2009
HSC Course
TRIAL EXAMINATION

General Mathematics

General Instructions

- o Reading Time - 5 minutes

- o Working Time - $2\frac{1}{2}$ hours

- o Write using a blue or black pen

- o Board Approved calculators may be used

- o A formulae sheet is provided at the back of this paper which may be detached and used throughout the paper.

Total Marks 100

Section I

Total marks (**22**)

- o Attempt Questions 1-22

- o Answer on the Multiple Choice answer sheet provided.

- o Allow about 30 minutes for this section

Section II

Total marks (**78**)

- o Attempt questions 23 – 28

- o Answer on the blank paper provided, unless otherwise instructed. Start a new page for each question.

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

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 ◯

1.   Which expression below is the expansion of $2xy(2x^2 - xy)$?

    (A) $4x^2y - 2x^2y^2$

    (B) $4x^3y - 2x^2y^2$

    (C) $4x^3y - 2xy$

    (D) $2x^3y - x^2y^2$

2.   A paddock which is bordered by a river is shown below.
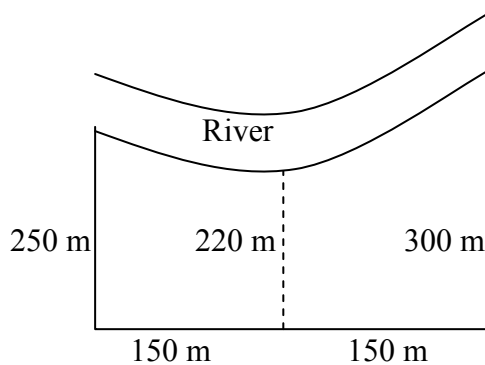
    Use Simpsons Rule to find the area of the paddock.

    (A)   115 500 m^2 (B)   38 500 m^2

    (C)   143 000 m^2 (D)   71 500 m^2

3.   The scores below are the marks that Julio scored on 10 skills tests.

    12, 14, 20, 20, 25, 32, 32, 34, 38, 40

    The interquartile range of the scores is:

    (A)   6   (B)   19

    (C)   14   (D)   28

4.   The cost per student (C) for a Mathematics excursion is given by the equation

    $C = \dfrac{140 + 5n}{n}$ where n is the number of students going on the excursion.

    If the number of students going on the excursion increases from 35 to 40, what change does this make to the cost per student (C)?

    (Answer to the nearest five cents)

    (A)   Each student pays fifty cents more.

    (B)   Each student pays fifty cents less.

    (C)   Each student pays twenty five cents less.

    (D)   There is no change in the cost per student.

5.   What is the area of the triangle shown? (Correct to 2 significant figures.)
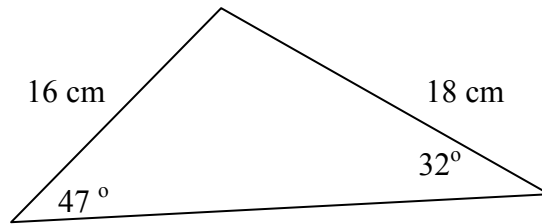
(A)   140 cm^2 (B)   76 cm^2

(C)   280 cm^2 (D)   110 cm^2

6.   Jennifer is paid a wage of $28.40 per hour for up to 8 hours per shift, then overtime at time and a half for the next two hours and double time for any further hours in that shift. In one shift she worked 12 hours. What would she be paid?

(A) $454.40

(B) $369.20

(C) $340.80

(D) $426.00

7.   Jack works in sales and is paid a retainer which is equivalent to a salary of $52 000 p.a. He also earns a commission of 1.5% of his sales. Last fortnight, his sales totalled $45 200. What would be his pay for this fortnight?

(A) $2 000.00

(B) $2 678.00

(C) $1159.00

(D) $678.00

8.   Given that $v^2 = u^2 + 2as$. If u is always positive, which is the correct formula for u?

(A) $u = \sqrt{v^2 + 2as}$ (B) $u = \sqrt{v^2 - 2as}$

(C) $u = v - 2as$ (D) $u = \sqrt{2as - v^2}$

9.   The results gained by the students in two classes A and B on a test are shown below:

Class A

Class B

| | | | | | | | | | | | | | |
30   35   40   45   50   55   60   65   70   75   80   85   90   95   100
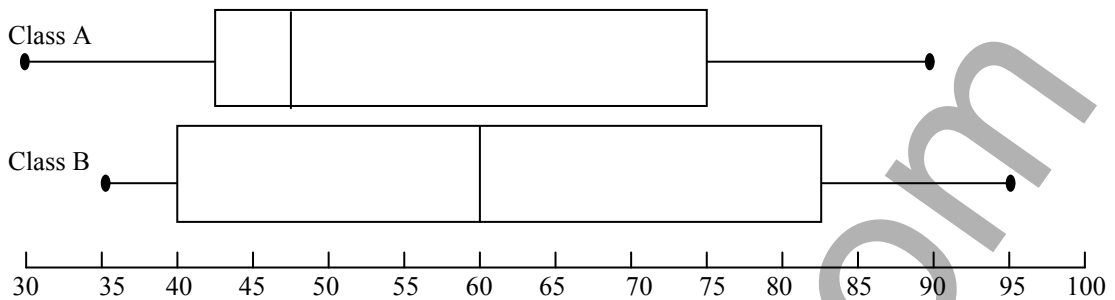
Which statement is true?

(A)   Both classes had the same median score.

(B)   Both classes had the same interquartile range.

(C)   Both classes had the same range.

(D)   Both classes had the same maximum score.

10.   A sphere has a surface area of 452 m^2. The volume is closest to?

(A)   24 366 m^3

(B)   904 m^3

(C)   9 610 m^3

(D)   113 m^3

11.   Which is not true of the following set of scores?

| Score	Frequency
12	3
13	9
14	5
15	5
16	3
Total	25

(A)   The mean is 13.84.

(B)   The mode is 13.

(C)   The range is 4.

