Government of **Western Australia**
Curriculum Council

WACE
Western Australian Certificate of Education

MATHEMATICS

2A/2B

Calculator-free

WACE Examination 2010

Final Marking Key

This 'stand alone' version of the WACE Examination 2010 Final Marking Key is provided on an interim basis.

The Standards Guide for this examination will include the examination questions, marking key, question statistics and annotated candidate responses. When the Standards Guide is published, this document will be removed from the website.

Question 1 **(4 marks)**

(a) Evaluate $4-(7-11)^2 \div 2$. (2 marks)

Solution
$4-(7-11)^2 \div 2$ $=4-(-4)^2 \div 2$ $=4-16 \div 2$ $=4-8$ $=-4$
Specific Behaviours
✓ correctly applies rule of order – brackets first ✓ calculates correct answer

(b) In a recent test, Ryan was asked to expand $(2x+3)(x-9)$. Ryan's response was $2x^2-27$. Determine whether Ryan was correct or not. Justify your answer. (2 marks)

Solution
$(2x+3)(x-9) = 2x^2-15x-27$ Ryan was incorrect – he missed out the middle term
Specific Behaviours
✓ correctly expands a binomial ✓ identifies Ryan was wrong as middle term is missing

Question 2 **(6 marks)**

The ratio of boys to girls in Jessie's Mathematics 2A/2B class is 2:3. Her class recently completed a test for which the maximum score was 50 marks. The parts of the question below relate to Jessie's class and the test they completed.

(a) If there were 12 girls in the class, how many boys were there? (1 mark)

Solution
B : G $2:3 = b:12$ $b = 12 \div 3 \times 2$ **or** similar argument therefore 8 boys
Specific Behaviours
✓ uses ratios to calculate the number of boys

(b) Jessie received 68% for her test. What score (out of 50) did Jessie obtain? (1 mark)

Solution
68% of 50 = 34
Specific Behaviours
✓ calculates a simple percentage of a whole number

(c) Michael got 18 out of 50 for his test. Write his score as a decimal. (1 mark)

Solution
$\frac{18}{50} = 0.36$
Specific Behaviours
✓ converts fraction to decimal

(d) Mikayla said that she got a test score greater than 75% but less than $\frac{4}{5}$ of the maximum score. All of the girls' test scores, out of 50, are listed in order below.

19, 22, 30, 32, 34, 36, 37, 39, 40, 44, 45, 48

What score did Mikayla obtain? (2 marks)

Solution
75 % is 37.5 marks $\frac{4}{5}$ is 40 marks therefore 39 marks
Specific Behaviours
✓ calculates simple percentages and fractions of a whole number ✓ chooses correct score based on calculations.

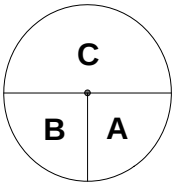
(e) Adrian was exaggerating to his friends. He said that he practised seventy-five million questions before the test. Write this number in scientific notation. (1 mark)

Solution
$75\,000\,000 = 7.5 \times 10^7$
Specific Behaviours
✓ correctly expresses numbers in scientific notation

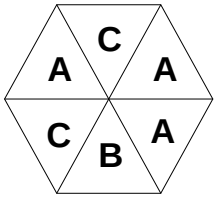
Question 3 **(7 marks)**

Consider the spinners below.

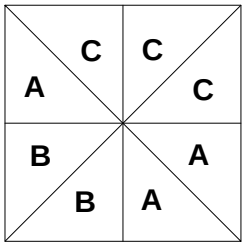
Spinner I



Spinner II



Spinner III



(a) Order the spinners above from **most likely** to **least likely** to spin the letter C. (2 marks)

Solution
Spinner I, Spinner III, Spinner II
Specific Behaviours
✓ correctly calculates the probability of getting a C on each spinner ✓ correctly compares and orders the probabilities from largest to smallest

(b) Spinner II is spun 30 times. How many 'B's would you expect? (1 mark)

Solution
$\frac{1}{6} \times 30 = 5$
Specific Behaviours
✓ use probabilities to predict the number of times an outcome will occur in n trials

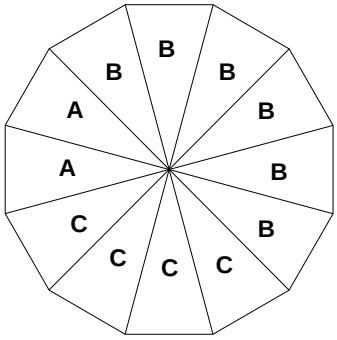
(c) Emily spins one of the spinners above 120 times. Her results are shown in the table on the right. Which is most likely the spinner that Emily used? Justify your choice.

