KINCOPPAL–ROSE BAY
SCHOOL OF THE SACRED HEART

2009

HIGHER SCHOOL CERTIFICATE
TRIAL EXAMINATION

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – 2 ½ hours
- Write using black or blue pen
- Board-approved calculators may be used
- A formulae sheet is provided at the back of this paper
- All necessary working should be shown in every question
- Answer Section 1 on the Multiple Choice Answer sheet provided
- Start a new booklet for each question in Section 2

Total marks – 100

Section 1 Pages 2-7

22 marks

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

Section 2 Pages 8-16

78 marks

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

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

Use the multiple choice answer sheet provided.

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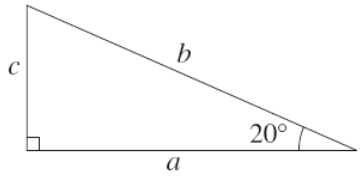
1. The table below shows the results of a test.

Score	Frequency
5	7
6	4
7	10
8	10
9	4
10	7

Which of the following best describes the skewness of the data?

(A) Positively skewed
(B) Negatively skewed
(C) Symmetrical
(D) Uniform

2. What is the correct expression for $\cos 20°$ in this triangle?



(A) $\frac{c}{b}$

(B) $\frac{a}{b}$

(C) $\frac{c}{a}$

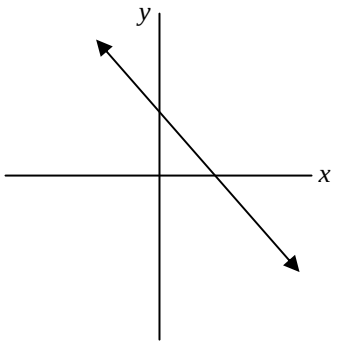
(D) $\frac{a}{c}$

3. The distance between the Earth and the Sun is 1.49×10^{11} km. What is this distance in kilometres?

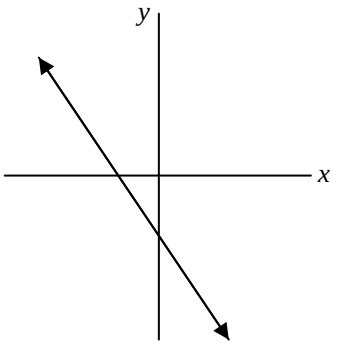
(A) 1 490 000 km
(B) 149 000 000 km
(C) 149 000 000 000 km
(D) 14 900 000 km

4. Jane is drawing the graph of $y = 4 - 3x$. Which sketch could be the correct graph?

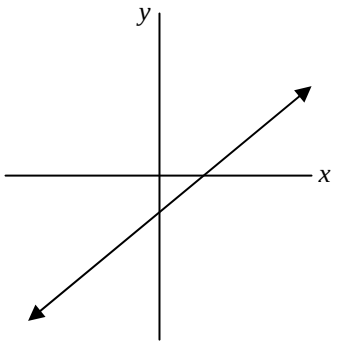
(A)



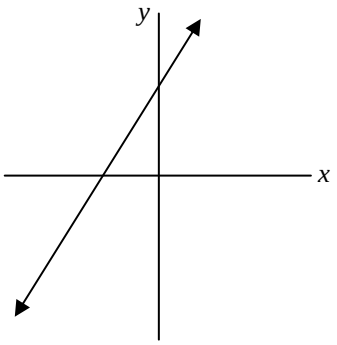
(B)



(C)



(D)



5. The mass of a rack of lamb is given as 520g correct to the nearest 20g. The percentage error of this measurement is closest to:

(A) 0.95%
(B) 1.9%
(C) 3.8%
(D) 26%

6. To estimate the population of bats in the Royal Botanical Gardens, the National Parks and Wildlife Rangers netted 140 bats, tagged them and released them. Later 210 bats were netted, of which 28 were found to be tagged.

The approximate population of bats is:

(A) 42
(B) 420
(C) 1050
(D) 2000

7. Make v the subject of $E = \frac{1}{2}mv^2$

(A) $v = \sqrt{\frac{2E}{m}}$

(B) $v = \frac{\sqrt{2E}}{m}$

(C) $v = \frac{2\sqrt{E}}{m}$

(D) $v = \sqrt{2Em}$

8. Andrew buys an entertainment centre valued at $980. He borrows the money over 2 years to make the purchase, with repayments set at $55 per month.