(D)   The median is 13

12.   Which best describes the two distributions shown below.
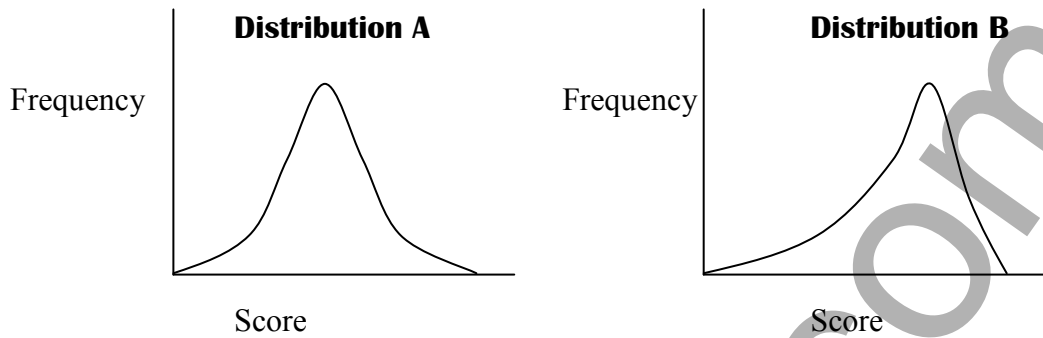
(A)   Both distributions are symmetrical.

(B)   Distribution A is symmetrical and B is positively skewed.

(C)   Distribution A is symmetrical and B is negatively skewed

(D)   Both distributions are negatively skewed.

13.   Which best describes the two sets of data X and Y, shown below.
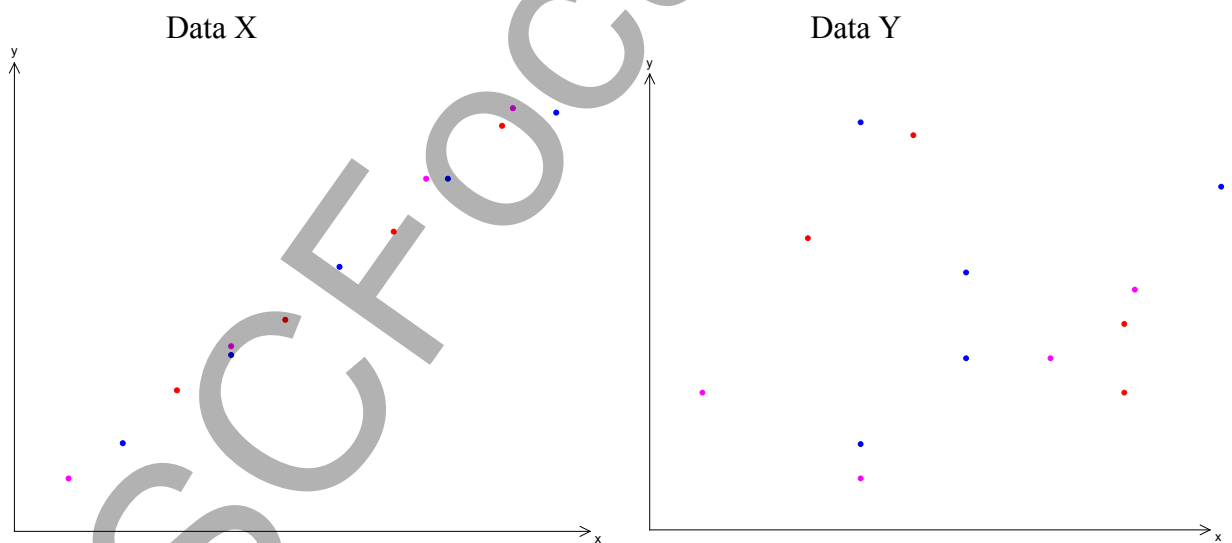
(A)   X has a strong positive correlation and Y has no correlation.

(B)   X has a strong negative correlation and Y has a strong positive
       correlation.

(C)   X has a strong positive correlation and Y has a strong negative
       correlation.

(D)   X has a strong negative correlation and Y has no correlation.

6

14.   What is the angle of depression of the ship from the viewer on the cliff ?

250 metres

450 metres
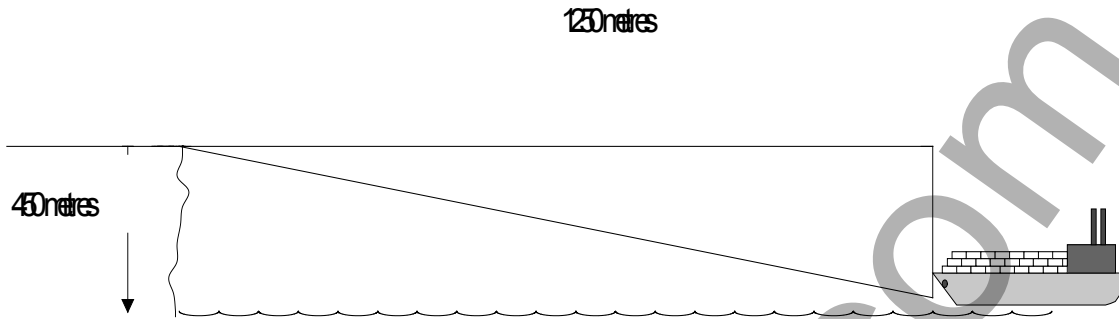
(A)   69°

(B)   21°

(C)   20°

(D)   70°

15.   The following table shows the fortnightly repayments required to repay a
        personal loan at 11.5% p.a. for terms from 2 to 5 years.

Amount Borrowed	2 Years	3 Years	4 Years	5 Years
$12 000	$269	$190	$151	$127
$16 000	$358	$253	$201	$170
$20 000	$447	$316	$251	$212
$24 000	$536	$379	$301	$254
$26 000	$581	$411	$326	$275
$30 000	$670	$474	$376	$317

Josie borrows $24 000 over 4 years. How much interest does she pay?

(A) $7 826

(B) $1 826

(C) $31 304

(D) $7 304

16.   A child's puzzle has 40 pieces of which 25% are rectangular, and 15% are triangular. The remainder are other shapes. A piece is chosen at random from the puzzle. What is the probability that it is not triangular or rectangular?

