2006 TRIAL HIGHER SCHOOL CERTIFICATE

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time - 2½ hours
- Write using blue or black pen
- Calculators may be used
- Write your Centre Number and Student Number at the top of relevant pages as indicated
- A Formulae Sheet is provided at the back of this paper

Section I Pages 2 - 7
Total marks (**22**)

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

Section II pages 8 – 16
Total marks (**78**)

- Attempt Questions 23 – 28
- Allow about 2 hours for this section

Section I

Total marks (22)
Attempt Questions 1 – 22
Allow about 30 minutes for this section

Use the Multiple-Choice Answer sheet provided

1 Which of the following is equal to 3.864×10^{-4}

(A) 0.0003864

(B) 0.00864

(C) 3864

(D) 38640

2 Evaluate to two decimal places: $\dfrac{1.28\times10^{2}}{\sqrt{4.9\times10^{6}}}$

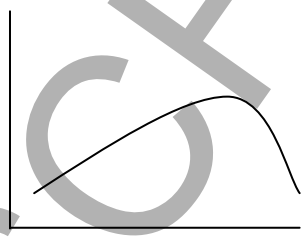
(A) 0.05

(B) 0.06

(C) 0.18

(D) 1.83

3 Describe the type of distribution of the following



(A) Negative

(B) Normal

(C) Symmetrical

(D) Positive

4 The area of an ellipse with a major axis of 12 cm and a minor axis of 6 cm, is given by the formula:

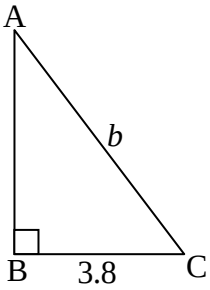
(A) $6\times3\times\pi\ \ cm^2$

(B) $6\times3^2\times\pi\ \ cm^2$

(C) $12\times8\times\pi\ cm^2$

(D) $12\times3^2\times\pi\ \ cm^2$

5 Given $\angle ACB = 48^0$. Which of the following statements below would be used to correctly find length AC?



NOT TO SCALE

(A) $b = \dfrac{3.8}{\sin 48^0}$

(B) $b = \dfrac{3.8}{\cos 48^0}$

(C) $b = 3.8 \sin 42^0$

(D) $b = 3.8 \cos 42^0$

6 Two hundred tickets are sold in a raffle. There are two prizes. Brad buys four tickets. Which expression, gives the probability that Brad wins both prizes?

(A) $\dfrac{4}{200} \times \dfrac{4}{199}$

(B) $\dfrac{4}{200} + \dfrac{3}{199}$

(C) $\dfrac{4}{200} \times \dfrac{3}{199}$

(D) $\dfrac{4}{200} + \dfrac{3}{199}$

7 Convert 4 *m/s* to *km/h*. correct to one decimal place.

(A) 1.4 *km/h*

(B) 14.4 *km/h*

(C) 16.6 *km/h*

(D) 24.3 *km/h*

8 When the equation $y = \dfrac{3-2w}{6}$ is transposed to make *w* the subject, the result is:

(A) $w = \dfrac{6y-3}{2}$

(B) $w = \dfrac{6-2y}{2}$

(C) $w = \dfrac{3-6y}{2}$

(D) $w = 3-6y$

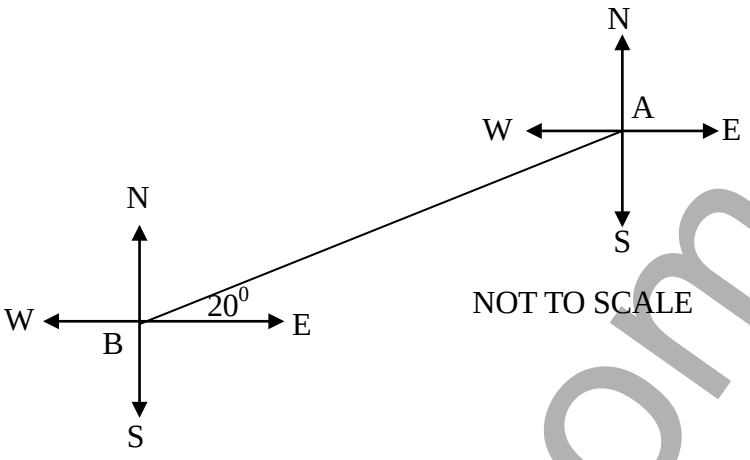
9 The bearing of B from A is

(A) 020^0

(B) 110^0

(C) 200^0

(D) 250^0



10 During the last month in the town of Sector Hill, houses were sold for the following prices:

$200 000	$135 000	$1 150 000	$170 000
$190 000	$165 000	$135 000	$150 000

Which of the following has the highest value:

(A) Median

(B) Mode

(C) Mean

(D) Range

11 At a netball match the ratio of adult men to adult females is 4:9, whilst the ratio of adult females to children is 12:5. Find the ratio of adult men to children.

(A) 4:5

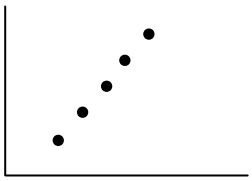
(B) 4:15

(C) 16:15

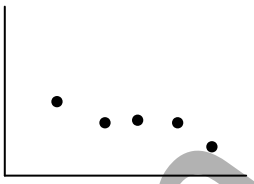
(D) 15:6

12 Which graph shows a low positive correlation

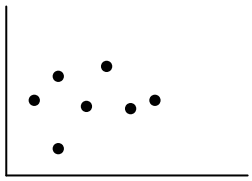
(A)



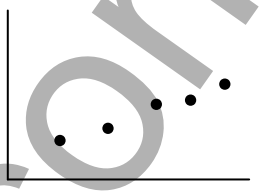
(B)



(C)



(D)



13 A car with an original value of \$8800 depreciates by \$960 every year. Use the straight line depreciation formula ($S = V_0 - Dn$) to calculate when the computer is half its original value (to the nearest 0.1 year)

(A) 2.7

(B) 3.8

(C) 4.5

(D) 4.6

14 Simplify $8x^3 - 3x(x^2 - 4)$

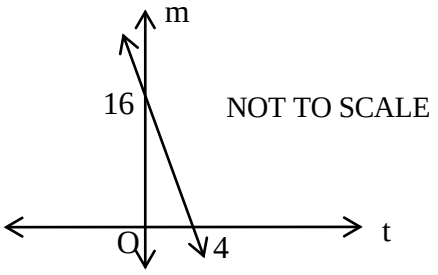
(A) $5x^3 - 12x$

(B) $5x^3 + 12x$

(C) $5x^3$

(D) $12x - 5x^3$

15 Find the equation of this line



(A) $m = -4t + 16$

(B) $m = 4t + 16$

(C) $t = -4m + 16$

(D) $m = 4t + 4$

16 The table of monthly loan repayments for a loan of $1000 is shown below

Interest rate (p.a.)