What is the simple interest rate charged on the loan, correct to 1 decimal place?

(A) 17.3%
(B) 34.7%
(C) 55.1%
(D) 17.4%

9. A cone has a volume of 34 cm^3. If its perpendicular height is 12 cm, what is the base area of the cone?

(A) 0.9 cm^2
(B) 2.8 cm^2
(C) 8.5 cm^2
(D) 408 cm^2

10. Len works at a hardware store and earns $12.40 per hour for a 36 hour working week. Linda works at a fast food restaurant and earns $10.80 per hour for a 40 hour working week.

If Linda is paid time and a half for any overtime worked the number of hours of overtime that she needs to work to earn more money than Len in one week is:

(A) 1
(B) 2
(C) 3
(D) 4

11. A share is valued at $23.40. Gina buys 4000 shares and, at the end of the financial year, Gina receives a dividend of $4212. The dividend yield on Gina's investment is:

(A) 0.55%
(B) 1.053%
(C) 4.5%
(D) 5.3%

12. A bag contains 3 red marbles, 13 blue marbles and 4 yellow marbles. A marble is chosen from the bag and then replaced in the bag. In 90 selections, the expected number of blue marbles selected is closest to:

(A) 13
(B) 20
(C) 55
(D) 59

13. Anna is flying from Sydney (GMT +10) to Honolulu (GMT -11). The flight takes 15 hours.

If the flight leaves Sydney at 10:00 pm Sunday, what time does it arrive in Honolulu?

(A) 1:00 am Sunday
(B) 7:00 am Sunday
(C) 4:00 pm Sunday
(D) 1:00 pm Monday

14. Sophia scored the following results in four tests: 36, 42, 25 and 63. The following weeks she repeated the four tests and recorded an improvement of 7 marks in each test.

Which of the following statements is true?

(A) The mean increases and the standard deviation remains the same.
(B) The mean increases and the standard deviation will increase by 7.
(C) The mean and the standard deviation will decrease by 7.
(D) The mean and the standard deviation will remain unchanged.

15. There are five questions on a test, each with only one correct solution, which can be answered as True or False. What is the probability of guessing all five answers and scoring 100% on the test?

(A) $\frac{1}{2}$ (B) $\frac{1}{25}$ (C) $\frac{1}{5}$ (D) $\frac{1}{32}$

16. Kara has a credit card that has no interest-free period and accrues interest daily at a rate of 0.035%. On March 10, Kara used the credit card to purchase a printer for $400.

How much interest will Kara be charged for the month of March if she pays the bill on the 31st of March?

(A) $2.94
(B) $4.20
(C) $4.34
(D) $14.00

17. Simplify the expression $8x - 3(4x + 5) + 10$

(A) $25 - 4x$
(B) $-4x - 5$
(C) $x + 2$
(D) $20x - 45$

18. Leon's average for the first three Science tests is 75. If he achieves a mark of 60 on the fourth test, what will his new average be?

(A) 15
(B) 71.25
(C) 67.5
(D) 33.75

19. A quadrant has a radius of 7 centimetres.

What would be the radius of a quadrant that has twice the area as the first quadrant?

(A) 4.9 cm
(B) 5.2 cm
(C) 14 cm
(D) 9.9 cm

20. It is known that y varies directly with the cube of x. When $x = 3$, $y = 648$.

What is the equation connecting x and y?