    (A)   0.6

    (B)   0.4

    (C)   0.75

    (D)   0.85

17.   A drawing of a block of land is completed from an offset survey. What is the perimeter of the block of land?
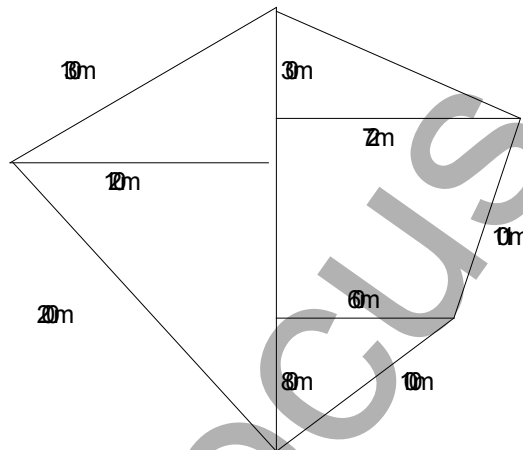
    (A)   531 m

    (B)   609 m

    (C)   1 091 m

    (D)   633 m

18.   As part of a party trick, Joseph splits a standard deck of 52 cards into two piles. The first pile has the 12 cards which are marked K, Q or J, and the second pile has the 40 cards which include the Aces and the cards which are numbered 2 to 10. He draws two cards from the first pile and then three from the second and lays them out in a line in the order they are chosen. How many arrangements of the five cards on the table are possible?

    (A) $12^2 \times 40^3$

    (B) $12 \times 11 \times 10 \times 40 \times 39$

    (C) $12 \times 11 \times 40 \times 39 \times 38$

    (D) $12^3 \times 40^2$

19. John has worked out that the relationship between two variables d and e, can be expressed as $d = 2e^2 + k$, where k is a constant value that he is trying to find. He takes another measurement and finds that $d = 16$, when $e = 2.5$. What is the value of k?

    (A)   − 9   (B)   2.5
    (C)   13.5   (D)   3.5

20. A scale drawing of a house, showing its position on the block of land on which it is to be built is shown below. The scale is 200:1.

Block of land.

What area of the block is not covered by the house?

    (A)   230 m^2 (B)   130 m^2
    (C)   110 m^2 (D)   350 m^2

21. Justine calculates the depreciation on her car which is five years old using the declining balance method and obtains a value of $14 200 to the nearest hundred dollars. If its value was $32 000 when new, what was the depreciation rate per annum?

(A) 55%

(B) 15%

(C) 85%

(D) 12%

22. The graph below shows the straight line relationship between two variables M and N. What is equation of the line?
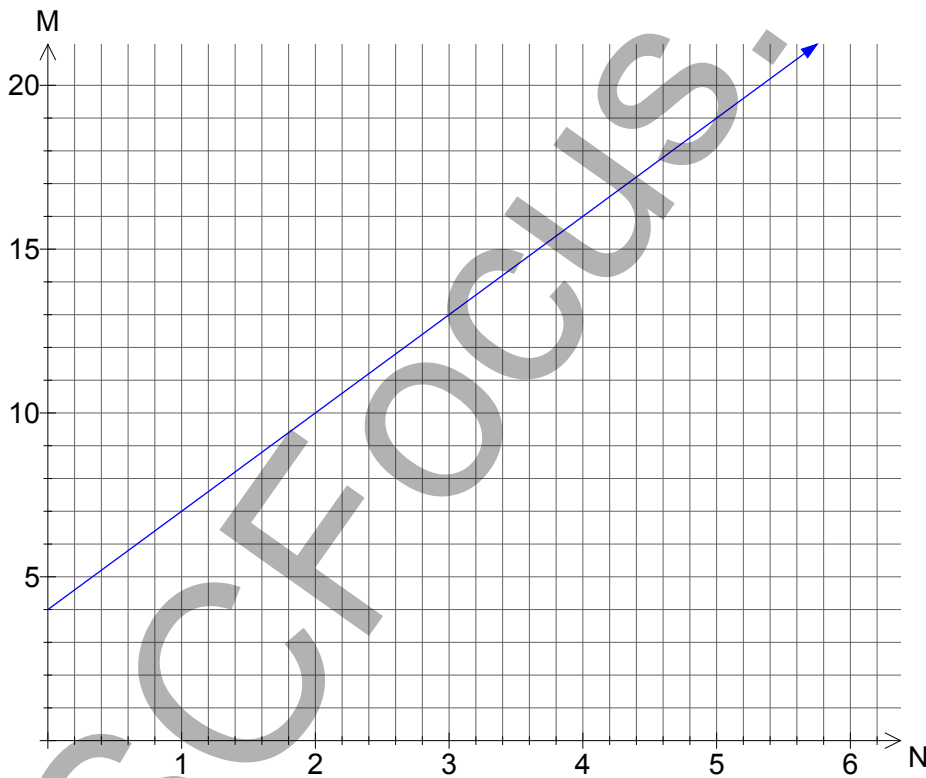
(A) M = 3N + 4

(B) M = 0.6N + 4

(C) M = 4N + 0.6

(D) M = 4N + 3

End of Section 1

Section II

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

Answer all questions, starting each question on a new sheet of paper with your name and question number at the top of the page. Do not write on the back of sheets.

Question 23 (13 marks) Start a new sheet of paper.

Marks

(a)   The area chart below shows the attendance at Football matches in four states from 2004 to 2009.

