Student's name **Student's number** **Teacher's name**

_____ _____ _____

PRESBYTERIAN LADIES' COLLEGE SYDNEY 1888

2010

TRIAL
HIGHER SCHOOL CERTIFICATE
EXAMINATION

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – $2\frac{1}{2}$ hours
- Write using blue or black pen
- Calculators may be used
- A formulae sheet is provided at the back of this paper

Total Marks – 100

Section I: Pages 2-7
22 marks

- Attempt questions 1-22, using the answer sheet on page 21.
- Allow about 30 minutes for this section

Section II: Pages 8-17
78 marks

- Attempt questions 23-28, using all 6 writing booklets provided
- Allow about 2 hours for this section

Multiple Choice	23	24	25	26	27	28	Total
							%

Section 1

22 marks
Attempt Questions 1 to 22.
Allow about 30 minutes for this section.

Use the multiple-choice answer sheet for Questions 1-22.

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

(A) $2x+6$
(B) $2x-6$
(C) $2x-2$
(D) $2x+2$

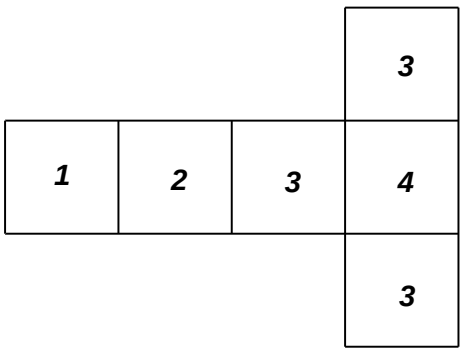
2. Which one of the following is NOT equivalent to 3.6 metres?

(A) $3.6\times10^{3}mm$
(B) $3600mm$
(C) $360cm$
(D) $0.036km$

3. What is the difference between the mean and the mode of the scores:
35, 65, 75, 35, 55

(A) 2 **(B)** 18 **(C)** 20 **(D)** 40

4. The figure below is the net of a die. Which of the following statements is INCORRECT?

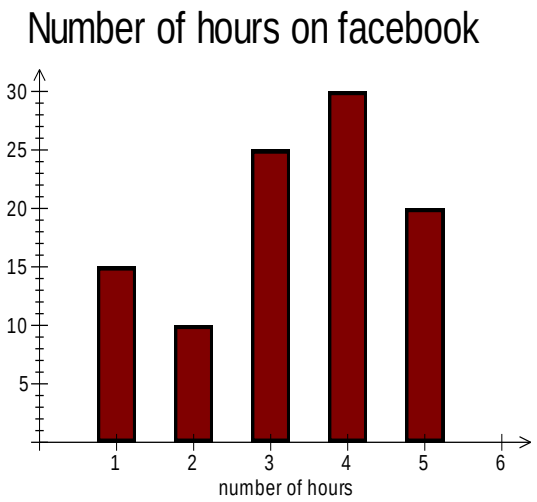


(A) The number 3 is the most likely number to be rolled.
(B) The probability of rolling a 3 is $\frac{1}{2}$.
(C) The number 4 is less likely to be rolled than any other number.
(D) There is an equal chance of rolling a 1 or a 2**.**

5. To estimate the number of butterflies in an enclosure, entomologists capture 250 of them, mark them and then release them. Some months later they capture 150 butterflies and found 30 of them were marked. Which would be the best estimate of the number of butterflies in the enclosure?

(A) 1250 **(B)** 3675 **(C)** 3750 **(D)** 11250

6. In a survey of 100 PLC students, each girl was asked how many hours they spent on facebook on August 2. The results are set out in the graph below.



What fraction of students spent 4 or more hours on facebook on August 2?

(A) $\frac{1}{20}$ **(B)** $\frac{1}{5}$ **(C)** $\frac{3}{10}$ **(D)** $\frac{1}{2}$

7. Each fortnight Danielle earned \$2 110 gross income. During the financial year she spent \$3 450 on work-related expenses and made donations of \$940 to charities which she could claim as deductions. She had \$696 deducted each fortnight in PAYG income tax. What is her annual taxable income?