Term (in years)	**6%**	**7%**	**8%**	**9%**
3	$8.50	$9.60	$9.80	$10.30
6	$7.63	$8.40	$8.50	$9.05
9	$6.40	$7.30	$7.60	$8.10
12	$5.90	$6.80	$6.90	$7.10

Kate has a $70 000 mortgage at 7% p.a. over 6 years. After interest rates rise to 9% p.a, Kate extends the term of the loan to 12 years. What is the change in Kate's monthly repayments?

(A) Increase by $91 per month

(B) Decrease by $91 per month

(C) Decrease by $1.30 per month

(D) Increase by $1.30 per month

17 From a forest, 50 birds were captured tagged and then released. One week later, 60 birds were caught and 15 were found to be tagged. Estimate the total number of birds in the forest.

(A) 100

(B) 200

(C) 350

(D) 400

18 The mean of a set of data is 40 and the standard deviation is 7. A score of 7 is then added to the data set. Which of the following is correct?

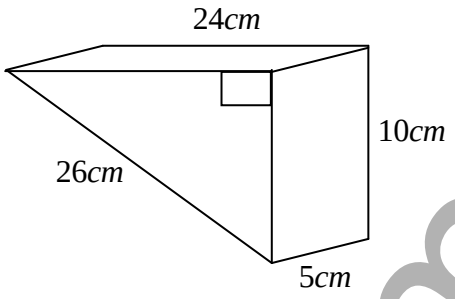
(A) The mean will decrease and the standard deviation will increase

(B) The mean will increase and the standard deviation will decrease

(C) The mean will increase and the standard deviation will increase

(D) The mean will decrease and the standard deviation will decrease

19 Find the volume of the following prism



(A) 400 cm^3

(B) 600 cm^3

(C) 1200 cm^3

(D) 3120 cm^3

20 Five boys try out for two places on a doubles rowing team. The number of teams that can be chosen is:

(A) 5

(B) 10

(C) 20

(D) 25

21 Solve the following equation: $\frac{a}{5}+\frac{2a+1}{2}=2$

(A) $a = 1\frac{1}{4}$

(B) $a = 2\frac{1}{4}$

(C) $a = 3$

(D) $a = 5$

22 The height of a cone is inversely proportional to the square of the radius. If the height of the cone is 1.5m when r = 2m, what is the height when r = 1m?

(A) $\frac{1}{4}m$

(B) 4m

(C) 6m

(D) 12m

Section II

Total marks (78)
Attempt Questions 23-28
Allow about 2 hours for this section

Start each question on a SEPARATE page/ booklet.

All necessary working should be shown in every question

Question 23 (13 marks) Use a separate page/ booklet **Marks**

(a) Fifteen fans were randomly chosen at two football matches. The first game was at the Century stadium whilst the second game was at the Pele stadium.
The number of whole minutes each fan waited, in order to purchase a ticket at each game, was recorded in this survey. The ordered stem-and-leaf plot displays the results.

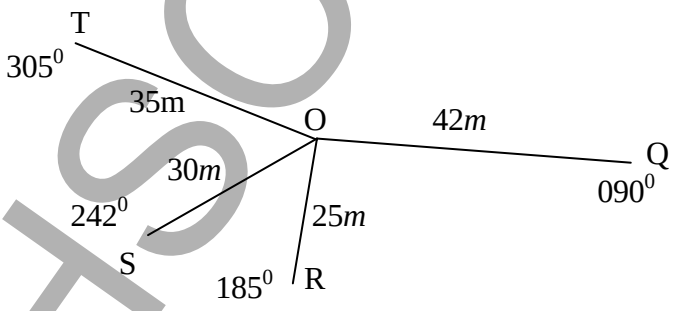
Century stadium				Pele stadium					
	7	6	2	0	7				
		5	5	1	4	4	7		
9	6	2	1	2	8	9	9		
9	8	8	4	3	3	4	5	5	5
		7	3	4	4	□	6		

(i) One entry (represented by □) is missing for the Pele Stadium.
Give a possible number of minutes that this fan waited. **1**

(ii) Write down the range, in minutes, of the waiting times for the Century Stadium. **1**

(iii) Calculate the mean and the sample standard deviation of the waiting times for the Century Stadium. Give answers correct to one decimal place. **2**

(b) A radial survey of a paddock is drawn below. All measurements are in metres



(i) What is the size of $\angle$TOQ. **1**

(ii) Calculate the length of TQ to 1 decimal place. **2**

(iii) Calculate the area of triangle TOQ to the nearest m^2. **2**

(c) The rear windscreen wiper of a car rotates on an arm 50cm long.
The wipers rubber blade is 40 cm long. The wiper rotates through an arc of 120^0.

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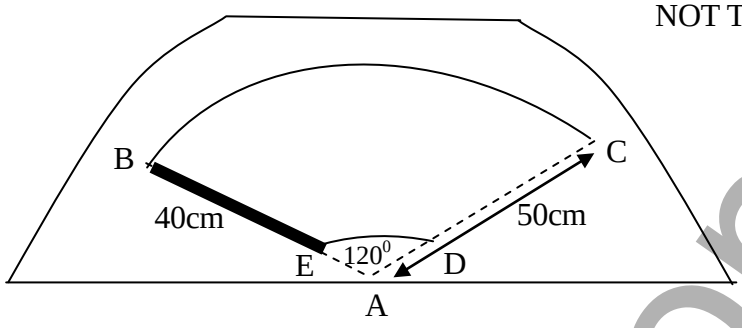
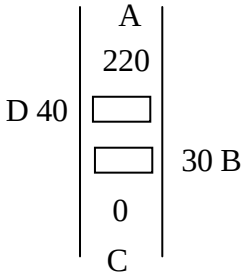


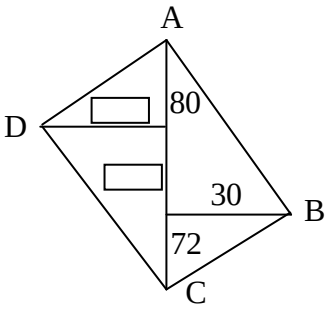
(i) Calculate the area of sector ABC to the nearest one decimal place. **2**

(ii) Hence calculate the area of the windscreen cleaned, ie area BCDE to the nearest cm^2. **2**

Question 24 (13 marks) Use a separate page/ booklet **Marks**

(a) A traverse survey of an industrial park was conducted. The notebook entry and a sketch are drawn below. Both are incomplete. (Measurements are in metres)





NOT TO SCALE

(i) Copy the above diagrams into your writing booklet and write the correct measurements in the boxes provided. **2**

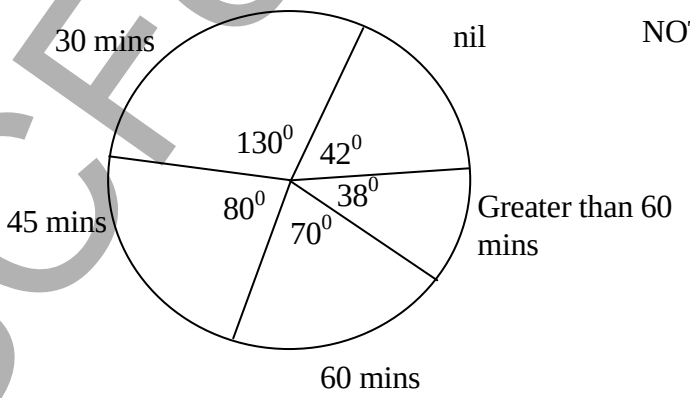
(ii) Calculate the area of figure ADCB. **3**

(iii) Calculate the length of DC, to one decimal place. **2**

(b) Paula decides to survey her class-mates on their methods of exercise. One of the questions in her survey is 'How often do you exercise?'