Attendance at Football Matches
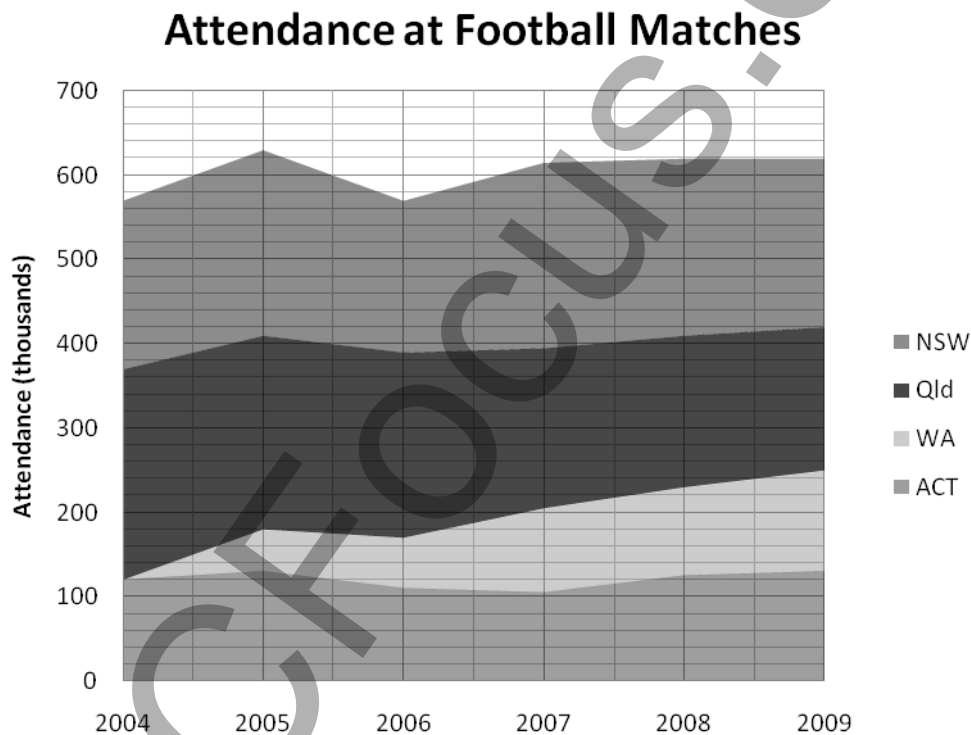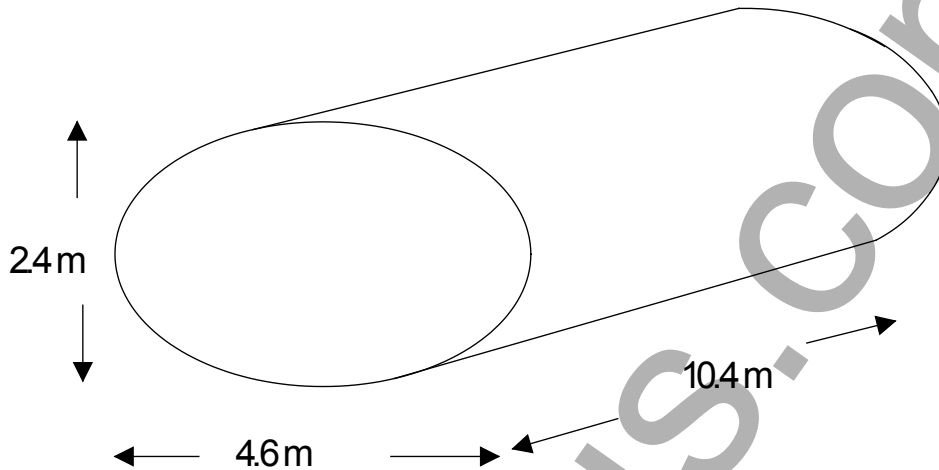

   (i) What were the attendances in the NSW in 2005?   **1**

   (ii) Compare the trends in the attendances in Qld and WA over   **2**
        the period shown.

(b)   A plane uses 5 litres of fuel per second during takeoff. Express   **1**
       this as kilolitres per hour.

Question 23 continues on page 12

11

Question 23 (continued)

Marks

(c)   The diagram below shows a tank used for transporting liquids.

24 m

4.6 m

10.4 m

(i) Find the area of the ellipse which forms the end of the tank.   **1**

(ii) The tank is filled from a spherical container which has a
diameter of 30 metres. How many times could the tank be
filled from the spherical container?   **2**

(d)   Solve the equation $5x + 3(2 - x) = \dfrac{2x}{3} + 12$ **3**

(e)   The sector graph below shows the proportions of people
travelling to various destinations from Sydney on a given day.
What percentage of the travellers were going to Europe?   **1**

Travel from Sydney Airport

Europe

Interstate

America

Asia

Africa

Question 23 (continued)   **Marks**

(f)   Using the graph for express international courier charges below,   **2**
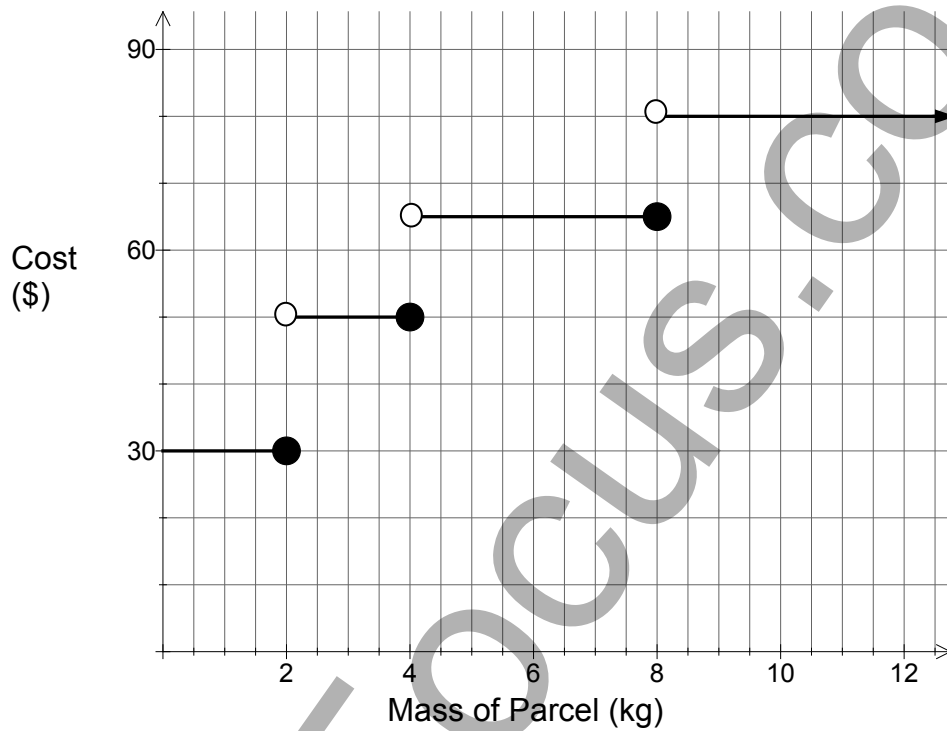   determine how much less it would cost to send two items
       weighting 1.5 kg and 4kg, as a single parcel, rather than as two
       separate parcels.

End of Question 23

Marks

Question 24 (13 marks) Start a new sheet of paper.

(a)   Madison is paid a salary of $46 800, and has $480 per fortnight
        deducted from her pay in PAYG tax instalments.

        (i)   What is her fortnightly net pay?   **1**

        (ii)   She also has investments which earned her $480.00 in the   **1**
             financial year and has tax deductions which total $1 500.
             What is her taxable income?

        (iii)   She pays income tax on this taxable income calculated   **2**
             according to the table below, plus a Medicare levy of 1.5%
             of her taxable income. Calculate her tax due for the
             financial year?

