

# Level 4 Mathematics Examination 1



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Kilbaha Education  
PO Box 2227  
Kew Vic 3101  
Australia  
ABN 47 065 111 373

Tel: +613 9018 5376  
Email: [kilbaha@gmail.com](mailto:kilbaha@gmail.com)  
Web: <https://kilbaha.com.au>

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**Kilbaha Pty Ltd** ABN 47 065 111 373 trading as  
Kilbaha Education  
PO Box 2227  
Kew  
Victoria 3101  
Australia  
Tel: (03) 9018 5376 +61 3 9018 5376

[kilbaha@gmail.com](mailto:kilbaha@gmail.com)  
<https://kilbaha.com.au>



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<p>Creator: Judy Anders Title: Level 4 Mathematics Examination 1 with detailed answers ISBN: 9781922881038 (eBook) Series: Mathematics Examinations with detailed answers for High Schools Target Audience: School age. Secondary. Subject: Mathematics Other Creators: Barbara Healy, William Paul Healy</p>	<p>All rights reserved.</p> <p>No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form by any means whatsoever without the prior permission of the copyright owner.</p> <p>Apply in writing to the publishers.</p>
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**About the Authors:** Barbara Healy BSc BEd and William Paul Healy BSc BA Dip Ed are principal writers for Kilbaha Education. They are experienced classroom teachers of mathematics with specialised skills in writing assessment questions and detailed answers for all levels of mathematics. Together they have been creating mathematics content for Australian schools for more than 30 years. Teachers and parents use their highly regarded educational content on a regular basis.

# LEVEL 4

# MATHEMATICS EXAMINATION 1



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Kilbaha Education ABN 47 065 111 373  
PO Box 2227  
Kew Vic 3101  
Australia

Tel: (03) 9018 5376

[kilbaha@gmail.com](mailto:kilbaha@gmail.com)  
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PO Box 2227  
Kew Vic 3101  
Australia

Tel: (03) 9018 5376

[kilbaha@gmail.com](mailto:kilbaha@gmail.com)  
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## Notes to Teachers

*This is a Digital Publication supplied in both PDF and WORD formats with a school site licence to reproduce for students in both print and electronic formats.*

- This examination is based on a syllabus containing topics for Year 10 Mathematics. Some of these topics are: (not all are necessarily included in this examination)  
  
working with indices, arithmetic and applications, surds, variation, similarity, circle properties, constructions and transformations, properties of 2D shapes, perimeter and area, surface area and volume, trigonometry, applications of trigonometry, expansion, factorisation and indices, linear functions, quadratic functions, transposition, substitution and fractions, probability, analysing data, cumulative frequency curves, bivariate data.
- Teachers should examine the questions to judge if they are suitable for their classes
- This is a 1.5 hour examination (total = 80 marks)
- The examination can be shortened if required by removing some of the questions
- A set of detailed answers with a marking scheme is supplied with this examination
- A multiple-choice answer sheet is supplied with this examination
- While every effort has been made to ensure the correctness of each question and answer, there is no guarantee of perfection. Please advise if you believe you have found an error.

STUDENT NAME \_\_\_\_\_

# Examination 1

## LEVEL 4 MATHEMATICS

Reading time: 15 minutes  
Total writing time: 1.5 hours

### QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of Marks
A	10	10	10
B	12	12	70

#### Directions to students

##### Materials

Question and answer book of 18 pages.

Working space is provided throughout the book.

You may use an approved calculator, ruler, protractor, set square and aids for curve sketching.

##### The Examination.

Ensure that you write your **name** in the space provided on the cover of this book.

Answer **all** questions.

There is a total of 80 marks available for the examination.

The marks for each part of each question are shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Unless otherwise specified, give answers correct to two decimal places.

Angles in all diagrams are measured in degrees.

All written responses should be in English.

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**SECTION A** consists of ten multiple choice questions. Write the letter which corresponds to your answer in the box at the right of each question. Each question is worth 2 marks. Show your working in the space provided. Marks will **not** be deducted for incorrect answers.

**Question 1**

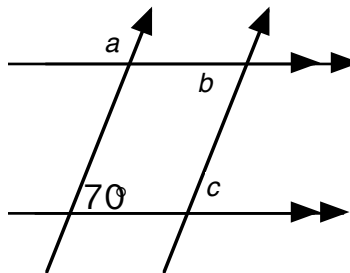
If  $y = 2 - 3x - 2x^2$  then, when  $x = -3$ ,  $y$  equals

- A. 47
- B. 35
- C. 29
- D. 25
- E. -7

**Question 2**

In the diagram below, which angles are equal to  $70^\circ$ ?

- A.  $a$  only
- B.  $b$  only
- C.  $c$  only
- D.  $a$  and  $b$
- E.  $b$  and  $c$




**Question 3**

When factorised,  $2(a + 2)^2 - 18$  equals

- A.  $2(a - 1)(a + 5)$
- B.  $2(a - 7)(a + 5)$
- C.  $2(a - 1)(a + 1)$
- D.  $2(a + 5)(a - 5)$
- E.  $2(a + 2)^2 - 18$

**SECTION B** consists of twelve short answer questions.  
 Answer each question in the space provided. Show all working.  
 Write your final answer in the box provided.  
 The marks for each part of each question are shown at the end of the part.  
 The total number of marks for Section B is 70

**Question 1 (6 marks)**

a. Simplify  $4\sqrt{3} \times 5\sqrt{6}$ .

.....  
 .....

(1 mark)

b. Write  $27^2$  as a power of 3.