(A) $y = 24x$
(B) $y = 24x^3$
(C) $y = 216x$
(D) $y = 216x^3$

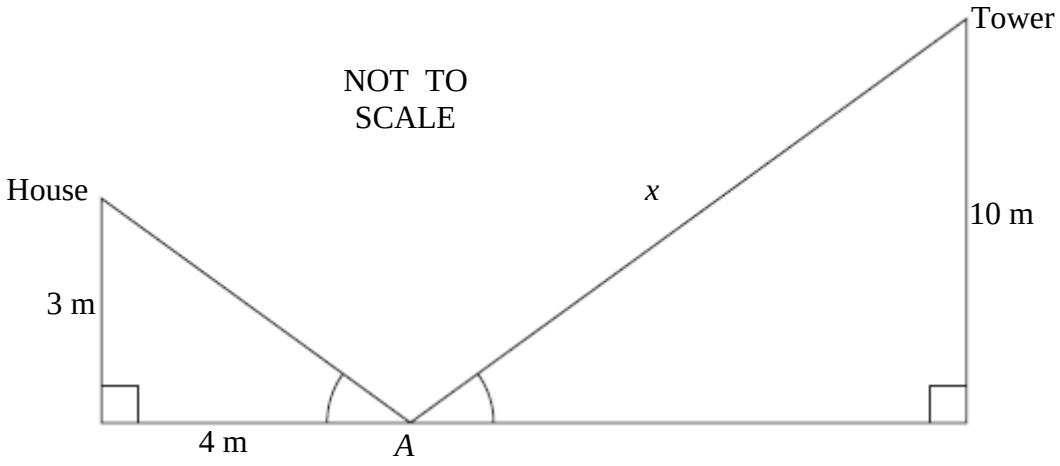
21. A prism has a volume of 144 L. Its height is 40 cm.

What is the area of the base?

(A) 0.36 m^2
(B) 3.6 m^2
(C) 36 m^2
(D) 360 m^2

22. A point *A* lies between a house, 3 metres high, and a tower, 10 metres high. *A* is 4 metres away from the base of the house.

From *A*, the angles of elevation to the top of the house and to the top of the tower are equal.



What is the distance, *x*, from *A* to the top of the tower?

(A) 16.67 m
(B) 13.33 m
(C) 11 m
(D) 14.92 m

End of Multiple Choice section

Section II

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

Answer each question in a SEPARATE writing booklet. Extra writing booklets are available.

All necessary working should be shown in every question.

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

(a) If $m = 4000x^2$, find m when $x = -2.35$
Give your answer correct to 2 significant figures. **2**

(b) (i) Sara invests \$300 per month into an annuity for 4 years at 6% p.a. compounded quarterly. Find out how much money she will have at the end of 4 years. **3**

(ii) What single amount of money could Sara have invested for 4 years to earn the same amount as she did in part (i)? Use the same interest rate and time period as part (i). **1**

(c) Renee is considering investing in shares. If she decides to invest, she has a 60% chance of making \$15 000 and a 40% chance of losing \$8000.

(i) Calculate the financial expectation involved in the investment Renee is considering. **2**

(ii) Do you think Renee should invest in shares?
Explain your answer. **1**

(d) Joan wishes to buy an apartment. The interest rate available to her is 6.8% compounding monthly. If the amount to be borrowed is \$320 000 over 25 years, find:

(i) the monthly repayment **2**

(ii) the total amount to be repaid **1**

(iii) the interest she will pay on the loan **1**

End of Question 23

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

(a) Solve for x: $\sqrt[3]{x-5}=6$ **2**

(b) In a city the heights of the population are normally distributed. The mean is 171 cm and the standard deviation is 7 cm.

(i) Between which two values will the height of a person in the city **almost certainly** lie? **2**

(ii) What percentage of the population are shorter than 164 cm? **2**

(c) Jack's running speed is 10 metres/second. Convert this to kilometres per hour. **2**

(d) Laura earns $58 000 as a sales representative. She also earns $4600 from interest gained from her bank account. Her allowable tax deductions total $8100.

(i) What is Laura's taxable income? **1**

(ii) Using the scale in the table below, find her tax payable. **2**

Tax rates 2008-09

Taxable income	*Tax on this income*
$1 – $6,000	Nil
$6,001 – $34,000	15c for each $1 over $6,000
$34,001 – $80,000	$4,200 plus 30c for each $1 over $34,000
$80,001 – $180,000	$18,000 plus 40c for each $1 over $80,000
$180,001 and over	$58,000 plus 45c for each $1 over $180,000

(iii) If her employer is deducting $330 per week for tax, will she receive a refund at the end of the 2008-09 financial year or will she have to pay extra tax? Show working to justify your answer. (Assume a 52 week year) **2**

End of Question 24

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

(a) (i) Ava, Beau, Chris and Dina wish to compete with each other in a number of wrestling matches so that each person wrestles all others once only. What is the probability that Ava and Chris wrestle each other first? **2**

(ii) If there were n people involved, write an algebraic expression to represent the number of matches required so that each person wrestles all others once only. **1**

(b) 150 patients were tested for a disease. Some were suffering from the disease and some were not. The results were:

- 38 people had the disease. Of these, the test indicated that 25 had the disease;
- 112 people did NOT have the disease. Of these, the test indicated that 17 had the disease.