Taxable income	Tax payable
$0 – $12 000	Nil
$12 001 – $30 000	Nil plus 30 cents for each $1 over $12 000
$30 001 – $45 000	$5400 plus 40 cents for each $1 over $30 000
$45 001 – $60 000	$11 400 plus 50 cents for each $1 over $45 000
over $60 000	$18 900 plus 55 cents for each $1 over $60 000

        (iv) Determine her tax refund or tax bill for the financial year.   **1**

Question 24 (continued)

(b)   Saskia is a business consultant and has developed a method of predicting the success or failure of a small business. The results of her predictions for fifty businesses are shown in the table below.

	Predicted Success	Predicted Failure	Total
Actual Success	28	10	38
Actual Failure	4	*	12
Total	32	18	50

(i)   What value should appear where the * symbol is shown?

1

(ii)   If a business is chosen at random, what is the probability that it succeeded?

1

(iii)   If Saskia predicted success for a business, what is the probability that it succeeded?

1

(iv)   Was she better at predicting success of failure? Explain your answer.

2

(c)   Marcus borrows $25 000 at 12% p.a. repaid in monthly instalments over 6 years.

(i)   Use the present value formula to find the amount of each monthly instalment.

2

(ii)   How much does he pay in interest?

1

End of Question 24

Question 25 (13 marks) Start a new sheet of paper.

(a)   Farmer Nick wishes to enclose a paddock with an area of 6 hectares. The graph shows the possible dimensions.

Length (00 m)

Width (00 m)
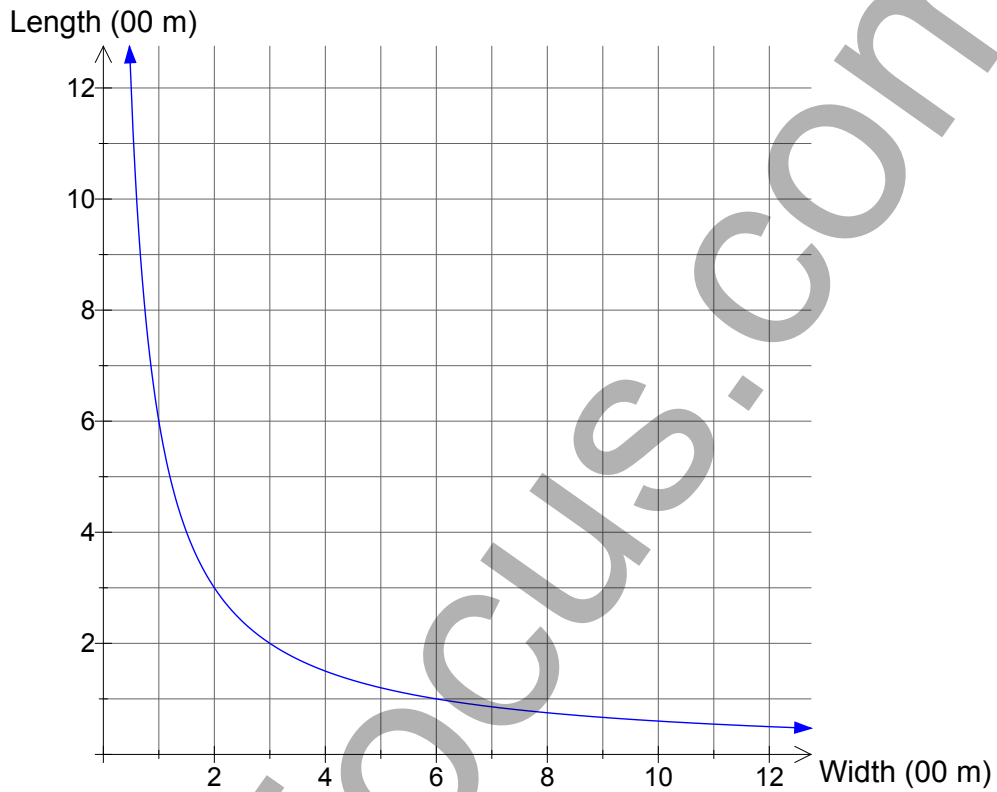
(i)   Is the curve shown an exponential graph, a parabola or a hyperbola?   **1**

(ii)   If the width of the paddock was 100m, what was the length?   **1**

(iii)   If the paddock were to be a square, what would be its length?   **1**

(iv)   Which would cost more to fence, a paddock that was 800 m wide, or one that was 300 m wide? Justify your answer using the graph and relevant calculations.   **1**

Question 25 continues on page 17

Question 25 (continued)

(b)   Lydia and Mike play a game of darts. Mike has a 0.8 chance of hitting the number he aims at and Lydia has a 0.6 chance of hitting the number she aims at. They each throw a single dart at the board, both aiming at the number twenty.

       (i)   Copy and complete the probability tree diagram.

1

<table>
<tr><td>Mikes dart</td><td>Lydias Dart</td></tr>
</table>

```
                                              Hit 20
                           Hit 20  <
                  0.8   /                      Miss 20

                       \                       Hit 20
                           Miss 20  <
                                              Miss 20
```
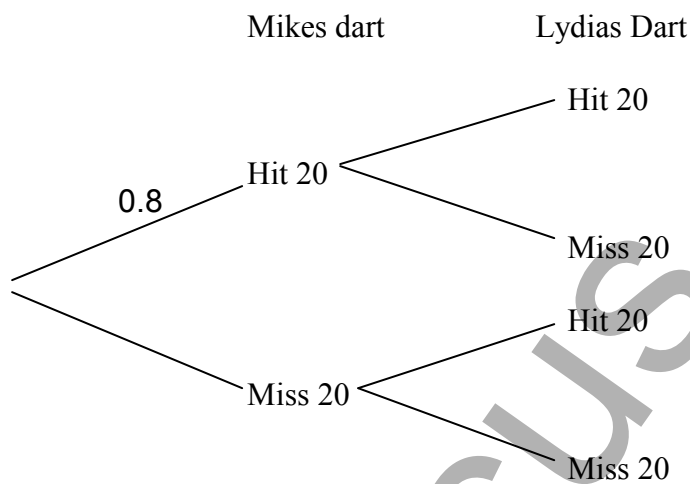
       (ii)   Find the probability that they both hit the number 20.

1

       (iii)   Find the probability that exactly one of the darts hits the number 20

1

       (iv)   Find the probability that at least one of the darts hits the number 20.

