THE SCOTS COLLEGE
Sydney

2008
TRIAL H.S.C.
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
- Use the Multiple Choice Answer Sheet provided
- Use graph paper provided for Question 25 (a) and Question 27
- A separate formula sheet is provided
- All necessary working should be shown in every question

Total marks – 100
Section I
- Total marks 22
- Attempt Questions 1-22
- Allow about 30 minutes for this section

Section II
- Total marks 78
- Attempt Questions 23-28
- Allow about 2 hours for this section

STUDENTS ARE ADVISED THAT THIS IS A TRIAL EXAMINATION ONLY AND CANNOT IN ANY WAY GUARANTEE THE CONTENT OR THE FORMAT OF THE HIGHER SCHOOL CERTIFICATE EXAMINATION.

Section 1
Total Marks (22)
Attempt questions 1-22
Allow about 30 minutes for this section

Select the alternatives A, B, C or D that best answers the question and indicate your choice with a cross (X) in the appropriate space on the **Section 1 answer sheet attached.**

1. The number 134.535 correct to two significant figures is:

A) 134.54 B) 134 C) 130 D) 135

2. The scores 95, 38, 54, 72, 77, 56, 28, 48, 60, 62 have a mean of 59 and a standard deviation of 18.3. How many of these scores are more than one standard deviation away from the mean?

A) 1 B) 2 C) 3 D) 5

3. The base length l of a square pyramid of volume V and perpendicular height h is given by

$$l = \sqrt{\frac{3V}{h}}$$

Find l, correct to 1 decimal place, if $V = 652$ and $h = 7.8$.

A) 5.7 B) 700.4 C) 15.8 D) 250.8

4. A tap is dripping water at a rate of 90 drops per minute. Each drop is $0.3mL$. How many litres drip from the tap every day?

A) 1.62 B) 19.44 C) 38.88 D) 432

5. The maximum speed of a train going up a hill is inversely proportional to the square root of its weight. A train weighing 3600 tonnes can go up a hill at 30km/h.
What is the maximum speed at which a train weighing 2500 tonnes could go up the same hill?

A) 43.2km/h B) 36km/h C) 25km/h D) 20.8km/h

6. There are twenty-seven times as many cars in Australia as motorcycles. C stands for the number of cars and M for the number of motorcycles.
Which equation correctly describes the relationship between the numbers of cars and motorcycles?

A) $M = 27C$ B) $C = \frac{27}{M}$ C) $C = 27M$ D) $M = 27 + C$

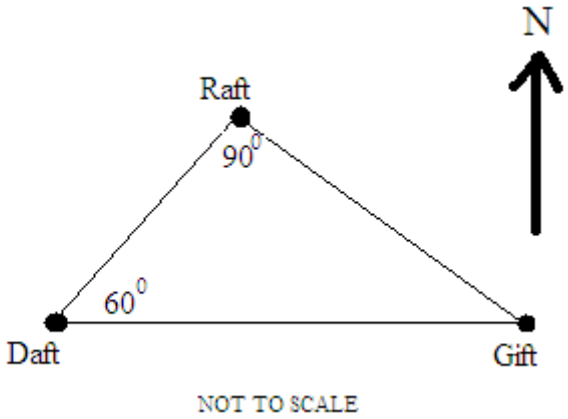
7. Simplify fully $4(2x-1)-3(x-3)$.

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

8. Given that $E = mc^2$, find c if $m = 0.05$ and $E = 4.5\times10^{15}$.

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

9. Three towns, Daft, Gift and Raft, are situated as shown in the diagram. Gift is due east of Daft.



The bearing of Gift from Raft is:

A) 030^0 B) 120^0 C) 150^0 D) 300^0

10. Molly's car uses 8 litres of petrol to travel 100 km. Petrol costs $1.69 per litre. How far can she drive using $60 worth of petrol, to the nearest kilometre?

A) 444 km B) 284 km C) 128 km D) 345 km

11. Three students have an average mass of 46 kg. A fourth student with a mass of 66 kg joins the group. What is the average mass of the four students?

A) 48 kg B) 51 kg C) 56 kg D) 62 kg

12. The range of values for a measurement of 13.6 cm is:

A) 13-14 cm B) 13.6-14.6 cm C) 13.5-13.7 cm D) 13.55-13.65 cm

13. If 3 is added to each score in a set, which one of the following statements will be true?

A) The mean and standard deviation will remain the same.

B) The mean will increase by 3 and the standard deviation will remain the same.

C) The mean will increase by 3 and the standard deviation will increase by $\sqrt{3}$.

D) The mean will increase by 3 and the standard deviation will increase by 3.

14. This table shows monthly repayments for various amounts borrowed and different annual interest rates for a term of 20 years.

	Monthly repayment			
Amount borrowed	5% pa	6% pa	7% pa	8% pa
\$10 000	\$66.00	\$71.64	\$77.53	\$83.64
\$15 000	\$98.99	\$107.46	\$116.29	\$125.47
\$20 000	\$131.99	\$143.29	\$155.06	\$167.29
\$25 000	\$164.99	\$179.11	\$193.82	\$209.11

The total interest paid over the term of a loan of \$25 000 at 7% pa is:

A) \$23 758.56 B) \$21 516.80 C) \$27 325.84 D) \$46 516.80

15. Three mathematics classes did the same assessment task. The mean marks for the three classes were 60, 75 and 76.5. The number of students in the classes were 22, 18 and 20 respectively. What was the mean mark for all students on this assessment task?

A) 70.5 B) 45.25 C) 70 D) 75

16. Vietnam has an area of approximately 330 000 km^2 and a population in 1996 of approximately 74 million. Australia has an area of approximately 7 680 000 km^2 and in 1996 a population of about 18 million. The population density (ie number of people per square kilometre) of Vietnam is greater than that of Australia in 1996 by approximately

A) 4 times B) 25 times C) 100 times D) 200 times

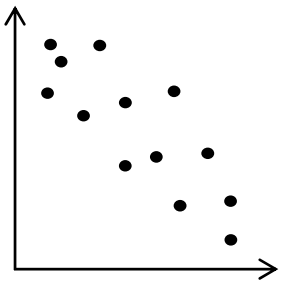
17. For a loan of $20 000 a deposit of $1600 is made and payments of $564 per month are paid for 4 years.