(i) Copy and fully complete the following table using the above information. **2**

	Test Results		
	Positive	Negative	Total
Number with disease			
Number without disease			
Total			

(ii) For how many of the people tested was the test accurate? **1**

(iii) For what percentage of the people tested is the test not accurate? **1**

(iv) What is the probability that the test indicated a positive result for a person who did NOT have the disease? **1**

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

Mathematics

73	94	93	64	76
68	52	66	65	88

History

92	94	63	77	84
76	74	73	79	79

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

(ii) Casey receives a z-score of -2 on the Mathematics examination. Calculate the actual mark scored by Casey to the nearest whole number. **1**

(ii) Neisha's mark for Mathematics was 86 and for History 87. She thinks she performed better in History. Do you agree? Justify your answer using appropriate calculations. **2**

End of Question 25

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

(a) The rear windscreen wiper of a car rotates on an arm 60cm long.
The wiper's rubber blade is 50cm long. The wiper rotates through an arc of $130°$.

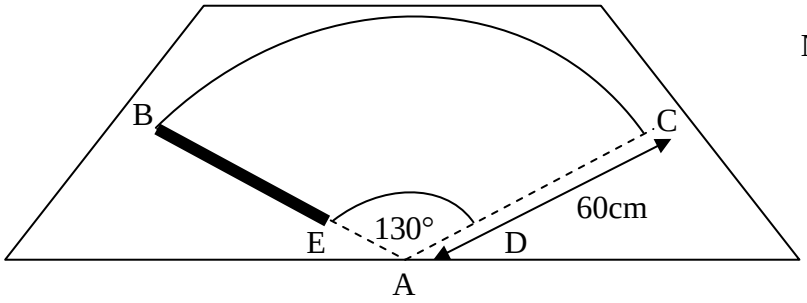


DIAGRAM
NOT TO SCALE

Calculate the area of the windscreen cleaned, ie area of BCDE, to the nearest cm^2. **2**

(b) The digits 2, 3, 5, 7 and 9 are used to form a 5-digit number. No digit is repeated.
What is the probability that the 5-digit number is even? **2**

(c) An offset survey of a building site was conducted. The notebook entries are shown.
Measurements are in metres.

		D		
		60		
C	12	35		
		15	20	*B*
		0		
		A		

(i) Use these notebook entries to draw a neat sketch of the building site.
Mark the interval and offset measurements on your diagram. **2**

(ii) Find the distance from *C* to *D* correct to one decimal place. **1**

(iii) Calculate the area of the entire building site. **2**

Question 26 continues on page 12

Question 26 continued **Marks**

(d) Two unbiased dice are thrown. The dice each have six faces that are numbered 1, 2, 3, 4, 5 and 6.

(i) What is the probability that neither dice shows a 4? **1**

(ii) Sam plays a game with these dice. The cost of each game is $1.

When the dice are thrown:

- Sam wins $15 if both dice show a 4
- She wins $3 if there is only one 4
- She wins nothing if neither shows a 4.

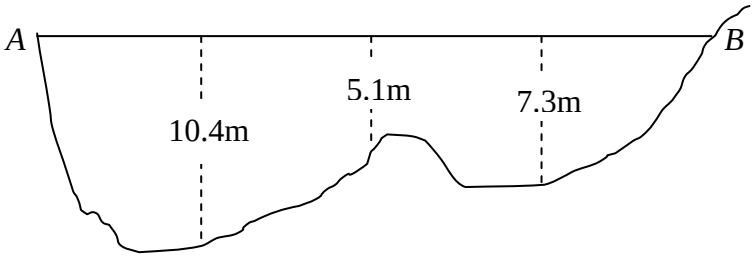
What is the financial expectation from this game? **3**

End of Question 26

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

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

DIAGRAM
NOT TO SCALE



At equal intervals along the 80m pathway *AB*, 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 95m. Calculate the volume of water in the lake in cubic metres. **1**

