Semester 2 (Unit 1 & Unit 2) Examination, 2015

Question/Answer Booklet

MATHEMATICS APPLICATIONS

Section One: Calculator-free

Student Name/Number: _____

Teacher Name: _____

Time allowed for this section

Reading time before commencing work: five minutes
Working time for this section: fifty minutes

Materials required/recommended for this section

To be provided by the supervisor: This Question/Answer Booklet
Formula Sheet

To be provided by the candidate:

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: nil

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of exam
Section One: Calculator-free	8	8	50	55	35
Section Two: Calculator-assumed	11	11	100	100	65
					100

Instructions to candidates

1. The rules for the conduct of School exams are detailed in the _____*School/College assessment policy*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
   - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
   - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

5. **Show all working clearly.** Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat any question, ensure that you cancel the answer you do not wish to have marked.

6. It is recommended that you **do not use pencil**, except in diagrams.

7. The Formula Sheet is **not** to be handed in with your Question/Answer Booklet.

See next page

Section One: Calculator-free **35% (55 Marks)**

This section has **8** questions. Answer **all** questions. Write your answers in the spaces provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
- Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

Suggested working time: **50 minutes**.

Question 1 **(4 marks)**

Margaret received a dividend of $2000 on her 80 shares in an IT company.

(a) What was the dividend for each share? (1 mark)

Twelve months later the dividend paid was $2500.

(b) Determine the percentage increase in the value of the dividend. (1 mark)

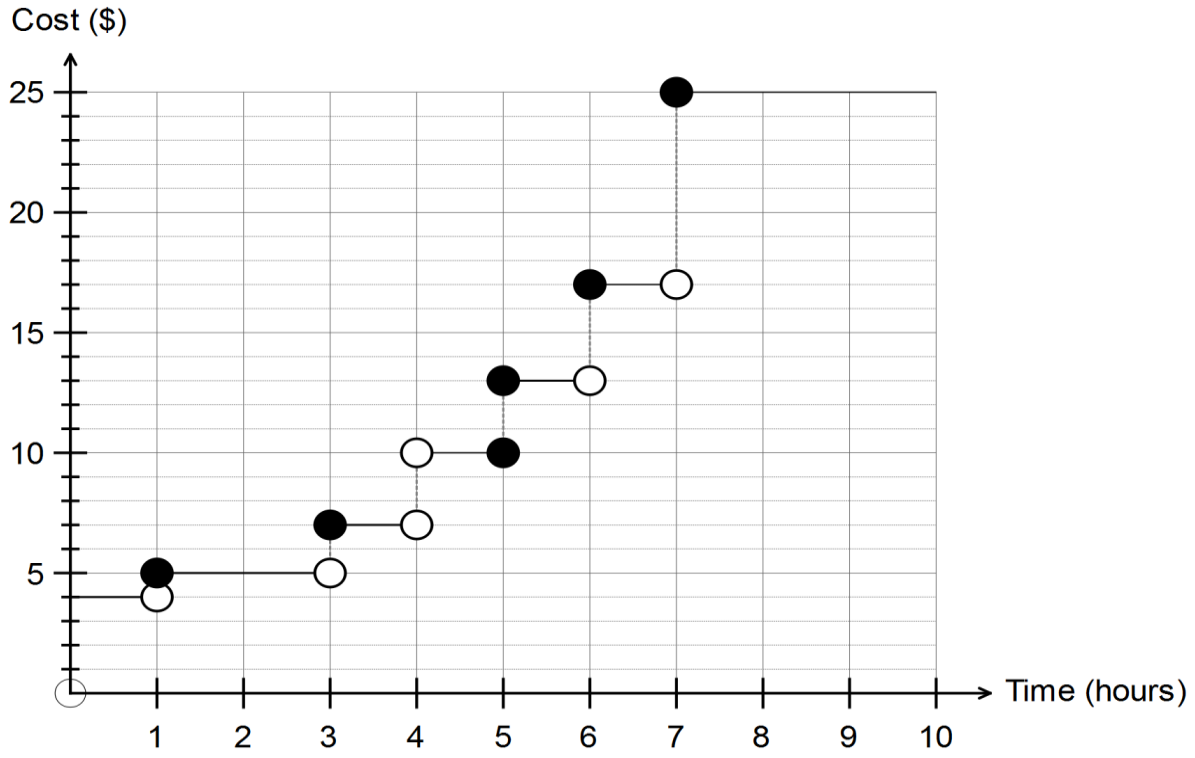
After another twelve months the dividend increased by 7%.