The total repaid is

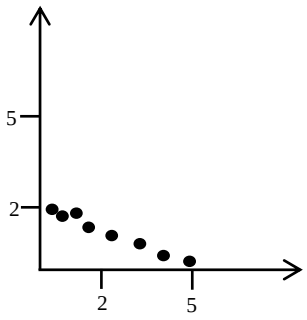
A) $2256 B) $3856 C) $27 072 D) $28 672

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

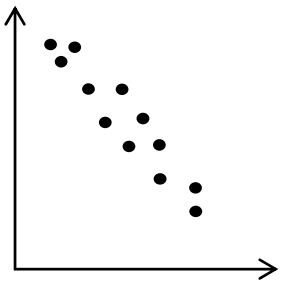
A)



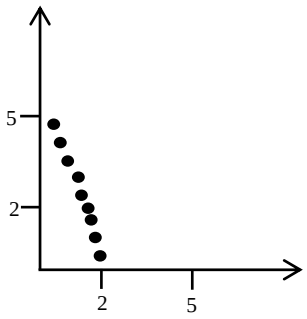
B)



C)



D)



19. Jonathan scored 78 in a maths test. The maths test had a mean of 62 and a standard deviation of 8. A recent English test had a mean of 58 and a standard deviation of 11.

What mark in the English test would have been equivalent to Jonathan's maths mark?

A) 74 B) 76 C) 78 D) 80

20. In a distribution the mean is 42 and the standard deviation is 8. When a score of 52 is converted to a Z score, the result is?

A) -1.25 B) -1.1 C) 1.1 D) 1.25

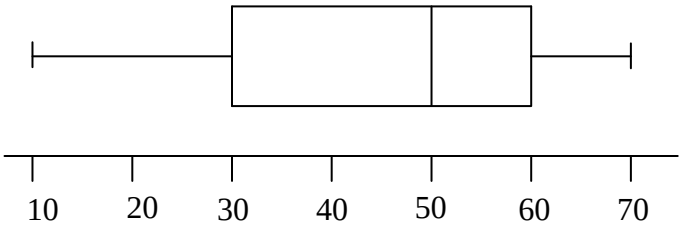
21. The median and interquartile range of the Box and Whisker plot are?

(A) 50 and 6

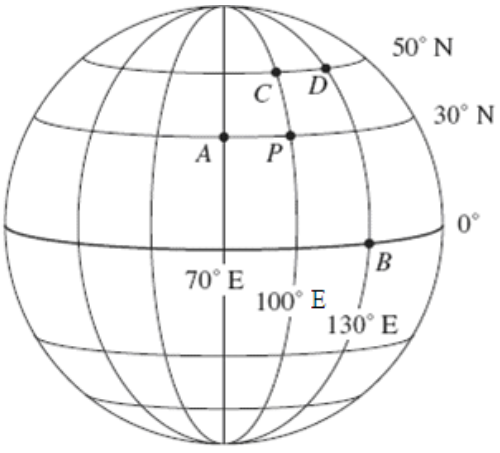
(B) 50 and 30

(C) 50 and 40

(D) 30 and 60



22. It is 9am at *P* (30^0N, 100^0E). At which other location (A, B, C or D) is it also 9am?



NOT TO SCALE

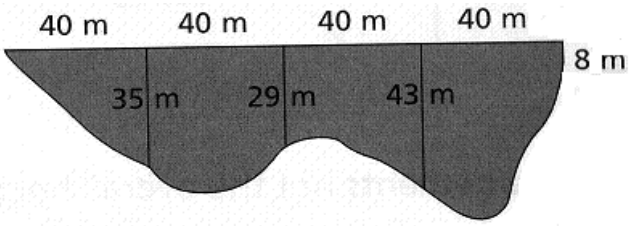
A) A (30^0N, 70^0E) B) B (0^0N, 130^0E)
C) C (50^0N, 100^0E) D) D (50^0N, 130^0E)

End of Section 1

Section 2
Total marks (78)
Attempt all questions 23-28
Allow approximately 2 hours for this section
Start a new page for each question.

Question 23 Start a new writing booklet (13 marks)

a) The diagram below shows a vertical cross-section of an artificial lake which is 250 metres long.



i) Use 2 applications of Simpson's Rule to approximate the area of the cross-section. (2)

ii) Find the approximate volume of water in the lake, in kilolitres, if it has the same cross-section for the whole of its length.

(1)

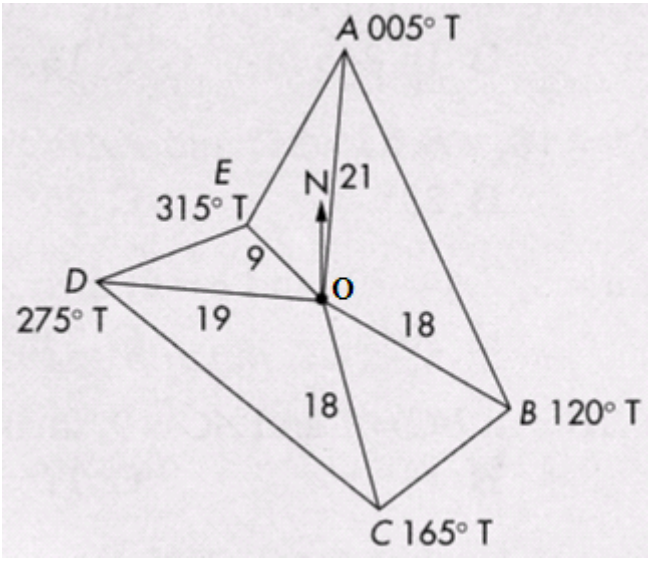
b) A flat rectangular roof is 25 metres long and 10 metres wide.

i) What is the area of the roof? (1)

ii) In a particular shower, 10 mm of rain falls. Find the volume of water that falls onto the roof, in litres. (2)

iii) The water is collected in a cylindrical tank of radius 1.8 m. Before the rain fell the depth of water in the tank was 90 cm. Find the depth of water in the tank after the rainwater has been added. Give the answer to the nearest centimetre. (3)

c) The diagram shown was produced using the compass radial survey method. All lengths are measured in metres.



