Ultimate Brackets
Teacher Notes

Introduction

The aim of this activity is to provide students with **unlimited** practice at both expanding brackets and factorising both linear and quadratic expressions.. The document contains over 400 distinct levels of questions for expanding and factorising questions, organised into 30 exercises of increasing difficulty.

Students tackle sets of 5 questions at a time. Depending on how well the questions are answered, the program will respond 'intelligently' by either increasing the level of complexity, give more practice at the same difficulty or by making the task less complex.

Students have the option of completing tests which can quickly establish their levels of competence, and can lead the student onto gradually developing their skills at an appropriate pace.

Resources

This document works on all models of TI-Nspire handhelds - Numeric and CAS handhelds, Colour and Greyscale screens, as well as the Computer Software in Handheld Mode.
It is also compatible with the TI-Nspire App on the iPad.

The 'Ultimate Brackets.tns' document file is all that is required. Past experience of using this program with students reveals that this activity ultimately replaces the comparable exercises in any textbook normally used when teaching this topic.

This activity is so powerful in its ability to provide the right quantities of questions of the right level of difficulty (in a way that a static textbook exercise can never hope to do), it means that it will likely become the teacher's preferred resource for developing and assessing students' ability to both expand brackets and factorise expressions.

TI-Nspire Skills required

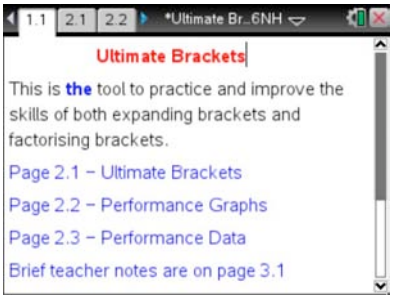
The only TI-Nspire skills required by the student are the ability to open a TI-Nspire document and move from one page to the next. All other actions are menu driven, or intuitively obvious.

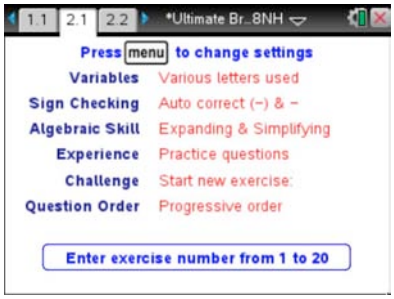
If the program is being used for the first time with a class then see **Appendix 1** for recommended lesson plans to help both teachers and students experience a productive lesson.

The Activity

Page 1.1 provides a title page of the contents of the document.

Page 2.1 is the main activity page, from which the program settings can be changed.





The following pages of these teacher notes describe each of these Start Menu options.

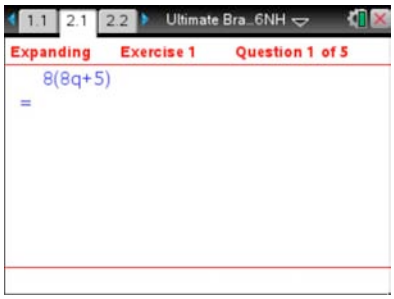
Start Menu Options

Menu Item	***Options Available***	***Description of Options***
Variables	Only letter x used Various letters used	Questions can be presented either in terms of a variable x, or a different letter from the alphabet. This is purely a cosmetic feature and does not affect the difficulty of the questions.
Sign Checking	Auto correct (-) & − Strictly check (-) & −	Students are often unsure when to type a negative sign or a subtraction sign. Also, they often type expressions that contain consecutive operators, such as "+-" Choosing the **Auto correct** option enables the program to "fix" these, and many other situations, which would otherwise be logically wrong in terms of normal calculator syntax. Choosing **Strictly Check** requires the student to enter all answers in exactly correct calculator syntax.
Algebraic Skill	Expanding & Simplifying Factorising	Depending on which skill is chosen, the answers must be entered in either their most simplified or most factorised form. Partially simplified or factorised answers are not accepted and feedback messages are displayed in response.
Experience	Practice questions Test conditions	**Practice questions** generates a sequence of 5 questions from the chosen exercise or level. The user has several attempts at each question. If factorising questions are attempted, they may obtain a **Hint** about the format of the answer. **Test conditions** generates a sequence of 5 questions from the chosen difficulty of test - either **Novice**, **Intermediate**, **Advanced** or **Expert**. Each of these four settings selects questions from a range of exercises. See Appendix 3 for more details. The student has, in general, only one attempt at each question. The **Hint** facility for factorising is disabled in Test mode - it is a test after all!

