



St Catherine's School

Year: 12

Subject: 2 UNIT GENERAL MATHEMATICS

Date: AUGUST 2004

Time Allowed: 2 hours 30 minutes
plus 5 minutes reading time

Student Number: _____

TRIAL EXAMINATION

Directions to candidates:

SECTION 1

- Answer all multiple choice questions on the multiple choice answer sheet

SECTION 2

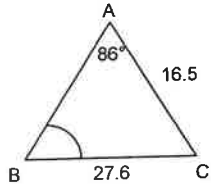
- All questions are to be attempted.
- All necessary **working** must be shown in every question.
- Full marks may not be awarded for careless or badly arranged work.
- Start a new page when instructed
- Write your student number on the top right hand corner of every page as well as on exam paper
- Approved calculators and geometrical instruments are required.
- Hand in all question sheets and answer sheets

TEACHER'S USE ONLY	
Total Marks	
Section 1	/22
Section 2	
Q23	/13
Q24	/13
Q25	/13
Q26	/13
Q27	/13
Q28	/13
TOTAL	
100	

7. When the altitude of the sun is 30° , a building casts a shadow of 56 metres. Calculate the height of the building to the nearest metre.

- (A) 25 m (B) 48 m (C) 32 m (D) 51 m

8. In the given triangle ABC, find $\angle B$ to the nearest degree.



- (A) 37° (B) 59° (C) 61° (D) 83°

9. A town X is 58 km East and 113 km South of town Y. The bearing of X from Y is closest to

- (A) SE (B) NE (C) $153^\circ T$ (D) $063^\circ T$

10. A coin is tossed and a die is thrown. What is the probability of tossing a head and a number less than 5?

- (A) $\frac{1}{4}$ (B) $\frac{1}{6}$ (C) $\frac{1}{12}$ (D) $\frac{1}{3}$

11. Postcodes for mail delivery have four digits. All Victoria postcodes must have '3' as the first digit. How many postcodes are available in Victoria?

- (A) 10 (B) 100 (C) 1000 (D) 10000

12. From the following set of scores:

Score	Frequency
1	8
2	5
3	5
4	3
5	3

The median is:

- (A) 1 (B) 2 (C) $2\frac{1}{2}$ (D) 3

SECTION 1

Total Marks (22)

Attempt all 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.

1. Evaluate $xy^2 - y$, where $x = 2$ and $y = -3$.

- (A) 15 (B) 21 (C) 33 (D) 39

2. Light travels at a speed of 3×10^8 m/s

How many kilometres does light travel in 1 week? (answer in scientific notation to two significant figures)

- (A) 1.08×10^{12} km/wk (B) 2.59×10^{13} km/wk
 (C) 1.8×10^{11} km/wk (D) 2.59×10^{10} km/wk

3. Simplify fully $6a - 2(4a - 7)$

- (A) $4 + 2a$ (B) $7 - 2a$ (C) $4a - 14$ (D) $14 - 2a$

4. The range of values for a measurement of 23.6 cm is

- (A) 23 – 24 cm (B) 22.6 – 24.6 cm
 (C) 23.5 – 23.7 cm (D) 23.55 – 23.65 cm

5. The surface area of a sphere with diameter 17.8 cm, correct to two decimal places is

- (A) 995.38 cm^2 (B) 3981.52 cm^2 (C) 3981.53 cm^2 (D) 2952.97 cm^2

6. The area of this part of a circle is closest to



- (A) 1.2 cm^2 (B) 0.65 cm^2 (C) 0.16 cm^2 (D) 6.16 cm^2

19. The manager of a small picture theatre snack bar has been keeping account of the amount that each customer spends at interval. It was found that these amounts have a mean of \$3.00 and a standard deviation of \$0.80.

The amount spent which corresponds to a z-score of 1.20 is:

- (A) \$3.96 (B) \$1.50 (C) \$2.52 (D) \$3.00

20. The marks on a test are normally distributed with a mean of 66 and a standard deviation of 7. Approximately what proportion of students scored a mark between 52 and 80?

