SCOTCH COLLEGE

Scotch College
Semester One Examination, 2015

Question/Answer Booklet

MATHEMATICS METHODS (Yr 11)

Section One:
Calculator free

Teacher (please circle):

J Fletcher R Foster P Newman M Zuidersma

Name:

Time allowed for this section
Reading time before commencing work: 5 minutes
Working time for this section: 50 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, pencils, pencil sharpener, eraser, correction fluid, ruler, highlighters

Special items: nil

Important note to candidates
No other items may be used in this section of the examination. 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	Weighting
Section One: Calculator-free	8	8	50	50	35
Section Two Calculator-assumed	13	13	100	100	65
				150	100

Instructions to candidates

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2015*. Sitting this examination implies that you agree to abide by these rules.

2. Write your answers in the spaces provided in this Question/Answer Booklet. 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.

3. **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.

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

Section One: Calculator-free (50 Marks)

This section has **eight (8)** questions. Answer **all** questions. Write your answers in the space 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 for this section is 50 minutes.

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1. [5 marks]

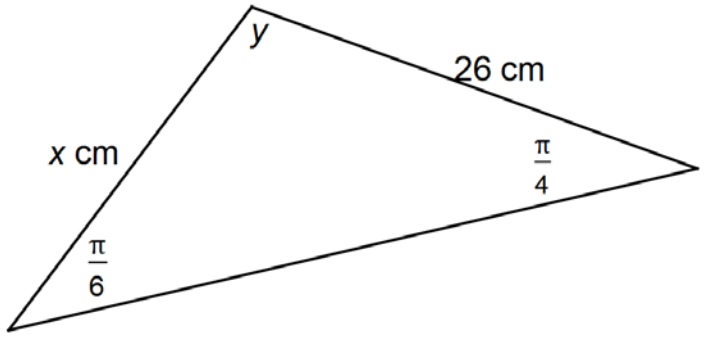
Find the equation of the line passing through the point with coordinates (6, 5) and

(a) parallel to the line with equation $3x + 2y = 20$. **[2]**

(b) perpendicular to the line with equation $2x + 4y = 10$. **[3]**

2. [5 marks]

Find the exact values of x and y in the following triangle.



3. [10 marks]

Let $f(x) = 12 - 3(x+1)^2$.

For the graph of $f(x)$

(a) write down the coordinates and nature of the turning point **[2]**

(b) write down the coordinates of the *y*-intercept **[1]**

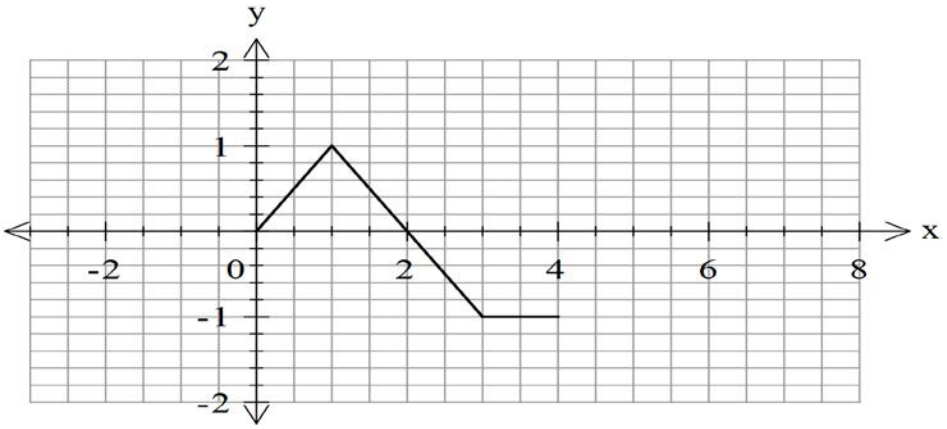
(c) find the coordinates of both *x*-intercepts. **[3]**

A function *g* is defined as $g(x) = 9 - 9x$

(d) Find the coordinates of the points where $f(x) = g(x)$ **[4]**

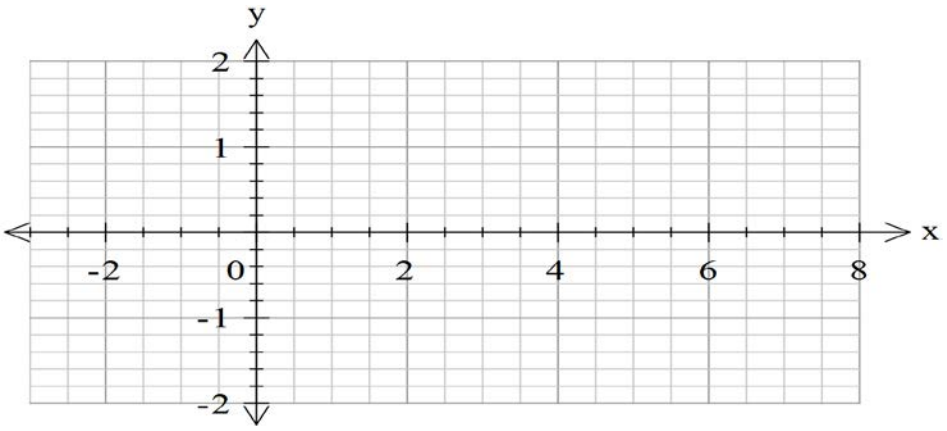
4. [7 marks]

The graph of $y = f(x)$ is shown in the diagram.