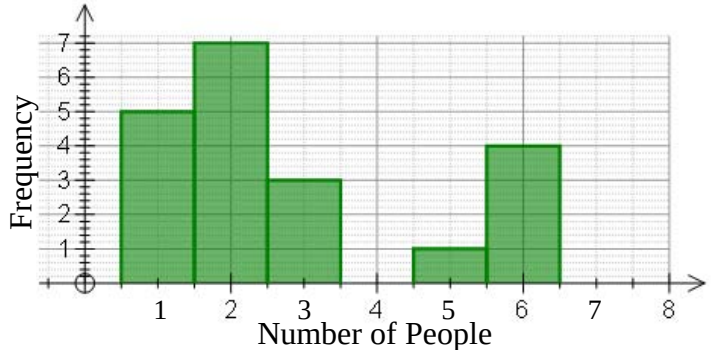
(iii) Calculate the capacity of the lake to the nearest litre. **1**

Question 27 continues on page 14

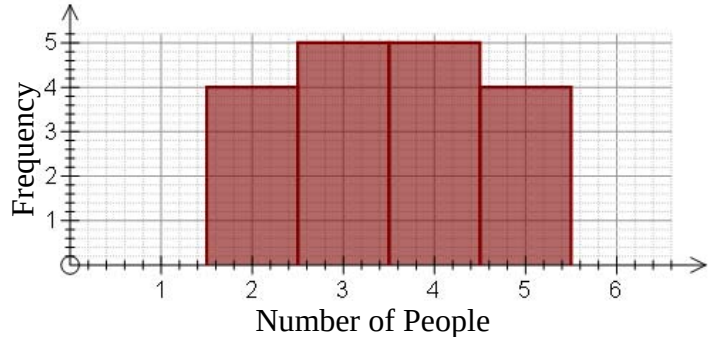
Question 27 continued **Marks**

(b) A bakery wishes to open a business. In order to find out which area they will open a store, they record the number of people living in each household. The frequency histograms and box and whisker plots show the results for two towns, Ormeau Hills and Helensvale.

Ormeau Hills:

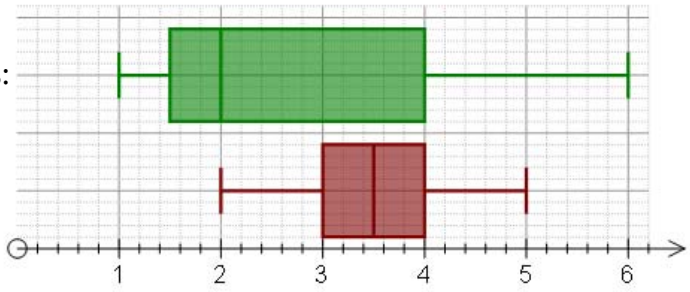


Helensvale:



Ormeau Hills:

Helensvale:



(i) Find the mean and median for the two areas. **3**

(ii) Using the above displays, compare and contrast the number of people living in the households of the two areas by examining the following:

- the shape and skewness of the distribution, and
- the measures of location and spread **4**

(iii) Use your answer to part (ii) to either support or reject the statement:

'There are more people per household in Ormeau Hills, therefore this is the area that the bakery should open a store.' **2**

End of Question 27

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

(a) The diagram shows information about the location of towns *X*, *Y*, and *Z*.

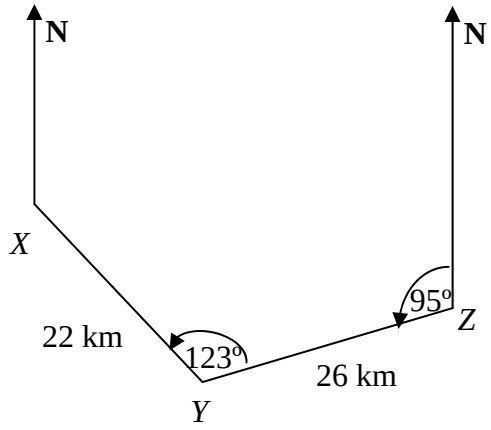


DIAGRAM
NOT TO SCALE

(i) Find the distance from Town *X* to Town *Z*.
Give your answer to the nearest km. **2**

(ii) Calculate the bearing of Town *Y* from Town *X*. **2**

(iii) These towns are represented on a map which has a scale of 3 cm : 8 km.
What will be the map distance between towns *Y* and *Z*? **1**

Question 28 continues on page 16

Question 28 continued **Marks**

(b) The diagram represents the earth with two points X and Y on the surface of the Earth.