- (A) 68% (B) 95% (C) 99.7% (D) 34%

21. Find the distance apart in kilometres between two places on the same meridian with latitudes 5° N and 7° S.

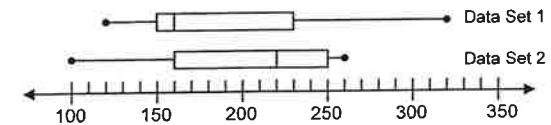
- (A) 1340km (B) 1676km (C) 1495km (D) 500km

22. If it is 10 a.m. in Greenwich what is the time in Denver which is 105° west of Greenwich?

- (A) 4 p.m. (B) 3a.m. (C) 4a.m. (D) 3a.m.

END OF SECTION 1

13.



Which of the following statements is true for the data sets above?

- (A) The range of data set 2 is greater than the range of data set 1.
 (B) The median for data set 1 is greater than the median for data set 2.
 (C) The interquartile range is greater for data set 2.
 (D) The highest value occurs in data set 2.

14. An office purchases a laser printer for \$1995. Its useful life is estimated to be five years, at the end of which time its salvage value will be \$250. The annual depreciation using the straight-line depreciation method is:

- (A) \$349 (B) \$948 (C) \$1495 (D) \$500

15. The reducing-balance method of depreciation assumes that depreciation of an asset is:

- (A) uniform throughout the life of the asset
 (B) highest in the earliest years in the life of the asset
 (C) highest in the later years in the life of the asset
 (D) random throughout the life of the asset

16. The simple interest payable on a loan of \$2380 at a simple interest rate of 7.45% pa for a period of 17 months is

- (A) \$251.19 (B) \$251.20 (C) \$2481.88 (D) \$101.88

17. Eleanor wants to have \$8000 in 6 years time. The amount she would need to deposit annually into an annuity that pays 6.8% pa interest is:

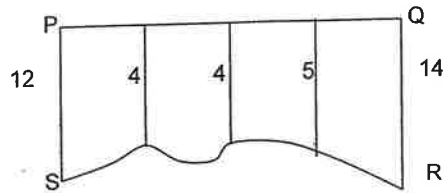
- (A) \$1124.01 (B) \$1124.02 (C) \$1877.34 (D) \$3264

18. If the interest rate is 0.05312% per day, the amount to be paid on a cash advance of \$625, if the total amount is repaid after 9 days is

- (A) \$2.99 (B) \$298.80 (C) \$627.99 (D) \$923.80

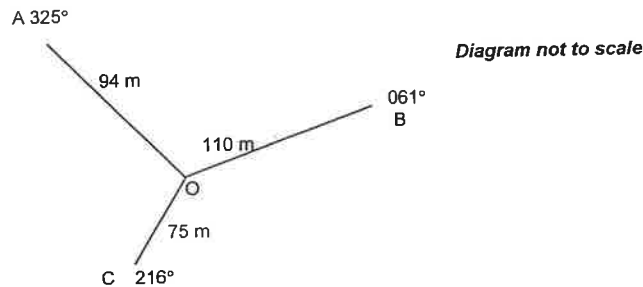
Question 24 Start a new page (13 marks)

(a)(i) Using Simpson's Rule twice, estimate the area of the irregular shape PQRS given that PQ = 28. All measurements are in metres.



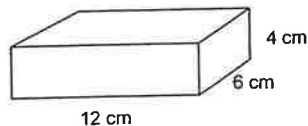
(ii) Find the cost of fertilising the entire field at \$12.50 per square metre. /3

(b) The results of a compass radial survey are shown in the diagram.



- (i) Find $\angle AOB$
- (ii) Use the Cosine Rule to find the length of the boundary AB.
- (iii) Find the area of $\triangle AOB$. /5

(c) A goldsmith is making gold medals. She has 20 gold ingots each in the shape of a rectangular prism shown below. Each ingot measures 12 cm by 6 cm by 4 cm.



- (i) What is the total volume of all 20 gold ingots in cubic centimetres?
- (ii) After melting down the ingots, the goldsmith uses all the gold to make 150 cylindrical gold medals. What is the volume of gold in each medal?