Challenge	Start on new exercise Try single level ***or***	If **Practice questions** is chosen, the student selects from **Start on exercise** or **Try single level**. They must then type in the number of the exercise or the level that they are starting at. The dialogue box at the foot of the screen informs what exercise or level numbers are valid. See Appendix 3 for more details.
	Carry on past exercise ***or***	If **Practice questions** is chosen, this option looks at the Performance Data stored on page 2.3, identifies the highest level that's recorded as answered correctly, and starts the student off on the exercise containing that highest level. In effect, it allows students to carry on from their previous best attained position.
	Novice (1-b) Intermediate (b-c) Advanced (c-d) Expert (d-e)	If **Test Conditions** is chosen, the student selects the difficulty of the test. The **Novice**, **Intermediate**, **Advanced** and **Expert** test levels all overlap by one exercise (eg. the hardest level on Novice is the easiest level on Intermediate, etc). See Appendix 3 for more details.
Question Order	Progressive order Random order	The student can choose either to have their 5 questions presented to them in increasing order of difficulty (**Progressive order**) or in a mixed up order (**Random order**).
Question Format	Always given as ax^2+bx+c NOT always given as ax^2+bx+c	If the student selects **Factorising** then they must choose either to have every question presented to them with the terms strictly in the order ax^2+bx+c, or in different orders. (eg. instead of x^2-5x+6, it could be presented as $6+x^2-5x$, or as $6-5x+x^2$, but not $-5x+x^2+6$) Selecting '**NOT always…**' gives, where possible, expressions whose first term is not negative.

The Activity in Action

When constructing each question, the program accesses its database of over 400 types of expressions that are then populated with psuedo-randomly generated coefficients and constants. Thus, students have a nearly unlimited number of different questions to tackle, which each take on a predefined form and algebraic complexity.



Along the very top line of the display, from left to right is the following information:

- Expanding *or* Factorising
- the Exercise number, *or* Test Difficulty (when selected)
- the Question number

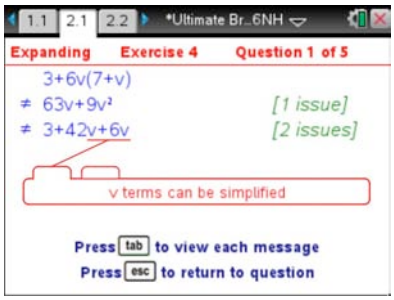
To answer each question, the student must type in the correct expression next to the = sign, and then press enter.

Note that (and) are disabled when Expanding.

A variable may be typed by either pressing the allocated letter, or X.

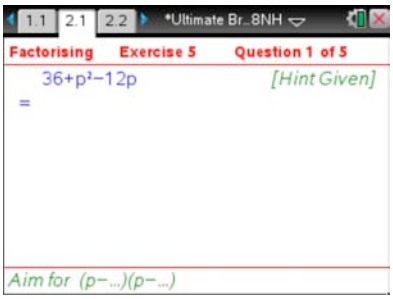
Squared terms may be obtained by pressing either x² or ^.

All answers are checked in a variety of ways and appropriate messages are displayed - see **Appendix 2** for the full list of messages which can be displayed, and their causes.



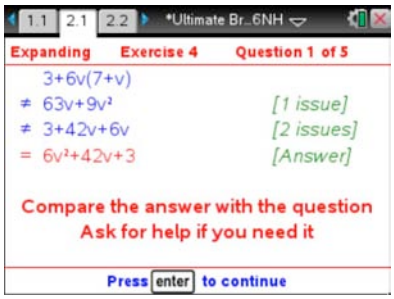
Where issues are identified within an answer, feedback messages are shown and the problematic part of the expression is underlined. Where more than one issue has been detected, pressing tab cycles through the issues in turn.

Pressing esc returns to the question, for a re-attempt.

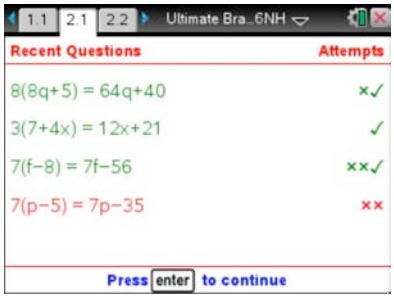


When tackling **Practice Questions** on **Factorising**, pressing menu displays a Hint for the format of the answer *(see left).*

However, this counts as an attempt at the question, thereby reducing the number of attempts at the question that they have left.



Pressing menu also allows the student to access a summary screen of their Recent Questions and the number of Attempts for each one *(see right).*

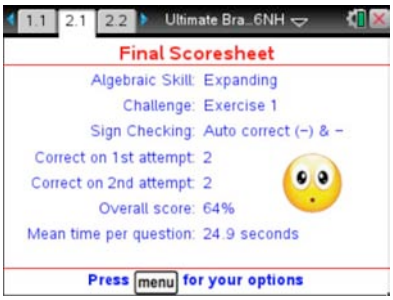


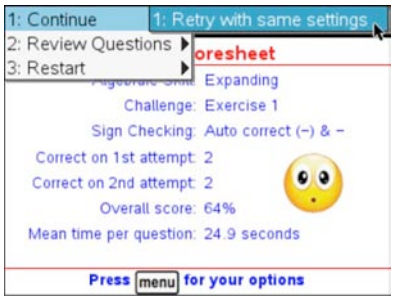
For each question, students can have up to 5 attempts to enter in the correct answer. However, depending upon the severity of any errors they make, they may only be allowed 2 attempts before the correct answer is revealed.

For example, if a student has two attempts, both of which are algebraically different to the question, then they are deemed to need the answer to help them progress their understanding. By contrast, if they submitted algebraically correct answers that have just not been fully simplified or fully factorised, then they are allowed more attempts as they are on the right tracks.