Letter	**Frequency**
A	61
B	19
C	40

(2 marks)

Solution
Spinner II
Specific Behaviours
✓ Spinner II ✓ identifies that A occurs about one half of the time, so eliminates spinners I and III or recognizes B occurs about one-sixth of the time so chooses spinner II

(d) Madeline uses a new spinner to run a simulation 60 times. The spinner has 12 equal sectors as shown and uses only the letters A, B and C. Madeline recorded her results as 10 'A's, 31 'B's and the rest 'C's. Complete the spinner below so that it is most likely the spinner that Madeline used. (2 marks)

Solution

Specific Behaviours
✓ calculates that A occurs about one-sixth of the time so two sectors are As
✓ recognizes B occurs about one half of the time, so $\frac{6}{12}$ is B and the rest are Cs

Question 4 **(9 marks)**

Dougal is an electrician who likes to be considered 'good value for money' by his customers. Dougal charges an hourly rate of \$75 per hour but no callout fee.

(a) Complete the table of values below to show the cost of having Dougal complete jobs of varying lengths. (2 marks)

Solution

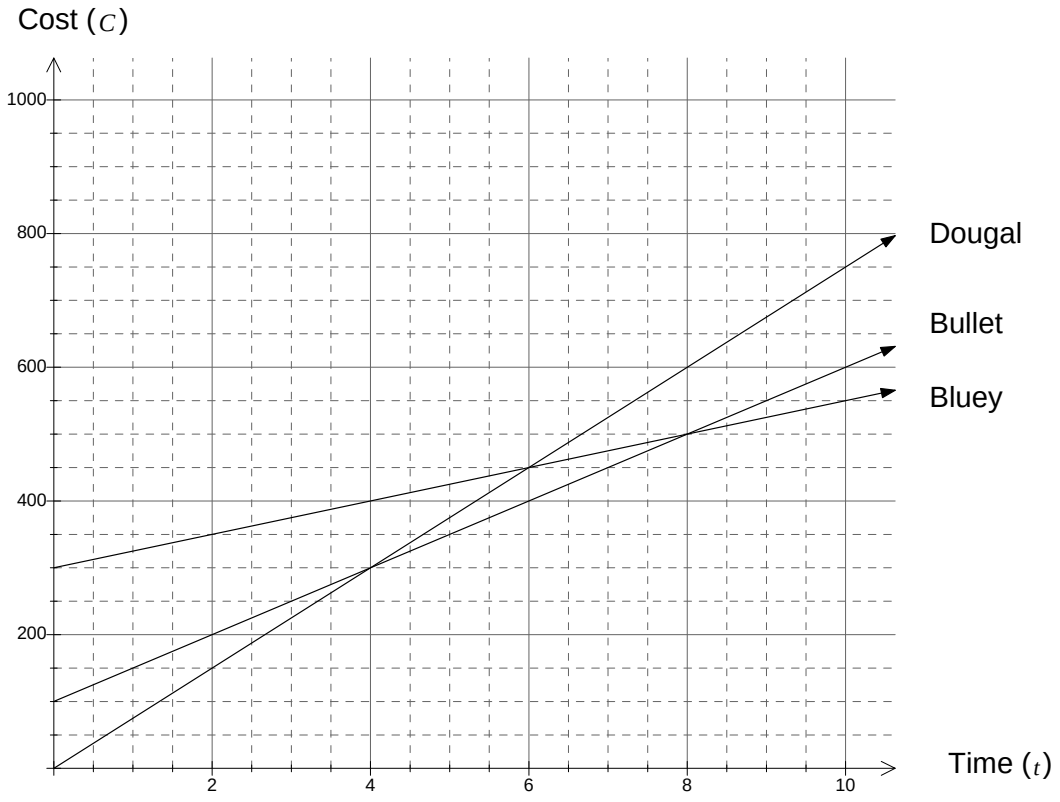
Time (t hours)	0	2.5	4	10
Cost (\$$C$)	0	**187.50**	300	**750**

Specific Behaviours

✓✓ correctly calculates costs (by identifying rule is 75 x number of hours)

(b) On the axes below, plot the cost of Dougal completing a job of length t hours. The cost of Bluey, another electrician, has already been plotted. (1 mark)

Solution



Specific Behaviours

✓ correctly plots graph using points in (a)

(c) Write a rule to calculate the cost of employing Dougal for any length of time (t).
(1 mark)

Solution
$C = 75t$
Specific Behaviours
✓ determines correct rule (words or symbols)

(d) Write a rule to calculate the cost of employing Bluey for any length of time (t).
(2 marks)