(i) Give a reason why this is not a good way to ask a question in a survey. **1**

(ii) Paula used a sector graph to display the responses she received to her question 'How many minutes per day have you exercised in the past week'.



NOT TO SCALE

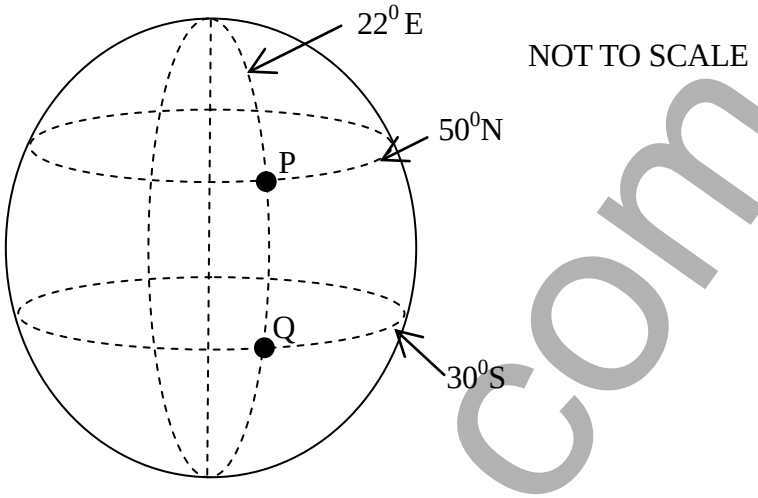
What percentage of the people surveyed, exercised 45 minutes or more per day? Write your answer to one decimal place. **2**

(iii) If 25 students participated in the survey, find how many students exercised less than 45 minutes per day. **1**

(c) Solve the equation $4\sqrt{x-2} = 20$ **2**

Question 25 (13 marks) Use a separate page/ booklet **Marks**

(a) The diagram represents the earth with two points P and Q on the surface of the Earth.



(i) What great circle runs through the points P and Q? **1**

(ii) Calculate the angular distance between P and Q and hence find the shortest distance between P and Q in nautical miles, given that 1 degree of latitude equals 60 M. **2**

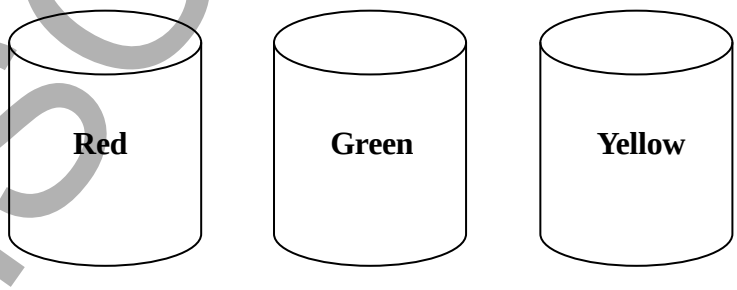
(iii) Calculate the shortest distance between P and Q to the nearest kilometre

(α) using the arc length formula with r = 6400 km **1**

(β) by applying the conversion 1 nautical mile = 1.852 km. **1**

(iv) Explain why your answers to (iii) (α) and (iii) (β) are different. **1**

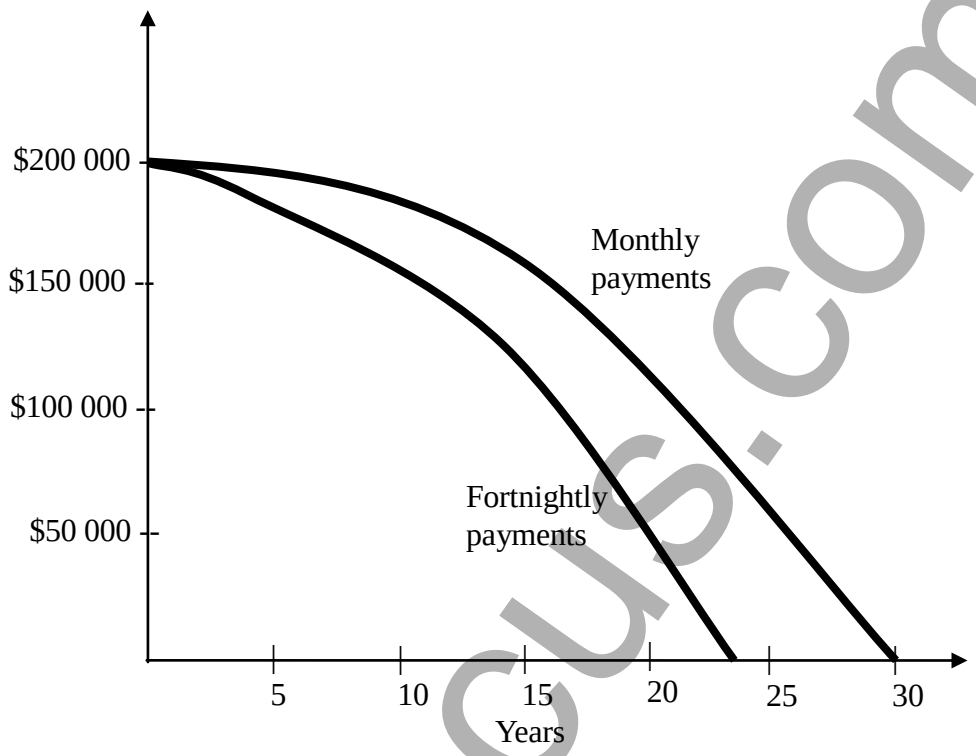
(b) Three cans of paint sit on a stand at the local paint shop. The cans are labelled red, green and yellow.



(i) In how many ways can the cans be arranged in a row? **2**

(ii) Jo buys two different coloured cans of paint. What is the probability the cans she selects are yellow first, followed by the green paint.
Show working to justify your answer. **2**

(c) The graph compares the progress of a $200 000 loan when repayments are made monthly and fortnightly.



(i) Estimate the amount owing on the loan after 15 years if repayments are made monthly. **1**

(ii) Estimate the number of years it takes to reduce the balance to $50 000 if the repayments are made fortnightly. **1**

(iii) What is the benefit of paying fortnightly instead of monthly? **1**

Question 26 (13 marks) Use a separate page/ booklet **Marks**

(a) The heights of a group of year 5 girls and their mothers were collected and the results tabulated below.