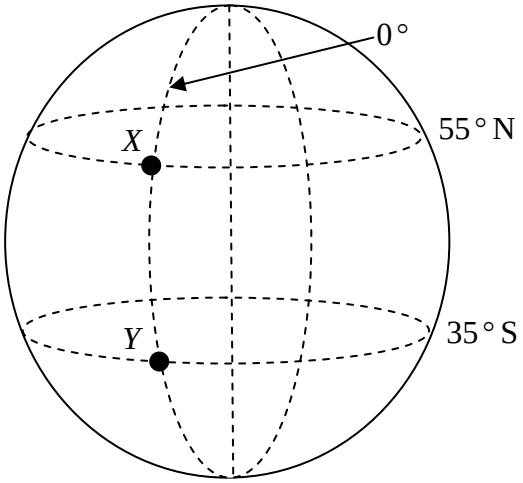


DIAGRAM
NOT TO SCALE

(i) What great circle runs through the points X and Y? **1**

(ii) Calculate the angular distance between X and Y and hence find the shortest distance between X and Y in nautical miles. **2**

(iii) Calculate the shortest distance between X and Y to the nearest kilometre. (You can assume that the radius of the Earth is 6400 km, and that 1 nautical mile = 1.852 km.) **1**

(c) A toll booth charges \$3, and will only accept \$2 coins, \$1 coins and \$0.50 coins.

(i) List all the different combinations of coins that could be used to pay the \$3 toll. **1**

(ii) Mike has four \$2 coins, six \$1 coins and three \$0.50 coins. He selects two coins at random. What is the probability that he selects exactly \$3? **2**

(iii) At the end of a day, the toll machine has a two-dollar coins, b one-dollar coins, and c fifty cent coins. Write an expression for the total value of coins in dollars in the machine. **1**

End of Examination

General Mathematics

FORMULAE SHEET

Area of an annulus

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

R = radius of outer circle

r = radius of inner circle

Area of an ellipse

$A = \pi ab$

a = length of semi-major axis

b = length of semi-minor axis

Area of a sector

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

θ = number of degrees in central angle

Arc length of a circle

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

θ = number of degrees in central angle

Simpson's rule for area approximation

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

h = distance between successive measurements

d_f = first measurement

d_m = middle measurement

d_l = last measurement

Surface area

Sphere $\quad A = 4\pi r^2$

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

r = radius

h = perpendicular height

Volume

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

Cylinder $\quad V = \pi r^2 h$

Pyramid $\quad V = \dfrac{1}{3}Ah$

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

r = radius

h = perpendicular height

A = area of base

Sine rule

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Area of a triangle

$A = \dfrac{1}{2}ab\sin C$

Cosine rule

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

or

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

FORMULAE SHEET

Simple interest

$$I = Prn$$

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

Compound interest

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

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

Future value (A) of an annuity

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

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

Present value (N) of an annuity

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

or

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

Straight-line formula for depreciation

$$S = V_0 - Dn$$

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

Declining balance formula for depreciation

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

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

Mean of a sample

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

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

$\bar{x}$ = 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

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

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:

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

Year 12 General Mathematics

Student Number : Teacher's Name :

Section I

Multiple-Choice Answer Sheet

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

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 ⬭

22

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Section I—Multiple Choice:

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

Section II—Short Answer:

Question 23:

a.

$m = 4000 \times (-2.35)^2$

$m = 4000 \times 5.5225$ ☑ (correct expansion of $(-2.35)^2$)

$m = 22090$

$= 22000\,(correct\ to\ 2\ sf)$ ☑

b. i.

$n = 4 \times 4 = 16$

$r = 6\% \div 4 = 1.5\% = 0.015$ ☑ (correct adjustment for quarterly compoundings)

$M = 900$ ☑ $(300 \times 3 = 900\ per\ quarter)$

$A = \$16139.13$ ☑

ii. \$12718.14 ☑

c. i.

$0.6 \times 15000 - 0.4 \times 8000$ ☑ entering loss as a negative

=\$5800 ☑ answer (or correct follow through with correct method)

ii. Yes, she should invest in shares as her financial expectation is a positive amount. ☑

d. i.

