

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

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

**To be provided by the candidate**

Materials required/recommended for this section  
**To be provided by the supervisor**  
 This Questionnaire/Answer Booklet  
 Formula sheet

Time and marks available for this section  
 Marks available:  
 Working time for this section: 30 minutes  
 Marks available: 30 marks

Teacher's name

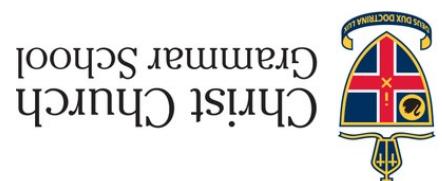
Stofhous.

Your name

Section One:  
 Calculator-free

### MATHEMATICS METHODS Year 11

Test 2  
2021



- Question 8
- The water level under the Narrows Bridge approximately follows the formula  $h = \frac{20t - 2t^2}{5}$  where  $h$  is the vertical height of water (in metres) and  $t$  is the number of hours after 9 am.
- (a) At what time is the water level at its highest? (1 mark)
- ∴  $2.00\text{pm}$  *time correct*
- (b) Determine the height of the water level at this time. (1 mark)
- 10m *correct height*
- (c) If the Rottnest Ferries can only pass under the bridge when the water level is 2.5 metres or more below the maximum height. Determine during which times of the day a ferry can pass under the bridge. (3 marks)
- $2.5, 7.5$  and  $(7.5, 7.5)$  *correct*
- Before 11.30am and after 4.30pm *correct*
- Time:  $k = 7.5$  *correct*
- Special items: nil *correct*
- Other items: nil *correct*
- Non-personal items: nil *correct*

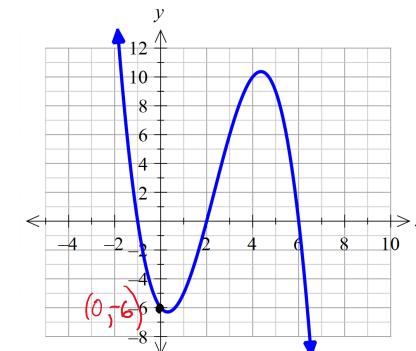
**Instructions to candidates**

- 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.
- Write your answers in this Question/Answer Booklet using a blue/black pen. Do not use erasable or gel pens.
- Answer all questions.
- 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.
- 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.
- 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 one mark, 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.

**Question 6**

(6 marks)

The graph of  $y = ax^3 + bx^2 + cx + d$  is shown below. Determine the values of the constants  $a$ ,  $b$ ,  $c$ , and  $d$ .



$$y = a(x+1)(x-2)(x-6)$$

$$-6 = a(0+1)(0-2)(0-6)$$

$$a = -\frac{1}{2}$$

$$y = -0.5x^3 + 3.5x^2 - 2x - 6$$

$$a = -\frac{1}{2} \quad b = 3.5$$

$$c = -2 \quad d = -6$$

✓ Uses  $x$  intercepts  
to write factors

✓ Uses a coordinate  
to find  $a$

///  $a, b, c$  and  
 $a$

(-1 mark if not given  
as  $a = b = c = 8 d =$ )  
(3 marks)

**Question 7**

State the natural domain and range for the function  $y = 5 - x^2$

Domain:  $\{x \in \mathbb{R}\}$

✓ Correct domain

Range:  $\{y \in \mathbb{R}: y \leq 5\}$

✓ Correct range

✓ Correct notation

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

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

the answer is continued, i.e. give the page number.  
use these pages to continue an answer, indicate at the original answer booklet if you  
question have been provided at the end of this Question/Answer booklet.

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[See next page](#)

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See next page

(3 marks)

$$9 + x = \frac{x}{16} \quad (c)$$

$$\begin{aligned} - &= x \\ 8 &= x_8 - \\ 51 &= x_8 - L \\ - &x_0 + x_8 - \textcircled{1} \end{aligned}$$

$$1 = \frac{S}{(4 - 6x) + S(2x - 1)}$$

$$\frac{3}{z-x-1} + \frac{5}{z(z-3x+1)} = 2 \quad (q)$$

(3 marks)

$$T = x \text{ and } O = x$$

$$8x(x-2) = 0$$

$$8x_z \equiv 16x \quad (a)$$

(2 marks)

(8 marks)

### Question 1

Solve the following equations.

MATHEMATICS METHODS YEAR 11

MATHEMATICS METHODS YEAR 12

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CALCULATOR-FREE

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THEMATICS METHODS Year 11

## Question 2

(5 marks)

Given that  $f(x) = 6 - 5x$  and  $g(x) = 6x^2 + 7x$ , find:

(a)  $f(-1) + g(-1)$

(2 marks)

$$\begin{aligned} & 6 - 5(-1) + 6(-1)^2 + 7(-1) \\ &= 10 \end{aligned}$$

$\checkmark$  Substitutes  $x = 1$   
 $\checkmark$  Simplifies

\* If they just  
 show 10, must  
 award 2 marks.