(A) \$32 374 **(B)** \$49 774 **(C)** \$50 470 **(D)** \$68 566

8. A score of 13 is added to this sample. Which measure will change?

Score	***Frequency***
11	6
12	4
13	2
14	5
15	4

(A) range **(B)** mode **(C)** median **(D)** mean

9. Which formula could be used to calculate the largest angle, X, of the following triangle?

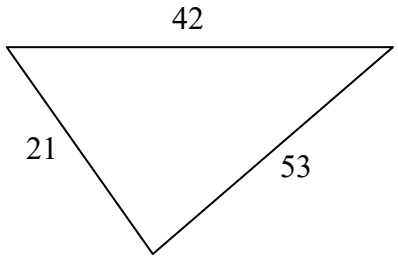


DIAGRAM NOT DRAWN TO SCALE

(A) $CosX = \dfrac{53^2 + 42^2 - 21^2}{2 \times 21 \times 42}$

(B) $CosX = \dfrac{21^2 + 53^2 - 42^2}{2 \times 21 \times 53}$

(C) $CosX = \dfrac{53^2 + 42^2 - 21^2}{2 \times 21 \times 53}$

(D) $CosX = \dfrac{21^2 + 42^2 - 53^2}{2 \times 21 \times 42}$

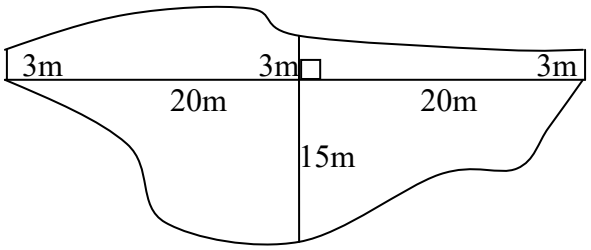
10. Five cards are turned face down. The five cards are a Jack, a Queen and 3 Kings. The first card is turned over and it is the Queen. What is the probability that the next card is a King?

(A) $\frac{1}{5}$ **(B)** $\frac{1}{4}$ **(C)** $\frac{3}{5}$ **(D)** $\frac{3}{4}$

11. A bus is travelling at a constant speed of 90km/h. How far will it travel in 45 minutes?

(A) $4.05km$ **(B)** $2km$ **(C)** $60km$ **(D)** $67.5km$

12. A council needs to re-grass a section of a park, shown below. Which of the following expressions correctly estimates the area to be re-grassed using Simpson's Rule?



(A) $\frac{20}{6}(0+60+0+3+12+3)$

(B) $\frac{20}{3}(3+72+3)$

(C) $\frac{20}{3}(3+18+3)$

(D) $\frac{20}{3}(0+15+0+3+3+3)$

13. Simplify fully $\dfrac{6a^3b^2 \times 4ab^4}{8a^2b^3}$

(A) $\dfrac{ab}{3}$ **(B)** $\dfrac{a^2b^2}{3}$ **(C)** $3a^6b^9$ **(D)** $3a^2b^3$

14. The counsellor of PLC decides to survey a sample of students about their health. She chooses a sample from 100 Year 7 girls and 140 Year 8 girls. Which of the following stratified samples would provide the most reliable results?

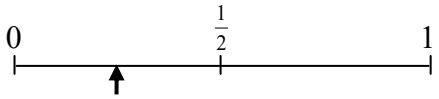
(A) 14 Year 7 and 10 Year 8 girls
(B) 25 Year 7 and 35 Year 8 girls
(C) 40 Year 7 and 40 Year 8 girls
(D) The first 100 Year 7 or Year 8 students to arrive at school

15. The table below shows the results of 120 spins of a circular spinner:

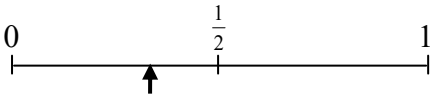
Colour	***Result***
Red	29
Blue	21
Green	70

In the diagrams below, which arrow best indicates the probability of obtaining the colour "Red"?

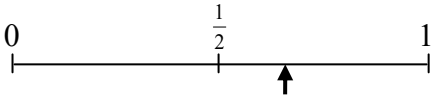
(A)



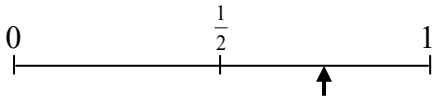
(B)



(C)



(D)



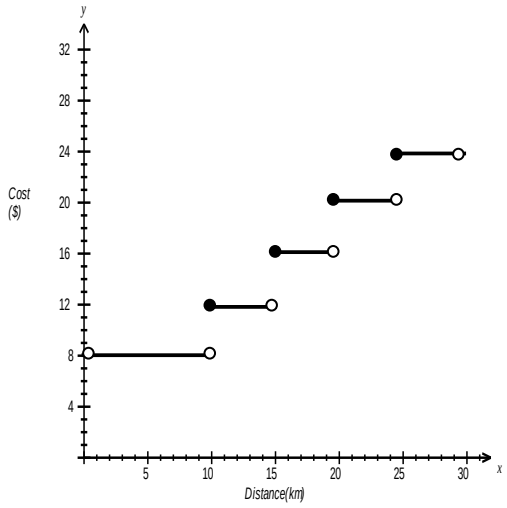
16. Which is the correct statement?