$n = 25 \times 12 = 300$

$r = 6.8\% \div 12 = 0.5\dot{6}\% = 0.00\dot{5}\dot{6}$ ☑(correct adjustment for monthly compoundings)

$PV = 320000$

$FV = 0$

$M\,(PMT) = \$2221.03$ ☑

ii. Total repaid: $2221.03 \times 300 = \$666309.22$ ☑

iii. Interest paid: $666309.22 - 320000 = \$346309.22$ ☑

Question 24:

a.

$\sqrt[3]{x-5} = 6$

$x - 5 = 6^3$ ☑

$x = 216 + 5$

$x = 221$ ☑

b. i.

"almost certainly" = 99.7% (within 3 standard deviations) ☑

$\therefore 171 \pm 3 \times 7 = 171 \pm 21$

$\therefore$ the height of a person will almost certainly be between 150-192cm ☑

ii. 164cm is a z-score of -1. ☑

$\therefore 50 - 34 = 16\%$ of the population is shorter than 164cm ☑

c.

$\frac{10m}{s}(\frac{60s}{1\min})(\frac{60\min}{1hr})(\frac{1km}{1000m}) = 36km/hr$ ☑☑

OR

$10m\,in\,1\sec$

$600m\,in\,1\min$

$36000m\,in\,1hr$ ☑ (converting time)

$36km\,in\,1hr$ ☑ (convertingdistance)

d.	**i.**	Taxable income: $58000 + 4600 - 8100 = \$54500$ ☑
	ii.	$4200 + 0.3(54500 - 34000)$ ☑ Tax payable: $= 4200 + 0.3(20500)$ $= \$10350$ ☑
	iii.	Yearly tax deducted from employer: $330 \times 52 = \$17160$ ☑ $\therefore$ she receives a refund of $17160 - 10350 = \$6810$ ☑

Question 25:

a. i. ${}^4C_2 = 6 \quad (or \frac{4 \times 3}{2 \times 1} = 6)$ ☑

$\therefore$ probability that Ava and Chris wrestle first $= \frac{1}{6}$ ☑

ii. $\frac{n(n-1)}{2} = \frac{n^2 - n}{2}$ ☑

b. i.

	Test Results		
	Positive	Negative	Total
Number with disease	25	13	38 ☑
Number without disease	17	95	112 ☑
Total	42	108	150

ii. 25+95 = 120 people ☑

iii. 150-120 = 30 people
$\frac{30}{150} \times 100 = 20\%$ ☑

iv. $\frac{17}{112}$ ☑

c. i. Maths: mean = 73.9; sample standard deviation = 13.9 ☑
History: mean = 79.1; sample standard deviation = 9.1 ☑

ii. $73.9 - (2 \times 13.9) = 46$ (correct to the nearest whole number) ☑

iii. Maths z-score: $\frac{86 - 73.9}{13.9} = 0.8705...$ History z-score: $\frac{87 - 79.1}{9.1} = 0.8681...$
☑ z-score calculations
She did slightly better in Mathematics as her z-score in that subject was higher. ☑

Question 26

a. Area of sector $AED = \frac{130}{360}\pi \times 10^2 = 113.4464...cm^2$ ☑

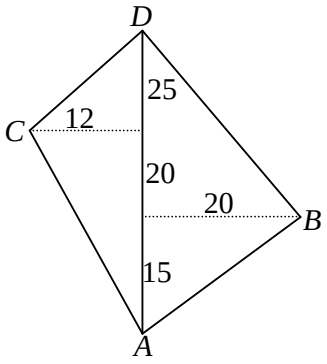
Area of sector $ABC = \frac{130}{360}\pi \times 60^2 = 4084.070...cm^2$

Area of $BCDE$ = 4084.070...—113.4464... = 3971cm^2 (correct to the nearest cm^2) ☑

b. Possible even 5-digit numbers: $4 \times 3 \times 2 \times 1 \times 1 = 24$ ☑

Total possible 5-digit numbers: $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

