BEATTY SECONDARY SCHOOL
MID-YEAR EXAMINATION 2022

SUBJECT : Mathematics **LEVEL : Sec 2 Express**

PAPER : 2 **DURATION : 1 hour 30 minutes**

SETTER : **DATE : 11 May 2022**

CLASS :	NAME :	REG NO :

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
If working is needed for any question, it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 50.

For Examiner's Use
50

1 Given that m satisfies the inequality $\frac{3m-10}{3} \geq \frac{m-1}{2}$, find the smallest integer value of n for which $n = 3m + 2$.

Answer n = ... [3]

2 **(a)** A bakery uses 5 bags of Brand *A* flour to make 345 cupcakes.

(i) How many bags of Brand *A* flour are needed to make 1104 cupcakes?

Answer ……bags [1]

(ii) A bag of Brand *B* flour can be used to make 23 more cupcakes than Brand *A*. How many fewer bags of flour is needed to make 1104 cupcakes if the bakery uses Brand *B* flour instead of Brand *A* flour?

Answer ……bags [3]

(iii) The shop owner claims that since one bag of Brand *B* flour can be used to make 23 more cupcakes than Brand *A* flour, the bakery should use Brand *B* flour instead of Brand *A* flour.
Explain why the shop owner's claim may not be true.

Answer……

……

……

…… [1]

(b) 4 workers in the bakery takes 3 hours to make 1104 cupcakes.

(i) Find the time it takes to make 1104 cupcakes if the bakery hires one more worker. Give your answer in hours and minutes.

Answer ……..……h ……..…min [3]

(b) (ii) Write down one assumption you made in working out your answer in part **(b)(i)**.

Answer ……...

……

…… [1]

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3 Simplify $(a+2)(a-2)^2-(a-2)(a+2)^2$, leaving your answer in the expanded form.

Answer …… [3]

4 **(a)** Factorise completely $21m^2 + 3m - 42mn - 6n$.

Answer ……... [3]

(b) Given that p and q are positive integers and $p^2 - q^2 = 17$, find the values of p and of q.

Answer p =……, q =…… [2]

(c) If $(3x - y)^2 = 90$ and $9x^2 + y^2 = 48$, find the value of $3xy$.

Answer …… [2]

5 Polygon A has 12 sides.

Polygon B has n sides.

The sum of the interior angles of polygon A is greater than the sum of the interior angles of polygon B by 540°.

(a) Show that the polygon B is a nonagon, a 9-sided polygon.

Answer [3]

(b) Given that polygon A is a regular polygon, find the size of one exterior angle of polygon A.

Answer …… [2]

6 **(a)** Solve the equation $\frac{a}{2} - a^2 = 0$.

Answer a = ……..…….. [2]

(b) Without using calculator, evaluate $445^2 - 450 \times 440$ by using special products of algebraic expressions.

Answer …… [2]

7. **(a)** The volume of a pot is x litres and the volume of a bowl is y litres.
3 pots and 2 bowls can hold 7 litres of water.
Form an equation in x and y to represent this information.

Answer ……... [1]

(b) 9 pots and 8 bowls can hold 22 litres of water.
Form an equation in x and y to represent this information.

Answer …….. [1]

(c) Solve the two equations in **(a)** and **(b)** to find the value of x and of y.

Answer x = ……..

y = …….. [3]

8 *ABCD* is a square of sides $(x + 1)$ cm. *XYZ* is a right-angled triangle where angle *XYZ* is 90°, $XY = (2x + 5)$ cm and $YZ = (2x - 1)$ cm.

(a) Given that the area of triangle *XYZ* is 1.5 times the area of the square *ABCD*, form an equation, in terms of *x*, and show that it reduces to $x^2 + 2x - 8 = 0$.

Answer [3]

(b) Solve the equation in part **(a)** by factorisation and find the perimeter of the square *ABCD*.