(A) $3a \times 3a = 3a^2$ **(B)** $3(a+b) = 3a+b$ **(C)** $3a - a = 3$ **(D)** $\dfrac{3a}{a^2} = \dfrac{3}{a}$

17. Rachel buys a lounge suite for \$2400 on the terms of $\dfrac{1}{3}$ deposit up front and then equal monthly repayments over 2 years. How much is the cost of each monthly repayment correct to the nearest dollar?

(A) \$33 **(B)** \$55 **(C)** \$67 **(D)** \$100

18. The graph shown represents a certain company's cost for transporting goods with respect to the distance travelled.



The company runs 2 jobs on one day, the first being a distance of 10 km and the second being a distance of 15 km. What is the total amount that the company charged for these 2 deliveries?

(A) \$12 **(B)** \$20 **(C)** \$24 **(D)** \$28

19. One error has been made in solving the equation below. Which line is the error?

$6(m+2)-2(m-3)=23$

(A) $6m+12-2m+6=23$

(B) $4m+18=23$

(C) $4m=5$

(D) $m=\frac{4}{5}$

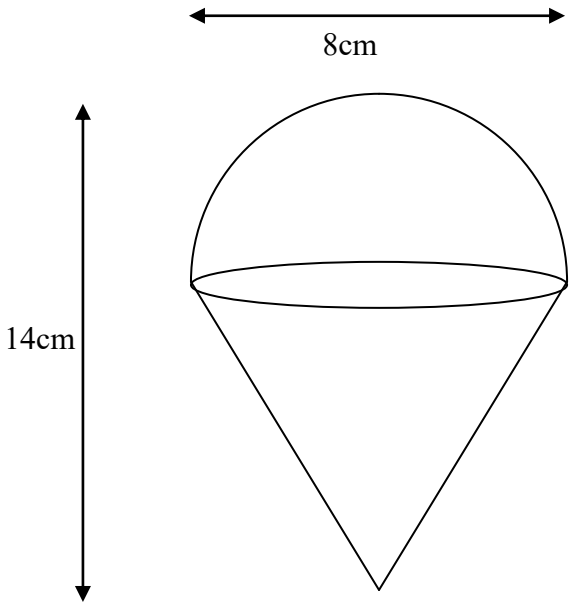
20. Australian phone numbers have 8 digits. How many different phone numbers are possible that begin with the first 4 digits 9712?

(A) $10\times9\times8\times7$ **(B)** $4\times3\times2\times1$ **(C)** $10\times10\times10\times10$ **(D)** $9\times7\times1\times2$

21. With simple interest, how long will it take for a sum of money to double itself at 8% p.a.?

(A) 12 years 4 months **(B)** 12 years 5 months
(C) 12 years 6 months **(D)** 12 years 9 months

22. A new ice-cream is manufactured in the shape of a cone and a hemisphere, shown below. The diameter of the hemisphere is 8cm and the total height of the ice-cream is 14cm. What is the volume of this new ice-cream, correct to the nearest cubic centimetre? Assume that the cone is entirely filled with ice-cream as well as the hemisphere.



(A) $117cm^3$ **(B)** $302cm^3$ **(C)** $435cm^3$ **(D)** $2212cm^3$

End of Section 1

Question 23 (13 marks) Start a new writing booklet.

Marks

a) Convert a speed of $13.5m/s$ to km/h. **2**

b) When an aid parcel is dropped from a plane by parachute, the distance it has fallen in metres, d, varies with the square of the time, t, it has been falling, in seconds.
After 4 seconds, an aid parcel has fallen 78.4 metres.

i) Write a formula for d in terms of t, finding the constant of variation. **2**

ii) Find the time taken for the parcel to fall $138m$. Give your answer correct to 1 decimal place. **2**

c) This ordered stem-and-leaf plot shows the age for 25 members of a Zumba class.

4	3 3 4 4
4	5 6 6 6 7 9 9 9
5	0 1 1 3 4
5	5 7 7 9
6	1 4
6	5
7	1

i) How many members are aged 59 or over? **1**

ii) Calculate the **median** and the **lower** and **upper** quartiles. **3**

iii) Describe the shape of the distribution **1**

iv) Draw a box-and-whisker plot to display this data **2**

End of Question 23

Question 24 (13 marks) Start a new writing booklet.

Marks

a) Body Mass Index is calculated using:

$B = \frac{m}{h^2}$ where m = mass in kilograms and

h = height in metres.