(c) What was the dividend paid? (2 marks)

 See next page

Question 2 **(5 marks)**

The cost of parking during trading hours (9:00 am – 5:30 pm) at Watertown is shown in the graph below.



(a) How much will it cost to park at Watertown for 6 hours? (1 mark)

(b) If you arrive at Watertown at 9:15 am and pay $5 to park, by what time will you need to move the car and still get the maximum amount of parking for your $5? (1 mark)

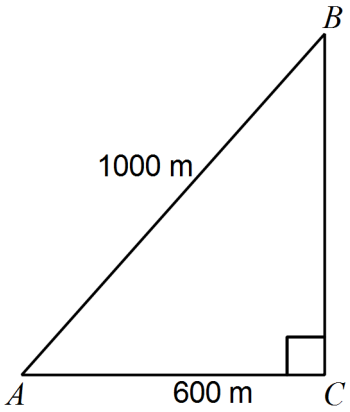
(c) If you own a business that trades each weekday for the whole day but not on weekends, what would it cost you to park for the week during trading hours? (1 mark)

(d) One student said that it cost $8 for "3-4 hours of parking".
Give two reasons to justify that this statement is inaccurate. (2 marks)

See next page

Question 3 **(5 marks)**

Triangle ABC represents the sailing course for a race on the river.



(a) Use the fact that $\sin A = \frac{4}{5}$ to determine the length of BC. (2 marks)

(b) Write an expression to determine $\angle BAC$ (2 marks)

(c) If $\angle ABC$ ~ 37°, estimate the true bearing of A from B. (1 mark)

See next page

Question 4 **(7 marks)**

(a) Solve the following pair of simultaneous equations algebraically. (5 marks)

$$2x + 3y = 10.5$$
$$3x + 2y = 9.5$$

(b) The equations in part (a) were written by Marcia when she started to solve the problem described below.

On Wednesday Kevin bought 2 caramel bars, each 50 g in weight and 3 chocolate bars, each 100 g in weight from the local supermarket and paid $10.50. The following day he bought 3 of the same caramel bars and 2 of the same chocolate bars and paid $9.50. The prices had not changed between his visits to the supermarket.

What do the variables x and y represent? (2 marks)

See next page

Question 5 **(5 marks)**

Mel was studying the tennis results on a competition website so that she could work out how the player's "% chance of winning" was calculated. She determined the following process:

1. Subtract the opponent's points from the player's points
2. Multiply the result of the calculation in part 1. by 0.01 (same as dividing by 100)
3. Add 50

(a) Using m to represent the player's points and k to represent the opponent's points, determine the rule to calculate the player's "% chance of winning". (2 marks)