i) Find the area of the triangular field ABO, correct to one decimal place. (2)

ii) The fence CD is broken. How many metres of wire would need to be purchased to replace this fence, assuming it is a single strand fence? Answer to the nearest metre. (2)

Question 24 Start a new writing booklet (13 marks)

a) Tom has a credit card which has no interest free period and charges an annual interest rate of 15.85%.

i) Find the amount of interest charged on a purchase of $210.60 if the full debt is repaid 21 days later. (2)

ii) What percentage, correct to one decimal place, of the total price paid (cost plus interest) is the interest? (1)

b) Use the compound interest formula to calculate the interest, to the nearest dollar, of $30 000 invested for 5 years at an interest rate of 12% per annum. (2)

c) The Balmain Bowling Club wish to accumulate $75 000 in 10 years time in order to refurbish the clubhouse. The club establishes a sinking fund with quarterly contributions paid into a savings account paying 5.6% per annum compounding quarterly. Calculate the amount of the quarterly contribution, to the nearest dollar. (3)

d) Determine the single amount, to the nearest dollar, to be invested at 4.8% per annum compounded monthly in order to provide for a series of monthly payments of $750 for 20 years (3)

e) Use the table below of present value interest factors of an ordinary annuity to find the present value required to pay $800 per month for 10 months, deposited at 12%pa compounded monthly. Give the amount to the nearest dollar. (2)

Periods n	Interest rate per period									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684
8	7.6517	7.3255	7.0197	6.7327	X	6.2098	5.9713	5.7466	5.5348	5.3349
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446

Question 25 Start a new writing booklet (13 marks)

a) Jake has collected data, displayed in the table below, about the height and weight of 9 adults.

Height (cm)	150	155	160	165	170	175	180	185	190
Weight (kg)	50	70	60	55	50	70	70	80	90

i) Using a ruler and pencil, plot the points on the graph paper provided for Question 25. (1)

ii) Construct the median regression line for this data. (2)

iii) Calculate the equation of the median regression line for the data. (2)

iv) Use this model to predict the height of a person who weighs 85 kg. (1)

b) While waiting in a carpark, Alison notices that some of the cars entering the carpark have headlights on. For each car, Alison notes whether or not the lights are on, and whether the driver is male or female.

Her results are presented in the two-way table below.

	Headlights on	Headlights off	Total
Male drivers	10	43	53
Female drivers	8	62	70
Total	18	105	

i) How many cars are included in this data? (1)

ii) What fraction of the cars had female drivers? (1)

iii) Of the cars driven by women, what fraction has headlights on? (1)

c) A data set is known to follow a normal distribution with a mean of 42 and a standard deviation of $\sqrt{17}$. Find the *z*-score, to three decimal places, that corresponds to 53. (1)

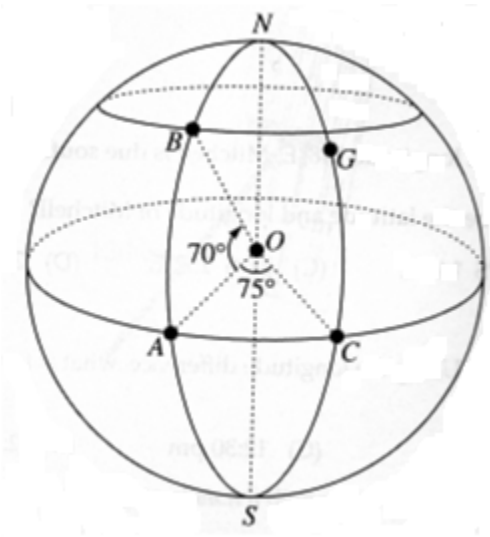
d) Two golfers, Bill and Ben, play a round of golf. Bill scores 70 while Ben scores 75. If Bill's scores follow a normal distribution with a mean of 72 and a standard deviation of 2 and Ben's scores follow a normal distribution with a mean of 80 and a standard deviation of 3, find:

i) whom has done better on the day compared to their usual performance. Justify your answer (2)

ii) the score Ben would need to have a comparative performance equal to Bill's 70. (1)

Question 26 Start a new writing booklet (13 marks)

a) In the diagram of the Earth, O represents the centre and G represents Greenwich. The point A lies on the equator.



i) What are the coordinates of point B? (1)

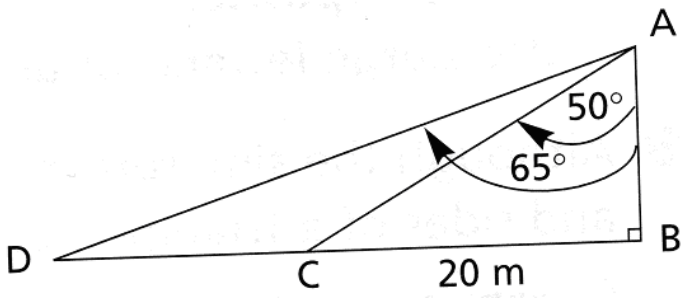
ii) Calculate the shortest distance, to the nearest kilometre, between points A and B given that 1 nautical mile = 1.852 km. (2)

iii) What is the time difference between Greenwich and point B? (1)

b) The approximate coordinates of Tokyo are (36^0N, 140^0E), while San Francisco is at approximately (36^0N, 102^0W).