(iii) If a medal is 0.5 cm thick, find the radius of each medal. (Answer to 1 decimal place). /4

Question 24 continues on the next page

SECTION 2

Total marks (78)

Attempt all questions 23 – 28

Allow about 2 hours for this section

Start a new page for each question

Question 23 Start a new page (13 marks)

(a) Goods costing 30 cents per kilogram are sold at \$400 per tonne. Find the gain as a percentage of the cost price. /2

(b) The distance d in km that one can see out to the horizon from a height h in metres above sea level, is given by the formula:

$$d = 4\sqrt{\frac{h}{3}}$$

Find d when $h = 0.27$ metres. /1

(c) Solve for m :

(i) $\frac{5m}{3} + 2 = 6$

(ii) $4(m + 3) = 2(m - 1)$ /4

(d) Expand and simplify fully $(2x^2y)^3 \div 4xy^5$ /2

(e) Make k the subject of the equation: $n = \frac{2 + 3k}{5}$ /2

(f) The volume of a square based pyramid can be found by using the formula $V = \frac{1}{3}s^2h$, where s is the side length of the square base and h is the height of the pyramid. Find the side length of a square based pyramid with a volume of 54.432 cm^3 and a height of 12.6 cm. /2

End of Question 23

Question 25 **Start a new page** **(13 marks)**

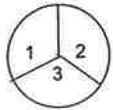
(a) (i) If it does not rain an ice cream vendor can make \$600 on a Sunday. If it does rain he can lose \$250. Calculate the expected financial return if the probability of rain on a Sunday is 0.45.

(ii) Should the ice cream vendor sell ice creams if it is raining on Sunday. Justify your answer.

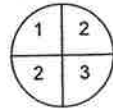
/3

(b) The following two spinners are used in a game. The sum of the two spinners is the score.

Left Spinner



Right Spinner



To analyse this game, Sam draws up a table to show all possible outcomes.

		Left Spinner		
		1	2	3
Right Spinner	1			
	2			
	3			

(i) Copy the table onto your answer sheet and complete it.

(ii) What is the probability of a score of 3?

(iii) How many times would Sam expect to score 3 in 120 throws?

/3

(c) A group of 50 year old women, chosen at random were given an X-ray to test for breast cancer. Some were suffering from the disease and some were not. The results of the tests are shown in the two-way table below.

	Test Results		
	Accurate	Not Accurate	Total
Number with disease	19	4	23
Number without disease	949	28	977
Total	968	32	

(i) How many women were tested?

(ii) How many women had a positive test result?

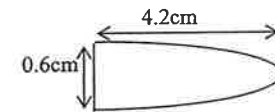
(iii) What percentage of women who had a positive test result actually had breast cancer?

(iv) What is the probability that a patient with a negative test result selected at random from the trial group actually has breast cancer?

/4

Question 24 (continued)

(e) Find the area of the semi ellipse



/1

End of Question 24

Question 26 **Start a new page** **(13 marks)**

(a) Find the mean and standard deviation for the following set of scores. /2
 124, 118, 115, 117, 136, 143, 120, 119, 125, 123, 117, 140

(b) The scores below represent quiz results for a French class of 12 students on test A and test B.

Test A	11	11	15	17	19	20	20	22	22	23	24	30
Test B	11	12	18	22	22	26	29	31	36	39	39	40

(i) On your answer sheet, display the above data in an ordered back-to-back stem and leaf plot using the stems given.

Test A	Stem	Test B
	1	
	2	
	3	
	4	

(ii) Between test A and test B the French teacher used a new series of practice exercises. Is she justified in thinking that the exercises improved the performance of the students on test B? Consider location, spread and shape of the data to help justify your answer. /3

(c) The speeds of the first 100 cars travelling through Town A and Town B between 8am and 9am on a Monday morning were measured and the results are shown below. The speed limit is 60 km/h.

	Town A	Town B
Mean	60	59
Median	58	58
Lower quartile	47	53
Inter-quartile range	13	18
Highest speed	115	85
Lowest speed	40	35

(i) Draw a box and whisker plot of Town A and Town B on one grid to display this information.