Height in cm

Year 5 girls	105	109	112	115	117	121	123	125	130
Mothers of year 5 girls	158	161	165	164	172	175	172	171	175

(i) On the graph provided on Page 19, draw a scatter plot and construct the median regression line.Let the horizontal axis be year 5 girls. **4**

(ii) Write the type of relationship shown in the scatter graph with respect to correlation. **1**

(b) A machine is set to produce spherical ball bearings with a mean diameter of 10.00 *cm* and a standard deviation of 0.03 *cm*. The diameters are normally distributed. An operator selects a ball bearing at random and notes its diameter to be 10.1 *cm*. Briefly state what conclusions he can make. **2**

(c) A new blood test for breast cancer has been developed. The following table shows the results of tests taken over a two week period.

	Positive (Indications of breast cancer)	Negative (No indications of breast cancer)	Total
Patients who developed breast cancer	30	15	45
Patients who did not develop breast cancer	25	20	
Total	55		

(i) How many samples were correctly diagnosed? **1**

(ii) How many blood sample tests were taken during the two week period? **1**

(iii) How many false-positive results did this test produce? **1**

(iv) How many false-negative results occurred in the two week testing period. **1**

(v) What is the probability that a person diagnosed as negative, developed breast cancer. **2**

Question 27 (13 marks) Use a separate page/ booklet **Marks**

(a) Ted and Freda Herd have worked out a budget and believe they can afford to pay $300 per week on a housing loan. They take the loan over a 20 year term at an interest rate of 5.2% p.a. interest, compounded weekly.

(i) Using 52 weeks per year, find the amount that Ted and Freda can afford to borrow. **3**

(ii) If they decide to pay $350 per week off their loan, how many whole years will it take them to pay out the loan? **3**

(b) A local rugby league club is conducting a fund raising raffle. The profit ($P) made on the raffle can be calculated using the formula $P = \frac{3n}{2} - 700$, where n is the number of tickets sold.

Calculate the number of tickets sold if a profit of $1100 was made. **2**

(c) A flag pole stands on Simpson's tower as shown below.

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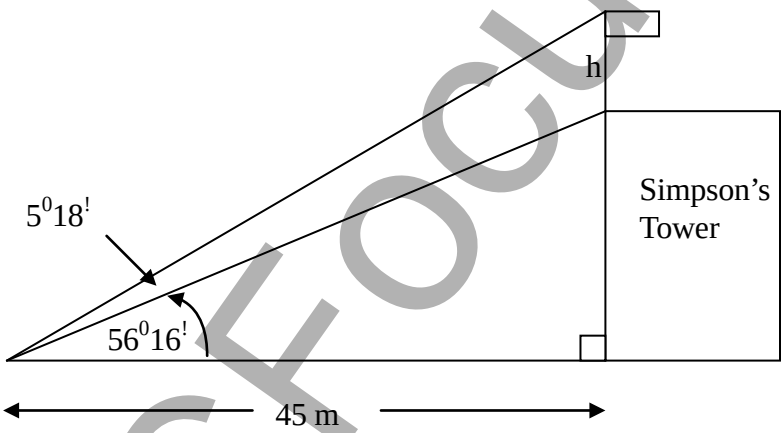

(i) Find the height of Simpson's tower to 2 decimal places. **2**

(ii) Find the height of the flag pole above ground level to 2 decimal places. **2**

(iii) Find the height of the flag pole (h) to one decimal place. **1**

Question 28 (13 marks) Use a *separate* page/ booklet **Marks**

(a) Fifty balls are arranged five by five in a double layer, in a rectangular cardboard box, as shown in the following diagram.

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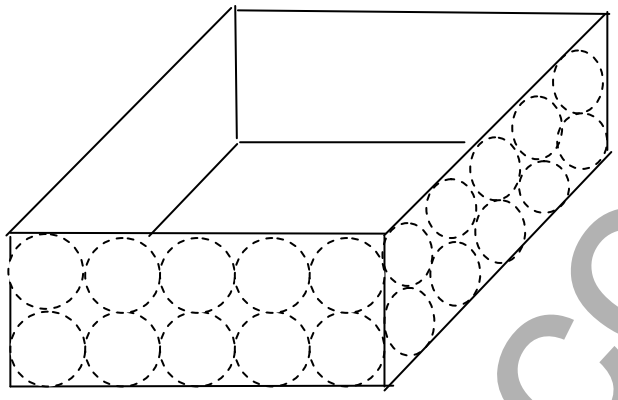

Each ball touches at least two other balls. If each ball has a radius of 1.2 cm, find

(i) the dimensions of the box, neglecting the thickness of the cardboard. **1**

(ii) the total surface area of the outside of the box, if the box has no lid. **2**

(iii) the percentage of the volume of the box occupied by the balls. **2**

(b) The following is a plan for a lake.

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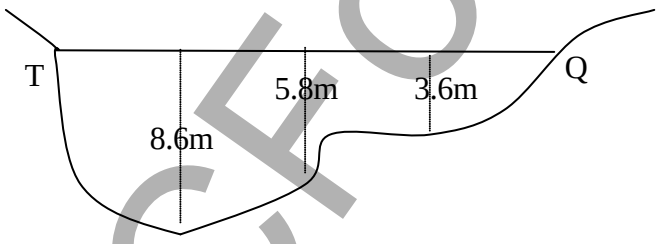


At equal intervals along the 80m pathway TQ, offset measurements were taken in metres to various points on the lake's boundary.

(i) Use two applications of Simpson's rule to find an approximation to the area of the lake. Give answer to the nearest m^2. **2**

(ii) The lake is to have a consistent depth of 185 cm. Calculate the volume of water in the lake in cubic metres. **1**

(iii) Calculate the capacity of the lake to the nearest litre. **1**

(c) The results of a sample of 10 students taken from a class of 40, who sat for English and Chemistry examinations were as follows.

English					Chemistry				
73	94	93	64	76	92	94	63	77	84
68	52	66	65	88	76	74	73	79	79

(i) Calculate the mean and sample deviation for each set of results, correct to 1 decimal place. **2**

(ii) Nina's mark for English was 86 and for chemistry 91. By converting these marks to Z-scores, determine in which subject Nina performed better. **2**

Trial Examination Paper
GENERAL MATHEMATICS

FORMULAE 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

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

$A \approx \frac{h}{3}(d_f + 4d_m + d_l)$
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 $A = 2\pi rh + 2\pi r^2$
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

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

or

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

FORMULAE SHEET

Simple interest

$I = \Pr n$
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
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

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

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

$\bar{x}$ = mean
x = individual score
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