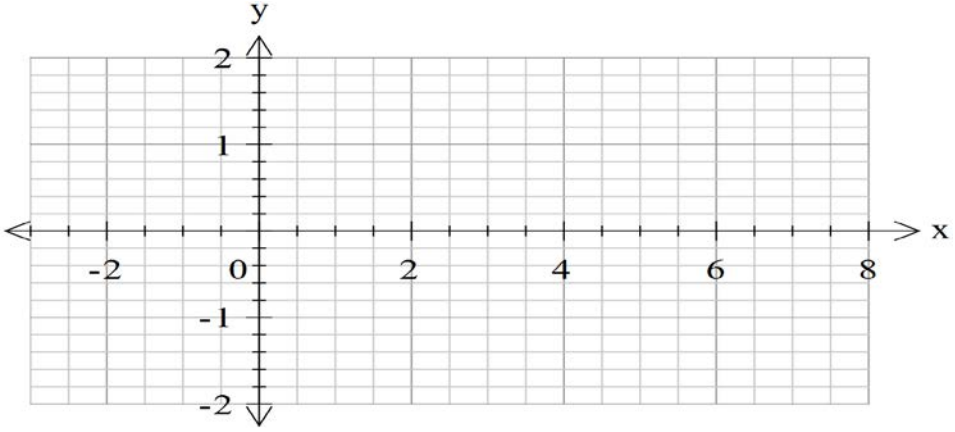


(a) On each of the following diagrams draw the required graph **[5]**

(i) $y = 2f(x-1)$



(ii) $y = f\left(\frac{x}{2}\right) - 1$



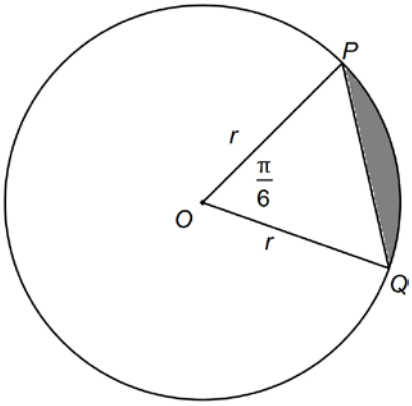
(b) The point A (3, –1) is on the graph of *f(x)*. The point A' is the corresponding point on the graph of $y = -f(x) + 1$. Find the coordinates of A' **[2]**

5. [5 marks]

Solve $x^3 + 4x^2 + x - 6 = 0$

6. [5 marks]

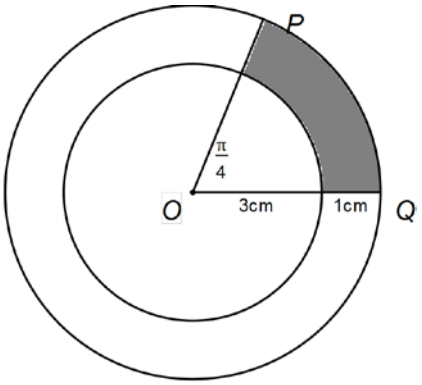
The shaded area in the diagram is a segment of a circle of radius r.



Show that the area of the segment is given by $\frac{r^2(\pi-3)}{12}$

7. [8 marks]

Two circles are drawn as shown.



(a) Find in terms of π

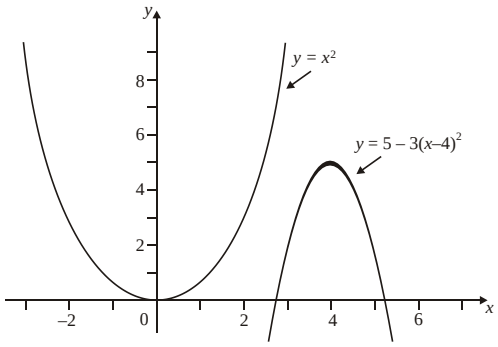
(i) the length of the arc PQ **[2]**

(ii) the area of the shaded region **[3]**

(b) What percentage of the larger circle is sector POQ? **[3]**

8. [5 marks]

The diagram shows parts of the graphs of $y = x^2$ and $y = 5 - 3(x - 4)^2$.



The graph of $y = x^2$ may be transformed into the graph of $y = 5 - 3(x - 4)^2$ by four transformations.

Describe the transformations in the correct order.

END OF SECTION ONE

EXTRA WORKING PAGES

Question	Marks	Result
1	5	
2	5	
3	10	
4	7	
5	5	
6	8	
7	5	
8	5	
Total	50 marks	