Chris is $72\,kg$ with a body mass index of 24.3. How tall is Chris? Answer to the nearest cm. **2**

b) A proton's resting mass is

$0.000\,000\,000\,000\,000\,000\,000\,000\,0167\,kg$

and the mass of an electron is

$0.000\,000\,000\,000\,000\,000\,000\,000\,000\,000\,911\,kg$,
both correct to 3 significant figures.

i) Change the mass of the proton to scientific notation. **1**

ii) To the nearest whole number, how many times heavier than an electron is a proton? **2**

c) Jacinta purchases a new laptop worth $1890.
It is assumed that after 3 years the laptop is worthless.

i) What percentage rate, per annum, would need to be used to calculate the value of the laptop after 2 years using the straight-line formula for depreciation? **1**

ii) What equivalent percentage rate is needed to achieve the same value after 2 years using the declining balance formula? Answer to 2 decimal places. **2**

Question 24 is continued on the next page.

d) Dr McKeith surveys all the Mathematics students in Year 12, asking if they play Saturday sport and if they have a part-time job. The table below shows the results.

	Sport	***No Sport***	***Total***
Job	48	32	80
No Job	42		70
Total	90		

i) How many students were surveyed in total? **1**

ii) How many students did not have a job and did not play sport? **1**

iii) Find the probability a student chosen at random from the survey plays sport and has a job. **1**

iv) Dr McKeith comments: **2**

"*For this school group, students with jobs are more likely to play sport than students without jobs*"

Is he right? Give mathematical reason(s) for your answer.

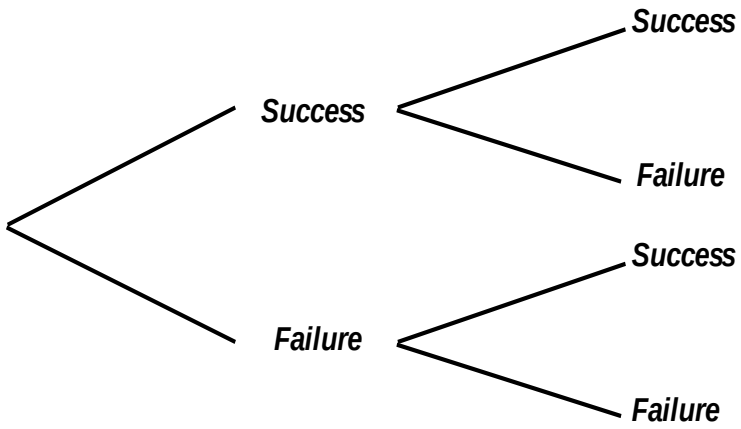
End of Question 24

Question 25 (13 marks) Start a new writing booklet.

Marks

a) Year 9 have created a game to raise money for Pet Show. Players have to throw a tennis ball through a small hole. After trying the game many times they discover the probability of getting the ball successfully through the hole is $\frac{3}{10}$.

i) Joel has 2 attempts at throwing the tennis ball through the hole. Copy or trace the tree diagram into your Writing Booklet. Complete your tree diagram by writing the correct probability on each branch. **2**



ii) Calculate the probability that Joel is successful on at least 1 throw. **2**

Year 9 decide to charge 20cents per throw and give $1 to any player who successfully gets the ball through the hole.

iii) What is the financial expectation for a player for 1 throw? **2**

iv) After a while, Year 9 realises that they are not making any money. What do they need to charge to at least break even? **2**

Question 25 is continued on the next page

b) When Lauren was 25 years old she began planning for her retirement. Lauren planned to work for 40 years and invested $2000 in an account at the beginning of her first year. The account was paying 6.5% p.a. with interest compounded annually.

i) Find the amount to which this initial investment of $2000 will grow after 40 years. **1**

ii) At the beginning of each year Lauren adds $2000 to the investment to form an annuity. Find the value of the annuity at the end of 40 years. **2**

iii) Lauren is now 30 and is married to James. James wants to make a single investment for the remaining 35 years so that his retirement fund will be worth the same amount as Lauren's on retirement. What single investment, invested at 6.5% p.a. with interest compounded annually, should James make to generate the same amount as Lauren after the remaining 35 years? **2**

End of Question 25

Question 26 (13 marks) Start a new writing booklet.

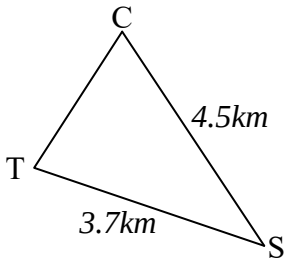
Marks

a) Mr Cooper earns $21 per hour for a 38 hour week and *time-and-a-half* for time worked over 38 hours. How much does Mr Cooper earn in a week in which he works 45 hours? **2**

b) During the first 5 games of the season, Hilary scored an average of 7 goals per game. How many goals must she score in the next game to have an average of 8 goals per game? **2**

c) Grace would like to go on a holiday at the end of her university course. She estimates she will need $10 000 in 5 years time. How much will she need to invest now, in an account that pays 7% p.a. interest, compounding quarterly? **2**

d) Ms Johnston sets out from Camp *C* on a bearing of 134° for $4.5km$ to reach a swimming spot, *S*. From *S*, Ms Johnston hikes $3.7km$ on a bearing of 281° to reach a tower, *T*.