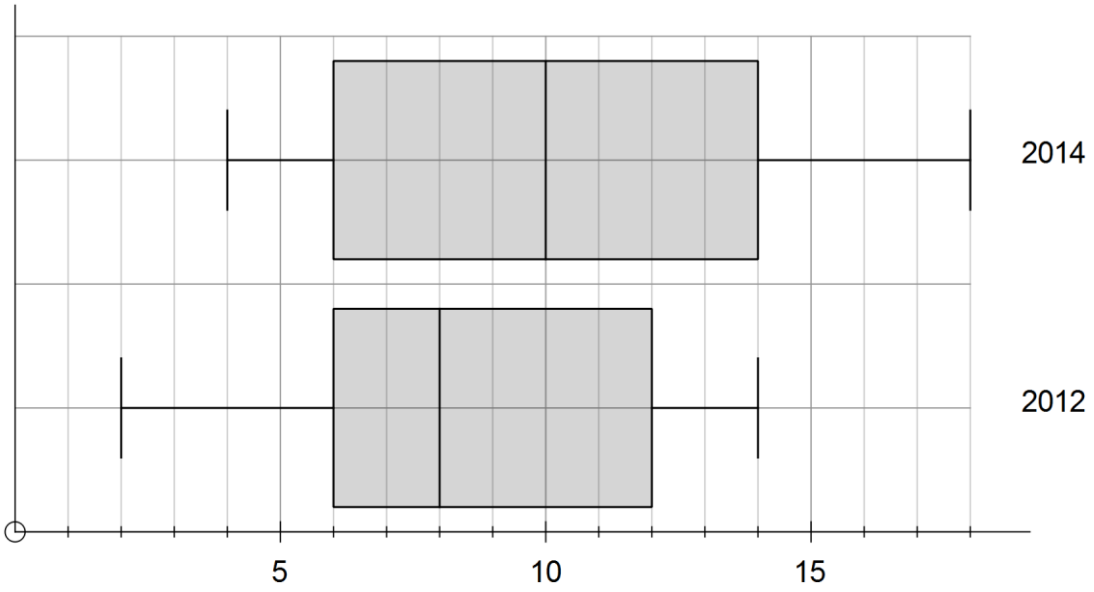
(b) Use your rule to complete the table provided. (3 marks)

Player's points	**Opponent's points**	**% chance of winning**
5000	4500	
5000	6200	

See next page

Question 6 **(9 marks)**

The daily house sales for the Abacus Real Estate Company for the period 1 September to 31 December in 2012 and 2014 are represented as box plots.



(a) What was the maximum number of houses sold on any one day during the 2014 period? (1 mark)

(b) Compare the range of daily house sales in 2012 with that of 2014. (2 marks)

(c) Determine the interquartile range for daily house sales in 2014 (1 mark)

(d) For 75% of the days during the period September 1, 2012 to December 31, 2012, the number of houses sold never exceeded a particular number. What was this number? (1 mark)

 See next page

 See next page

(e) The minimum number of houses sold on any one day is higher in 2014 than in 2012 and this suggests house sales could have increased overall from 2012 to 2014. Similarly the maximum number of houses sold in any one day is higher in 2014 than in 2012.

Referring to the boxplots, give two other reasons to support the suggestion that house sales in 2014 have increased since 2012. (2 marks)

(f) In both boxplots the lower quartile is 6. Does this indicate that on 25% of the days from September 1 until December 31 in both years, there were only 6 houses sold? Explain your decision. (2 marks)

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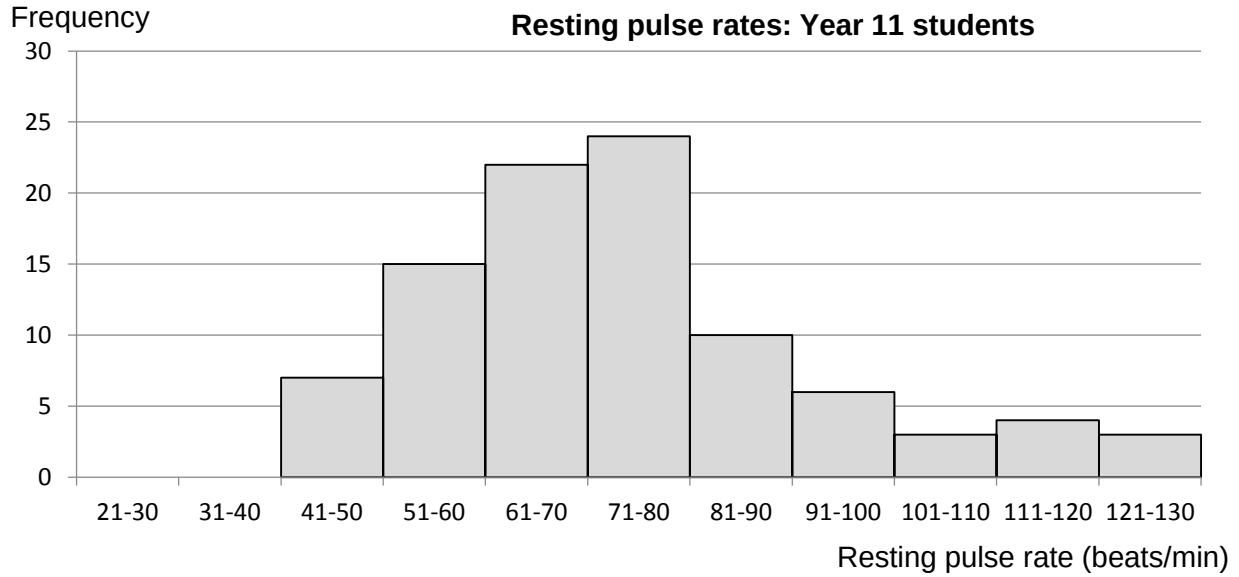
See next page