After the 5th question, students are presented with a Final Scoresheet of their progress that includes the number of questions answered correctly on the 1st and 2nd attempts, their overall percentage score and the mean time taken per question *(see below).*

Pressing menu allows the student to Continue to the next appropriate task, Review the 5 questions just attempted, or to Restart the activity.



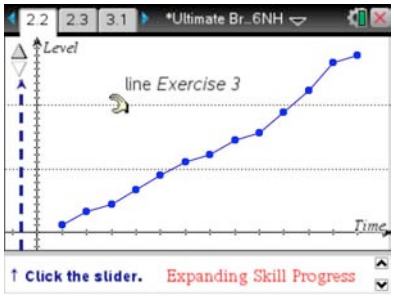


The criteria that are used when selecting the next appropriate task are given below:

all 5 questions correct and no more than one 2nd attempt required	☺ progress up to the next level/exercise/test
all 5 questions correct and either two or three 2nd attempts required	😐 either retry the same level/exercise/test, or progress up to the next
3 or 4 questions correct	😐 retry the same level/exercise/test
1 or 2 questions correct	☹ ask for help from their teacher, retry or move down a level/exercise/test

Under **Test Conditions** students will either start the next hardest level of test or start on the exercise number that corresponded to the easiest question that they answered incorrectly.

Performance Graphs & Data



As students use the document, it will record every level of question that has been answered correctly. If a question is not answered correctly, it is not recorded.

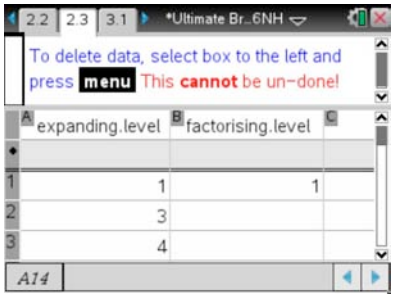
Page 2.2 allows students to view the levels of challenge that they have successfully completed.

The axes on this graph automatically rescale as they attempt more questions and correctly answer higher levels of challenge.

The horizontal lines that appear indicate the Exercise start levels.
Moving the cursor over any of these lines reveals the Exercise number that corresponds with that level.
For the screen shot shown above, the student is currently working on questions in Exercise 3 of Expanding, but not yet into Exercise 4 territory.

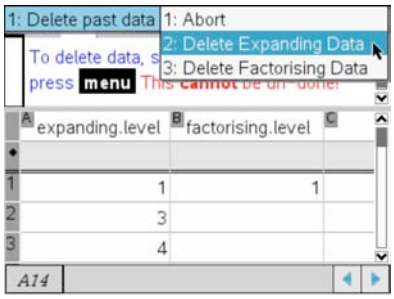
To alternate the view between the Performance Graph for Expanding and that for Factorising, click on the slider in the top left corner of the screen.

When no questions have yet been answered correctly, the graph will only show a single dot.



The data that has been captured, and upon which the Performance Graphs are based, is available to view on page 2.3

The numbers in each column correspond to the 330 levels of Expanding, and the 78 levels of Factorising. They are not the numbers of the exercises.



After using the document, the student should save it (by pressing ctrl then S) to keep their record of Performance Levels safe, ahead of when they return to using the document.

If all performance data needs to be deleted, then use the trackpad to first select the box in the top left corner of the screen, then press menu and then follow the options. The process of deleting data **cannot be undone.**

Acknowledgements

The original version of Ultimate Brackets was programmed for a TI84+ in February 2005 by Nevil Hopley. This TI-Nspire version builds upon the structure of that program, and over 7 years' observational experience of using that TI84+ version with students of all ages and abilities.

The conversion of the program code into Nspire Lua script by Nevil Hopley was extensively supported by the TI-Nspire Lua Scripting Google Group members of: *(in no particular order)*
Andy Kemp, Steve Arnold, Jim Bauwens, John Powers, Adrien Bertrand, Alfredo Rodriguez and Levak Borok.
This activity would simply not have been completed without their generous and swift help!

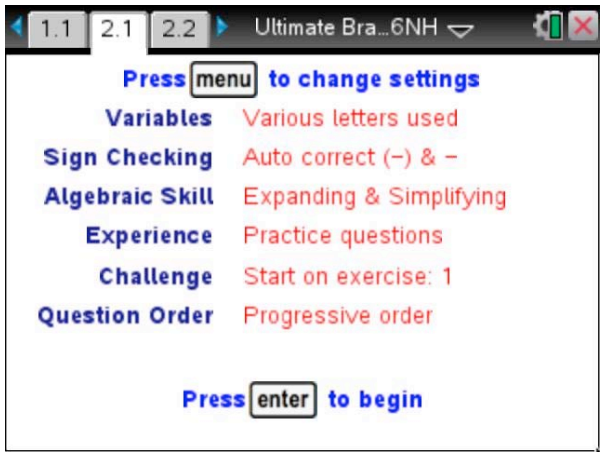
Appendix 1 - Recommended First Lessons (1 of 4)

See the next few pages for recommended First Lessons covering the following four scenarios:

1. Expanding (with a class who are meeting expanding for the first time)
2. Expanding (with a class who know how to expand already)
3. Factorising (with a class who are meeting factorising for the first time)
4. Factorising (with a class who know how to expand already)

1. Expanding (with a class who are meeting expanding for the first time)

Select the options as shown on the right.