i) Copy the diagram into your booklet.

ii) Show that $\angle CST = 33^\circ$. **1**

Ms Johnson wishes to return to Camp *C*.

iii) Find the distance *CT*, correct to the nearest metre. **3**

iv) Using the Cosine Rule, find $\angle STC$ and hence the bearing on which she must travel from *T* to *C*. **3**

End of Question 26

Question 27 (13 marks) Start a new writing booklet. Marks

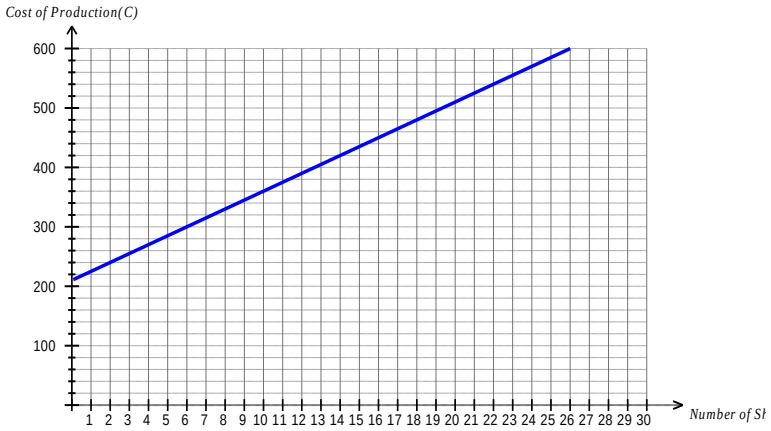
a) The initial cost of making a new PLC shirt is \$210 and each shirt will cost an extra \$15 to produce. The school will sell the shirts for \$25 each. An equation for the total cost of production, (C), in dollars for n shirts is :

$$C = 210 + 15n$$

i) Explain the significance of the \$210 in the cost of production. **1**

ii) If Y is the income in dollars ***received*** for selling n shirts, write an equation that represents this information. **1**

The graph of the cost of production is shown below and as an **attachment to your paper on page 23.**



iii) **On the attachment provided**, graph your equation for income, Y, in dollars for selling n shirts. Hand this in with Question 27. **1**

iv) Using the graphs, or otherwise, find how many shirts would need to be sold to break even? **1**

v) If 70 shirts are sold, how much profit is made? **2**

Question 27 is continued on the next page.

b) Chloe has $2000 available to invest. She has the option to choose between 2 types of investments:

Plan A:	Simple Interest: 3.5% per quarter	3years
Plan B	Compound Interest 12% p.a.compounded annually	3 years

i) What is the annual rate of interest paid in Plan A? **1**

ii) Find the interest earned by Chloe's investment, if she chooses Plan A. **1**

iii) Compare the interest rates of Plan A and Plan B. Which investment would you choose and why? Use mathematics to justify your answer. **2**

c) The city of Osaka is at $(37°N,\ 135°E)$ and Alice Springs is at $(23°S,\ 135°E)$.

i) Write down the angular distance between Osaka and Alice Springs. **1**

ii) Calculate the distance, correct to the nearest kilometre, between Osaka and Alice Springs. The radius of the Earth is 6400km. **2**

End of Question 27

Question 28 (13 marks) Start a new writing booklet.

Marks

a) Sydney is located at $(34°S,\ 151°E)$ and Los Angeles is located at $(34°N,\ 119°W)$.

i) It is 11pm in Los Angeles on a Monday. What is the day and time in Sydney? **2**

ii) A Qantas jet leaves Los Angeles at 11pm on Monday and flies non-stop to Sydney arriving after being in the air for 15 hours. What is the day and time the Qantas jet arrives in Sydney? **1**

iii) If the trip is 12 100 *km*, find the average speed of the plane. **1**

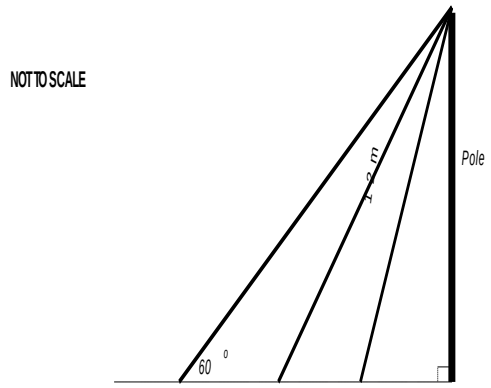
b) Mr Fletcher owned 5600 gold mining shares with a total market value of $113 600.

i) Mr Fletcher sold his gold mining shares. Calculate the brokerage fee if his broker charges 1.5% of the first $100 000 and 0.5% thereafter. **2**

ii) Find the equivalent flat interest rate that the broker could have charged to receive the same fee. **1**

Question 28 is continued on the next page.

c) Three ropes are attached to the top of a vertical pole.



