

**Semester One**

**Examination 2018**

**Question/Answer booklet**

**MATHEMATICS**

**APPLICATIONS UNIT 1**

**Section One:**

**Calculator–free**

|  |
| --- |
| Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Teacher’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  |

**Time allowed for this section**

Reading time before commencing work: five minutes

Working time for paper: fifty minutes

**Material 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 tape/fluid, 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**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Number of questions available | Number of questions to be attempted | Working time (minutes) | Marks available | Percentage of exam |
| **Section One****Calculator—free** | **6** | **6** | **50**  | **50** | **35** |
| Section TwoCalculator—assumed | 14 | 14 | 100  | 100 | 65 |
|  | Total marks | 100 |

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the

*Year 12 Information Handbook 2018.* Sitting this examination implies that you agree to abide by these rules.

1. Answer the questions according to the following instructions.

 **Show all your 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 an answer to any question, ensure that you cancel the answer you do not wish to have marked.

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

1. 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.
2. 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.
1. The Formula Sheet is **not** handed in with your Question/Answer Booklet.

# Section One: Calculator–free 35% (50 marks)

This section has **six (6)** questions. Attempt **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(s) that you are continuing to answer at the top of the page.

Working time: 50 minutes

**Question 1 (7 marks)**

(a) Calculate the simple interest on $500 for 2 years at 8% pa.(2 marks)

(b) What equation, when solved, would allow you to calculate the rate of interest

 a lender must charge to obtain $500 simple interest over 4 years on a principal

 of $2000? (2 marks)

After 3 years, a principal of $1000 grows to become $1200, when invested at 6% pa compounding at x times per year.

The formula which applies to this situation is 

State the values of:

 (i) P (1 mark)

 (ii) the compound interest earned. (1 mark)

 (iii) A (1 mark)

**Question 2 (14 marks)**

(a) Calculate M where M = XY + 5 with X = 6 and Y = 2. (1 mark)

(b) Calculate N where N = (x + y)2 with x = 6 and y = 2. (1 mark)

(c) Calculate the simple interest received on an investment of $4500 at the end of 5 years, with interest at a rate of 3.2% p.a. (2 marks)

(d) Determine the GST of 10% to be added on a sale of $75. (1 mark)

(e) Peter pays $88 for an item. This includes 10% GST.

 What was the price of the item before GST? (2 marks)

(f) What percentage of 120 is 30? (2 marks)

(g) Chloe’s netball team scored 25 goals in a final. The opposing team scored 20% more.

 What was the opposing team’s score? (2 marks)

(h) 5% of a length of wire was removed. 285 m of wire remained.

 What length of wire was removed? (3 marks)

**Question 3 (8 marks)**



(a) (i) Show that these two triangles are similar to each other. Lengths are in cm, and

 the angles are in degrees. (3 marks)

 (ii) Determine the value of k. (2 marks)

(b) (i) State the value of p + q in terms of y and z. (1 mark)

 (ii) State the value of the expression x + y + z. (1 mark)

(c) The area of the smaller triangle is A.

 What is the area of the larger triangle, in terms of A? (1 mark)

**Question 4 (9 marks)**

Consider these four matrices.

A =  B =  C =  D = 

(a) State the dimensions of matrix A. (1 mark)

(b) Calculate, if possible:

 (i) CB (2 marks)

 (ii) BD (2 marks)

 (iii) 2A (2 marks)

 (iv) −C − 2C (2 marks)

**Question 5 (5 marks)**

Two balloons are inflated so that their radii are in the ratio of 3:4.

The larger balloon has a radius of 80 cm.

(a) State:

 (i) the radius of the smaller balloon. (1 mark)

 (ii) the ratio of their surface areas. (1 mark)

 (iii) the ratio of their volumes. (1 mark)

(b) State, in terms of π, the surface area of the larger balloon. (2 marks)

**Question 6 (7 marks)**

This network (digraph) shown below represents roads between locations in a city.

Some roads are two−way, and some are one-way. Arrows indicate the direction of the

one−way roads.

(a) Enter the same information shown above into matrix M. (2 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | To |  |
|  |  |  |  | A B C |  |
|  |  | A |  |  |  |
| M = | From | B |  |  |  |
|  |  | C |  |  |  |

(b) Use matrix multiplication to determine matrix M2. (2 marks)

(c) In this context, what information is contained in matrix M2? (1 mark)

(d) (i) In how many ways can a person travel from A to B, using two paths? (1 mark)

 (ii) Which place (vertex), if any, cannot be reached from C in two stages? (1 mark)

**End of Questions**

**Additional working space**

Question number(s): ……………………

**Additional working space**

Question number(s): ……………………

**Additional working space**

Question number(s): ……………………

WATP acknowledges the permission of the School Curriculum and Assessment Authority in providing instructions to students.