At each menu choice, you might wish to describe to the class the difference between the various options, before the one that they want is selected.

At the screen with the first question, direct their attention to the information displayed along the very top of the screen.
Instruct the class how to type in their answer.

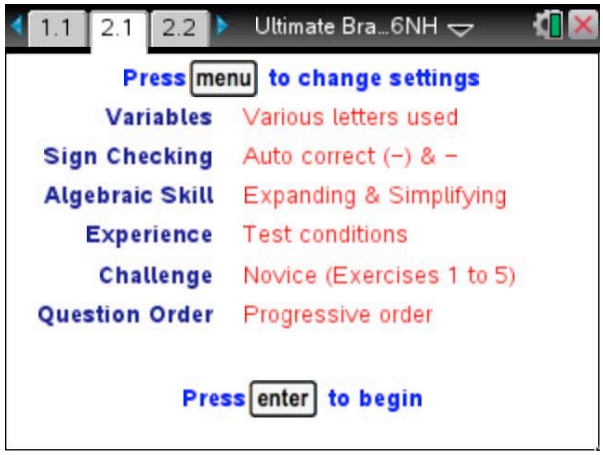
As students progress through their 5 questions, they may get error messages that require teacher support.
At the end of the 5 questions, their final score and performance will be displayed, and they can review all the questions that they tackled.
The class will then start to diverge in the tasks being tackled. Students will either move up to the next level/exercise, or retry the same level/exercise again.

Appendix 1 - Recommended First Lessons (2 of 4)

2. Expanding (with a class who know how to expand already)

Consider running students through Lesson Plan 1 (previous page), just for Exercise 1, so that they are familiar with the operation of the document.

Then, start them off under Test Conditions by selecting the options as shown on the right.



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Instruct the class how to type in their answer.

As students progress through their 5 questions, they may get error messages that require teacher support.
At the end of the 5 questions, their final score and performance will be displayed, and they can review all the questions that they tackled.

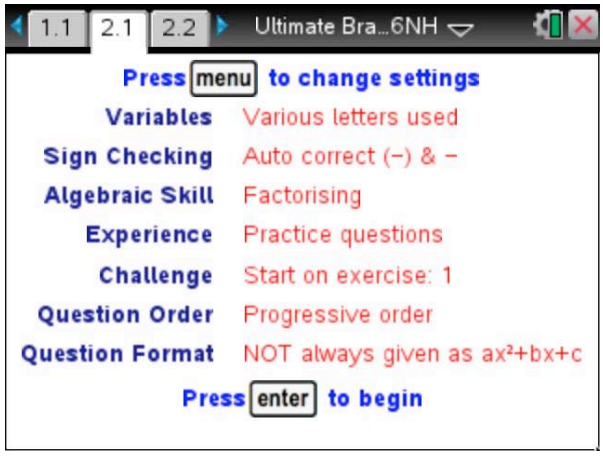
The class will then start to diverge in the tasks being tackled. Students will either start the next level of test (Intermediate level) or start on the exercise number that corresponded to the easiest question that they answered incorrectly.

At any point in time, the students can restart the program and run another test, or start at a higher difficulty exercise.

Appendix 1 - Recommended First Lessons (3 of 4)

3. Factorising (with a class who are meeting factorising for the first time)

Select the options as shown on the right.



The last option choice may seem strange for a first lesson, but it means that students will be presented with expressions in the simpler form of 8-12x,rather than -12x+8.

At each menu choice, you might wish to describe to the class the difference between the various options, before the one that they want is selected.

At the screen with the first question, direct their attention to the information displayed along the very top of the screen.
Instruct the class how to type in their answer.

As students progress through their 5 questions, they may get error messages that require teacher support.
At the end of the 5 questions, their final score and performance will be displayed, and they can review all the questions that they tackled.

The class will then start to diverge in the tasks being tackled. Students will either start the next level of test (Intermediate level) or start on the exercise number that corresponded to the easiest question that they answered incorrectly.

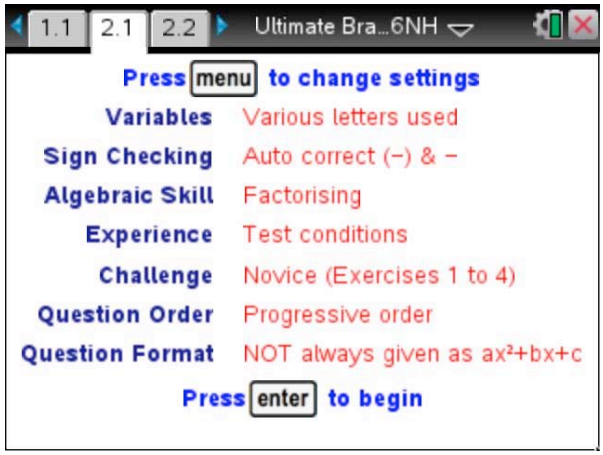
At any point in time, the students can restart the program and run another test, or start at a higher difficulty exercise.