(ii) From this data in which town should the police target speeding between 8am and 9am on Monday morning? Justify your answer. /5

Question 26 continues on the next page

Question 25 (continued)

(d) A local sports team has eight players. In how many ways can the position of captain and then vice captain be filled? /1

(e) Rick Jones decides to play two games of tennis. He has a 65% chance of winning each game.

(i) Draw a probability tree showing this information

(ii) Calculate the probability that he wins one game only /2

End of Question 25

Question 27 **Start a new page** **(13 marks)**

(a) A car is advertised for sale as follows:

Cash \$25070
Terms \$5000 deposit and \$1043.30 per calendar month for 2 years

- (i) What is the total amount paid for the car on these terms? /3
- (ii) Calculate the simple interest rate charged by the car yard on the balance of the car's price after the deposit, over the two year repayment period. /3

(b) Eric borrows \$20 000 to buy a car. He can choose between several different monthly repayment plans as shown in the table.

Number of repayments	24	36	48	60
Monthly instalments	\$912	\$638	\$505	\$425

How much more interest will he pay if he chooses to repay the loan in 48 months rather than 36 months? /1

(c) A home loan is taken out at an interest rate of 7.2% p.a. compounding monthly. If \$160000 is to be borrowed over 20 years, find :

- (i) the monthly repayment
- (ii) the total amount repaid
- (iii) the total interest repaid over the term of the loan /5

(d) A farmer buys a new tractor for \$100 000. The farmer expects to keep the tractor for 10 years after which it will be traded in on a new tractor. The estimate is that the value of the tractor will depreciate by 12% per annum. Calculate:

- (i) the amount that the farmer can expect as a trade in for the tractor in ten years (to the nearest dollar)
- (ii) the amount by which the tractor will depreciate in ten years /2

(e) The function $V = 24000 - 1600A$ shows the value V , of a car when it is A years old.

After how many years would the car be "written off" (the value of the car become \$0)? /2

End of Question 27

Question 26 (continued)

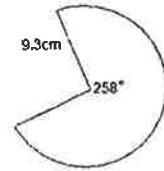
(d) Jenny sat exams in both physics and chemistry. In physics the exam results showed a mean of 64 and a standard deviation of 10, while in chemistry the mean was 66 and the standard deviation was 15. Jenny scored 57 and 59 in physics and chemistry respectively.

- (i) Convert each mark to a standardised score. /3
- (ii) In which subject did Jenny achieve the better result? Justify your answer. /3

End of Question 26

Question 28 Start a new page (13 marks)

(a) Calculate the length of the arc to 1 decimal place



/1

(b) A sphere has a radius of 7.1 cm. Calculate the upper and lower bounds for the volume of the sphere.

/3

(c) (i) Find the shortest distance, in nautical miles, between the following pairs of points J and K. Give your answer correct to 2 significant figures.

J (27°S, 146°W) and K (42°S, 146°W)

(ii) Calculate the time taken for a ship to sail between J and K at an average speed of 60 knots.

/3

(d) New York and Beijing are located at approximately (40°N, 75°W) and (40°N, 115°E) respectively.

(i) What is the angular size in longitude between these two cities?

(ii) If it is 9 a.m. on 7 August in New York, what time and date is it in Beijing? (Ignore time zones in this calculation)

/4

(e) A and B are two positions, A being 420 nautical miles due north of B. If B is (15°S, 25°E), find the position of A.

/2

END OF TEST

2004 TRIAL GENERAL MATHS

1. $2y^2 - y$
 $= 2 \times (-3)^2 - (-3)$
 $= 2 \times 9 + 3$
 $= 18 + 3$
 $= 21$ B

$3 \times 10^8 \text{ m/s}$
 $\div 1000 \rightarrow \text{km}$
 $\times 60 \rightarrow \text{min}$
 $\times 60 \rightarrow \text{h}$
 $\times 24 \rightarrow \text{day}$
 $\times 7 \rightarrow \text{week}$

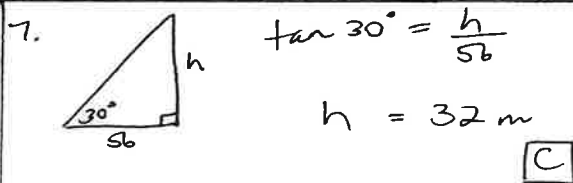
$= 1.8144 \times 10^{11} \text{ km/week}$
 $= 1.8 \times 10^{11}$ (2 s.f.) C