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

Gradient-intercept form of a straight line

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

Probability of an event

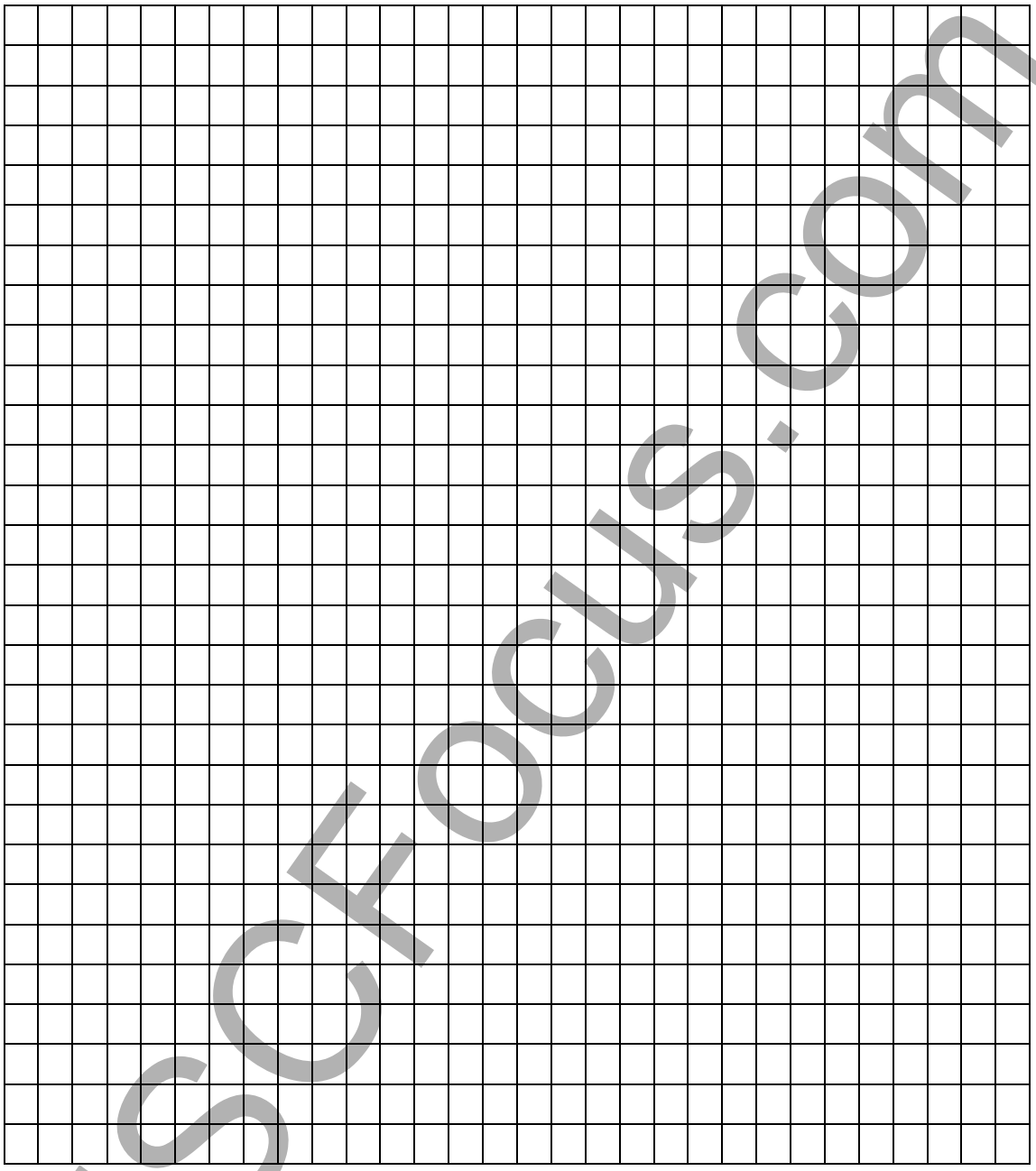
The probability of an event where outcomes are equally likely is given by:

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

Centre Number

Student Number

Use for Question 26 (a) (i)



Centre Number

Student Number

YEAR 12 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION 2006

GENERAL MATHEMATICS-MULTIPLE CHOICE ANSWER SHEET

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

(A) ⬭ (B) ⬬ (C) ⬭ (D) ⬭

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

(A) ⬭ (B) ⬭ (C) ⬬ (D) ⬭

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

(A) ⬭ (B) ⬬ (C) ⬬ (D) ⬭

ATTEMPT ALL QUESTIONS

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

2006 TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION

General Mathematics

- **Solutions including marking scale**
- **Mapping grid**

We have endeavoured to ensure that the solutions are free of errors and follow the spirit of syllabus in the methods used to solve the problems. However, individual teachers may opt for alternate solutions and/ ot* may choose *a different marking system.

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

ANSWERS QUESTION 23

Question 23 (a) (i)

Criteria	Marks
• One mark for correct answer	1

Answer:

44,45 or 46 mins

Question 23 (a) (ii)

Criteria	Marks
• One mark for correct answer	1

Answer:

45

Question 23 (a) (iii)

Criteria	Marks
• One mark for mean and one for standard deviation	2

Answer:

Mean = 25.5 and standard deviation = 14.3

Question 23 (b) (i)

Criteria	Marks
One mark for the correct answer	1

Answer:

145^0

Question 23 (b) (ii)

Criteria	Marks
• One mark for correct substitution into cosine rule and one for simplification	2

Answer:

$$TQ^2 = TO^2 + OQ^2 - 2 \times TO \times OQ \times \cos \angle TOQ$$
$$= 35^2 + 42^2 - 2 \times 35 \times 42 \times \cos 145^0$$
$$= 5397.30701.....$$
$$TQ = 73.466...$$
$$= 73.5m(1 decimal\ place)$$

Question 23 (b) (iii)

Criteria	Marks
• One mark for substitution into area formula and one for simplification	2

Answer:

$$Area = \frac{1}{2}(35)(42)\sin 145^0$$
$$= 421.578....$$
$$\approx 422 m^2$$

Question 23 (c) (i)

Criteria	Marks
• One mark for $\frac{120}{360}\times\pi\times 50^2$ and one for simplification	2

Answer:

$$Area = \frac{120}{360}\times\pi\times 50^2$$
$$= 2617.99...$$
$$= 2618.0cm^2$$

Question 23 (c) (ii)

Criteria	Marks
• One mark for $Area = 2618.0 - \frac{120}{360}\times\pi\times 40^2$ and one for simplification	2

Answer:

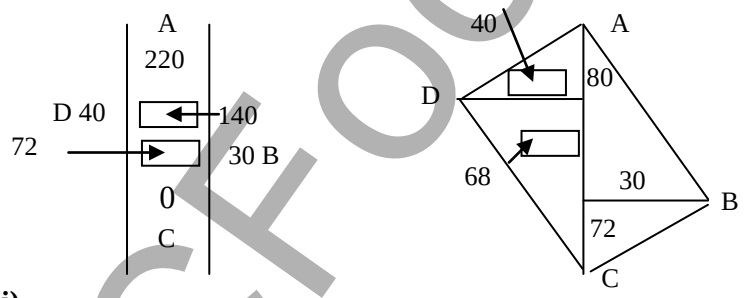
$$Area = 2618.0 - \frac{120}{360}\times\pi\times 40^2$$
$$= 2618.0 - 1675.5..$$
$$= 942.5$$
$$= 943cm^2$$

ANSWERS QUESTION 24

Question 24 (a) (i)

Criteria	Marks
• One mark for numbers 72 or 140 and one mark for 68 or 40	2

Answer:



Question 24 (a) (ii)

Criteria	Marks
• One mark for each for the area of triangles ADC and ABC and one for simplification	3

Answer:

$$A = \frac{1}{2}\times 220(40+30)$$
$$= 7700m^2$$

Question 24 (a) (iii)

