### Instructions:

- Answer all questions in the space provided.
- The marks for each question or part question are shown in the brackets [ ].
- All working must be clearly shown and omission of essential working will result in loss of marks.
- If the numerical answer is not exact, correct your answer to 3 significant figures unless otherwise stated in the question.
- The use of electronic calculator is permitted.

## Q1 Expand the following expressions

(a) 
$$(2a+7)(3a^2-6a)$$
 [1]

**(b)** 
$$(x^3 + x)(x^3 - x)$$
 [1]

(c) 
$$(3x-2y)^2$$
 [2]

(d) 
$$(x-y+3z)(x-2y)$$
 [3]

(e) 
$$(2a+1)^2 - 2(a+3)^2$$
 [3]

## **Q2** Factorise the following completely

(a) 
$$4x^3 - 16xyz$$
 [1]

**(b)** 
$$4a^2 - \frac{25b^2}{81}$$
 [2]

(c) 
$$10p - 6pq + 5r - 3qr$$
 [2]

(d) 
$$2x^2 + 8x + 6$$
 [2]

(e) 
$$9x^2 - 6x - 48$$
 [2]

(f) 
$$9x^2 - (y+1)^2$$
 [2]

(g) 
$$4q^4 - 4q^2r^2 - pr^2 + pq^2$$
 [3]

# Q3 Using algebraic rules, find the value of

(a) 
$$744^2 - 256^2$$
 [2]

**(b)** 
$$1999^2$$
 [2]

(c) 
$$\frac{2 \times 1234}{1234^2 - 1232 \times 1236}$$
 [3]

**Q4** If 
$$x^2 - y^2 = 42$$
 and  $x - y = 6$ , find the value of  $(x + y)^2$ . [2]

**Q5** If 
$$x^2 + y^2 = 73$$
 and  $xy = 24$ , find the value of  $3(x - y)^2$ . [2]

- Write a rational expression with trinomials as both the numerator and denominator and which is able to simplify to an expression with binomials as both the numerator and denominator. Show that your rational expression satisfies the conditions.

  [3]
- Q7 For the expression  $x^2 + x + k$ ,  $k \ne 0$ , are there any values of k for which the expression can be factorised? Explain your answer. [2]

### **Bonus**

**Q8** Factorise 
$$x^2 + 4x + 4 - y^2$$
 completely. [2]

**Q9** Factorise 
$$a^4 + 2a^3 + 3a^2 + 2a + 1$$
 completely. [2]