Probability of choosing an even 5-digit number = $\frac{24}{120} = \frac{1}{5} = 0.2 = 20\%$ ☑

c.	**i.**	
	ii.	$CD^2 = 12^2 + 25^2$ $CD^2 = 769$ ☑ $CD = \sqrt{769} = 27.7m$
	iii.	$\frac{1}{2} \times 60 \times 12 + \frac{1}{2} \times 60 \times 20$ ☑ $= 960\,m^2$ ☑
d.	**i.**	$\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$ ☑
	ii.	P(both dice show a 4) = $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ P(only one 4) = $2 \times \frac{1}{6} \times \frac{5}{6} = \frac{10}{36} = \frac{5}{18}$ ☑ (calculation of probabilities) P(neither shows a 4) = $\frac{25}{36}$ Financial expectation = $15 \times \frac{1}{16} + 3 \times \frac{5}{18} + 0 \times \frac{25}{36} - 1$ ☑ (taking into account the \$1 cost) = \$0.25 ☑

Question 27		
a.	**i.**	$A = \frac{20}{3}(0 + 4(10.4) + 5.1)$ ☑ $+ \frac{20}{3}(5.1 + 4(7.3) + 0)$ $A = 311\frac{1}{3} + 228\frac{2}{3}$ $A = 540m^2$ ☑
	ii.	$540 \times 95 = 51300m^3$ ☑
	iii.	51 300 000 L ☑
b.	**i.**	Ormeau Hills mean: $\frac{(1\times5)+(2\times7)+(3\times3)+(5\times1)+(6\times4)}{5+7+3+1+4} = \frac{57}{20} = 2.85$ ☑ Helensvale mean: $\frac{(2\times4)+(3\times5)+(4\times5)+(5\times4)}{4+5+5+4} = \frac{63}{18} = 3.5$ ☑ Ormeau Hills median: 2; Helensvale median: 3.5 ☑

ii.

	Ormeau Hills	Helensvale
Shape	Positive Skew	Symmetrical
Location	Mean=2.85 Median=2	Mean=3.5 Median=3.5
Spread	IQR=2.5 Range=5	IQR=1 Range=3

☑ for stating the numerical values

- While Ormeau Hills has a positive skew, Helensvale's distribution is symmetrical. ☑
- Looking at both mean and median, Helensvale has a higher average amount of people per household than Ormeau Hills. ☑
- Looking at both IQR and range, Helensvale has smaller values, meaning its values are more **consistent** than Ormeau Hills. ☑

iii. Even though Ormeau Hills has the highest value (6), its mean and median are smaller than Helensvale's. Also, Helensvale's values are more consistent. ☑
So no, they should not open the bakery in Ormeau Hills. ☑

Question 28

a. i.
$XZ^2 = 22^2 + 26^2 - 2 \times 22 \times 26 \times \cos 123°$ ☑
$XZ^2 = 1783.067...$
$XZ = \sqrt{1783.067...}$
$XZ = 42km$ (correct to the nearest km) ☑

ii. Draw in the North line at Town *Y*.
$\angle NZY = 95°, \therefore \angle NYZ = 180 - 95 = 85°$ (co-interior angles) ☑
$\therefore \angle NYX = 123 - 85 = 38°$
$\therefore \angle NXY = 180 - 38 = 142°$ (co-interior angles)
$\therefore$ *The bearing of Y from X is* $142°$. ☑

iii.
$\frac{3}{8} = \frac{x}{26}$
$x = (3 \times 26) \div 8 = 9.75cm$ ☑ (must have correct units)

b. i. The Greenwich (Prime) Meridian ☑

ii.
$35 + 55 = 90°$ ☑
$90 \times 60 = 5400M$ ☑

iii. $5400 \times 1.852 = 10\,000.8km$ ☑

c. i.
$2 + $1
$2 + $0.50 + $0.50
$1 + $1 + $1
$1 + $1 + $0.50 + $0.50
$1 + $0.50 + $0.50 + $0.50 + $0.50
$0.50 + $0.50 + $0.50 + $0.50 + $0.50 + $0.50 ☑ All 6 combinations

ii. Using a tree diagram (either choosing $2 first, then $1, or choosing $1 first, then $2):
$\frac{4}{13} \times \frac{6}{12} + \frac{6}{13} \times \frac{4}{12} = \frac{4}{13}$ ☑ (for realising this combination); ☑ (for doing both ways)

iii. $2a + b + 0.5c$ ☑