$6a - 2(4a - 7)$
 $= 6a - 8a + 14$
 $= -2a + 14$
 $= 14 - 2a$ D

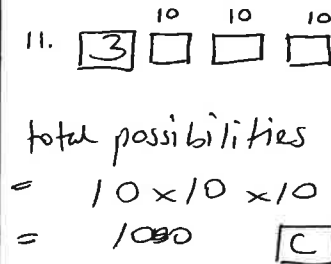
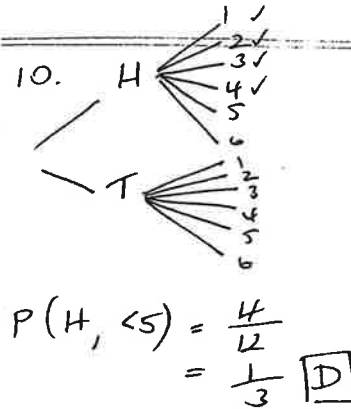
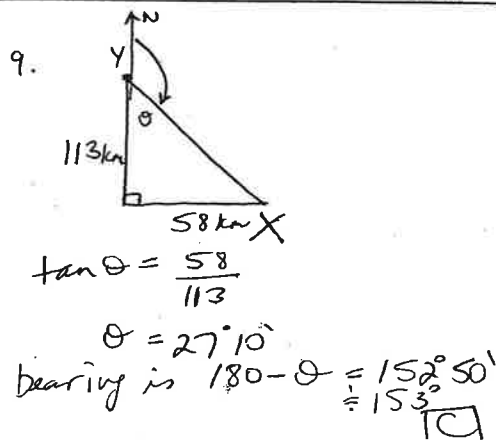
unit of measure = 0.1
 maximum error = 0.05
 min value = $23.6 - 0.05$
 max value = $23.6 + 0.05$
 range is $23.55 \rightarrow 23.65$ D

5. $SA = 4\pi r^2$
 $r = 17.8 \div 2$
 $= 8.9$
 $\therefore SA = 4 \times \pi \times (8.9)^2$
 $= 995.38 \text{ cm}^2$ (2 d.p.) A

6. $A = \frac{\theta}{360} \times \pi r^2$ $r = 1.4$
 $= \frac{38^\circ}{360} \times \pi \times (1.4)^2$
 $= 0.6499 \text{ cm}^2$
 $= 0.65 \text{ cm}^2$ B



8. $\frac{\sin \angle B}{16.5} = \frac{\sin 86^\circ}{27.6}$ (SINE RULE)
 $\sin \angle B = \frac{\sin 86^\circ \times 16.5}{27.6}$
 $\sin \angle B = 36.6103 \dots$
 $\therefore \angle B = 36^\circ 37'$ A



12. There are 24 scores altogether
 There are 2 middles
 12^{th} and 13^{th} scores
 median = $\frac{12^{\text{th}} \text{ score} + 13^{\text{th}} \text{ score}}{2}$
 $= \frac{2 + 2}{2}$
 $= 2$ B

13. C

14. $S = V_0 - Dn$
 $250 = 1995 - D \times 5$
 $250 - 1995 = -5D$
 $-1745 = -5D$
 $\therefore D = \frac{-1745}{-5}$
 $= 349$ A

15. B

16. $I = Prn$
 $= 2380 \times 0.0745 \times \frac{17}{12}$
 $= 251.1891667$
 $= 251.19$ A

17. $A = M \left\{ \frac{(1+r)^n - 1}{r} \right\}$
 (FUTURE VALUE)
 $A = 8000$
 $r = 6.8\%$
 $= 0.068$
 $n = 6$
 $M = ?$