Appendix 1 - Recommended First Lessons (4 of 4)

4. Factorising (with a class who know how to expand already)

Consider running students through Lesson Plan 3 (previous page), just for Exercise 1, so that they are familiar with the operation of the document.

Then, start them off under Test Conditions by selecting the options as shown on the right.



At each menu choice, you might wish to describe to the class the difference between the various options, before the one that they want is selected.

At the screen with the first question, direct their attention to the information displayed along the very top of the screen.
Instruct the class how to type in their answer.

As students progress through their 5 questions, they may get error messages that require teacher support.
At the end of the 5 questions, their final score and performance will be displayed, and they can review all the questions that they tackled.

The class will then start to diverge in the tasks being tackled. Students will either start the next level of test (Intermediate level) or start on the exercise number that corresponded to the easiest question that they answered incorrectly.

At any point in time, the students can restart the program and run another test, or start at a higher difficulty exercise.

Appendix 2 - Feedback Messages

Feedback Message	***Cause/Reason/Example***
Well Done! / etc	Answer correct on 1st attempt
Correct	Answer correct on 2nd or later attempt.
This term doesn't make sense Unexpected symbol following … Answer doesn't make sense	Any expression that the program cannot decipher logically. Most likely arising from a typo by the student.
Write the number without the power	eg. 7^2 rather than 49. It will only accept x^2 terms (or whatever the variable is)
Invalid character before subtraction symbol	eg. (−4+x) ought to use a negative sign, rather than a subtraction operator.
Addition sign not required	eg. +4+x is really just 4+x
Use negative sign, not subtraction	eg. −4+x ought to be -4+x
Unexpected symbol following ²	eg. $4+x^27$
+− is the same as − +- is the same as - −+ is the same as − -+ is the same as - −- is the same as + -− is the same as + −− is the same as + -- is the same as + ++ is the same as +	All of these issues will be reported if **Strictly check (-) & −** is chosen from the start menu. Where **Auto correct (-) & −** is chosen, these will all be fixed, and not reported, unless they give rise to further issues.
Constant terms can be simplified x² terms can be simplified x terms can be simplified	If any of the respective terms can be collected, it will be reported.
Re-order terms to avoid starting with a negative	eg. -4+x is more elegantly written as x−4
Answer must contain brackets	This is only reported when factorising, and no brackets are detected in the input.
Non-matching pairs of brackets Open bracket was expected Closed bracket was expected Too many sets of brackets Not enough brackets	A factorised expression ought to have the correct number of alternating open and closing brackets. If not, one of these messages will be triggered.
Unexpected bracket contents	In general, a set of brackets ought to contain two terms.
Factorise out ...	If a common factor of either a constant or a variable is detected, it will be reported.
Terms before/after brackets not wanted	If completed square form is entered, it will trigger this response.
Factorise the difference of two squares	If the answer is detected as being of the form $a^2x^2-b^2$, this will be reported.
Factor out negative to make more elegant	eg. -4−x is more elegantly written as -(4+x)
Write the repeated bracket with it squared	eg. (x+4)(x+4) is better as $(x+4)^2$
Bracket contains original expression	…which suggests that no factorisation has even taken place!

Appendix 3 - Expanding Brackets & Factorising Exercises and Levels

(Ex=Exercise, Nov=Novice, Int=Intermediate, Adv=Advanced, Exp=Expert)

Factorising Levels

(format of answer listed)

Ex 1	1	..(x+..)
Nov	2	..(..-x)
	3	..(x-..)
	4	..(..x+..)
	5	..(..-..x)
	6	..(..x-..)
Ex 2	7	x(x+..)
Nov	8	x(..-x)
	9	x(x-..)
	10	x(..x+..)
	11	x(..-..x)
	12	x(..x-..)
Ex 3	13	..x(x+..)
Nov	14	..x(..x+..)
	15	..x(..-x)
	16	..x(x-..)
	17	..x(..-..x)
	18	..x(..x-..)
Ex 4	19	-..(x+..)
Nov	20	-..(..x+..)
Int	21	-(x+..)
	22	-(..+..x)
	23	-x(..x+..)
Ex 5	24	(x+..)(x+..)
Int	25	(x-a)(x-a)
	26	(x+a)(x+a)
	27	(x-..)(x+..)
	28	(x+a)(x-a)
	29	(..-x)(..-x)
	30	(..-x)(..+x)
	31	(..-x)(x-..)
	32	(..+x)(..-x)
Ex 6	33	(..x+..)(x+..)
Int	34	(..x-..)(x-..)
Adv	35	(..x-..)(x+..)
	36	(..x+..)(x-..)
Ex 7	37	(..x+..)(..x+..)
Adv	38	(..x-..)(..x-..)
	39	(..x+..)(..x-..)
	40	(ax+b)(ax+b)
	41	(ax-b)(ax-b)
	42	(ax+b)(ax-b)
	43	$(..x+..)^2$
	44	$(..x-..)^2$
Ex 8	45	(..+..x)(..-x)
Adv	46	(..+..x)(x+..)
Exp	47	(..-..x)(..+x)
	48	(..-..x)(..+..x)
	49	(..+..x)(x-..)
	50	(..-..x)(x-..)
	51	(..-..x)(..x-..)
Ex 9	52	..(x+..)(x+..)
Exp	53	..(x-..)(x-..)
	54	..(x+a)(x+a)
	55	..(x-a)(x-a)
	56	..(x+a)(x-a)
	57	..(..+x)(x-..)
	58	..(..-x)(..+x)
	59	..(..-x)(x-..)
	60	..(..x-..)(x-..)
	61	..(..x+..)(x+..)
Ex 10	62	..(..+..x)(x-..)
Exp	63	..(..x+..)(..x+..)
	64	..(..x-..)(..x-..)
	65	..(..x-..)(..x+..)
	66	..(..-..x)(x-..)
	67	..(..+..x)(..-x)
	68	..(..-..x)(..+x)
	69	..(..x+..)(x-..)
	70	..(..x-..)(x+..)
	71	..(ax+b)(ax+b)
	72	..(ax-b)(ax-b)
	73	..(ax+b)(ax-b)
	74	..(..-..x)(..x-..)
	75	..(..-..x)(..x+..)
	76	$-(..x+..)^2$
	77	$..(..x+..)^2$
	78	$..(..x-..)^2$

