGEBRA mark.

* Points are roughly situated in a linear position

* A high 'CAPITALS' mark seems to correlate to a high 'ALGEBRA' mark.

* Points are forming a positive