The longest rope is inclined to the ground at $60°$, and the length of the shortest rope is 12 metres.
The angle between the shortest rope and the pole is equal to each of the angles between the adjacent ropes.

i) Show that the angle between the shortest rope and the pole is $10°$. **1**

ii) Find the length of the longest rope. Give your answer in metres, correct to 1 decimal place. **3**

d) Tahlia is yet to go for her driving test. She has been given the following information showing the number of attempts that the girls in Year 12 have taken to get their Provisional driving licences:

1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3, 4, 4

i) Calculate the mean and standard deviation of this data correct to 1 decimal place. **1**

ii) How many attempts would Tahlia need to make to lower the mean and decrease the standard deviation? **1**

End of Question 28

End of Examination

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General Mathematics Formulae Sheet (page 1 of 2)

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

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

$\theta =$ number of degrees in central angle

Arc length of a circle

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

$\theta =$ 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 $A = 4\pi r^2$
Closed cylinder $A = 2\pi rh + 2\pi r^2$

$r =$ radius
$h =$ perpendicular height

Volume

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

Cylinder $V = \pi r^2 h$

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

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

$r =$ 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

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

General Mathematics Formulae Sheet (page 2 of 2)

Simple interest

$I = Prn$

$P =$ initial quantity
$r =$ percentage interest 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 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:

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

General Mathematics: Multiple Choice Answer Sheet

Student Number_____

Completely fill the response oval representing the most correct answer.

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 ⬭

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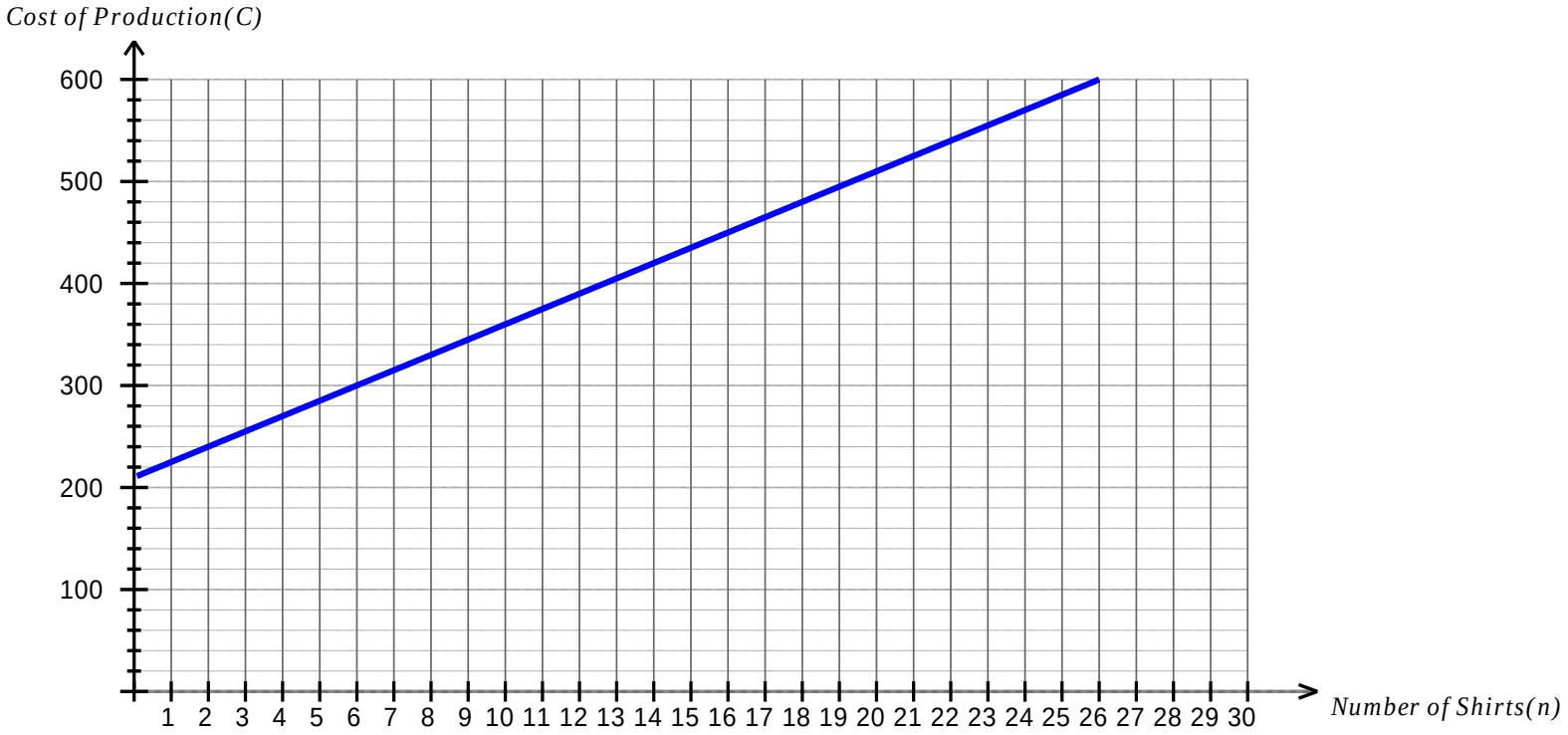
Question 27a)iii)