1

Question 25 (continued)   **Marks**

(c)   Xanthe and Yasmin are on a bushwalk. At one stage they become separated. They contact one another by mobile phone and realise they can both see the tops of two towers A and B which are 1.5 km apart. They take bearings with their compasses and mark the information below on their maps. They decide to meet up at tower B.
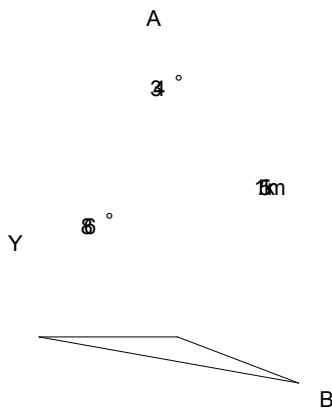
Yasmin's Map   Xanthe's Map
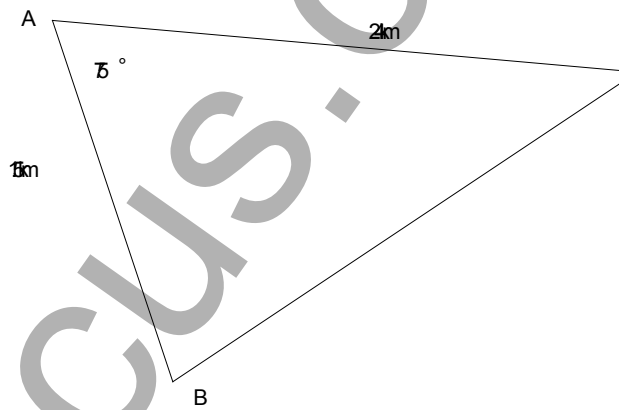
(i)   How far must Yasmin walk to get to the base of Tower B?   **2**

(ii)   How far must Xanthe walk to get to the base of Tower B?   **2**

(iii)   If Tower B is on a bearing 160° from Tower A, what bearing must Yasmin walk along to reach Tower B?   **1**

End of Question 25

Question 26 (13 marks) Start a new sheet of paper.   **Marks**

(a)   There are 16 players in the training squad for a volleyball team.   **1**

      (i)   The coach chooses 2 players to be the captain and vice captain. How many arrangements of captain and vice captain are possible?

      (ii)   Four players are chosen to make up the rest of the team. How many combinations of the four players are possible after the captain and vice captain have been chosen?   **1**

(b)   Year 11 has 40 boys and 50 girls and Year 12 has 35 boys and 45 girls. A student is chosen at random from each year. What is the probability that the students will be :

      (i)   Two boys?   **1**

      (ii)   A boy and a girl?   **1**

(c)   A computer system is purchased for \$5 800. Its depreciation can be calculated using a straight line depreciation of \$1 200 p.a. or by using a declining balance rate of 30% p.a.

      (i)   Find the value of the system after 6 years using the declining balance method.   **2**

      (ii)   Which method will give the system the greater value after 3 years?   **2**

(d)   Basketball NSW conducts a survey of its players across the state, using a sample of 250 players.

      (i)   If the Western Region has 8% of the basketball players in NSW, how many players from the Western Region should be included in the sample?   **1**

      (ii)   The stem and leaf plot below shows the results for the question on the heights (in cm) of players from the Southern Region   **3**

```
16 | 6 7 9
17 | 2 4 8 8 9
18 | 3 4 5 5 8 9 9
19 | 0 3 6 8 8
20 | 0 2
```

     Draw a box and whisker plot from this data.

      (iii)   Find the standard deviation of this sample to 2 decimal places.   **1**

End of Question 26

Question 27 (13 marks) Start a new sheet of paper.

Marks

(a)   Tayla is sailing across the Pacific Ocean. At 6:30 am on Saturday the 15th August her position is (0°, 170°E) and she is heading for Fantasy Island at (0°, 150°W).

   (i)   Assuming that she can do so on the shortest direct course, how far will she need to sail (in Nautical Miles)?   **2**

   (ii)   At a speed of 15 knots, how many days will the journey take?   **1**

   (iii) At 6:30 am on Saturday the 15th August, she rings her brother on Fantasy Island. What is the local time when her brother takes the call?   **2**

(b)   Poppy bought a plasma TV and paid a deposit of 20% of the cash price of $1750, and monthly repayments of $95.70 per month for 2 years.

   (i)   How much extra did she pay compared to paying cash for the TV?   **2**

   (ii)   What flat rate of interest per annum was she charged?   **1**

(c)   The intensity of light on a movie screen varies inversely with the square of the distance from the projector to the screen. If the illumination when the projector is 40 m from the screen is 25 units, what is the illumination when the projector is placed 50 m from the screen?   **3**

(d)   Ebony has a credit card with no interest free period and an interest rate of 14% p.a. calculated daily. She had paid her card off in full before July and makes the following purchases during the month of July.

2nd July	Cookpot	$ 68.00
16th July	DVDs	$ 53.50
23rd July	Petrol	$ 40.00
26th July	Makeup	$ 105.50
29th July	Dress	$ 150.80

   Ebony pays her credit card bill in full on the 5th of August. How much interest does she pay?   **2**

End of Question 27

20

Question 28 (13 marks) Start a new sheet of paper.

(a)   The scores of 3 students on their History and Geography assessments
      are given below, along with the mean and standard deviation of each
      assessment.

Student	History	Geography
Ally	72	67
Bella	66	72
Catalina	85	63
Mean	60	55
Standard Deviation	12	8

   (i)   Convert Ally's History and Geography marks to z - scores and   **2**
          determine which result was better in comparison to the other
          students in the course.

   (ii)   What percentage of students scored higher marks than Catalina   **1**
          on the Geography assessment?

   (iii) The top 2.5% of students on each assessment are invited to a   **2**
          talented students' day. Which students would be invited, and on
          which result would their invitation be based?   Justify your
          answer mathematically.

(b)   The triangular banner shown is in three sections. The triangle ABC is
      right angled with $BC = 120$ cm and $AB = 45$ cm. The distances AX,
      XY and YB are equal and $\angle XYC = 95°$.
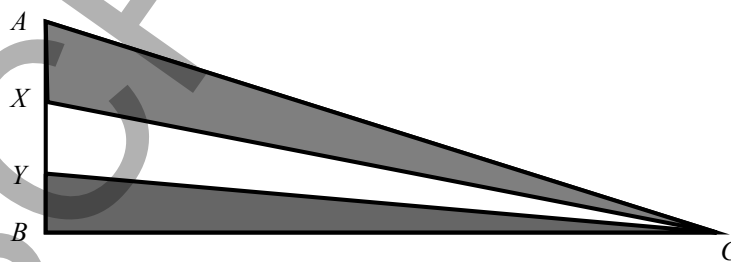
   (i) Find the distance YC correct to 3 significant figures.   **1**

   (ii) Hence find the area of the triangle XYC.   **2**

   (iii) What percentage of the area of the banner is the triangle XYC.   **1**

(c)   The scatter plot below compares the age of a vehicle with the number
       of mechanical problems it has experienced. A median regression line
       has been drawn.

