

## Level 3 Mathematics Examination 3



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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.



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# LEVEL 3 MATHEMATICS EXAMINATION 3



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#### Notes to Teachers

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• This examination is based on a syllabus containing topics for Year 9 Mathematics. Some of these topics are: (not all are necessarily included in this examination)

powers, roots and reciprocals, directed number and scientific notation, ratio, percentages, angles and triangles, quadrilaterals and other polygons, congruent and similar triangles, transformations, Pythagoras' theorem, perimeter and area, surface area and volume, trigonometry, expansion and factorisation, fractions and indices, equations, linear and quadratic graphs, probability, reading and drawing graphs, analysis of data, practical graphs.

- Teachers should examine the questions to judge if they are suitable for their classes
- This is a 1.5 hour examination (total = 90 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 of you believe you have found an error.

## **Examination 3**

## **LEVEL 3 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
А	25	25	25
В	7	7	35
С	3	3	30

#### **Directions to students**

#### Materials

Question and answer book of 28 pages.

Working space is provided throughout the book.

You may use an approved calculator, ruler, protractor, set square and aids for curve sketching. A formula sheet is provided.

#### 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 90 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. Angles in all diagrams are measured in degrees. All written responses should be in English.

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#### Level 3 Mathematics Formulas

Area of circle	$\pi r^2$
Circumference of circle	$2\pi r$
Area of rectangle	$L \times W$
Area of triangle	$\frac{1}{2}bh$
Area of parallelogram	bh
Area of trapezium	$\frac{1}{2}(a+b)h$
Volume of sphere	$\frac{4}{3}\pi r^3$
Volume of cylinder	$\pi r^2 h$
Volume of cone	$\frac{1}{3}\pi r^2h$
Surface area of rectangular prism	2(lh+lw+wh)
Surface area of cylinder	$2\pi r^2 + 2\pi rh$
Surface area of sphere	$4\pi r^2$

#### **MATHEMATICS — LEVEL 3 EXAMINATION 3**

#### SECTION A MULTIPLE CHOICE

There are 25 multiple choice questions. Write the letter which corresponds to your answer in the box at the right of each question. Each question is worth 1 mark. Show your working in the space provided. Marks will not be deducted for incorrect answers.

#### Question 1

 $6a^0 \times (b^2)^3$  equals

- $\mathbf{A.} \qquad 6ab^6$
- **B.**  $6b^6$
- **C.**  $6b^5$
- **D.**  $b^{6}$

**E.**  $b^{5}$ 

#### **Question 2**

 $\frac{5x^{-1}y}{10y^2}$  equals

A.  $\frac{1}{2xy}$ 

**B.**  $\frac{1}{50xy}$ 

- C.  $\frac{2}{xy}$
- **D.**  $\frac{2y}{x}$

**E.** 
$$\frac{1}{2xy^3}$$

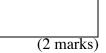
#### **MATHEMATICS — LEVEL 3 EXAMINATION 3**

**SECTION B** consists of seven short answer questions. Answer each question in the space provided. Show all working. Write your final answer in the box where this is 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 35

#### **Question 1(5 marks)**

Simplify each of the following

**a.** 7a - 2(3a + 1)



**b.** 
$$\frac{(x+2)(x-1)}{(x+3)} \div \frac{4(x-1)}{x+3}$$

.....

(3 marks)

#### MATHEMATICS — LEVEL 3 EXAMINATION 3

#### SECTION C ANALYSIS TASKS

There are three questions worth 10 marks each. Answer each question in the space provided. Show all working. Write your final answer in the box where this is provided.

#### **Question 1(10 marks)**

The following data show the amounts spent in dollars by 20 people going through a supermarket checkout.

19,42,68,39,66,13,44,23,24,56,62,12,84,73,88,99,95,74,71,82

**a.** Complete the stem and leaf for these data.

Stem	Leaf
1	
2	
3	
4	
5	
6	
7	
8	
9	

(1 mark)

### LEVEL 3 MATHEMATICS

### **EXAMINATION 3**

## **ANSWER SHEET**

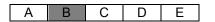


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#### NAME

#### 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.



#### **SECTION A**

r					
1	А	В	С	D	Е
2	Α	В	С	D	Е
3	Α	В	С	D	ш
4	Α	В	С	D	Е
5	Α	В	С	D	Е
6	Α	В	С	D	Е
7	Α	В	С	D	Е
8	Α	В	С	D	Е
9	Α	В	С	D	Е
10	Α	В	С	D	Е
11	Α	В	С	D	Е
12	Α	В	С	D	Е

13	Α	В	С	D	E
14	А	В	С	D	Е
15	А	В	С	D	Е
16	А	В	С	D	Е
17	А	В	С	D	Е
18	А	В	С	D	Е
19	А	В	С	D	Е
20	Α	В	С	D	Е
21	А	В	С	D	Е
22	А	В	С	D	Е
23	А	В	С	D	E
24	А	В	С	D	Е
25	А	В	С	D	Е

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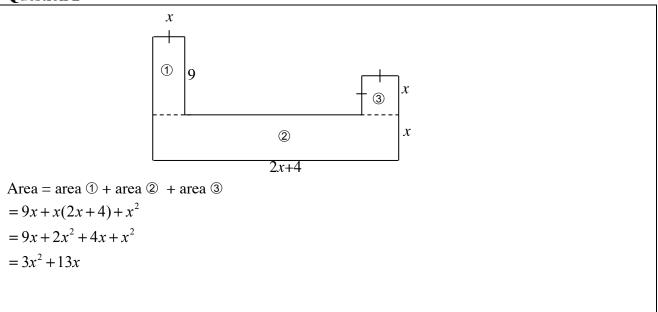
## MATHEMATICS — LEVEL 3 EXAMINATION 3 DETAILED ANSWERS