Criteria	Marks
• One mark for $DC^2 = 140^2 + 40^2$ and one for simplification	2

Answer:

$$DC^2 = 140^2 + 40^2$$
$$DC^2 = 21200$$
$$DC = 145.6m^2$$

Question 24 (b) (i)

Criteria	Marks
• One mark for correct response	1

Answer:

Question is too open. Leads to too many different responses

Question 24 (b) (ii)

Criteria	Marks
• One mark for $\frac{188}{360}\times 100\%$ and one for simplification	2

Answer:

$$\frac{188}{360}\times 100\% = 52.2\%$$

Question 24 (b) (iii)

Criteria	Marks
• One mark for correct answer	1

Answer:

47.8% of 25= $\frac{47.8}{100}\times 25 = 11.95$ i.e. about 12 students

Question 24 (c)

Criteria	Marks
• One mark for $\sqrt{x-2}$ = 5 and one for simplification	2

Answer:

$$4\sqrt{x-2} = 20$$
$$\sqrt{x-2} = 5$$
$$x-2 = 25$$
$$x=27$$

ANSWERS QUESTION 25

Question 25 (a) (i)

Criteria	Marks
• One mark each for correct answer	1

Answer:

22^0E meridian of longitude runs through P and Q

Question 25 (a) (ii)

Criteria	Marks
• One mark each for = 80^0 . One mark each for 4800 M	2

Answer:

Angle = $(50^0 + 30^0)$
= 80^0
Angular distance= 80×60M
= 4800 M

Question 25 (a) (iii) (α) and (β)

Criteria	Marks
• One mark each for each correct answer.	2

Answer:

(α) PQ = $\frac{80}{360}\times 2\times\pi\times 6400$
= 8936.0857….
=8936 *km*

(β) PQ = 4800 × 1.852 *km*
= 8889.6 *km*

Question 25 (a) (iv)

Criteria	Marks
• One mark for the correct answer	1

Answer:

Answer to question (β) is more accurate as *1.852 is exact to 4 significant figures, whilst 6400 is only accurate to 2 significant figures.*

Question 25 (b) (i)

Criteria	Marks
• One mark for using counting techniques and one for answer	2

Answer:

Number of arrangements are $3\times 2\times 1=6$ *ie RGY, RYG,GRY,GYR,YRG and YGR*

Question 25 (b) (ii)

Criteria	Marks
• One mark for stating all arrangements and one for the probability	2

Answer:

number of arrangements, Jo can select two cans are: RG, GR, RY, YR, GY and YG
Therefore since only one of these is YG. The probability of selecting a RG is 1/6

Question 25 (c) (i) (ii) and (iii)

Criteria	Marks
• One mark each for correct answers for (i) (ii) and (iii)	3

Answer:

(i) $150 000 (ii) 20 years (iii) The amount of money owing is reduced faster paying fortnightly then monthly

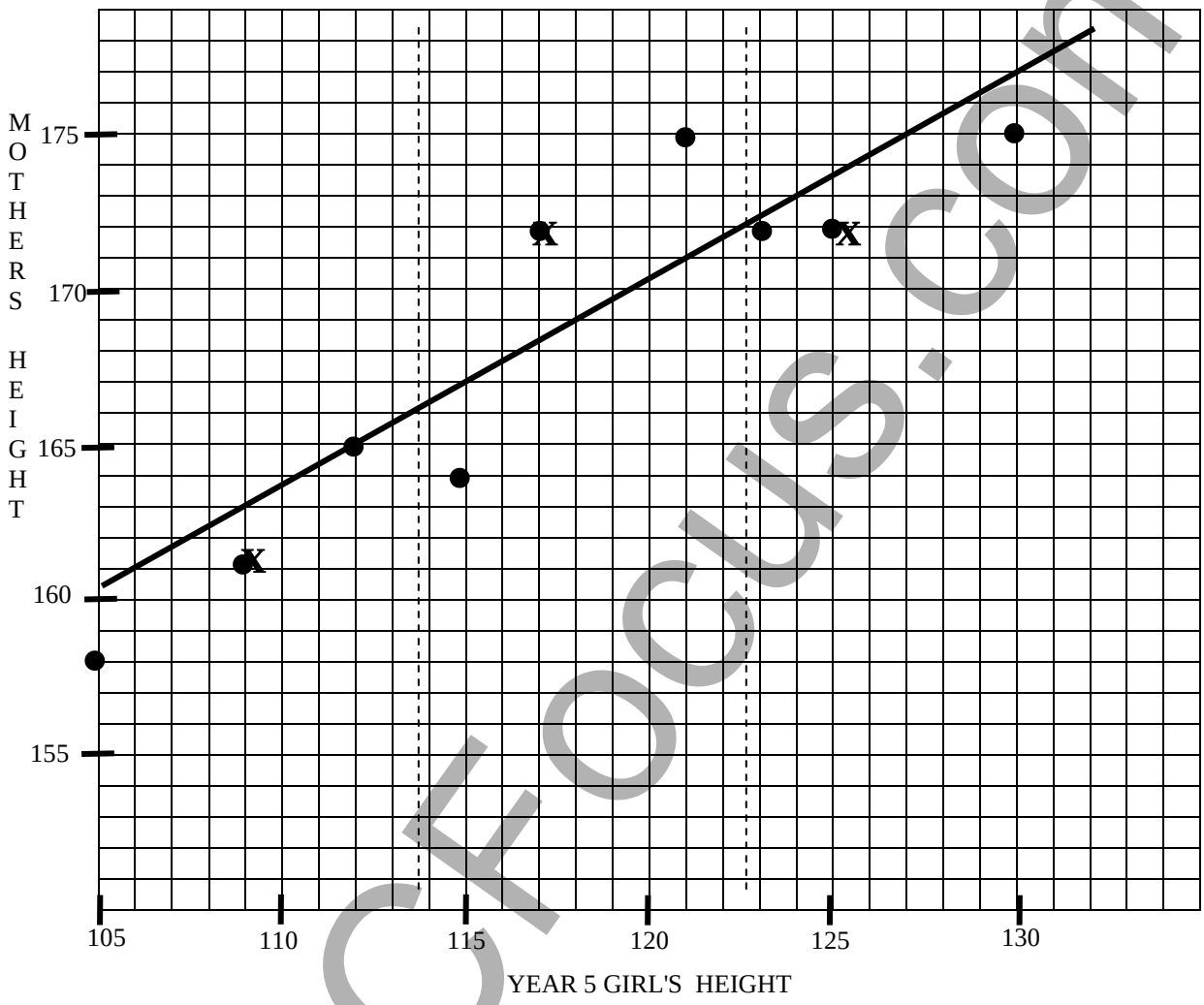
ANSWERS QUESTION 26

Question 26 (a) (i)

Criteria	Marks
• One mark for correct labelling of axis, one for plotting points, one for gradient of median regression line and one for y intercepts	4

Answer:

Use for Question 26 (a) (i)



Question 26 (a) (ii)

Criteria	Marks
• One mark the correct answer	1

Answer:

Positive correlation.