Question 7 **(10 marks)**

The histogram below shows the resting pulse rates in beats per minute of approximately 100 Year 11 students.



(a) Determine the approximate percentage of these Year 11 students that had a resting pulse between from 81 to 90 beats per minute. (1 mark)

(b) Is the numerical variable classified as discrete or continuous?
Justify your decision. (2 marks)

(c) Which is the modal class? (1 mark)

See next page

(d) When making this graph, Tina omitted an outlier. What might have been the value of the outlier? (1 mark)

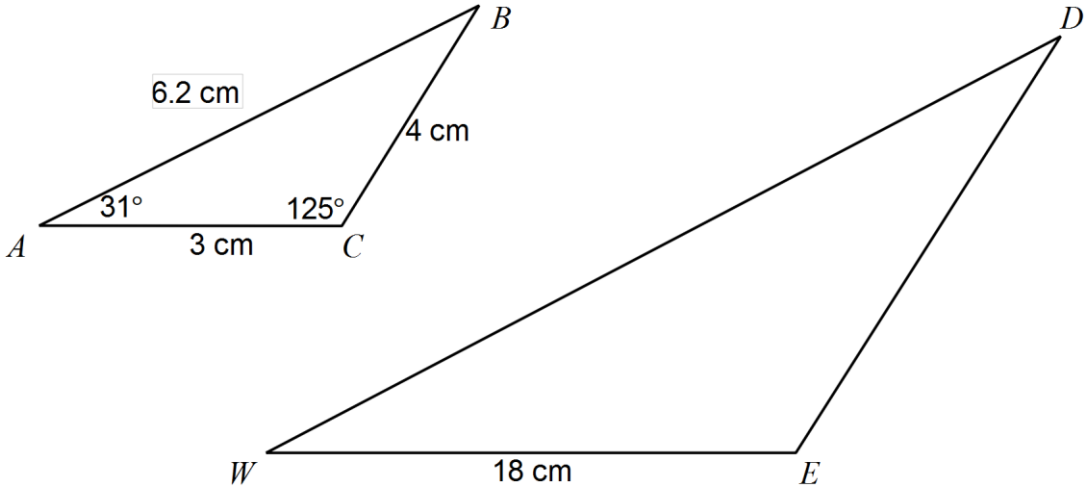
(e) For which two classes was the frequency the same? (1 mark)

(f) According to Susie, the lowest resting pulse could have been 49 beats per minute. Was Susie correct? Explain. (2 marks)

(g) Describe the shape of the distribution of this data and describe what this means in terms of the resting pulses for this sample of Year 11 students. (2 marks)

See next page

Question 8 (10 marks)



Triangle ABC represents the scaled diagram of the glass panel of a car window and triangle WDE represents the actual glass panel. Neither diagram is drawn to scale.

(a) Given triangle ABC is similar to triangle WDE mark all known sides and angles for triangle WDE. (4 marks)

(b) Write an expression that could be used to calculate the area of triangle ABC. (2 marks)

(c) A strip of rubber is placed around the sides of the glass panel.
How long is the strip of rubber? (1 mark)

See next page

(d) The area of the glass panel in the car is 353.87 cm^2. (3 marks)

(i) How many times larger is the area of the glass panel than the area of the scaled diagram?

(ii) Justify your answer to part (d) (i).

End of Questions

See next page

Additional working space

Question number: _____

 See next page

Additional working space

Question number: _____

See next page

Acknowledgements

Data for Question 7 from http://www.cas.abs.gov.au/cgi-local/cassampler.pl

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