Expanding Levels

(format of question listed)

Ex 1	1	..(x+..)
Nov	2	..(..+x)
	3	..(..x+..)
	4	..(..+..x)
	5	..(..-x)
	6	..(x-..)
	7	..(..-..x)
	8	..(..x-..)
Ex	9	..+..(..x+..)
2	10	..+..(..+..x)
Nov	11	..+..(..x-..)
	12	..+..(..-..x)
	13	..x+..(..x+..)
	14	..x+..(..+..x)
	15	..x+..(..x-..)
	16	..x+..(..-..x)
Ex	17	x(..+x)
3	18	x(x+..)
Nov	19	x(..x+..)
	20	x(..+..x)
	21	x(x-..)
	22	x(..-x)
	23	x(..x-..)
	24	x(..-..x)
	25	..x(..+x)
	26	..x(x+..)
	27	..x(..+..x)
	28	..x(..x+..)
	29	..x(x-..)
	30	..x(..-x)
	31	..x(..x-..)
	32	..x(..-..x)
Ex	33	..+..x(..+..x)
4	34	..+..x(..x+..)
Nov	35	..+..x(..-..x)
	36	..+..x(..x-..)
	37	..x+..x(..+..x)
	38	..x+..x(..x+..)
	39	..x+..x(..-..x)
	40	..x+..x(..x-..)
Ex	41	-..(x+..)
5	42	-..(..+x)
Nov	43	-..(..x+..)
Int	44	-..(..+..x)
	45	-..(..-x)
	46	-..(x-..)
	47	-..(..-..x)