Answer ……...cm [3]

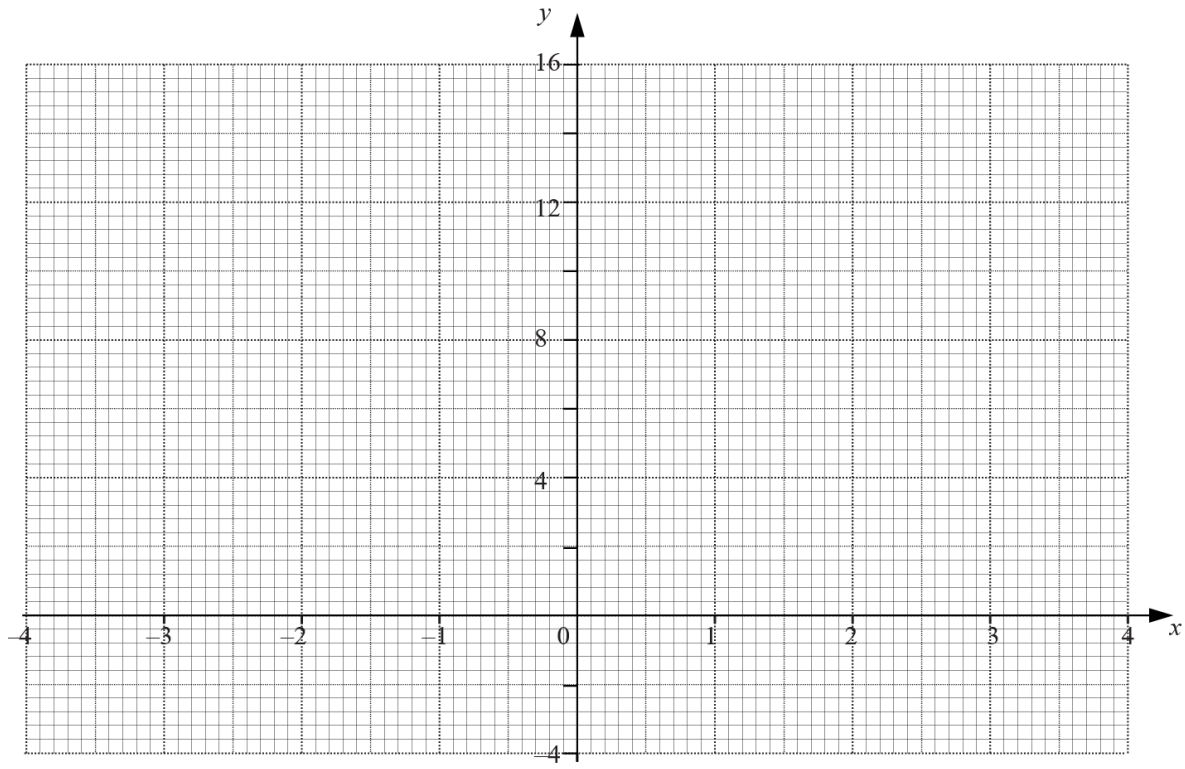
9 The variables x and y are connected by the equation $y = -2 + (x+1)^2$.
Some corresponding values of x and y are given in the table below.

x	–4	–3	–2	–1	0	1	2	3
y	7	2	–1	–2	–1	2	7	a

(a) Find the value of a.

Answer a = ……..… [1]

(b) On the grid given below, draw the graph of $y = -2 + (x+1)^2$ for $-4 \le x \le 3$.



[3]

(c) Using your graph, find the values of x when $y = 4$.

Answer $x =$ ……..…….... and …… [2]

(d) Draw and label the line of symmetry on your graph and write down the equation of this line.

Answer ……..…… [2]

~ End of Paper 2 ~

Answer Key

1	19		
2ai	16	2aii	4
2aiii	This is because the cost of Brand *A* and Brand *B* flour are not given. (or any logical reasoning – eg. Quality of flour, Difference in expiry date, etc)		
2bi	2 hours 24 minutes	2bii	Rate of work is the same for all workers.
3	$16-4a^2$		
4a	$3(7m+1)(m-2n)$	4b	$p=9,\ q=8$
4c	$3xy=-21$	5b	30°
6a	$a=0$ or $a=\frac{1}{2}$	6b	25
7a	$3x+2y=7$	7b	$9x+8y=22$
7c	$x=2,\ y=0.5$	8b	12 cm
9a	14	9c	$x=-3.45$ and $x=1.45$
9d	$x=-1$		