An aeroplane takes 8 hours to fly between Tokyo and San Francisco. If the plane leaves Tokyo at 10.00pm on Saturday, Tokyo time, what day and time will it arrive in San Francisco? (2)

c) Two ropes are attached to a tree at point A, forming angles of 50^0 and 65^0 with the vertical, and to pegs in the ground C and D, as shown in the diagram below. C is 20m from the base of the tree, B.



i) Draw a diagram in your answer booklet, showing the size of all angles. (1)

ii) Find the length of the shorter rope, to three significant figures. (2)

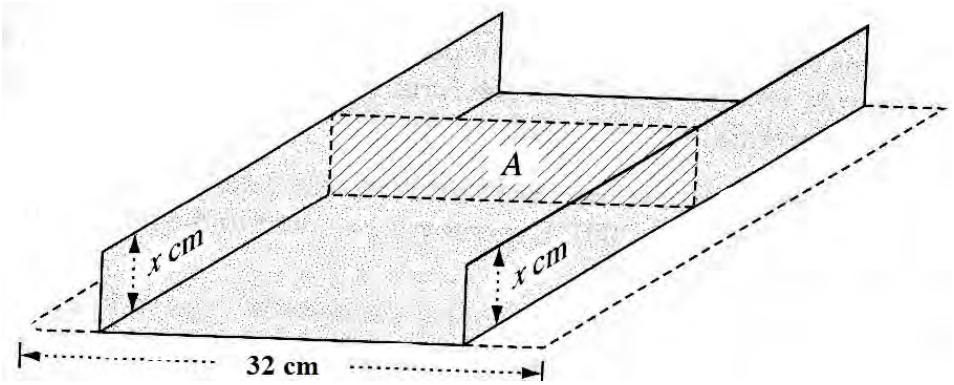
iii) Find the length of the longer rope, to three significant figures. (2)

iv) Find the distance between the two pegs, C and D, to three significant figures. (2)

Question 27 Start a new writing booklet (13 marks)

a) Make L the subject of the equation $T = 2\pi L^2$ (2)

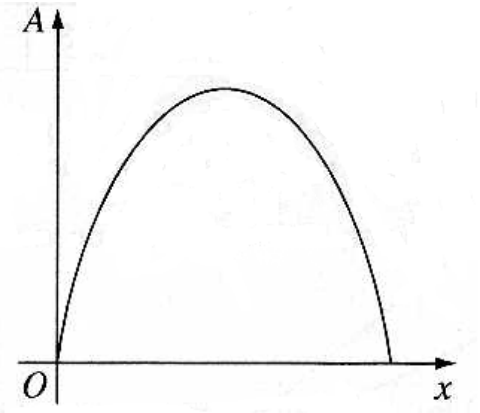
b) A long rectangular sheet of metal 32 cm wide is to be made into a gutter by turning up sides of equal height x cm, perpendicular to the base.



i) Show that a formula for the cross sectional area, A, of the gutter is $A = 32x - 2x^2$ (1)

ii) Explain why the formula in part (i) is only valid for values of x between 0 and 16. (1)

iii) The graph of A against x, for values of x between 0 and 16, is a parabola as shown.



What is the maximum value of A? (2)

c) Tiffany is on holiday in Mexico and she plans to buy some silver jewellery. Various silver necklaces are on sale. The cost varies directly as the square of the length of the pendant.
A pendant of length 30 mm costs $130.
How much does a pendant of length 40 mm cost? (answer to the nearest dollar) (2)

d) The volume (V m^3) of a series of similar-shaped grain storage silos can be modeled by the formula $V = 0.6h^3$, where h is the height of the silo in metres.

i) Copy and complete the table below into your answer booklet. On the graph paper provided for Question 27, construct the graph of $V = 0.6h^3$ (3)

h	0	0.5	1	1.5	2	2.5	3
V							

ii) Cameron wants to install a grain silo with a volume of 3 m^3 on his farm. Use your graph to determine the height of the silo Cameron will need to order. (1)

iii) Cameron thought that if he doubled the height of his grain silo it would have twice the volume. Is he correct? Write a sentence to explain your answer. (1)

Question 28 Start a new writing booklet (13 marks)

a) There are two bags each containing a red, blue, yellow and green marble. One marble is chosen at random from each bag. Draw a tree diagram and write the sample space. (2)

b) In a cricket team of 11 players, a captain and a vice captain are to be chosen. All players have equal chance of selection. In how many ways can this be done? (2)

c) The purchase price of a boat is $25 000. The value of the boat depreciates by 10%pa. Calculate the salvage price of the boat after 8 years, to the nearest dollar. (2)

d) A plumber purchases equipment for a total of $60 000. The value of the equipment is depreciated by $8 000 per year. When the value of the equipment falls below $10 000 it should be replaced. Calculate the number of years after which the equipment should be replaced. (2)

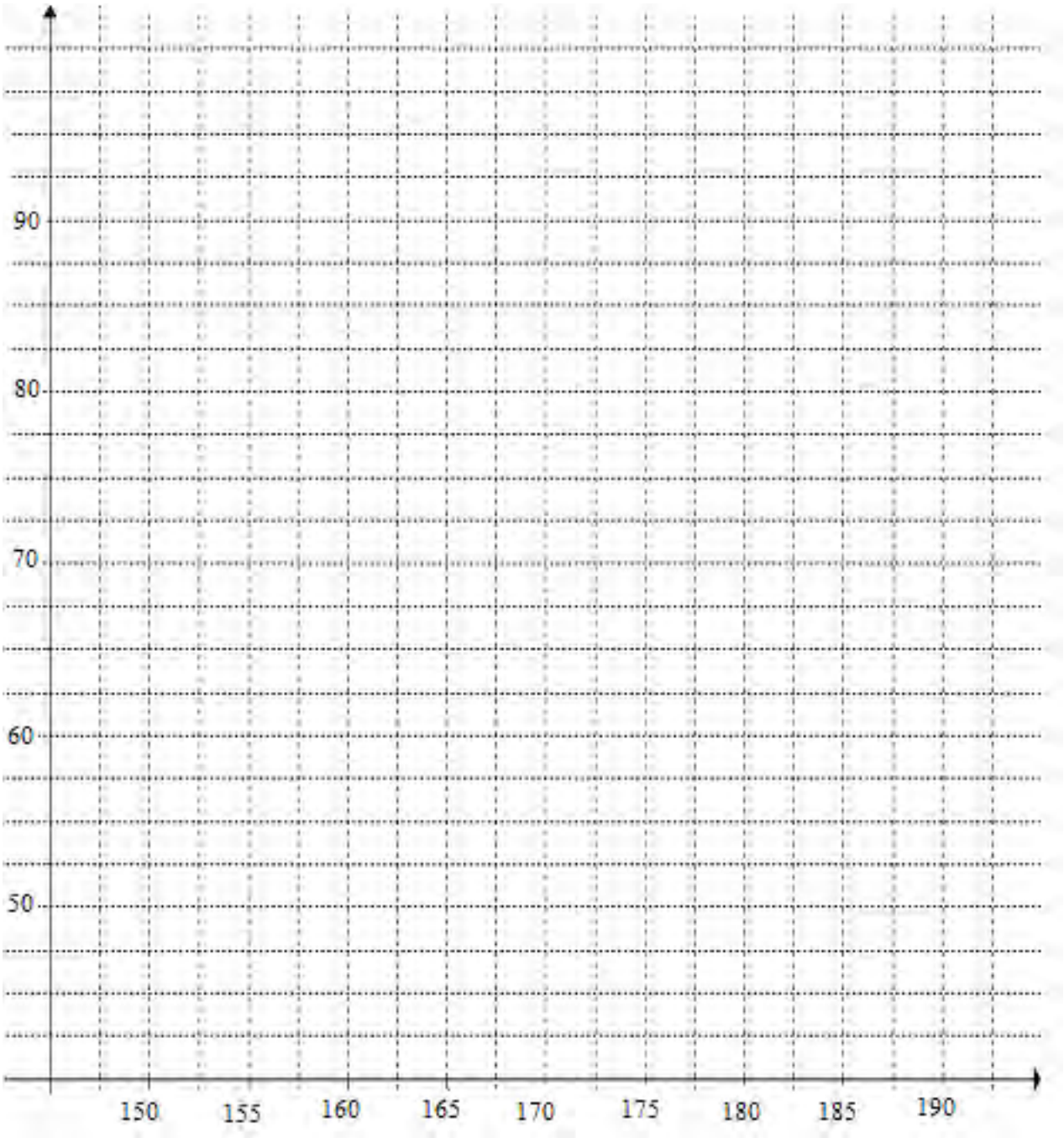
e) A commemorative cricket ball has a diameter of 7 cm. It is to be housed in a cubic case that will allow 5 mm on each side of the ball.