.....  
 .....

(1 mark)

c. Michael has an annual salary of \$32,000.

i. If he works 38 hours per week, how much is he paid per hour?

.....  
 .....

(2 marks)

ii. Michael pays 9% of his annual salary in superannuation and 32% of his annual salary in taxation. How much does Michael earn in the year after these amounts have been deducted?

.....  
 .....

(2 marks)

# LEVEL 4 MATHEMATICS

## EXAMINATION 1

### ANSWER SHEET



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NAME \_\_\_\_\_

#### INSTRUCTIONS

- Write your name in the space provided above.
- Marks will **NOT** be deducted for incorrect answers.
- **NO MARK** will be given if more than **ONE** answer is completed for any question.
- All answers must be completed like **THIS** example.

A	B	C	D	E
---	---	---	---	---

#### SECTION A

1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E



**1. E**

$$y = 2 - 3(-3) - 2(-3)^2 = 2 + 9 - 18 = -7$$

**2. E**

$c$  corresponds to  $70^\circ \therefore c = 70^\circ$

$b$  is alternate to  $c \therefore a = 70^\circ$

$\therefore b$  and  $c$  are also  $70^\circ$

**3. A**

$$2(a+2)^2 - 18 = 2[(a+2)^2 - 9] = 2(a+2-3)(a+2+3) = 2(a-1)(a+5)$$

**4. B**

$$P = a - 2b = (3x - 2) - 2(4 - 5x) = 3x - 2 - 8 + 10x = 13x - 10$$

**5. C**

$$3^2 = x^2 + 1^2$$

$$\therefore 9 = x^2 + 1$$

$$\therefore x^2 = 8$$

$$\therefore x = \sqrt{8} = 2\sqrt{2} \qquad \cos \theta = \frac{2\sqrt{2}}{3}$$

**6. D**

Length of bed and path  $8 + 2w$

Width of bed and path  $6 + w$

Height = 10cm = 0.1 m

$$V = lwh$$

$$\therefore 5 = (8 + 2w)(6 + w)(0.1)$$

$$\therefore 50 = (8 + 2w)(6 + w)$$

**7. D**

Range of totals = 10  $\therefore$  D is false

**8. D**

$y = 4$ : horizontal line through  $y = 4$

correct

$x = 2$  vertical line through  $x = 2$

correct

$y = \frac{1}{2}x$  line passes through the origin and when  $x = 2, y = 1$

incorrect

$x + y = 2$   $x$ -intercept:  $x = 2$ ,  $y$ -intercept:  $y = 2$

correct

Three out of the four lines are correct.

**9. B**

The graph is  $y = \frac{1}{2}x^2$

**10. A**

Graph is translated 2 units to the right

$$a = -2$$

Graph is translated 4 upward

$$b = 4$$

(10  $\times$  2 = 20 marks)

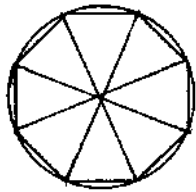
**Question 1**

- a.  $4\sqrt{3} \times 5\sqrt{6} = 20\sqrt{18} = 20 \times 3\sqrt{2} = 60\sqrt{2}$  [1]
- b.  $27^2 = (3^3)^2 = 3^6$  [1]
- c. i. Hourly rate of pay =  $\$32000 \div 52 \div 38 = \$16.19$  [2]
- ii. Superannuation = 9% of  $\$32000 = 0.09 \times 32000 = \$2880$  [1/2]  
 Taxation = 32% of  $\$32000 = 0.32 \times 32000 = \$10240$  [1/2]  
 Earnings =  $\$32000 - \$2880 - \$10240 = \$18960$  [1]

**Question 2**

- a. Let  $x$  denote the length of the ramp  
 $\sin 35^\circ 35' = \frac{7}{x}$   
 $\therefore x = \frac{7}{\sin 35^\circ 35'} = 12.03$   
 The ramp is 12.03 metres long. [2]

b. i.

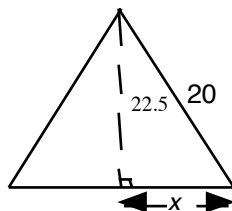


[1]

ii.

Each angle at the centre =  $360^\circ \div 8 = 45^\circ$  [1]

iii.



$\sin 22.5^\circ = \frac{x}{20}$   
 $\therefore 20 \sin 22.5^\circ = x$   
 $\therefore x = 7.65$   
 Side length of octagon =  $2x = 15.3$  cm

[2]

**Question 3**

- a. Let  $h$  denote the height of the gate. Therefore width of gate is  $2h$ . [1/2]  
 Length of timber =  $2h + 2h + h + h + h + h = 8h$  [1/2]  
 $\therefore 8h = 30$   
 $\therefore h = 3.75$   
 The gate is 3.75 metres high. [1]
- b. i. Width determined by the  $x$ -intercepts which are  $(-10, 0)$  and  $(10, 0)$ .  
 $\therefore$  width = 20 m [2]
- ii. Highest point at  $y$ -intercept.  $\therefore y = 0.1(10)(10) = 10$   
 Highest point is 10 metres above the ground. [2]

# Kilbaha Education Mathematics Examinations High Schools

Kilbaha Education (Est. 1978) (ABN 47 065 111 373) PO Box 2227 Kew Vic 3101 Australia	Tel: (03) 9018 5376  Email: <a href="mailto:kilbaha@gmail.com">kilbaha@gmail.com</a> Web: <a href="https://kilbaha.com.au">https://kilbaha.com.au</a>
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