Solution
$C = 25t + 300$
Specific Behaviours
✓ determines the gradient ✓ determines correct rule

(e) Bullet works very quickly, but charges a callout fee of $100. For 2 hours of work, Bullet charges a total of $200. Graph the cost of employing Bullet on the same axes as Dougal and Bluey. (1 mark)

Solution
See diagram
Specific Behaviours
✓ forms line graph from two correctly plotted points

(f) You are keen to pay as little money as possible. For what interval of time would you employ Bullet instead of Dougal or Bluey? (2 marks)

Solution
From 4 hours to 8 hours
Specific Behaviours
✓ finds points of intersections between Bullet and Dougal and Bullet and Bluey ✓ correctly states time as interval between 4 and 8 hours

Question 5 **(8 marks)**

Solve algebraically for each unknown.

(a) $2(p+1)-3p=3-2p$ (2 marks)

Solution
$2(p+1)-3p=3-2p$ $2p+2-3p=3-2p$ $2-p=3-2p$ $p=1$
Specific Behaviours
✓ expands brackets. ✓ gathers like terms to arrive at correct solution.

(b) $3W^2-5=43$ (2 marks)

Solution
$3W^2-5=43$ $W^2=16$ $W=\pm 4$
Specific Behaviours
✓ solves for W^2 ✓ correctly solves for W (both solutions)

(c) $2^x-1=31$ (2 marks)

Solution
$2^x-1=31$ $2^x=32$ $2^x=2^5$ $x=5$
Specific Behaviours
✓ solves for 2^x ✓ correctly solves for x

(d) $28 - 3k \geq 13$ (2 marks)

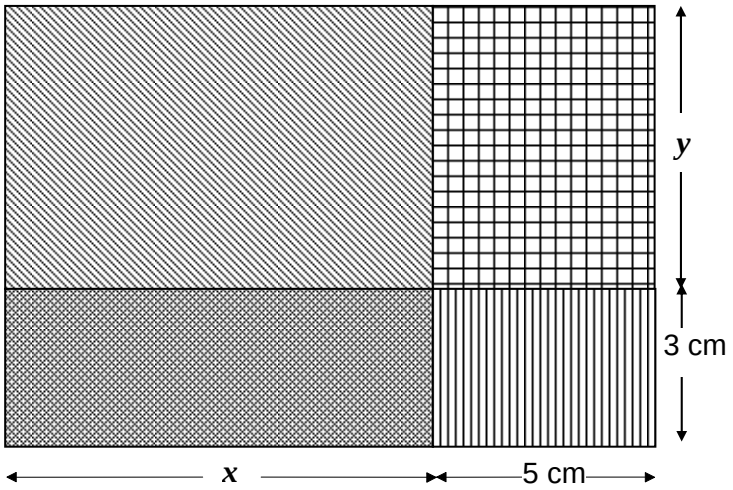
Solution
$28 - 3k \geq 13$ $\quad$ $28 - 13 \geq 3k$ $-3k \geq -15$ $\quad$ $15 \geq 3k$ $k \leq 5$ **or** $5 \geq k$
Specific Behaviours
✓ solves for k but with wrong symbol ✓✓ uses correct inequality sign in answer

Question 6 **(6 marks)**

Sonya designs patchwork quilts, which are constructed from a number of rectangular patches joined together. Each patch is made up of four smaller rectangles, as shown in the diagram below.

Sonya already has some material which measures 5 cm by 3 cm, cut, and plans to use this in one corner of her rectangular patch. She is experimenting with the lengths x and y to complete her patch design.

Rectangular patch:



(a) If $x = 7$ and $y = 4$, calculate the area of the rectangular patch. (1 mark)

Solution
$12 \times 7 = 84$ cm^2
Specific Behaviours
✓ calculates area of rectangle

(b) If $y = 4$, state the area of the rectangular patch in terms of x (in expanded form). (1 mark)

Solution
$7 \times (x + 5) = (7x + 35)$ cm^2
Specific Behaviours
✓ correctly expands expression

(c) The area of the rectangular patch can be expressed as $(x + 5)(y + 3)$. Expand this expression. (2 marks)

Solution
$(x + 5)(y + 3) = (xy + 3x + 5y + 15)$ cm^2
Specific Behaviours
✓ correctly expands expression $x(y + 3)$ ✓ correctly expands expression $5(y + 3)$

(d) Using the expanded expression from (c), show that the area when $x = 7$ and $y = 4$ is the same as the area in (a). (2 marks)

Solution
$7 \times 4 + 3 \times 7 + 5 \times 4 + 15 = 84$ cm^2 Same as (a)
Specific Behaviours
✓ correctly substitutes values . ✓ correctly evaluates expression