i) What will the side length of the cubic case be? (1)

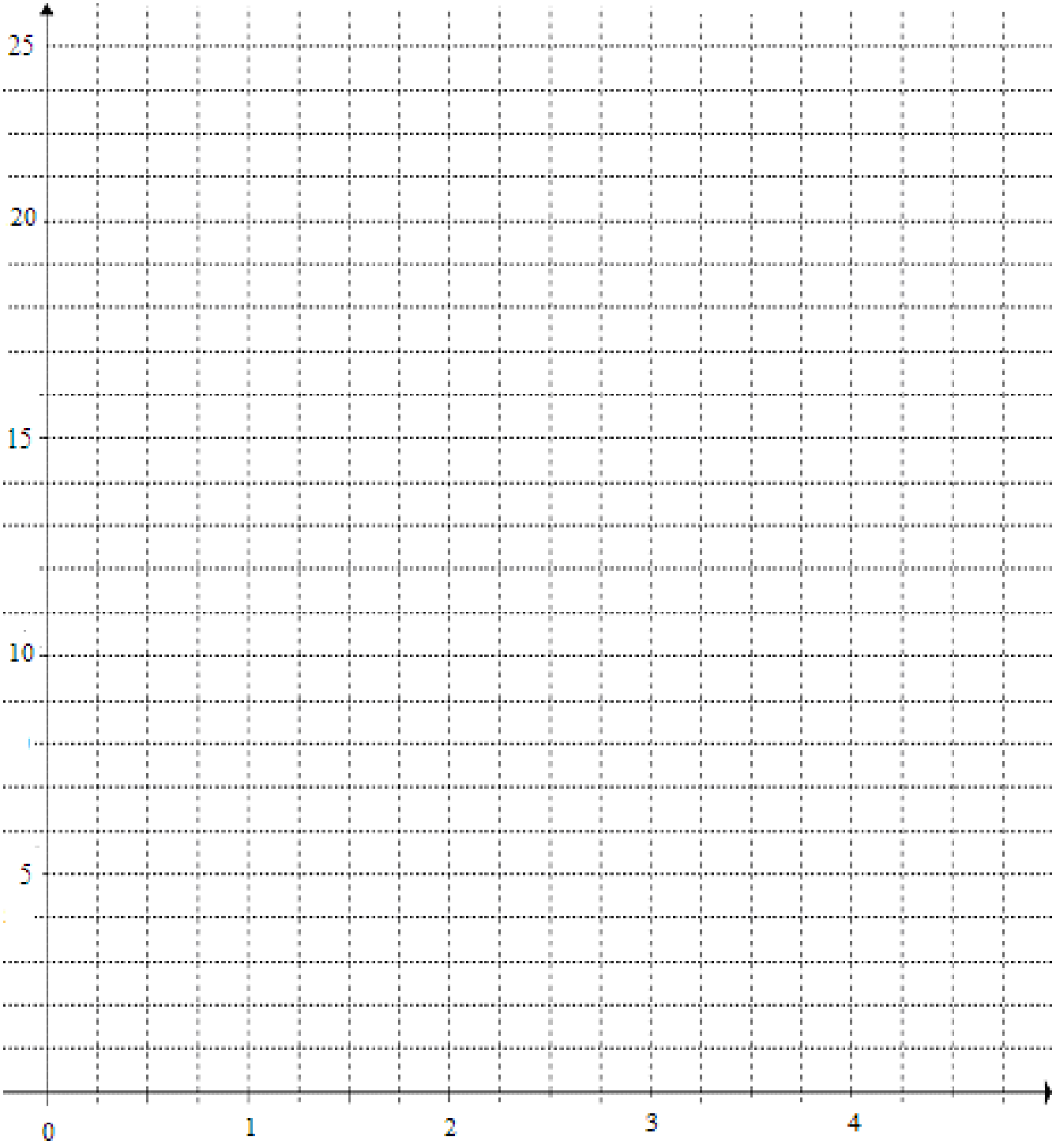
ii) Calculate the amount of empty space inside the case, to the nearest whole number. (3)

iii) Calculate the percentage of space inside the case occupied by the ball, to the nearest whole number. (1)

Question 25 (a) Graph Paper Student Number:_____



Question 27 Graph Paper Student Number:_____



Corrections

SECTION 1 - MULTIPLE CHOICE ANSWER SHEET

TOTAL MARKS (22)

