Christ Church Grammar School

2021
Test 3

MATHEMATICS METHODS Year 11

Section One:
Calculator-free

Your name _____

Teacher's name _____

Time and marks available for this section

Working time for this section:	25 minutes
Marks available:	25 marks

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.

Instructions to candidates

1. The rules of conduct of the CCGS assessments are detailed in the Reporting and Assessment Policy. Sitting this assessment implies that you agree to abide by these rules.

2. Write your answers in this Question/Answer Booklet using a blue/black pen. Do not use erasable or gel pens.

3. Answer all questions.

4. You must be careful to confine your response to the specific question asked and to follow any instructions that are specified to a particular question.

5. Supplementary pages for the use of planning/continuing your answer to a question have been provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

6. **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.

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

See next page

Question 1 **(7 marks)**

(a) For each of the following determine the new equation once each of the given transformations has been applied.

(i) The graph of $f(x) = (x-3)^2$ is reflected in the x-axis followed by a dilation of scale factor $\frac{1}{2}$ parallel to the y-axis. (2 marks)

(ii) The graph of $f(x) = 2x^2 + 3x - 1$ is translated 2 units to the left and 3 units up. (3 marks)

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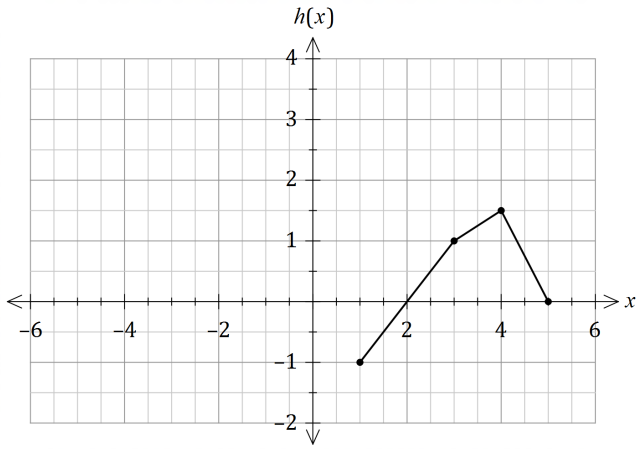
(b) List the sequence of transformations needed to transform the function $y = \sqrt{x}$ to $y = \sqrt{4x} + 2$ (2 marks)

See next page

Question 2 **(7 marks)**

The graph of the function $y = h(x)$ is shown below.



(a) Sketch the graph of $h(x + 4)$ on the above axis and label the function clearly. (2 marks)

(b) Sketch the graph of $h(-x)$ on the above axis and label the function clearly. (2 marks)

(c) Solve $h(x + 4) = h(-x)$. (1 mark)

(d) State the co-ordinates of the maximum point of $y = -2h(-x)$. (2 marks)

See next page

Additional working space

Question number: _____

Additional working space

Question number: _____

Question 3 **(3 marks)**

Determine the radius and centre of the circle given by $x^2 + y^2 = 10x - 8y + 40$.

See next page

Question 4 **(4 marks)**

Solve the following:

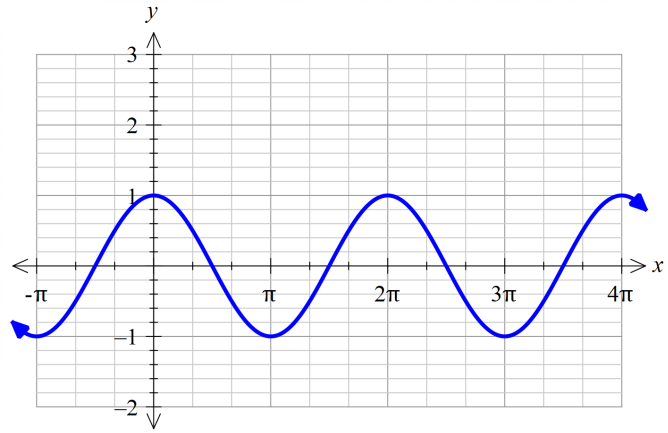
$$5\cos(x) - 2\cos^2 x - 2 = 1 \text{ for } -180° \leq x \leq 180°$$

See next page

Question 8 **(7 marks)**

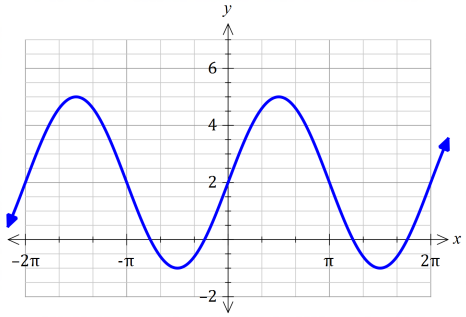
(a) Consider the graph of $y = \cos(x)$ shown below.