Student Number……



General Mathematics: Multiple Choice Answer Sheet

Student Number Ans.

Completely fill the response oval representing the most correct answer.

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 ○

Academic Year	Yr 12	Calendar Year	2010
Course	General maths	Name of task/exam	Gen Maths Trial Exam

Question 23 :

a) 13.5 m/s to km/h

$= (13.5 \div 1000) \times (60 \times 60)$

$= 48.6$ km/h

b) i) $d = kt^2$

$78.4 = k \times 4^2$

$k = 4.9$

$\therefore d = 4.9t^2$

ii) $138 = 4.9t^2$

$t = 5.3$ sec (1 dp)

c) i) 5

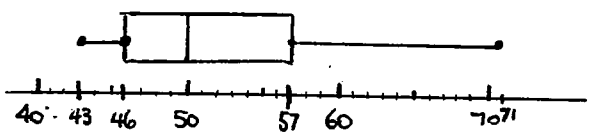
ii) Median = 50

$Q_1 = 46$ (lower quartile)

$Q_3 = 57$ (upper quartile)

iii) Positively skewed

iv)



Question 24 :

a) $B = \frac{m}{h^2}$

$24.3 = \frac{72}{h^2}$

$h = 172$ cm (nrst cm)

b) i) 1.67×10^{-26} kg

ii) $(1.67 \times 10^{-26}) \div (9.11 \times 10^{-31})$

$= 18332$ times heavier (nrst whole number)

c) i) $\frac{1890}{3} = 630$.

value after 2 yrs = 630

$\therefore \frac{630}{1890} \times 100\% = 33\frac{1}{3}\%$

ii) $630 = 1890(1-r)^2$

$r = 0.4226....$

$\therefore 42.26\%$

d) i) 150

ii) 28

iii) $\frac{48}{150} = \frac{8}{25}$

Academic Year	Yr 12	Calendar Year	2010
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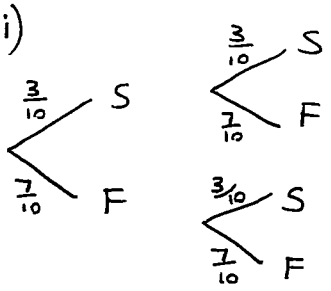
iv) Students with jobs playing sport $= \frac{48}{80} = \frac{3}{5}$

Students without jobs playing sport $= \frac{42}{70} = \frac{3}{5}$

∴ This statement is not true. There is an equal chance that students with jobs play sports as students without jobs playing sport. They both have the same probability of occurring.

Question 25:

a) i)



ii) P (Joel successful on at least 1 throw) $= 1 - (FF)$

$= 1 - \left(\frac{7}{10} \times \frac{7}{10}\right)$

$= 1 - \frac{49}{100}$

$= \frac{51}{100}$

iii) Financial expectation

$= \frac{3}{10}(\$1) + \frac{7}{10}(-\$0.20)$

$= \$0.16$

iv) $\frac{3}{10}(\$1) + \frac{7}{10}(-x) = 0$

$\frac{7x}{10} = \frac{3}{10}$

$7x = 3$

$x = \frac{3}{7}$

∴ need to charge 42.857c/throw to break even

(accept 43c or 45c)

b) i) $A = 2000(1 + 6.5\%)^{40}$

$= \$24\ 832.149$

$= \$24\ 832.15$

ii) $A = 2000\left\{\frac{(1+6.5\%)^{40} - 1}{6.5\%}\right\}$

$A = \$351\ 263.83$

iii) $351\ 263.83 = P(1 + 6.5\%)^{35}$

$P = \$38\ 761.20$

Academic Year	Yr 12	Calendar Year	2010
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Question 26:

a) $38 \times 21 + 7 \times 1\frac{1}{2} \times 21$

$= \$1018.50$

b) $\frac{\text{Sum scores}}{\text{no. scores}} = \bar{x}$

$\frac{\text{Sum scores}}{5} = 7$

$\therefore$ Sum scores $= 35$

$\frac{35 + x}{6} = 8$

$35 + x = 48$

$x = 13$.