(i)   Describe the correlation shown on the graph.   **1**

(ii)   What is the gradient of the regression line?   **1**

(iii)   What is the equation of the regression line?   **1**

(iv)   Use the line to predict the number of problems experienced   **1**
        by a 20 year old car.

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

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

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

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

h = distance between successive measurements
d_f = first measurement
d_m = middle measurement
d_l = last measurement

Surface area

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

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

r = radius
h = perpendicular height

Volume

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

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

Pyramid $\qquad V = \frac{1}{3}Ah$

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

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

$$I = Prn$$

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

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

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

$\overline{x}$ = mean

x = individual score

n = number of scores

f = frequency

Formula for a z-score

$$z = \frac{x - \overline{x}}{s}$$

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:

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

Multiple Choice Answer Sheet

Name _____

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 ◯

General Mathematics

SOLUTIONS

General Mathematics Trial HSC Examination 2009

Multiple Choice Answer Sheet

Name _____ Marking Sheet _____.

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 ◯

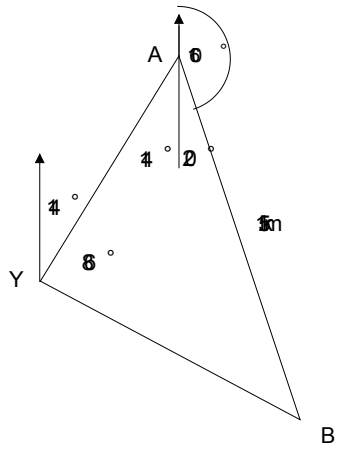| Question 23	HSC Trial Examination-		2009	
Part	Solution		Marks	Comment
(a) (i)	Attendance in NSW = 630 000 – 410 000 =220 000		1	
(a) (ii)	Queensland had the highest attendance of any state in 2004 then decreased over the following years, while WA only began in 2005 and grew steadily each year after that.		2	1 for decrease in Qld and 1 for increase in WA
(b)	5 L/s = 5 × 60 × 60 L/h = 18000 L/h = 18000 ÷ 1000 kL /h = 18 kL /h		1	
(c) (i)	$Area = \pi ab$ $= \pi \times 1.2 \times 2.3$ $= 8.7\ m^2$		1	
(c) (ii)	Volume tank = Ah $= 8.7 \times 10.4$ $= 90.2\ m^3$ Volume sphere $= \frac{4}{3}\pi r^3$ $= \frac{4}{3} \times \pi \times (15)^3$ $= 14\ 137\ m^3$ Number of refills $= 14\ 137 \div 90.2$ $= 156.77$ $= 156$ complete refills		2	
(d)	$5x + 3(2 - x) = \frac{2x}{3} + 12$ $5x + 6 - 3x = \frac{2x}{3} + 12$ $2x + 6 = \frac{2x}{3} + 12$ $2x = \frac{2x}{3} + 6$ $6x = 2x + 18$ $4x = 18$ $x = 4.5$		3	3 marks for complete solution 2 marks if 1 or 2 simple errors made 1 mark if some correct manipulation done
(e)	Angle =72° Percentage $= \frac{72}{360} \times 100$ $= 20\%$		1	
(f)	Cost of separate parcels = $30.00 + $50.00 = $80.00 *Cost of single parcel (5.5 kg)* = $65.00 Saving = $15.00		2	2 marks for correct answer 1 mark if single error

Question 24	HSC Trial Examination-	2009	
Part	Solution	Marks	Comment
(a) (i)	Fortnightly net pay = 46 800 ÷ 26 − 480 = $1 320	1	
(a) (ii)	Taxable income = 46 800 + 480 − 1 500 = $45 780	1	
(a) (iii)	Income tax = 11 400 + 0.50 × 780 = $11 790 Medicare levy = 0.015 × 45 780 = $686.70 Tax due = 686.70 + 11 790 = $12 476.70	2	2 marks for final result 1 mark if Income tax or Medicare is correct
(a) (iv)	Tax Paid = $480 × 26 = $12 480 Tax Refund = $12 480 − $12 476.70 = $3.30 refund	1	
(b) (i)	12 − 4 = 18 − 10 = 8	1	
(b) (ii)	$P(Success) = \dfrac{38}{50}$ $= \dfrac{19}{25} = 0.76$	1	
(b) (iii)	$P(\text{Success given predicted success}) = \dfrac{28}{32}$ $= \dfrac{7}{8} = 0.875$	1	
(b) (iv)	$P(\text{Failure given predicted failure}) = \dfrac{8}{18}$ $= \dfrac{4}{9} = 0.444$ She is better at predicting success as she was right 87.5% of the time when she predicted success but only 44.4% when she predicted failure.	2	1 for working put failure 1 for reason
(c) (i)	$N = M\left\{\dfrac{(1+r)^n - 1}{r(1+r)^n}\right\}$ $25\,000 = M\left\{\dfrac{(1.01)^{72} - 1}{0.01(1.01)^{72}}\right\}$ $25\,000 = 51.1\,M$ $M = \dfrac{25000}{51.1}$ $= \$488.75$	2	1 for sub in formula correctly 1 for calculating answer
(c) (ii)	Interest = 488.75 × 72 − 25 000 = 35 190 − 25 000 = $10 190	1	Accept 10 191

Question 25	HSC Trial Examination-		2009	
Part	Solution		Marks	Comment
(a) (i)	Hyperbola		1	
(a) (ii)	600 m		1	
(a) (iii)	240 to 250 m		1	
(a) (iv)	Width 800, length 75, perimeter 1750m Width 300, length 200 perimeter 1000m The 300 m width paddock would be cheaper to fence.		1	
(b) (i)			1	
(b) (ii)	$P(HH) = 0.8 \times 0.6$ $= 0.48$		1	
(b) (iii)	$P(HM) + P(MH) = 0.8 \times 0.4 + 0.2 \times 0.6$ $= 0.32 + 0.12$ $= 0.44$		1	
(b) (iv)	$P(\text{ at least one } H) = 0.48 + 0.44$ $= 0.92$ OR $P(\text{ at least one } H) = 1 - P(MM)$ $= 1 - 0.2 \times 0.4$ $= 0.92$		1	
(c) (i)	$\dfrac{YB}{\sin 34^\circ} = \dfrac{1.5}{\sin 86^\circ}$ $YB = \dfrac{1.5}{\sin 86^\circ}(\sin 34^\circ)$ $= 0.841$ km		2	1 for sub in sine rule 1 for calculation
(c) (ii)	$XB^2 = 2.4^2 + 1.5^2 - 2 \times 2.4 \times 1.5 \times \cos 75^\circ$ $= 6.15$ $XB = 2.5$ km		2	1 for sub in cosine rule 1 for calculation