ATTEMPT QUESTIONS 1 – 22

ALLOW ABOUT 30 MINUTES FOR THIS PART

STUDENT NUMBER _____

SECTION I
MULTIPLE-CHOICE ANSWER SHEET

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 ○

STUDENTS SHOULD NOW CONTINUE WITH SECTION II

Question 23

a) i) $A_1 = \frac{h}{3}\{d_F + 4d_m + d_L\}$

$= \frac{40}{3}\{0 + 4\times 35 + 29\}$

$= \frac{40}{3}\{169\}$ ①

$= \frac{6760}{3}$

$A_2 = \frac{40}{3}\{29 + 4\times 43 + 8\}$

$= \frac{40}{3}\{209\}$

$= \frac{8360}{3}$ ①

Total $A = \frac{15120}{3} = 5040\,m^2$

ii) $V = A \times h$

$= 5040 \times 250$

$= 1260000\,m^3$ ①

as $1m^3 = 1000L$ or $1kL$

$= 1260000\,kL$

b) i) $A = l \times b$

$= 25 \times 10$ ①

$= 250\,m^2$

ii) $V = A \times h$ $(10mm = 0.01m)$

$= 250 \times 0.01$

$= 2.5\,m^3$ ①

as $1m^3 = 1000L$

$= 2500L$ ①

iii) 

$V = \pi r^2 h$

$2.5 = \pi \times 1.8^2 \times h$ ①

$\frac{2.5}{(\pi \times 1.8^2)} = h$

$h = 0.2456...m$

$= 24.56cm$

$= 25cm$ ①

$\therefore$ height $= 90 + 25$

$= 115\,cm.$ ①

c) i) $A = \frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 21 \times 18 \times \sin 115^\circ$ ①

$= 171.29\,m^2$

$= 171.3m^2$ (to 1dp) ①

ii) Angle $= 275 - 165$

$= 110^\circ$ ①

$a^2 = b^2 + c^2 - 2bc\cos A$

$= 19^2 + 18^2 - 2\times 19 \times 18 \times \cos 110^\circ$

$= 918.9...$

$a = \sqrt{918.9...}$ ①

$= 30.3...$ $= 30m^2$ (nearest m^2)

Question 24

a) i) $I = PRN$

$= 210.60 \times \frac{15.85}{100} \times \frac{21}{365}$ (1)

$= \$1.92$ (1)

ii) Total paid = $210.60 + 1.92$

$\$212.52$

$\% = \frac{1.92}{212.52} \times 100$ (1)

$= 0.9\%$

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

$= 30\,000\,(1+0.12)^5$

$= \$52\,870.25$ (1)

$\therefore$ Interest $= 52\,870.25 - 30\,000$

$= \$22,870.25$

$= \$22,870$ (nearest $).

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

$r = 5.6 \div 4$

$= 1.4\%$ pq

$= 0.014$ (½)

$n = 10 \times 4$

$= 40$ (½)

$A = 75000$

$75\,000 = m\left\{\frac{(1+0.014)^{14} - 1}{0.014}\right\}$ (1)

$75\,000 = m \times 53.1347\ldots$

$m = \frac{75\,000}{53.1347\ldots}$

$m = 1411.51$ (1)

$= \$1412$ (nearest $)

d) $r = 4.8\%$ pq

$= 0.4\%$ pm

$= 0.004$

$n = 20 \times 12$ (1)

$= 240$ mths

$m = 750$

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

$N = 750\left\{\frac{(1+0.004)^{240} - 1}{0.004(1+0.004)^{240}}\right\}$ (1)

$= 750 \times 154.093\ldots$

$= 115569.97$ (1)

$= \$115\,570$ (nearest $)

e) 12% pa $\div 12$

$= 1\%$ pm.