1. Answer B	2. Answer A
$6 \times 1 \times b^6 = 6b^6$	$5x^{-1}y$ $5y$ 1
	$\frac{5x^{-1}y}{10y^2} = \frac{5y}{10xy^2} = \frac{1}{2xy}$
3. Answer D	4. Answer C
Similar triangles.	Co-interior angles sum to 180°.
$\frac{x}{8} = \frac{9}{12}$	$3a + 60 = 180^{\circ}$
$\overline{8}^{-}\overline{12}$	$\Rightarrow 3a = 120$
$\Rightarrow 12x = 72$	$\Rightarrow a = 40$
$\Rightarrow x = 6$ 5. Answer E	
5. Answer E	6. Answer B
$x^2 - 5x - 6 = (x - 6)(x + 1)$	(3x-5)(2x+1)
	$=6x^{2}+3x-10x-5$
	$= 6x^2 - 7x - 5$ 8. Answer E
7. Answer E	8. Answer E
$\tan a = \frac{4}{3}$	$\cos 35^\circ = \frac{x}{25}$
	$\Rightarrow x = 25 \times \cos 35^{\circ}$
$\Rightarrow a = \tan^{-1}\left(\frac{4}{3}\right)$	$\Rightarrow x = 20.4788$
$\Rightarrow a = 53^{\circ}$	
$\Rightarrow a = 53^{\circ}$ 9. Answer C	10. Answer B
$x^2 + (6.3)^2 = (10.7)^2$	There are 4 kings in a pack of 52 cards.
$\Rightarrow x^2 = (10.7)^2 - (6.3)^2$	Probability = $\frac{4}{52} = \frac{1}{13}$
$\Rightarrow x = \sqrt{(10.7)^2 - (6.3)^2}$	52 15
$\Rightarrow x = 8.64$	
$\Rightarrow x = 8.6$ to one decimal place	
11. Answer B	12. Answer E
Probability = $\frac{8}{20} = \frac{2}{5}$	$\frac{3}{5} \div p = \frac{3}{5p}$
13. Answer B	14. Answer A
<i>y</i> 6	(x-5) represents translation 5 units in the
$\frac{y}{3} = \frac{6}{5}$	positive $\bar{X}$ direction. + 1 represents translation 1 unit in the positive Y direction.
$\Rightarrow y = \frac{18}{5}$	sint in the positive I direction.
$\Rightarrow y = 3.6$	
$\frac{1}{15.}  \text{Answer C}$	16. Answer C
X intercepts when	The line parallel to the $Y$ axis cutting the $X$ axis
$x^2 + 6x - 27 = 0$	at 4 has the equation $x = 4$ .
$\Rightarrow (x+9)(x-3) = 0$	
$\Rightarrow x = -9 \text{ or } x = 3$	

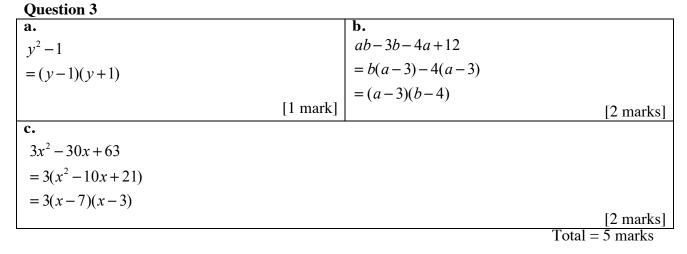
## MATHEMATICS — LEVEL 3 EXAMINATION 3 DETAILED ANSWERS

Question 1			
a.		b.	
7a - 2(3a + 1)		$\frac{(x+2)(x-1)}{(x+3)} \div \frac{4(x-1)}{x+3}$	
=7a-6a-2			
= a - 2		$=\frac{(x+2)(x-1)}{(x+3)} \times \frac{x+3}{4(x-1)}$	
	[2 marks]	$=\frac{(x+2)}{4}$	
			[3 marks]
			Total = 5 marks

#### **Question 2**



Total = 5 marks



## MATHEMATICS — LEVEL 3 EXAMINATION 3 DETAILED ANSWERS

#### Question 1

a. Complete the stem and leaf for these data.

Stem	Leaf
1	2,3,9
2	3,4
3	9
4	2,4
5	6
6	2,6,8
7	1,3,4
8	2,4,8
9	5,9
	[2 1 ]

[2 marks]

b.		с.	
Smallest amount spent = $$12$		Number of people spending less than	42 = 6
[1	mark]		[1 mark]
d.		е.	
Number of people spending more than \$88	8 = 2.	Median amount spent	
$=\frac{2}{20} \times 100 = 10\%$ [2]		$=\frac{62+66}{2}=\frac{128}{2}=\$64$	[1 mark]
marks]			
<b>f.</b>		<b>g.</b>	
Lower quartile		Upper quartile	
$=\frac{24+39}{2}=\frac{63}{2}=\$31.50$ [1]	mark]	$=\frac{74+82}{2}=\frac{156}{2}=\$78$	[1 mark]
h.			
Interquartile range = $78 - 31.50 = $46.50$			[1 mark]
		Total =	= 10 marks



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