(b)  $x$ , when  $g(x) = 10$

(3 marks)

$$\begin{aligned} 10 &= 6x^2 + 7x \\ 0 &= 6x^2 + 7x - 10 \\ 0 &= (6x-5)(x+2) \\ x &= \frac{5}{6} \quad 3-2 \end{aligned}$$

$\checkmark$  Rearranges  
 $\rightarrow = 0$   
 $\checkmark$  Factorises  
 $\checkmark$  Solves for  $x$



Christ Church  
Grammar School

2021  
TEST 2

## MATHEMATICS METHODS Year 11

Section Two:  
Calculator-assumed

Your name Solutions

Teacher's name \_\_\_\_\_

## Time and marks available for this section

Working time for this section: 15 minutes  
 Marks available: 14 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 the WACE examinations

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correct  
gives us a  
-1 if not  
(mult. give 2)  
and indicate  
correct but  
marks if correct  
(mult. give 2)

$$\begin{aligned} & \text{y} = \frac{-5}{2}x + 1 \\ & \therefore (-4, -5) \text{ is a solution} \\ & x = -4 \\ & 8 = \frac{-5}{2}(-4) + 1 \\ & (8, 1) = \left( \frac{x+20}{2}, \frac{7+4}{2} \right) \end{aligned}$$

- A. (b) The point  $M(8, 1)$  is the midpoint of  $A$  and  $B(20, 7)$ . Determine the coordinates of  $A$ . (2 marks)

use distance  
formula correctly  
use formula  
for a  
values for a.  
/ a values, mult  
however both

$$\begin{cases} 13^2 = (7-a)^2 + (5-a)^2 \\ 144 = (8-3)^2 + (7-a)^2 \end{cases}$$

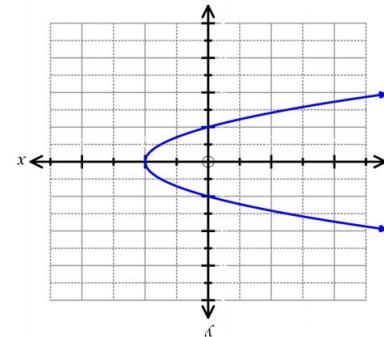
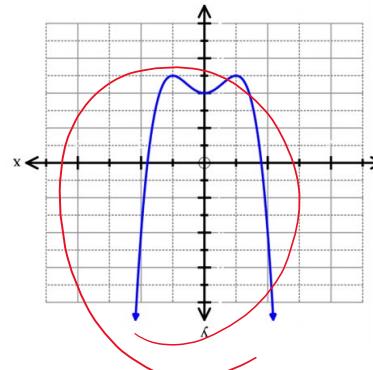
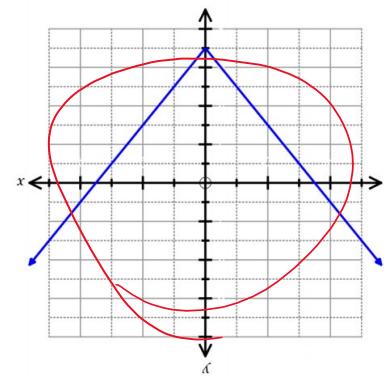
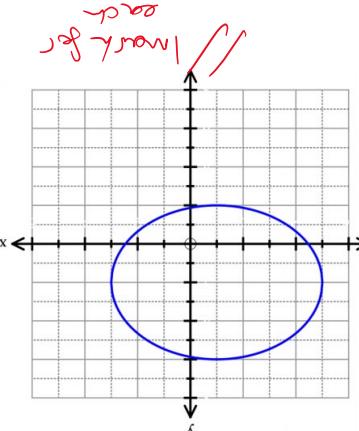
- (3 marks)

- (5 marks)

Maths  
which is a  
vertical line  
that passes  
through the  
middle of the  
line.

each graph passes the vertical line test.

- (b) Explain why the graphs selected in part (a) represent a function. (1 mark)



- (2 marks)

- (3 marks)

- (a) For what value/s of  $a$  is the point  $(a, 3)$  13 units away from the point  $(7, 8)$ . (3 marks)

- Question 3 (3 marks)

- (a) Circle the graphs that represent a function. (2 marks)

- Question 5 (5 marks)

## Question 4

(9 marks)

- (a) A straight line passes through points  $C(2, -5)$  and  $D(-2, 2)$ . Determine the equation of the straight line that is perpendicular to this line and passes through  $C$ , expressing your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$ , and  $c$  are integers. (4 marks)

$$m = \frac{-5-2}{2+2} \\ = \frac{-7}{4}$$

$$y = \frac{4}{7}x + c \quad \text{sub in } (2, -5) \\ -5 = \frac{4}{7}(2) + c \\ -5 = \frac{8}{7} + c \\ c = -6\frac{1}{7} = -\frac{43}{7} \\ \therefore y = \frac{4}{7}x - \frac{43}{7} \\ 7y = 4x - 43 \\ 7y - 4x + 43 = 0$$

✓ Calculates gradient of CD  
 ✓ Finds perpendicular gradient  
 ✓ Calculates c value.  
 ✓ Final equation in  $ax + by + c = 0$  form.

## Question 4 continued

- (b) For the graph with the equation  $y = (x+2)(x-4)$ , determine the coordinates of (i) all intercepts. (3 marks)

$$x \text{ intercepts: } (-2, 0) \text{ and } (4, 0) \quad // \\ y \text{ int: } (0, -8) \quad //$$

One mark  
for each

-1 if not coordinates.

- (ii) the turning point. (2 marks)

$$\frac{4-2}{2} = 1 \\ y = (1+2)(1-4) \\ = -9 \\ \therefore (1, -9)$$

✓ finds line of symmetry

✓ Correct coordinate

(must award 2 marks if correct coord but no working)