	48	-..(..x-..)
Ex	49	-(x+..)
6	50	-(x-..)
Int	51	-(..-x)
	52	-(..+x)
	53	-(..+..x)
	54	-(..x+..)
	55	-(..x-..)
	56	-(..-..x)
	57	-(-..x+..)
	58	-(-..x-..)
	59	-(-..+..x)
	60	-(-..-..x)
Ex	61	..-..(..+..x)
7	62	..-..(..x+..)
Int	63	..-..(..-..x)
	64	..-..(..x-..)
	65	..-(..+..x)
	66	..-(..x+..)
	67	..-(..-..x)
	68	..-(..x-..)
Ex	69	..x-..(..+..x)
8	70	..x-..(..x+..)
Int	71	..x-..(..-..x)
	72	..x-..(..x-..)
	73	..x-(..x+..)
	74	..x-(..+..x)
	75	..x-(..-..x)
	76	..x-(..x-..)
Ex	77	-x(..+..x)
9	78	-x(..x+..)
Int	79	-x(..-..x)
	80	-x(..x-..)
	81	-x(-..+..x)
	82	-x(-..x+..)
	83	-x(-..-..x)
	84	-x(-..x-..)
Ex	85	..-x(..+..x)
10	86	..-x(..x+..)
Int	87	..-x(..-..x)
Adv	88	..-x(..x-..)
	89	..-..x(..+..x)
	90	..-..x(..x+..)
	91	..-..x(..-..x)
	92	..-..x(..x-..)
	93	..x-x(..+..x)
	94	..x-x(..x+..)
	95	..x-x(..-..x)
	96	..x-x(..x-..)
	97	..x-..x(..+..x)
	98	..x-..x(..x+..)
	99	..x-..x(..-..x)
	100	..x-..x(..x-..)
Ex	101	..(..+..x)+..(..+..x)
11	102	..(..-x)+..(..-..x)
Adv	103	..(..x+..)+..(..x+..)
	104	..(x-..)+..(..x-..)
	105	..x(..+..x)+..(..+..x)
	106	..x(..-x)+..(..-..x)
	107	..x(..x+..)+..(..x+..)
	108	..x(x-..)+..(..x-..)
	109	..(..+..x)+..x(..+..x)
	110	..(..-x)+..x(..-..x)
	111	..(..x+..)+..x(..x+..)
	112	..(x-..)+..x(..x-..)
	113	..x(..+..x)+..x(..+..x)
	114	..x(..-x)+..x(..-..x)
	115	..x(..x+..)+..x(..x+..)
	116	..x(x-..)+..x(..x-..)
	117	..(..+..x)-..(..+..x)
	118	..(..-x)-..(..-..x)
	119	..(..x+..)-..(..x+..)
	120	..(x-..)-..(..x-..)
	121	..x(..+..x)-..(..+..x)
	122	..x(..-x)-..(..-..x)
	123	..x(..x+..)-..(..x+..)
	124	..x(x-..)-..(..x-..)
	125	..(..+..x)-(..+..x)
	126	..(..-x)-(..-..x)
	127	..(..x+..)-(..x+..)
	128	..(x-..)-(..x-..)
	129	..x(..+..x)-(..+..x)
	130	..x(..-x)-(..-..x)
	131	..x(..x+..)-(..x+..)
	132	..x(x-..)-(..x-..)
	133	..(..+..x)-x(..+..x)
	134	..(..-x)-x(..-..x)
	135	..(..x+..)-x(..x+..)
	136	..(x-..)-x(..x-..)
	137	..x(..+..x)-x(..+..x)
	138	..x(..-x)-x(..-..x)
	139	..x(..x+..)-x(..x+..)
	140	..x(x-..)-x(..x-..)
	141	..(..+..x)-..x(..+..x)
	142	..(..-x)-..x(..-..x)
	143	..(..x+..)-..x(..x+..)
	144	..(x-..)-..x(..x-..)
	145	..x(..+..x)-..x(..+..x)
	146	..x(..-x)-..x(..-..x)
	147	..x(x-..)-..x(..x-..)
Ex	148	(x+..)(x+..)
12	149	(x+..)(x-..)
Adv	150	(x-..)(x+..)
	151	(x-..)(x-..)
	152	(x+..)(x+..)
	153	$(x+..)^2$
	154	(x-..)(x-..)
	155	$(x-..)^2$
	156	(x+..)(x-..)
	157	(x-..)(x+..)
	158	(..+x)(..+x)
	159	(..+x)(x+..)
	160	(..+x)(x-..)
	161	(..+x)(..-x)
	162	(..-x)(..+x)
	163	(..-x)(x+..)
	164	(..-x)(..-x)
	165	(..-x)(x-..)
Ex	166	(..x+..)(x+..)
13	167	(..x+..)(..x+..)
Adv	168	(..x+..)(x-..)
	169	(..x+..)(..x-..)
	170	(..x-..)(..x+..)
	171	(..x-..)(x+..)
	172	(..x-..)(x-..)
	173	(..x-..)(..x-..)
	174	(..x+..)(..x+..)
	175	(..x+..)(..x-..)
	176	$(..x+..)^2$
	177	(..x-..)(..x+..)
	178	(..x-..)(..x-..)
	179	$(..x-..)^2$
	180	(..+..x)(..+x)
	181	(..+..x)(x+..)
	182	(..+..x)(..-x)
	183	(..+..x)(x-..)
	184	(..-..x)(..+x)
	185	(..-..x)(..-x)
	186	(..-..x)(x+..)
	187	(..-..x)(x-..)
	188	(..+..x)(..+..x)
	189	(..+..x)(..x+..)
	190	(..+..x)(..x-..)
	191	(..-..x)(..+..x)
	192	(..-..x)(..-..x)
	193	(..-..x)(..x+..)
	194	(..-..x)(..x-..)
Ex	195	..(x+..)(x+..)
14	196	..(x+..)(x-..)
Adv	197	..(x-..)(x+..)
	198	..(x-..)(x-..)
	199	..(x+..)(x+..)
	200	..(x+..)(x-..)
	201	$..(x+..)^2$
	202	..(x-..)(x+..)
	203	..(x-..)(x-..)
	204	$..(x-..)^2$
	205	..(..+x)(..+x)
	206	..(..+x)(..-x)
	207	..(..-x)(..+x)
	208	..(..-x)(..-x)