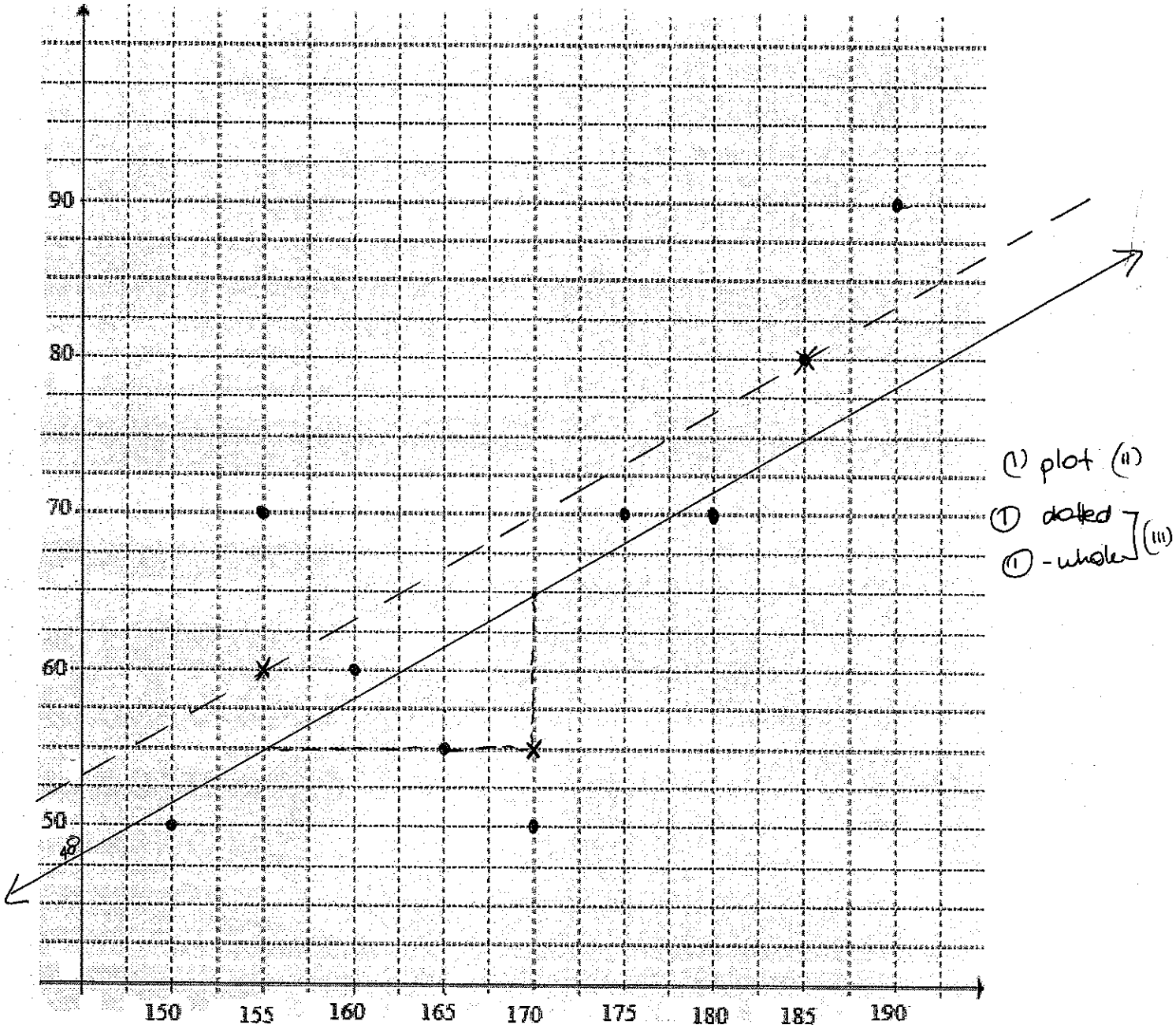
$n = 10$

9.4713 (1) $\times 800$

$= \$7577.04$

$= \$7577$ (nearest $) (1)

Question 25 (a) Graph Paper Student Number:_____



Question 25

a) iii) $m = \frac{rise}{run}$ $\quad b = 48$ (½)

$= \frac{20}{15}$ $\quad y = \frac{4}{3}x + 48$

$= \frac{4}{3}$ (1) $\quad$ weight $= \frac{4}{3} \times$ height $+ 48$ (½)

(iv) $85 = \frac{4}{3} \times h + 48$

$37 \times \frac{3}{4} = h$

$h = 27.75$ cm. (1)

(b) (i) $53 + 70 = 123$ (1)

(ii) $\frac{70}{123}$ (1)

(iii) $\frac{8}{70} = \frac{4}{35}$ (1)

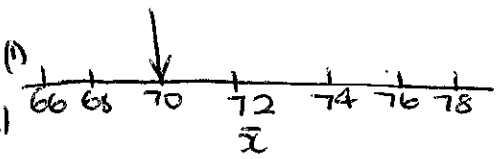
(c) z score $= \frac{53 - 42}{\sqrt{17}}$

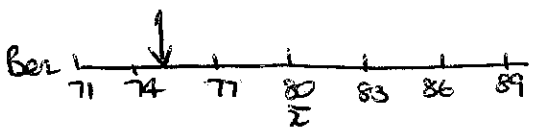
$= \frac{11}{\sqrt{17}}$

$= 2.66789...$ (1)

$= 2.668$ (to 3dp).

(d) (i)





Ben (1) scored better a day - only < 1σ_n below mean whereas Bill was only 1σ_n below mean. & lower the score the better. (1)

(ii) Ben = 77 (ie 1σ_n below mean).

Question 26

a) i) $(70°N, 75°W)$ ①

ii) Angle difference $= 70°$

$1° = 60$ nmiles $= 60 \times 70$

$= 4200$ nmiles ①

$(\times 1.852)$ $= 7778.4$ km

$= 7778$ km. ①

iii) $75°$ – angle difference

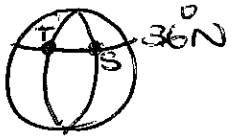
$1° = 4$ minutes

Time difference $= 75 \times 4$

$= 300$ minutes

$= 5$ hrs ①

Point B is 5 hrs behind Greenwich.

b) 

Angle difference $= 40 + 78$

$= 118°$

Time difference $= 118 \times 4$

$= 472$ mins ①

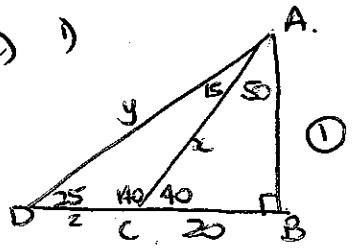
$= 7$ hrs 52 mins

T 10pm Sat. – 8 hrs

⇒ 6pm Sat + 7h52m

$= 1$pm 52

$= 1$:52 pm ①

c) i) 

①

ii) $\cos 40° = \frac{20}{x}$ ①

$x = \frac{20}{\cos 40°}$

$= 26.1$ m. (3 sig fig) ①

iii) $\frac{y}{\sin 140°} = \frac{26.1...}{\sin 25°}$

$y = \frac{(\sin 140°) \times 26.1...}{\sin 25°}$

$= 39.7$ m (3 sig fig)