(i) Add a sketch for $y = \cos(x) + 1$ for $0 \leq x \leq 4\pi$ (2 marks)



(ii) Determine the equation of the new curve in the form $y = a \times \sin(x - c) + d$. (3 marks)

(b) Determine the equation of the following **sine** function. (2 marks)



End of questions

Question 7 continued

(c) Explain if the student will touch the water. (2 marks)

(d) If the bungee cord is perfectly elastic, after how many seconds will she first return to the level of the bridge? (1 mark)

See next page

Question 5 **(4 marks)**

Use a suitable angle sum or difference identity to give the exact value of $\sin(15°)$.

End of questions

Additional working space

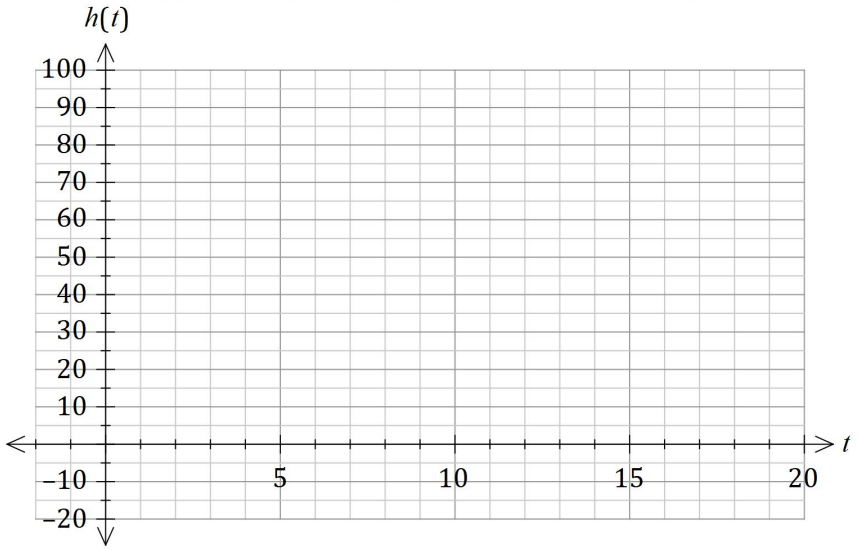
Question number: _____

Question 7 **(7 marks)**

In a moment of foolishness, a student decides to go bungee jumping from a bridge. On the way down, she reflects that her height in metres above the water at any time t seconds after leaping can be described using the function

$$h(t) = 45\cos(0.4t) + 43.5$$

(a) On the axes below, draw a graph of her height for the first 20 seconds. (3 marks)



(b) Determine the time(s) when the student is 50 m above the water. (1 mark)

See next page

Question 6 **(4 marks)**

(a) The quantity P, is directly proportional to another quantity h and when $h = 4.5$, $P = 1125$. Determine the value of h when $P = 7200$. (2 marks)

(b) The force of attraction, F, between two magnets varies inversely with the square of the distance, d, between them. When the magnets are 2 cm apart, the force, of attraction, F, is 18 newtons. Determine the force of attraction between the magnets if the distance between them is 6 cm. (2 marks)

See next page

Additional working space

Question number: _____

Christ Church Grammar School

2021
TEST 3

MATHEMATICS METHODS Year 11
Section Two:
Calculator-assumed

Your name _____

Teacher's name _____

Time and marks available for this section
Working time for this section: 20 minutes
Marks available: 18 marks

Materials required/recommended for this section
To be provided by the supervisor
This Question/Answer Booklet
Formula Sheet (retained from Section One)

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

Special items: drawing instruments, templates, and up to three calculators approved for use in this assessment

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