Question 26 (b)

Criteria	Marks
One mark for formula and substitution, one for conclusion	2

Answer: An acceptable range for the diameter of the ball is $10 \pm 3 \times 0.03$ which is $9.91 \leq d \leq 10.09$

This ball falls outside this range. So he may reject it.

Question 26 (c) (i) (ii) (iii) (iv)

Criteria	Marks
• One mark for each correct answer	**4**

Answer:

(i) 30+20 = 50 (ii) 55+35= 90 or 45+45 = 90 (iii) 25 (iv) 15

Question 26 (b) (v)

Criteria	Marks
• One mark for $\frac{15}{35}$ and one for simplification	**2**

Answer:

$$\frac{15}{35}=\frac{3}{7}$$

ANSWERS QUESTION 27

Question27 (a) (i)

Criteria	Marks
• One mark for r • One mark for $=300\{\frac{1.001^{1040}-1}{0.001(1.001)^{1040}}$ • One mark for simplification	**3**

Answer:

$$r=\frac{5.2}{\frac{52}{100}}=0.001 \text{ and } 20 \text{ years}=20\times 52=1040 \text{ weeks}$$

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

$$=300\left\{\frac{1.001^{1040}-1}{0.001(1.001)^{1040}}\right\}$$

=$193908.48 (2 dec. places)

Question 27 (a) (ii)

Criteria	Marks
• One mark for $0.554024257=\frac{1.001^n-1}{1.001^n}$, one for $= 0.541415292\ldots<0.554024257$ and one for conclusion	**3**

Answer:

$$193908.48=350\left(\frac{1.001^n-1}{0.001\times 1.001^n}\right)$$

$$0.554024=\frac{1.001^n-1}{1.001^n}$$

Trial and error. Check for various values of n

$Let\ n=780\ (n=15\ years)$

$$\frac{1.001^{780}-1}{1.001^{780}}=\frac{1.18062222..}{2.180622224..}$$

$$= 0.541415292\ldots<0.554024$$

$Let\ n = 832\ (16\ years)$

$$\frac{1.001^{832}-1}{1.001^{832}} = \frac{1.296954872..}{2.296954872..}$$

$$= 0.564640989..>0.554024$$

It will take about 16 years to repay the loan.

Question 27 (b)

Criteria	Marks
• One mark for $1100 = \frac{3n}{2} - 700$ and one for simplification	**2**

Answer:

$$P = \frac{3n}{2} - 700 \text{ where } p = 1100$$

$$1100 = \frac{3n}{2} - 700$$

$$1800 = \frac{3n}{2}$$

$$n = 1200$$

i.e 1200 raffle tickets were sold

Question 27 (c) (i)

Criteria	Marks
• One mark for tan 56 ^{0} 16=h/45 and one for simplification	**2**

Answer:

Let d be the height of Simpson's tower.

$$tan\ 56^0 16' = \frac{d}{45}$$

$$\therefore d = 45\tan 56^0 16'$$

$$= 67.389...$$

$$= 67.39m \text{ (2 dec.places)}$$

Question 27 (c) (ii)

Criteria	Marks
• One mark for $t = 45\tan 61^0 34'$ and one for simplification	**2**

Answer:

Let t be the height of flag pole above ground level

$$\therefore \tan 61^0 34' = \frac{t}{45}$$

$$t = 45\tan 61^0 34'$$

$$t = 83.11015...$$

$$t = 83.11$$

Question27 (c) (iii)

Criteria	Marks
• One mark for the correct answer	**1**

Answer:

h = 83.11-67.39

h = 15.7m

ANSWERS QUESTION 28

Question 28 (a) (i)

Criteria	Marks
• One mark for correct answer	1

Answer:

Length = width = $5\times 2\times 1.2 = 12cm$, height=2(2)(1.2)=4.8cm

Question 28 (a) (ii)

Criteria	Marks
• One mark for $SA = 2\times 4.8\times 12 + 2\times 4.8\times 12 + 12\times 12$ and one for simplification	2

Answer:

$$SA = 2\times 4.8\times 12 + 2\times 4.8\times 12 + 12\times 12$$
$$= 4\times 4.8\times 12 + 144$$
$$= 230.4 + 144$$
$$= 374.4$$
$$= 374.4cm^2$$

Question 28 (a) (iii)

Criteria	Marks
• One mark for volume of 50 balls = 361.9 cm^3 and one for simplification	2

Answer:

$$Volume\ of\ one\ table\ tennis\ ball = \frac{4}{3}\pi(1.2)^3 = 7.12382... = 7.128cm^3$$

$$Volume\ of\ 50\ balls = 50\times 7.238 = 361.9cm^3$$

$$\%\ occupied\ by\ table\ tennis\ balls = \frac{361.9}{691.2}\times 100 = 52.358\%$$

Question 28 (b) (i)

Criteria	Marks
• One mark for $A = \frac{20}{3}\{0 + 4\times 8.6 + 5.8\} + \frac{20}{3}\{5.8 + 4\times 3.6 + 0\}$ and one for simplification	2

Answer:

$$A = \frac{h}{3}\{d_f + 4d_m = d_l\}$$
$$= \frac{20}{3}\{0 + 4\times 8.6 + 5.8\} + \frac{20}{3}\{5.8 + 4\times 3.6 + 0\}$$
$$=268+134.66\ldots$$
$$= 402.66..$$
$$=403\ m^2$$

Question 28 (b) (ii)

Criteria	Marks
• One mark for correct answer	1

Answer:

$$Volume = 1.85\times 403$$
$$= 745.55..$$
$$=746\ m^3$$

Question 28 (b) (iii)

Criteria	Marks
• One mark for the correct answer	1

Answer:

$Capacity = 746 \times 1000 \ litres$

$= 746000 litres$

Question 28 (c) (i)

Criteria	Marks
• One mark for the correct mean for either subject. One mark for correct standard deviation for either subject	**2**

Answer:

English: mean= 73.9 and s.d = 13.9 Chemistry: mean 79.1 and s.d = 9.1

Question 28 (b)

Criteria	Marks
• One mark finding either z score. One mark for conclusion	**2**

Answer:

English

$$z = \frac{86 - 73.9}{13.9}$$
$$= 0.8705...$$
$$= 0.87$$

Chemistry:

$$z = \frac{91 - 79.1}{9.1}$$
$$= 1.307...$$
$$= 1.31$$

Nina performed better in chemistry. The z-score of 1.31 is higher than 0.87 indicating a better result

