

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.

### Important note to candidates

Special items: nil

To be provided by the candidate  
Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction tape/fluid, erasers, ruler, highlighters

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

### Material required/recommended for this section

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

Teacher's Name:

Student's Name:

Calculator-free  
Section One:

## MATHEMATICS METHODS UNIT 1

Question/Answer booklet

Examination 2017

Semester One



**Structure of this paper**

	Number of questions available	Number of questions to be attempted	Working time (minutes)	Marks available	Percentage of exam
<b>Section One Calculator—free</b>	<b>8</b>	<b>8</b>	<b>50</b>	<b>51</b>	<b>35</b>
Section Two Calculator—assumed	13	13	100	99	65
			150		100

**Additional working space**

Question number(s): .....

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2017*. Sitting this examination implies that you agree to abide by these rules.
2. 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.

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

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

(1 mark)

(iii)  $n(B \cup C)$ 

(1 mark)

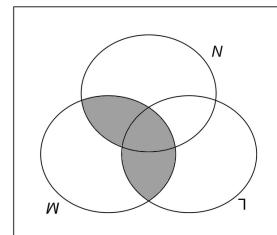
(ii)  $(A \cup B)^c$ 

(1 mark)

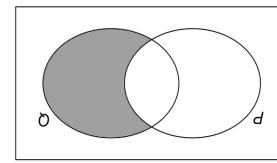
(i)  $A \cap B \cap C$ 

State the following:  
 $A = \{\text{prime numbers less than } 19\}$     $B = \{\text{factors of } 12\}$     $C = \{\text{multiples of } 3\}$   
 $U = \{\text{positive integers between } 1 \text{ and } 20, \text{ where } 1 \text{ and } 20 \text{ are not included}\}$

(b)



(iii)



(ii)

(2 marks)

(a) Describe the shaded region in set notation.

**Question 1 (5 marks)**

Working time: 50 minutes

- Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing: If you need to use the space for planning, indicate this clearly at the top of the page and/or as additional space if required to continue an answer.
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  - Original answer: If you need to use the space for planning, indicate this clearly at the top of the page and/or as additional space if required to continue an answer.
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- 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.
- This section has **eight (8)** questions. Attempt all questions. Write your answers in the spaces provided.

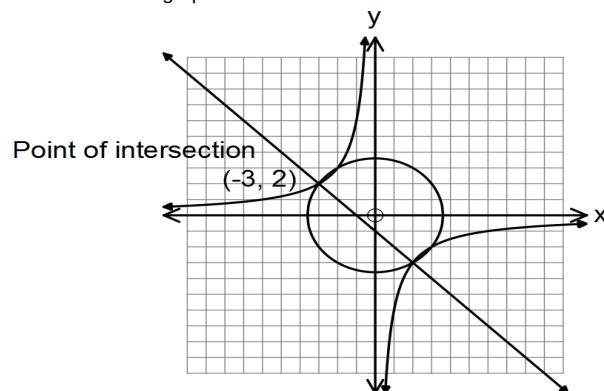
**Section One: Calculator-free**  
**35% (51 marks)**

**Additional working space**

Question number(s): .....  
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 Question number(s): .....

**Question 2 (11 marks)**

Consider the functions graphed below.



**(a)** State the equation for:

(i)  $f(x)$ , the circle with centre at the origin. (2 marks)

(ii)  $g(x)$ , the hyperbola. (2 marks)

(iii)  $h(x)$ , the straight line. (2 marks)

**(b)** Hence, solve the equation  $f(x) = g(x)$ . There are four solutions. (2 marks)

**(c)** The graph  $g(x)$  undergoes the following transformation  $g(2x) + 1$ .

(i) State the coordinates of the point  $(-3, 2)$  after this transformation has occurred. (2 marks)

(ii) The graph  $h(x)$  undergoes the same transformation namely  $h(2x) + 1$ . State the gradient of the transformed function. (1 mark)

**Question 8 (5 marks)**

Solve for all values of  $\theta$  in the given domain.

**(a)**  $2 \sin \theta = -1$  where  $0^\circ \leq \theta \leq 360^\circ$

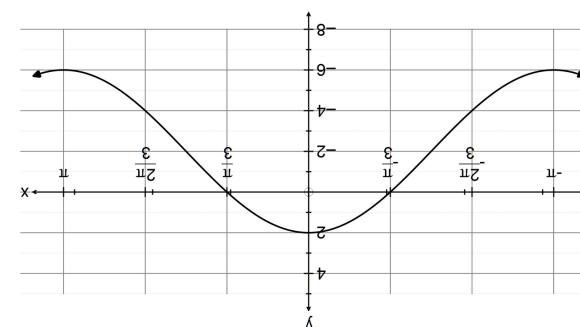
(2 marks)

**(b)**  $4 \cos^2 \theta - 3 = 0$  and  $\theta \in [0, 2\pi]$

(3 marks)

**End of Questions**

(4 marks)

(a) Determine the values of  $a$ ,  $b$ ,  $c$  and  $d$ .The graph below can be written  $k(x) = a \cos(x) - b = c \sin(x - d) - b$ 

(2 marks)

(b) State the range of  $k(x)$ .

(2 marks)

(c) Explain why the graph represents a function and verify your explanation by using the vertical line test on the graph.

(4 marks)

- (b) Rationalise the denominator of your solution.  
 (a) Use the sum of two angles to find the exact value of  $\tan \frac{12}{7\pi}$ .

(2 marks)

(2 marks)

Question 4 (6 marks)

- (a) Find the exact value of  $(\sin 250^\circ)(\cos 25^\circ) - (\cos 250^\circ)(\sin 25^\circ)$ .

Question 3 (4 marks)

A circle with the equation  $x^2 + y^2 - 2x - 2y - 23 = 0$  has a diameter MN. Find the coordinates of M

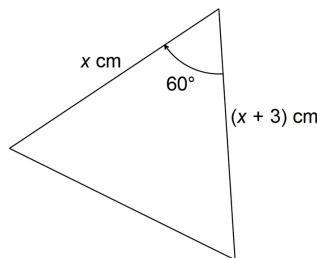
if N is the point (4, 5).

(4 marks)

(a) Determine the values of  $a$ ,  $b$ ,  $c$  and  $d$ .

**Question 5 (7 marks)**

Consider the triangle, which is not drawn to scale, shown below.



- (a) Show that the area of the triangle is given by  $\frac{x}{4}(\sqrt{3}x + 3\sqrt{3})$  cm<sup>2</sup>. (2 marks)

- (b) Given that the length of the unmarked side is 7 cm, find the value of x. (3 marks)

- (c) Hence, or otherwise, find the exact area of the triangle. (2 marks)

**Question 6 (5 marks)**

A doctor wishes to tell her patient's family the probability of his condition improving after a certain treatment. Suppose I is the event that the patient's condition improves, O is the event that his condition remains the same and W is the event that his condition worsens.

If P(W) = 30% and P(O) = 10 % find the probability that the patient's condition:

- (a) improves. (1 mark)

- (b) does not improve. (1 mark)

- (c) improves or stays the same. (1 mark)

- (d) Draw a Venn diagram which shows that these three events are mutually exclusive. (2 marks)