(c)
(iii) | Bearing is $86^o + 14^o = 100^oT$ | 1

Question 26	HSC Trial Examination-		2009	
Part	Solution		Marks	Comment
(a) (i)	No combinations $= 16 \times 15 = 240$ combinations		1	
(a) (ii)	Combinations of 4 players from 14 players $= 14 \times 13 \times 12 \times 11 = 24024$ combinations Order isn't important, so arrangements $4 = 4 \times 3 \times 2 \times 1 = 24$ So number of ways of selecting rest of team $= 24024 \div 24 = 1001$		1	
(b) (i)	$P(BB) = \dfrac{40}{90} \times \dfrac{35}{80}$ $ = \dfrac{7}{36}$		1	
(b) (ii)	$P(B \text{ and } G) = P(BG) + P(GB)$ $\phantom{P(B \text{ and } G)} = \dfrac{40}{90} \times \dfrac{45}{80} + \dfrac{50}{90} \times \dfrac{35}{80}$ $\phantom{P(B \text{ and } G)} = \dfrac{71}{144}$		1	
(c) (i)	$S = V_0(1 - r)^n$ $ = 5800(1 - 0.3)^6$ $ = \$682.36$		2	
(c) (ii)	$S = V_0(1 - r)^n \qquad$ OR $\qquad S = V_0 - Dn$ $ = 5800(1 - 0.3)^3 \qquad\qquad = 5800 - 1\,200 \times 3$ $ = \$1989.40 \qquad\qquad\quad = \$2\,200.00$ Straight line gives greater value		2	
(d) (i)	Number of players from Western $= 8\%$ of 250 $ = 20$ players		1	
(d) (ii)	$Min\ Ext = 166 \quad Q_1 = 178 \quad Q_2(median) = 185 \quad Q_3 = 193 \quad Upper\ Ext = 202$ 		3	1 each for Extremes Median Quartiles
(d) (iii)	Sample SD $= 10.85$		1	

Question 27	HSC Trial Examination-		2009	
Part	Solution		Marks	Comment
(a)(i)	Angular distance $= 10° + 30° = 40°$ $\qquad$ Distance $= 40 \times 60 \, M$ $\qquad\qquad = 2\,400 \, M$		2	1 for Ang dist 1 for dist
(a)(ii)	Time $=$ distance/speed $\qquad = \dfrac{2400}{15}$ $\qquad = 160$ hours $\qquad = 6\frac{2}{3}$ days $\qquad$ or 6 days 16hrs		1	
(a)(iii)	$40°$ longitude difference $\Rightarrow 40 \times 4$ minutes time difference FI is 2 hrs and 40 min later and on other side of Date line Time on FI is 6:30 + 2:40 = 9:10 am on Friday 14th August.		2	1 for time 1 for date
(b)(i)	Deposit $= 0.2 \times 1750$ $\qquad = \$350.00$ Payments $= 24 \times \$95.70$ $\qquad = \$2\,296.80$ Total Paid $= \$2\,296.80 + \$350.00$ $\qquad = \$2\,646.80$ Interest $= \$2\,646.80 - 1750.00$ $\qquad = \$896.80$		2	1 for payments 1 for extra paid
(b)(ii)	Interest Rate $= \dfrac{\$896.80}{1400} \div 2$ $\qquad = 32\%$ p.a.		1	
(c)	$I \propto \dfrac{1}{d^2}$ $I = \dfrac{k}{d^2}$ $25 = \dfrac{k}{40^2}$ $k = 40\,000$ $I = \dfrac{40000}{d^2}$ $= \dfrac{40000}{50^2}$ $= 16$ metres		3	1 for equation 1 for value of k 1 for answer

(d)	Rate per day = 0.0003835			2	Allow for rounding errors
	Amount	Days Interest	Interest to 5th Aug		Accept $2.25 - $2.35
	68.00	34	0.8867		
	53.50	20	0.4104		
	40.00	13	0.1995		
	105.50	10	0.4047		
	150.80	7	0.4049		
		Total Interest =	$ 2.31		

Question 28	HSC Trial Examination-		2009	
Part	Solution		Marks	Comment
(a)(i)	Geog $z_G = \dfrac{67-55}{8} = 1.5$ Hist $z_H = \dfrac{72-60}{12} = 1$ Geography result is better.		2	1 finding each z score
(a)(ii)	Z score $= \dfrac{63-55}{8} = 1$ 68% lie between 1 and -1 34% lie between 0 and 1 16% greater than 1		1	
(a)(iii)	5% lie outside -2 and 2 so 2.5% lie above 2. Hist z score of 2 $= 60 + 2 \times 12 = 84$ (1 above) Geog z score of 2 $= 55 + 2 \times 8 = 71$ (1 above) 2 students would be invited, Catalina on Hist and Bella on Geog..		2	1 for z scores and 1 for identifying students above
(b)(i)	$YC^2 = 15^2 + 120^2$ $\qquad = 14625$ $YC = \sqrt{14625}$ $\qquad = 121$ cm (3 *s.f.*)		1	
(b)(ii)	$Area = \dfrac{1}{2}ab\sin C$ $= \dfrac{1}{2} \times 15 \times 121 \times \sin 95°$ $= 904$ cm^2		2	1 for substitution 1 for answer
(b)(iii)	$Area\ \Delta ABC = \dfrac{1}{2} \times 120 \times 45 = 2700$ cm^2 Percentage $= \dfrac{904}{2700} \times 100 = 33.5\%$		1	Accept any method to get this solution
(c)(i)	A strong positive correlation.		1	
(c)(ii)	Gradient $= \dfrac{12}{8} = 1.5$		1	
(c)(iii)	$N = 1.5Y + 2$ or equivalent with other variables.		1	
(c)(iv)	$N = 1.5 \times 20 + 2 = 32$ problems		1	