General Mathematics

2006 TRIAL HSC Examination Mapping Grid

Question	Marks	Content	Syllabus outcomes	Targeted Performance bands
1	1	AM3 : Algebraic skills and techniques	H2	1-2
2	1	AM1 : Basic algebraic skills	P2	1-2
3	1	DA7 : Correlation	H9, H11	1-2
4	1	M5 : Further applications of area and volume	H2, H6	2-3
5	1	M4 : Right-Angled triangles	P3, P6	2-3
6	1	PB3 : Multi-stage events	H10	3-4
7	1	M1 : Units of measurement	P2, P5	2-3
8	1	AM3 : Algebraic skills and techniques	H2	3-4
9	1	M6 : Applications of Trigonometry	H6,H7	3-4
10	1	DA5 : Interpreting sets of data	H4	3-4
11	1	AM1 : Basic algebraic skills	P2	4-5
12	1	DA7 : Correlation	H9,H11	3-4
13	1	FM6 : Depreciation	H8	3-4
14	1	AM3 : Algebraic skills and techniques	H2	3-4
15	1	AM2 : Algebraic Modelling	P5	3-4
16	1	FM4 : Credit and Borrowing	H5, H8	3-4
17	1	DA2 : Data collection and sampling	P9	4-5
18	1	DA6 : Normal distribution	H5	3-4
19	1	M2 : Applications of Area and Volume	P6	3-4
20	1	PB3 : Multi-stage events	P4	3-4
21	1	AM3 : Algebraic skills and techniques	H2	4-5
22	1	AM2 : Modelling Linear relationships	P5	3-4
23(a)(i)	1	DA5 : Interpreting sets of data	H4	3-4
23(a)(ii)	1	DA5 : Interpreting sets of data	H4	4-5
23(a)(iii)	2	DA5 : Interpreting sets of data	H4	3-4
23(b)(i)	1	M6 : Applications of Trigonometry	H6, H7	3-4
23(b)(ii)	2	M6 : Applications of Trigonometry	H6, H7	4-5
23(b)(iii)	2	M6 : Applications of Trigonometry	H6, H7	3-4
23(c)(i)	2	M5 : Further applications of Area and Volume	H3 H7	4-5
23(c)(ii)	2	M5 : Further applications of Area and Volume	H3, H7	4-5
24(a)(i)	2	M2 : Applications of Area and Volume	P2, P6	3-4
24(a)(ii)	3	M2 : Applications of Area and Volume	P2, P6	4-5
24(a)(iii)	2	M2 : Applications of Area and Volume	P2, P6	4-5
24(b)(i)	1	DA2 : Data collection and sampling	P11	3-4
24(b)(ii)	2	DA3 : Displaying single data sets	P4, P7	3-4
24(b)(iii)	1	DA3 : Displaying single data sets	P6, P7	2-3
24(c)	2	AM3 : Algebraic skills and techniques	H2, H11	4-5
25(a)(i)	1	M7 : Spherical geometry	H2, H11	4-5
25(a)(ii)	2	M7 : Spherical geometry	H2, H11	3-4
25(a)(iii) (α)	1	M7 : Spherical geometry	H2, H11	3-4
25(a)(iii) (β)	1	M7 : Spherical geometry	H2, ,H11	3-4
25(a)(iv)	1	M7 : Spherical geometry	H2, H7,H11	5-6

25(b)(i)	2	PB3 : Multi-stage events	H2, H11	4-5
25(b)(ii)	2	PB3 : Multi-stage events	H10	4-5
25(c)(i)	1	FM5 : Annuities and loan repayments	H8	4-5
25(c)(ii)	1	FM5 : Annuities and loan repayments	H8	4-5
25(c)(iii)	1	FM5 : Annuities and loan repayments	H8, H11	5-6
26(a)(i)	4	DA7 : Correlation	H9, H11	3-4
26(a)(ii)	1	DA7 : Correlation	H9, H11	3-4
26(b)	2	DA6 : Normal distribution	H5, H9	3-4
26(c)(i)	1	PB4 : Applications of probability	H10	4-5
26(c)(ii)	1	PB4 : Applications of probability	H10	4-5
26(c)(iii)	1	PB4 : Applications of probability	H10	5-6
26(c)(iv)	1	PB4 : Applications of probability	H10	5-6
26(c)(v)	2	PB4 : Applications of probability	H10	5-6
27(a)(i)	3	FM5 : Annuities and loan repayments	H8	4-5
27(a)(ii)	3	FM5 : Annuities and loan repayments	H8	4-5
27(b)	2	AM3 : Algebraic skills and techniques	H2	3-4
27(c)(i)	2	M6 : Applications of Trigonometry	H6	4-5
27(c)(ii)	2	M6 : Applications of Trigonometry	H6	4-5
27(c)(iii)	1	M6 : Applications of Trigonometry	H6	4-5
28(a)(i)	1	M5 : Further applications of areas and volume	H2, H6	4-5
28(a)(ii)	1	M5 : Further applications of areas and volume	H2, H6	5-6
28(a)(iii)	2	M5 : Further applications of areas and volume	H2, H6	3-4
28(b)(i)	2	M5 : Further applications of areas and volume	H2, H6	5-6
28(b)(ii)	1	M5 : Further applications of areas and volume	H2, H6	4-5
28(b)(iii)	2	M5 : Further applications of areas and volume	H2, H6	3-4
28(c)(i)	2	DA6 : Normal distribution	H5, H9	4-5
28(c)(ii)	2	DA6 : Normal distribution	H5, H9	4-5

General Mathematics

2006 TRIAL HSC Examination Answers only

Question	Marks	Answers
1-22	1 each	**1A 2B 3A 4A 5B 6C 7B 8C 9D 10D 11C 12D 13D 14B 15A 16B 17B 18A 19B 20B 21A 22C**
23(a)(i)	1	44,45 or 46 mins
23(a)(ii)	1	45
23(a)(iii)	2	$\bar{x} = 25.5,\ sd = 14.3$
23(b)(i)	1	145^0
23(b)(ii)	2	73.5 m
23(b)(iii)	2	422 m^2
23(c)(i)	2	2618.0 cm^2
23(c)(ii)	2	943cm^2
24(a)(i)	2	See solutions
24(a)(ii)	3	7700 m^2
24(a)(iii)	2	145.6 m^2
24(b)(i)	1	Question is too open. Leads to too many different responses
24(b)(ii)	2	52.2%
24(b)(iii)	1	12 students
24(c)	2	27
25(a)(i)	1	22^0 E
25(a)(ii)	2	4800 M
25(a)(iii) (α)	1	8836 km
25(a)(iii) (β)	1	8889 km
25(a)(iv)	1	See solutions
25(b)(i)	2	6
25(b)(ii)	2	$\frac{1}{6}$
25(c)(i)	1	$150 000
25(c)(ii)	1	20 years
25(c)(iii)	1	The amount of money owing is reduced faster paying fortnightly then monthly
26(a)(i)	4	See solutions
26(a)(ii)	1	Positive correlation
26(b)	2	See solutions
26(c)(i)	1	50
26(c)(ii)	1	90
26(c)(iii)	1	25
26(c)(iv)	1	15
26(c)(v)	2	$\frac{3}{7}$
27(a)(i)	3	$193908.48
27(a)(ii)	3	16 years
27(b)	2	1200
27(c)(i)	2	67.39 m
27(c)(ii)	2	83.11

27(c)(iii)	1	15.7 *m*
28(a)(i)	1	4.8 *cm*
28(a)(ii)	1	374.4 cm^2
28(a)(iii)	2	52.358 %
28(b)(i)	2	403 m^2
28(b)(ii)	1	746 m^3
28(b)(iii)	2	746000 *litres*
28(c)(i)	2	English mean = 73.9, sd = 13.9, Chemistry mean = 9.1, sd = 9.1
28(c)(ii)	2	Better in English. z score is higher