

N5 EXPRESSIONS & FORMULAE 1.2

This resource is to support pupils in passing the appropriate National 5 Assessment Standard. The questions and marking schemes used are from SQA past papers and as such test the topics in their entirety from grade A to C and *may* include other areas from the course.

In addition the questions from **Paper 1 (P1)** should be completed **without** the use of a calculator and questions from **Paper 2 (P2)** permit the use of a calculator.

Each Assessment Standard is used to ensure pupils have the minimum competency on the specified sub-skills for the National 5 course. As such each Assessment Standard will test grade C work on that specific topic.

This resource is divided into two sections:

- Section A has an example on each sub skill for the relevant Assessment Standard and the marking scheme for these questions
- Section B has extra practice questions on this Assessment Standard and the marking scheme for these questions

<u>Unit Assessment Standard</u>	<u>Sub skills</u>	Section A – Question Number
Expressions & Formulae 1.2 Applying algebraic skills to manipulate expressions	working with algebraic expressions involving expansion of brackets factorising an algebraic expression completing the square in a quadratic expression with unitary x^2 coefficient	Q1 Q2 (common factor + diff of 2 squares) Q3 (trinomial) Q3

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: $A = \frac{1}{2}ab \sin C$

Volume of a sphere: $V = \frac{4}{3}\pi r^3$

Volume of a cone: $V = \frac{1}{3}\pi r^2 h$

Volume of a pyramid: $V = \frac{1}{3}Ah$

Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}$, where n is the sample size.

Section A

Section A

Q		Marks
1 P1	5. Remove brackets and simplify $(2x + 3)^2 - 3(x^2 - 6).$	3
2 P1	2. Factorise fully $5x^2 - 45.$	2
3 P1	Factorise: $x^2 + 3x - 28$	2
4 P1	12. Given that $x^2 - 10x + 18 = (x - a)^2 + b,$ find the values of a and b .	3

Section A

MARKING

SCHEME

Section A – Marking Scheme

1	Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
	5	<p>Ans: $x^2 + 12x + 27$</p> <ul style="list-style-type: none"> • expanding first bracket • expanding second bracket • collecting terms 	<ul style="list-style-type: none"> • $4x^2 + 6x + 6x + 9$ • $-3x^2 + 18$ • $x^2 + 12x + 27$ <p style="text-align: right;">3KU</p>
<p>Notes:</p> <p>(i) the third mark is available only when an x^2 term is involved</p>			
2	Question No	Give 1 mark for each •	Illustrations of evidence for awarding each mark
	2	<p>Ans: $5(x - 3)(x + 3)$</p> <ul style="list-style-type: none"> • beginning to factorise • factorised fully 	<ul style="list-style-type: none"> • $5(x^2 - 9)$ • $5(x - 3)(x + 3)$ <p style="text-align: right;">2KU</p>
<p>Notes:</p> <p>(i) the 1st mark is available for $5(x^2 - 9)$ or $(5x - 15)(x + 3)$ or $(x - 3)(5x + 15)$</p> <p>(ii) All 3 factors must be shown together to obtain the 2nd mark</p>			
3	<ul style="list-style-type: none"> • Begin to facorise ... $(x+7)$ or ... $(x - 4)$ • Answer: $(x + 7)(x - 4)$ 		

4	12	<p>Ans: $a = 5, b = -7$</p> <ul style="list-style-type: none"> • valid strategy • processing • solution 	<ul style="list-style-type: none"> • either $-ax - ax$ or $a^2 + b$ • $a = 5$ • $b = -7$ <p style="text-align: right;">3KU</p>		
	<p>Notes:</p> <p>(i) for $a = 5$, with or without working, award the first two marks</p>				

Section B

Section B

Paper 1 Questions

Q		Marks
1	4. (a) Factorise $x^2 - 4y^2$.	1
	(b) Expand and simplify $(2x - 1)(x + 4)$.	1
2	2. Factorise fully $2m^2 - 18$.	2
3	2. Expand and simplify $(3x - 2)(2x^2 + x + 5)$.	3
4	2. Multiply out the brackets and collect like terms: $(2x - 5)(3x + 1)$.	2
5	3. Express $x^2 - 14x + 44$ in the form $(x - a)^2 + b$.	2

Paper 2 Questions

Q		Marks
6	2. Expand fully and simplify $x(x - 1)^2$.	2
7	2. Expand and simplify $(3x + 1)(x^2 - 5x + 4)$.	3

Section B

MARKING

SCHEME

Section B – Marking Scheme

Marking Scheme

Paper 1

Q				Marks
1	4 (a)	Ans: $(x - 2y)(x + 2y)$ <ul style="list-style-type: none"> factorising 	<ul style="list-style-type: none"> $(x - 2y)(x + 2y)$ 	1KU
	NOTES:			
	(b)	Ans: $2x^2 + 7x - 4$ <ul style="list-style-type: none"> expansion 	<ul style="list-style-type: none"> $2x^2 + 7x - 4$ 	1KU
2	2	Ans: $2(m - 3)(m + 3)$ <ul style="list-style-type: none"> beginning to factorise factorised fully 	<ul style="list-style-type: none"> $2(m^2 - 9)$ $2(m - 3)(m + 3)$ 	2KU
	NOTES: (i) the 1 st mark is available for $2(m^2 - 9)$ or $(2m - 6)(m + 3)$ or $(m - 3)(2m + 6)$ (ii) All 3 factors must be shown <u>together</u> to obtain the 2 nd mark			

Paper 2

Q				Marks
6	2	<p>Ans: $x^3 - 2x^2 + x$</p> <ul style="list-style-type: none"> • correct expansion of $x(x-1)$ or $(x-1)^2$ • further expansion and simplification 	<ul style="list-style-type: none"> • $x^2 - x$ or $x^2 - x - x + 1$ • $x^3 - 2x^2 + x$ <p style="text-align: right;">2KU</p>	
7	2	<p>Ans: $3x^3 - 14x^2 + 7x + 4$</p> <ul style="list-style-type: none"> • starting to expand • completed expansion • simplification 	<ul style="list-style-type: none"> • any 3 correct terms • $3x^3 - 15x^2 + 12x + x^2 - 5x + 4$ • $3x^3 - 14x^2 + 7x + 4$ <p style="text-align: right;">3KU</p>	
<p>NOTES:</p> <p>Caution:</p> <p>Error(s) in the completed expansion may result in a significant easing of the simplification. The final mark may not be available.</p>				