$8000 = M \left\{ \frac{(1+0.068)^6 - 1}{0.068} \right\}$

$8000 = M \times 7.11732$

$\frac{8000}{7.11732} = M$

$\therefore M = 1124.02$ B

$$18. \text{ repay} = 625 \times \frac{0.05312}{100} \times 9$$

$$= 2.99$$

$$\text{total to repay} = \$2.99 + \boxed{625}$$

$$= \$627.99 \quad \boxed{C}$$

$$19. z = \frac{x - \bar{x}}{\sigma_n}$$

$$1.20 = \frac{x - 3.00}{0.80}$$

$$1.20 \times 0.8 = x - 3.00$$

$$0.96 = x - 3.00$$

$$0.96 + 3.00 = x$$

$$\therefore x = 3.96 \quad \boxed{A}$$

22. $1^\circ = 4 \text{ min}$
west is behind
in time

\therefore time difference.

$$= 4 \times 105$$

$$= 420 \text{ mins}$$

$$= 7 \text{ hours}$$

\therefore Denver is 7 hours
behind Greenwich

$$= 3 \text{ a.m.} \quad \boxed{B} \text{ or } \boxed{D}$$

SECTION 2

QUESTION 23

(a) $\$0.30 / \text{kg}$

$$= \$0.30 \times 1000 / \text{tonne}$$

$$= \$300 / \text{tonne}$$

$$\therefore \text{profit} = \$100 \quad \checkmark$$

as %

$$\frac{100}{400} \times 100\%$$

$$= 25\% \quad \checkmark \quad 2$$

(b) $d = 4 \sqrt{\frac{0.27}{3}}$

$$= 4 \sqrt{0.09}$$

$$= 4 \times 0.3$$

$$= 1.2 \text{ m} \quad \checkmark$$

$$= 0.0012 \text{ km} \quad \checkmark$$

(c)(i) $\frac{5m}{3} + 2 = 6$

$$\frac{5m}{3} = 6 - 2$$

$$\frac{5m}{3} = 4 \quad \checkmark$$

$$5m = 4 \times 3$$

$$5m = 12$$

$$m = \frac{12}{5}$$

$$= 2.4 \quad \checkmark \quad 2$$

(ii) $4(m+3) = 2(m-1)$

$$4m + 12 = 2m - 2 \quad \checkmark$$

$$4m + 12 - 2m = -2$$

$$2m + 12 = -2$$

$$2m = -2 - 12$$

$$2m = -14$$

$$m = -7 \quad \checkmark$$

(d) $(2x^2y)^3 \div 4xy^5$

$$= 2^3 x^{2 \times 3} y^3 \div 4xy^5 \quad \checkmark$$

$$= 8x^6y^3 \div 4xy^5$$

$$= \frac{8x^6y^3}{4xy^5} \quad \text{or } \frac{8}{4} x^{6-1} y^{3-5}$$

$$= \frac{2x^5}{y^2} \quad \checkmark \quad 2x^5y^{-2} \quad 2$$

(e) $n = \frac{2 + 3k}{5}$

$$5n = 2 + 3k \quad \checkmark$$

$$5n - 2 = 3k$$

$$\frac{5n - 2}{3} = k \quad \checkmark \quad 2$$

(f) $V = \frac{1}{3} s^2 h$

$$54.432 = \frac{1}{3} \times s^2 \times 12.6$$

$$3 \times 54.432 = s^2 \times 12.6 \quad \checkmark$$

$$163.296 = s^2 \times 12.6$$

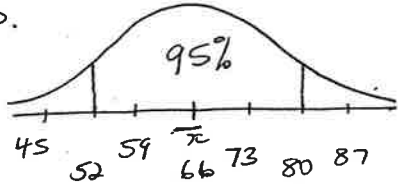
$$\frac{163.296}{12.6} = s^2$$

$$12.96 = s^2$$

$$\sqrt{12.96} = s$$

$$\therefore s = 3.6 \quad \checkmark \quad 2$$

20.