	209	..(..+x)(x-..)
	210	..(..-x)(x+..)
	211	..(..-x)(x-..)
	212	..(..+..x)(..+x)
	213	..(..+..x)(..-x)
	214	..(..-..x)(..+x)
	215	..(..-..x)(..-x)
	216	..(..+..x)(x+..)
	217	..(..+..x)(x-..)
	218	..(..-..x)(x+..)
	219	..(..-..x)(x-..)
	220	..(..x+..)(..x+..)
	221	..(..x+..)(..x-..)
	222	..(..x-..)(..x+..)
	223	..(..x-..)(..x-..)
	224	..(..x+..)(x+..)
	225	..(..x+..)(x-..)
	226	..(..x-..)(x+..)
	227	..(..x-..)(x-..)
	228	..(..x+..)(..x+..)
	229	..(..x+..)(..x-..)
	230	$..(..x+..)^2$
	231	..(..x-..)(..x+..)
	232	..(..x-..)(..x-..)
	233	$..(..x-..)^2$
	234	..(..+..x)(..+..x)
	235	..(..+..x)(..-..x)
	236	..(..-..x)(..+..x)
	237	..(..-..x)(..-..x)
	238	..(..+..x)(..x+..)
	239	..(..+..x)(..x-..)
	240	..(..-..x)(..x+..)
	241	..(..-..x)(..x-..)
Ex	242	$..+..(..x+..)^2$
15	243	$..+..(..+..x)^2$
Adv	244	$..+..(..x-..)^2$
Exp	245	$..+..(..-..x)^2$
	246	$..x+..(..x+..)^2$
	247	$..x+..(..+..x)^2$
	248	$..x+..(..x-..)^2$
	249	$..x+..(..-..x)^2$
Ex	250	$-(..x+..)^2$
16	251	$-(..x-..)^2$
Exp	252	$-(..+..x)^2$
	253	$-(..-..x)^2$
	254	$-(-..+..x)^2$
	255	$-(-..-..x)^2$
	256	$-(-..x+..)^2$
	257	$-(-..x-..)^2$
Ex	258	$..-(..x+..)^2$
17	259	$..-(..x-..)^2$
Exp	260	$..-(..+..x)^2$
	261	$..-(..-..x)^2$
	262	$..-(..x+..)^2$
	263	$..-(..x-..)^2$
	264	$..-(..+..x)^2$
	265	$..-(..-..x)^2$
	266	$..x-(..x+..)^2$
	267	$..x-(..x-..)^2$
	268	$..x-(..+..x)^2$
	269	$..x-(..-..x)^2$
	270	$..x-(..x+..)^2$
	271	$..x-(..x-..)^2$
	272	$..x-(..+..x)^2$
	273	$..x-(..-..x)^2$
Ex	274	$..(..x+..)+..(..x+..)^2$
18	275	$..(..x+..)^2+..(..x+..)$
Exp	276	$..(..+..x)+..(..+..x)^2$
	277	$..(..+..x)^2+..(..+..x)$
	278	$..(..x+..)^2+..x(..x+..)$
	279	$..x(..x+..)+..(..x+..)^2$
	280	$..(..+..x)^2+..x(..+..x)$
	281	$..x(..+..x)+..(..+..x)^2$
	282	$..(x-..)^2+..(..x-..)$
	283	$..(x-..)^2+..x(..x-..)$
	284	$..(x-..)+..(..x-..)^2$
	285	$..x(x-..)+..(..x-..)^2$
	286	$..(..-x)^2+..(..-..x)$
	287	$..(..-x)+..(..-..x)^2$
	288	$..(..-x)^2+..x(..-..x)$
	289	$..x(..-x)+..(..-..x)^2$
Ex	290	$..(..+..x)^2-..(..+..x)$
19	291	$..(..+..x)-..(..+..x)^2$
Exp	292	$..(..x+..)^2-..(..x+..)$
	293	$..x(..+..x)-..(..+..x)^2$
	294	$..x(..x+..)-..(..x+..)^2$
	295	$..(..x+..)^2-x(..x+..)$
	296	$..(..+..x)^2-x(..+..x)$
	297	$..(..x+..)^2-..x(..x+..)$
	298	$..(..+..x)^2-..x(..+..x)$
	299	$..x(..x+..)-(..x+..)^2$
	300	$..x(..+..x)-(..+..x)^2$
	301	$..(..x+..)^2-(..x+..)$
	302	$..(..x+..)-(..x+..)^2$
	303	$..(..x+..)-..(..x+..)^2$
	304	$..(..+..x)^2-(..+..x)$
	305	$..(..+..x)-(..+..x)^2$
	306	$..(x-..)^2-..(..x-..)$
	307	$..(x-..)-..(..x-..)^2$
	308	$..(..-x)^2-..(..-..x)$
	309	$..(..-x)-..(..-..x)^2$
	310	$..x(x-..)-..(..x-..)^2$
	311	$..x(..-x)-..(..-..x)^2$
	312	$..(x-..)^2-x(..x-..)$
	313	$..(..-x)^2-x(..-..x)$
	314	$..(x-..)^2-(..x-..)$
	315	$..(x-..)-(..x-..)^2$
	316	$..(..-x)^2-(..-..x)$
	317	$..(..-x)-(..-..x)^2$
	318	$..(x-..)^2-..x(..x-..)$
	319	$..(..-x)^2-..x(..-..x)$
	320	$..x(x-..)-(..x-..)^2$
	321	$..x(..-x)-(..-..x)^2$
Ex	322	$..(x-..)^2+..(..x-..)^2$
20	323	$..(..-x)^2+..(..-..x)^2$
Exp	324	$..(..x+..)^2+..(..x+..)^2$
	325	$..(..+..x)^2+..(..+..x)^2$
	326	$..(x-..)^2-..(..x-..)^2$
	327	$..(..-x)^2-..(..-..x)^2$
	328	$..(x-..)^2-(..x-..)^2$
	329	$..(..-x)^2-(..-..x)^2$
	330	$..(..x+..)^2-(..x+..)^2$