Needs to score 13 goals in the next game

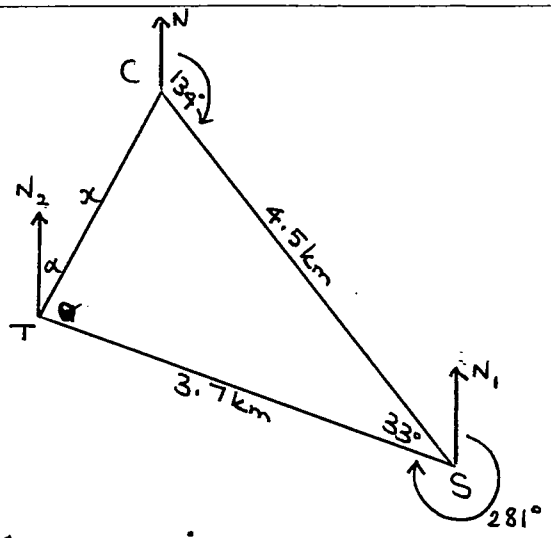
c) $10\,000 = P\left(1 + \frac{7\%}{4}\right)^{20}$

$10\,000 = P(1.0175)^{20}$

$P = \frac{10\,000}{(1.0175)^{20}}$

$P = \$7068.25$

d) i)



ii) $\angle N_1SC = 180° - 134°$

$= 46°$

$\angle CST = 360° - 281° - 46°$

$= 33°$

iii) $x^2 = 4.5^2 + 3.7^2 - 2(4.5)(3.7)\cos 33°$

$x = 2.452$ km (nrst m).

iv) $\cos\theta = \frac{2.451\ldots^2 + 3.7^2 - 4.5^2}{2 \times (2.451\ldots)(3.7)}$

$\theta = 91°44'$

$\angle N_2TS = 180 - (33 + 46)$

$= 101°$

$\therefore$ bearing $= 9°16'$

Academic Year	Yr 12	Calendar Year	2010
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Question 27:

a) i) Cost for materials, equipment, design i.e. start-up costs

ii) $Y = 25n$

iii) see attachment

iv) $210 + 15n = 25n$

$210 = 10n$

$n = 21$

or by the graph, the point of intersection is when $n = 21$.

v) $y = 25 \times 70 = 1750$ $\quad C = 210 + 15 \times 70 = 210 + 1050 = 1260$

$\therefore$ profit = \$490

b) i) $3.5\% \times 4 = 14\%$ p.a.

ii) $2000 \times 14\% \times 3$

$= \$840$

iii) for plan A Chloe earns \$840

for plan B

$\therefore A = 2000(1 + 12\%)^3$

$= 2809.856$

$\therefore$ interest = \$809.856

Chloe should choose plan A. Over the long term plan B is better, but for the short term the higher interest rates gives a better return.

c) i). Osaka (37° N, 135° E)

Alice Springs (23° S, 135° E)

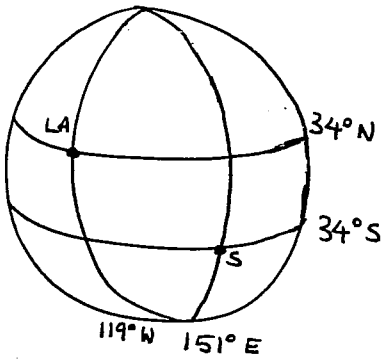
$\therefore$ angular distance is 60°

ii) distance $= \frac{60}{360} \times 2\pi \times 6400$

$= 6702$ km (nrst km)

Question 28:

a)



i) 1° = 4 mins

270° = 1080 mins

= 18 hours time difference

Academic Year	Yr 12	Calendar Year	2010
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11 pm L.A. Mon

is 5 pm Tues in Sydney

ii) 11 pm L.A is 5 pm Tues Syd

+ 15 hours = 8am Wednesday

iii) $S = \frac{D}{T}$

$= \frac{12100}{15}$

$= 806.6$ km/h

b) i) $1.5\% \times 100\,000$

$+ 0.5\% \times 13600$

$= \$1568$

ii) $1568 = 113600 \times r \times 1$

$r = 0.0138$

$\therefore \% r = 1.38\%$.

c) i) $180 - 90° - 60° = 30°$

$30° \div 3 = 10°$

ii) $\frac{x}{\sin 100} = \frac{12}{\sin 60}$

$x = 13.6$ m (1 dp)

d) i) $\bar{x} = 1.8$

$\sigma = 0.4$

ii) To decrease the mean Tahlia will need to get her P's with 1 attempt.

This would give $\bar{x} = 1.8$

and $\sigma = 0.894$

which lowers the mean & decreases the standard deviation.

Question 27a)iii)