\boxed{B}

21.

$$\text{angle diff} = 5 + 7$$

$$= 12^\circ$$

$$\text{inj } 1^\circ = 60 \text{ N.M.}$$

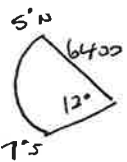
$$12^\circ = 12 \times 60$$

$$= 720 \text{ N.M.}$$

$$\text{inj } 1 \text{ N.M.} = 1.852 \text{ km}$$

$$720 \text{ N.M.} \times 1.852 \text{ km}$$

$$= 1333.44 \text{ km} \quad \boxed{A}$$



$$l = \frac{12}{360} \times 2 \times \pi \times 6400$$

$$= 1340.41$$

QUESTION 24

$$A \doteq \frac{h}{3} \{d_f + 4 \times d_m + d_r\}$$

$$h = \frac{28}{4} = 7 \quad \checkmark$$

$$\frac{7}{3} \{12 + 4 \times 4 + 4\}$$

$$\frac{7}{3} \{4 + 4 \times 5 + 14\} \quad \checkmark$$

$$\frac{7}{3} \times 32 + \frac{7}{3} \times 39$$

$$163 \frac{1}{3} \text{ m}^2 \quad 2$$

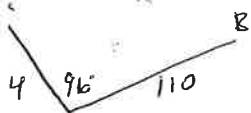
$$\text{Cost} = 163 \frac{1}{3} \times 12.50$$

$$= \$2041.67$$

$$\angle AOB = (360 - 325) + 61$$

$$= 35 + 61$$

$$= 96^\circ \quad \checkmark$$



$$= 94^2 + 110^2 - (2 \times 94 \times 110 \times \cos 96^\circ)$$

$$= 23097.64862$$

$$= \sqrt{23097.64862}$$

$$= 151.98 \text{ m} \quad 3.$$

$$A = \frac{1}{2} \times 94 \times 110 \times \sin 96^\circ$$

$$= 5141.68 \text{ m}^2 \quad 1$$

QUESTION 25

a)(i)

(E)	0.45 Rain	0.55 No rain
\$	-250	600

Fin. exp

$$= 0.45 \times -250 + 0.55 \times 600$$

$$= \$217.50 \quad 2$$

(ii) Fin exp > 0
 ∴ should sell icecreams
 as is likely to make \$217.50

(b)(i)

	Left		
	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6

(ii) $P(3) = \frac{3}{12}$

$$= \frac{1}{4}$$

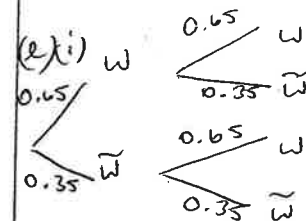
(iii) Expected value

$$= \frac{1}{4} \times 120$$

$$= 30 \text{ times}$$

- (c) (i) 1000
 (ii) $19 + 28 = 47$
 (iii) $\frac{19}{47} \times 100\% = 40.43\%$
 (iv) $\frac{4}{949+4} = \frac{4}{953}$

(d) $8 \times 7 = 56$



(ii) $P(W\bar{W}) + P(\bar{W}W)$

$$= 0.65 \times 0.35 + 0.35 \times 0.65$$

$$= 0.455$$

QUESTION 26

$\bar{x} = 124.75$ ✓

$\sigma_n = 9.18$ ✓

2

(i) TEST A	STEM	TEST B
75 1	1	128
220 0	2	220 9
0	3	16 99
	4	0

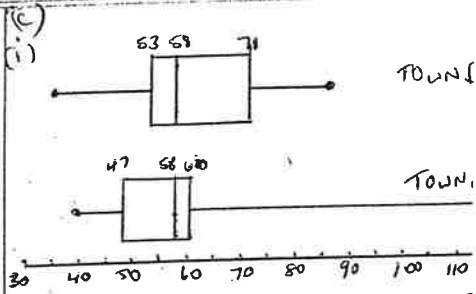
1 Yes she is justified to write the practice tests improved the performance. NO OF THE FOLLOWING: the median of Test B is higher than the median of Test A.

The mean of test B is higher than the mean of Test A.

Test B is more symmetrical curve while test A is positively skewed.