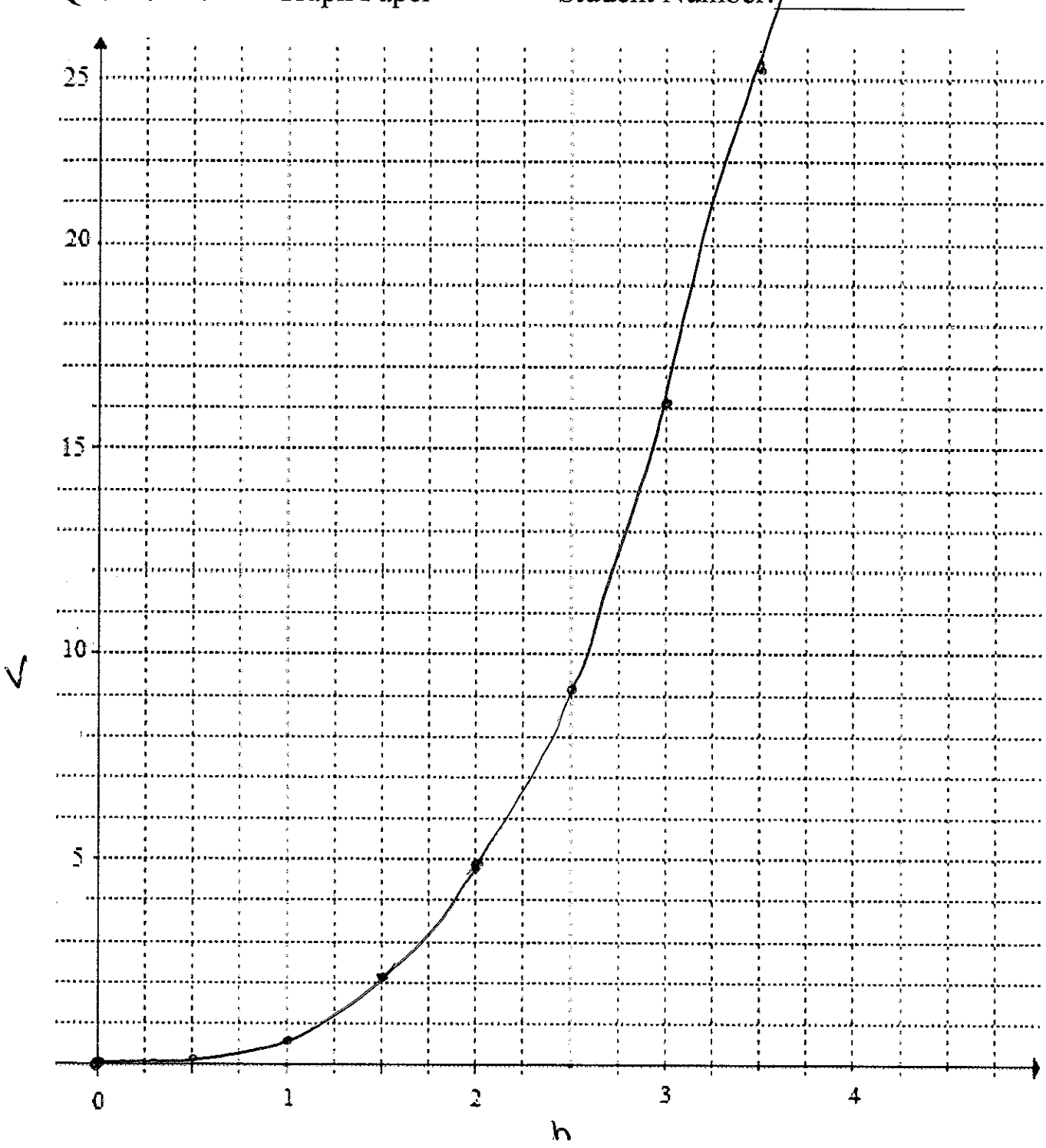
iv) $\frac{z}{\sin 15°} = \frac{39.7...}{\sin 140°}$

$z = \frac{39.7... \times \sin 15°}{\sin 140°}$ ①

$= 15.989...$

$= 16.0$ m (to 3 sig figs). ①

Question 27 Graph Paper Student Number: _____



Question 27

a) $T = 2\pi L^2$

$\frac{T}{2\pi} = L^2$ ①

$L = \sqrt{\frac{T}{2\pi}}$ ①

b) i) length $= 32 - 2x$. (½)

height $= x$

$A = l \times b$

$= x(32 - 2x)$ (½)

$= 32x - 2x^2$

ii) < 0 gives A negative

> 16 gives A negative ①

A cannot be negative.

iii) max value occurs when $x = 8$ ①

$A = 32 \times 8 - 2 \times 8^2$

max $A = 128\ cm^2$ ①

c) i) $C \propto L^2$

$C = k \times L^2$ where k is constant variation

$130 = k \times 30^2$

$k = \frac{130}{900}$ ①

$= \frac{13}{90}$

$C = \frac{13}{90} \times L^2$

$= \frac{13}{90} \times 40^2$

$= 231.111\ldots$

$= \$231$ (nearest $) ①

d) i) $V = 0.6h^3$

h	0	0.5	1	1.5	2	2.5	3
V	0	0.075	0.6	2.025	4.8	9.375	16.2

① ② - graph.

ii) $3 = 0.6 \times h^3$

$h = \sqrt[3]{\frac{3}{0.6}}$ ①

$\doteq 1.7$ m. (from their graph)

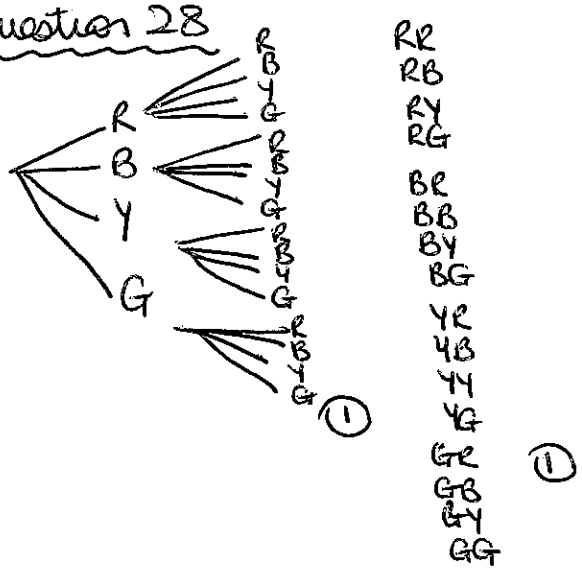
iii) $V = 0.6 \times (2h)^3$

$= 8 \times (0.6h^3)$

No ① it would increase the volume 8 times. (½)

Question 28

a)



① ⑪

b) ① ① $11 \times 10 = 110$ ways

c) $A = 25000(1-0.1)^8$ ①

$= 10\,761.60$

$= \$10\,762$ ①

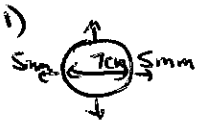
d) $10000 = 60000 - 8000n$ ①

$-50\,000 = -8000n$

$n = 6.25$ yrs ①

∴ after $6\frac{1}{4}$ yrs should be replaced.

e) i)



$7cm + 5mm + 5mm$

$= 8cm.$ ①

ii) $V_{sphere} = \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 3.5^3$ ①

$= 179.59\ldots m^3$

$V_{cube} = x^3$

$= 8^3$ ①

$= 512cm^3$

$Space = 512 - 179.59\ldots$

$= 332.40562\ldots$

$= 332m^3$ ①

iii) $\frac{179.59}{512} \times 100 = 35.077\ldots$

$= 35\%$. ①