



Nasco's

QUAD-FACTORS

BY HARRY ROMAN

**A game designed to improve factoring of
quadratic equations and binomial expansions.**

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INTRODUCTION

Students often encounter problems with the solving of quadratic equations and the expansion of binomials. This card game is designed to allow a competitive challenge either between teams of students in a classroom or for individual play among opponents. This fun component can challenge students to practice this aspect of algebraic manipulation, and hopefully improve their test scores and understanding.

GAME COMPONENTS

- Two card decks
 - Factor Me:** 28 cards
 - Expand Me:** 28 cards
- Die
- Watch with seconds-counting capability (not included)
- Referee (keeps time, check answers, keeps score)

GAME PLAY

Each player rolls the die to determine from which deck a challenge will be drawn. If the player rolling the die gets an even number (2, 4, 6), then the player must select a card from the **Factor Me** deck. If a player rolls an odd number (1, 3, 5), that player must select a card from the **Expand Me** deck.

Only the referee handles cards from the deck and shows what the challenge is to that player, and only that player. Once a challenge is shown, the player has 30 seconds to arrive at the answer to the card selected. If the right answer is achieved,

10 points are awarded. The wrong answer or no answer results in a 15 point penalty.

The cards in both decks marked with an asterisk (*) are bonus challenges and are worth 20 points if solved correctly. If not solved or wrong, they incur a 25-point penalty.

The referee has the final say as to whether the challenge was done correctly and within the 30-second time limit. If a challenge was completed within 15 seconds or less of its undertaking, the referee may award an additional 5 points for excellence.

Play continues until a player reaches a previously determined point total. Players may set point totals to win of 250, 500, 750, and 1,000, or less if desired.

If a card deck is exhausted during play, the referee is to reshuffle the exhausted deck and renew them for play.

PLAY VARIATIONS

1. This game can be played in the classroom with the teacher serving as the referee. Cards can be given to individual students facedown on their desks. When the referee says, "Go," all students are

faced with the same 30-second time limit. In this case, no 15-seconds-or-less excellence points are awarded, but bonus card rules apply.

- 2.** Teams of students can be pitted against each other in heats. Here the 15-second excellence points rule would apply. Again, the teacher serves as the referee.
- 3.** The card game can be used by school math clubs or in play between classes.
- 4.** Cards can be given to students to take home and solve as a way of gaining practice and faculty in algebraic manipulation.

5. Adults who are mathematically literate may also engage in playing this game.
6. Students can be encouraged to design their own “brain-buster” problems and make custom-designed card decks to challenge their classmates.

FACTOR ME CARDS & ANSWERS

	Card	Answer
1.	$x^2 + 7x + 10$	$(x + 5)(x + 2)$
2.	$x^2 + 6x + 8$	$(x + 4)(x + 2)$
3.	$x^2 + 12x + 32$	$(x + 8)(x + 4)$
4.	$x^2 - 2x - 24$	$(x - 6)(x + 4)$
5.	$x^2 - 6x + 8$	$(x - 4)(x - 2)$
6.	$x^2 - 1x - 42$	$(x - 7)(x + 6)$
7.	$x^2 + 7x + 12$	$(x + 4)(x + 3)$
8.	$x^2 - 36$	$(x + 6)(x - 6)$

9.	$x^2 - 5x - 24$	$(x - 8)(x + 3)$
10.	$x^2 + 15x + 54$	$(x + 6)(x + 9)$
11.	$x^2 - 16$	$(x + 4)(x - 4)$
12.	$x^2 - 4x - 21$	$(x - 7)(x + 3)$
13.	$x^2 + 13x + 40$	$(x + 8)(x + 5)$
14.	$x^2 + 10x + 24$	$(x + 6)(x + 4)$
15.	$x^2 - 5x - 36$	$(x - 9)(x + 4)$
16.	$x^2 + 14x + 48$	$(x + 8)(x + 6)$
17.	$x^2 - 1x - 30$	$(x - 6)(x + 5)$
18.	$x^2 - 4x - 32$	$(x - 8)(x + 4)$

19.	$x^2 - 81$	$(x - 9)(x + 9)$
20.	$x^2 + 7x - 18$	$(x + 9)(x - 2)$
21.	$x^2 - 4x - 12$	$(x - 6)(x + 2)$
22.	$\frac{x^3 + 11x^2 + 30x}{x}$	$(x + 6)(x + 5)$
23.	$x^2 + 19x + 48$	$(x + 16)(x + 3)$
24.	$2\left(\frac{x^2}{2} - 2x - 16\right)$	$(x - 8)(x + 4)$
25.	$3x^2 - 9x - 162$	$3(x - 9)(x + 6)$

26.	$\frac{x^5}{x^3} + 19x + \frac{270}{3}$	$(x + 10)(x + 9)$
27.	$x^2 + 23x + 132$	$(x + 12)(x + 11)$
28.	$x^2 - 9x - 100 + 9x$	$(x + 10)(x - 10)$

EXPAND ME CARDS & ANSWERS

	Card	Answer
1.	$(x + 5)(x + 9)$	$x^2 + 14x + 45$
2.	$(x - 8)(x + 7)$	$x^2 - 1x - 56$
3.	$(x - 6)(x - 9)$	$x^2 - 15x + 54$

4.	$(x + 14)(x - 3)$	$x^2 + 11x - 42$
5.	$(x + 5)(x + 14)$	$x^2 + 19x + 70$
6.	$(x + 20)(x - 5)$	$x^2 + 15x - 100$
7.	$(x - 12)(x - 4)$	$x^2 - 16x + 48$
8.	$(x + 8)(x - 9)$	$x^2 - 1x - 72$
9.	$(x + .5)(x - .5)$	$x^2 - .25$
10.	$(x + 6)(x + 3)$	$x^2 + 9x + 18$
11.	$2[(x + 3)(x + 7)]$	$2x^2 + 20x + 42$
12.	$(x - 13)(x + 3)$	$x^2 - 10x - 39$
13.	$(x + 9)(x - 7)$	$x^2 + 2x - 63$

14.	$(2x + 4)(3x - 3)$	$6x^2 + 6x - 12$
15.	$(x + 9)(x + 20)$	$x^2 + 29x + 180$
16.	$(x + 5)(3x - 11)$	$3x^2 + 4x - 55$
17.	$(x + 13)(x - 7)$	$x^2 + 6x - 91$
18.	$(x + 19)(x + 4)$	$x^2 + 23x + 76$
19.	$\left(\frac{2x^2 + 6x}{2}\right) + \frac{38}{19}$	$x^2 + 3x + 2$
20.	$1.5\left(\frac{20x^2}{3} + \frac{x}{4.5} + 5\right)$	$10x^2 + \frac{x}{3} + 7.5$
21.	$\frac{(2x^2 + 0)(9 - 3x)}{3x}$	$6x - 2x^2$

22.	$(x + 4)(x - 11)$	$x^2 - 7x - 44$
23.	$(x + 40)(x - 20)$	$x^2 + 20x - 800$
24.	$(x - 7)(x - 12)$	$x^2 - 19x + 84$
25.	$(x - 16)(x + 4)$	$x^2 - 12x - 64$
26.	$(2x + 1)(4x - 1)$	$8x^2 + 2x - 1$
27.	$(x + 3)(x + 3)$	$x^2 + 6x + 9$
28.	$4[(x + 6)(x)]$	$4x^2 + 24x$



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