The interquartile range of test B is $37\frac{1}{2} - 27\frac{1}{2} = 10$

The interquartile range of test A is $22\frac{1}{2} - 16 = 6\frac{1}{2}$. Range of test B is higher than range of test A but both have same lowest value. 2



(ii) The police should target Town B

Town A there are only 25% of motorists travelling over 60 km/h (upper quartile to highest speed)

Town B has almost 50% of motorists travelling over 60 km/h (median to highest speed) ∴ more people speeding in town B. 2

(d)(i) $Z = \frac{x - \bar{x}}{\sigma_n}$

Physics $Z = \frac{57-64}{10} = -0.7$
 Chemistry $Z = \frac{59-66}{15} = -0.47$

(ii) Jenny scored better in Chemistry since her score was closer to the mean - even though it was below the class. 1

QUESTION 27

(a)(i) $5000 + 1043.30 \times 2 \times 2 = 30,039.20$

(ii) interest paid = $\frac{30,039.20 - 160,000}{25,070} = 4969.20$

balance borrowed $25,070 - 5000 = 20,070$

SI = Prn
 $4969.20 = 20,070 \times r \times 2$
 $4969.20 = 40,140 \times r$

$\frac{4969.20}{40,140} = r$
 $0.12379 = r$
 $\therefore r = 12.4\%$ ✓ 2

(b) extra interest = $48 \times 505 - 30 \times 638 = 1272$

(c)(i) Use present value

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

$N = 160,000$
 $M = ?$

$r = \frac{7.2\%}{12} = 0.006$

$n = 20 \times 12 = 240$

$160,000 = M \left[\frac{(1+0.006)^{240} - 1}{0.006(1+0.006)^{240}} \right]$

$160,000 = M \times 127.0084321$

$\frac{160,000}{127.0084} = M$
 $\therefore M = 1259.76$ (per month) ✓ 3

(ii) total repaid = $1259.76 \times 12 \times 20 = 30,2342.40$

(iii) total interest = $30,2342.40 - 160,000 = 14,2342.40$

(d)(i) $S = V_0(1-r)^n$
 $S = ?$

$V_0 = 100,000$
 $r = 0.12$
 $n = 10$

$S = 100,000(1-0.12)^{10} = 27,850$

(ii) amount of depreciation = $100,000 - 27,850 = 72,150$

(e) $V = 24,000 - 1600A$
 $0 = 24,000 - 1600A$
 $-24,000 = -1600A$
 $\frac{-24,000}{-1600} = A$

$\therefore A = 15$ years. 2

QUESTION 28

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

$l = \frac{258}{360} \times 2 \times \pi \times 9.3$

$= 41.88 \text{ cm}$

$= 41.9 \text{ cm}$

1

b) unit of measure

$= 0.1$

max error = 0.05

lower radius = $\frac{7.1 - 0.05}{7.05}$

upper radius = $\frac{7.1 + 0.05}{7.15}$ ✓

lower volume = $\frac{4}{3} \pi r^3$
 $= \frac{4}{3} \times \pi \times (7.05)^3$
 $= 1467.76 \text{ cm}^3$

upper volume = $\frac{4}{3} \times \pi \times (7.15)^3$
 $= 1531.1 \text{ cm}^3$ ✓

3

(i) angular distance
 $= 75 + 115$
 $= 190^\circ$ ✓

ii) time difference
 $1^\circ = 4 \text{ mins}$
 $190^\circ = 190 \times 4$
 $= 760 \text{ mins}$ ✓
 $= 12 \text{ h } 40 \text{ mins}$

∴ New York is 12 h 40 mins behind Beijing
 ∴ Beijing is ahead of N.Y!

∴ time in Beijing is 9 a.m. + 12 h 40 mins
 $= 9:40 \text{ p.m.}$ ✓
 7th August 4

*

(c) (i) angular distance
 $= 42^\circ - 27^\circ$
 $= 15^\circ$ ✓

using $1^\circ = 60 \text{ M}$

∴ $15^\circ = 60 \times 15$
 $= 900 \text{ M}$ ✓

2

(ii) 1 knot = 1 M/h

and $d = s \times t$
 $900 = 60 \times t$
 $\frac{900}{60} = t$

∴ $t = 15 \text{ hours}$ ✓

1

(e) use $1^\circ = 60 \text{ M}$
 $\therefore 2^\circ \times 60 \text{ M} = 420 \text{ M}$
 $x^\circ = 7$

∴ A is 7° north of 15° S ✓

∴ A is $(8^\circ \text{ S}, 25^\circ \text{ E})$ ✓

2