

Innovation in mathematics education through AI technology

Knowre CEO, YJ Kim

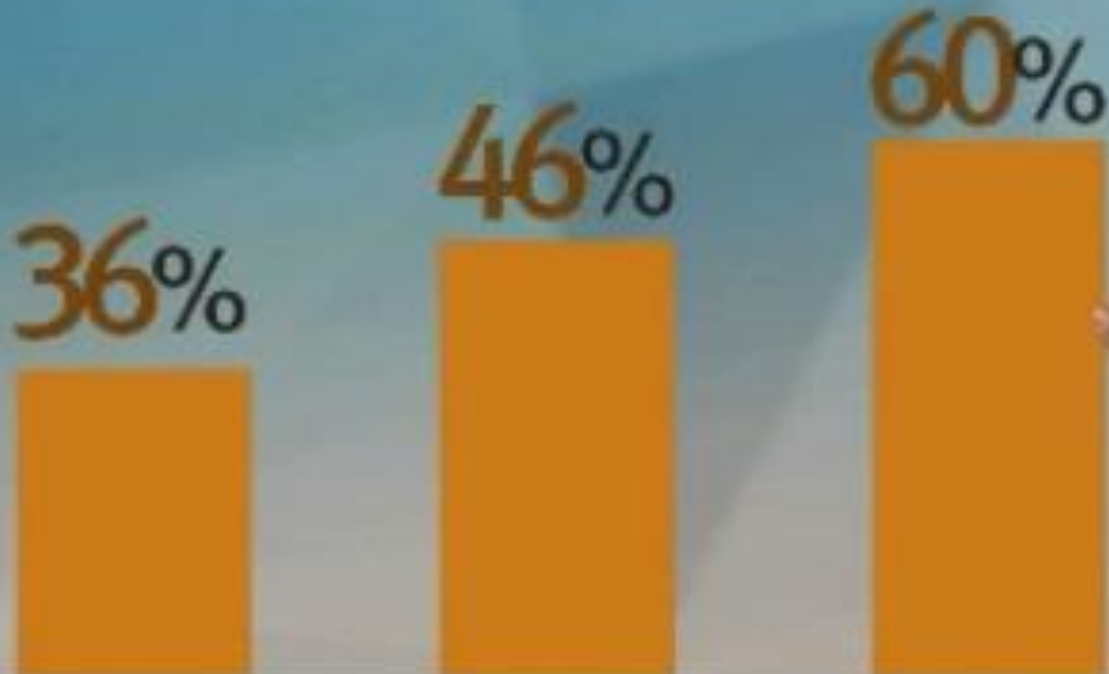




NATIONAL
MATH + SCIENCE
INITIATIVE

**Of the 20 fastest growing
careers, 15 of them
require a background in
math or science.**

Students who abandoned math



Elementary-school

Middle-school

High-school

출처: 사교육걱정없는세상, 박홍근 국회의원실








Classroom:
One Size Fits All

When one equation is already solved for x or y , then the coefficients of one variable are opposites. When the coefficients of one variable are the same, when no corresponding coefficients are the same or opposites.

HOMEWORK KEY

-  = WORKED-OUT SOLUTIONS on p. WS17 for Exs. 15 and 39
-  = STANDARDIZED TEST PRACTICE Exs. 2, 18, 34, 41, and 42
-  = MULTIPLE REPRESENTATIONS Ex. 40

is the least common multiple of 12 and 18?

2. how to solve the linear elimination method.

EXERCISES

Solve the linear system using elimination.

- 4. $3x - 2y = 3$
 $-x + y = 1$
- 7. $8x - 5y = 11$
 $4x - 3y = 5$

- $2x - 3y = -4$ Equation 1
- $7x + 9y = -5$ Equation 2

- 5. $4x + 3y = 8$
 $x - 2y = 13$
- 8. $11x - 20y = 28$
 $3x + 4y = 36$

- 24. $0.2x - 1.5y = 1$
 $x - 4.5y = 1$
- 27. $0.2x - 1.5y = 1$
 $x - 4.5y = 1$
- 30. $x + y = 0$
 $\frac{1}{2}x - \frac{1}{2}y = 2$

33. GEOMETRY

A new rectangle is formed by doubling the length, the length l , as shown. The perimeter P of 48 inches.

- a. Write and solve a system of the length and width of the rectangle.
- b. Find the length and width.

34. ★ WRITING

For which values of x and y does the system $ax + 3y = 2$ and $4x + 5y = 7$ have a unique solution?

CHALLENGE

Find the values of a and b for which the linear system has the solution $(4, 2)$.

- 35. $(4, 2)$

Handwritten notes on the right page:

$$-5.4y = 39.2$$
$$y = -7$$
$$30. x + y = 0$$
$$\frac{1}{2}x = \frac{1}{2}x + 2$$
$$+ \quad x - y = 4$$
$$\hline 2x = 4$$
$$x = 2$$



Paper Book

New Paradigm in Education

The emergence of
new low priced
devices and software
technology

2010

30%

2014

47%

2020

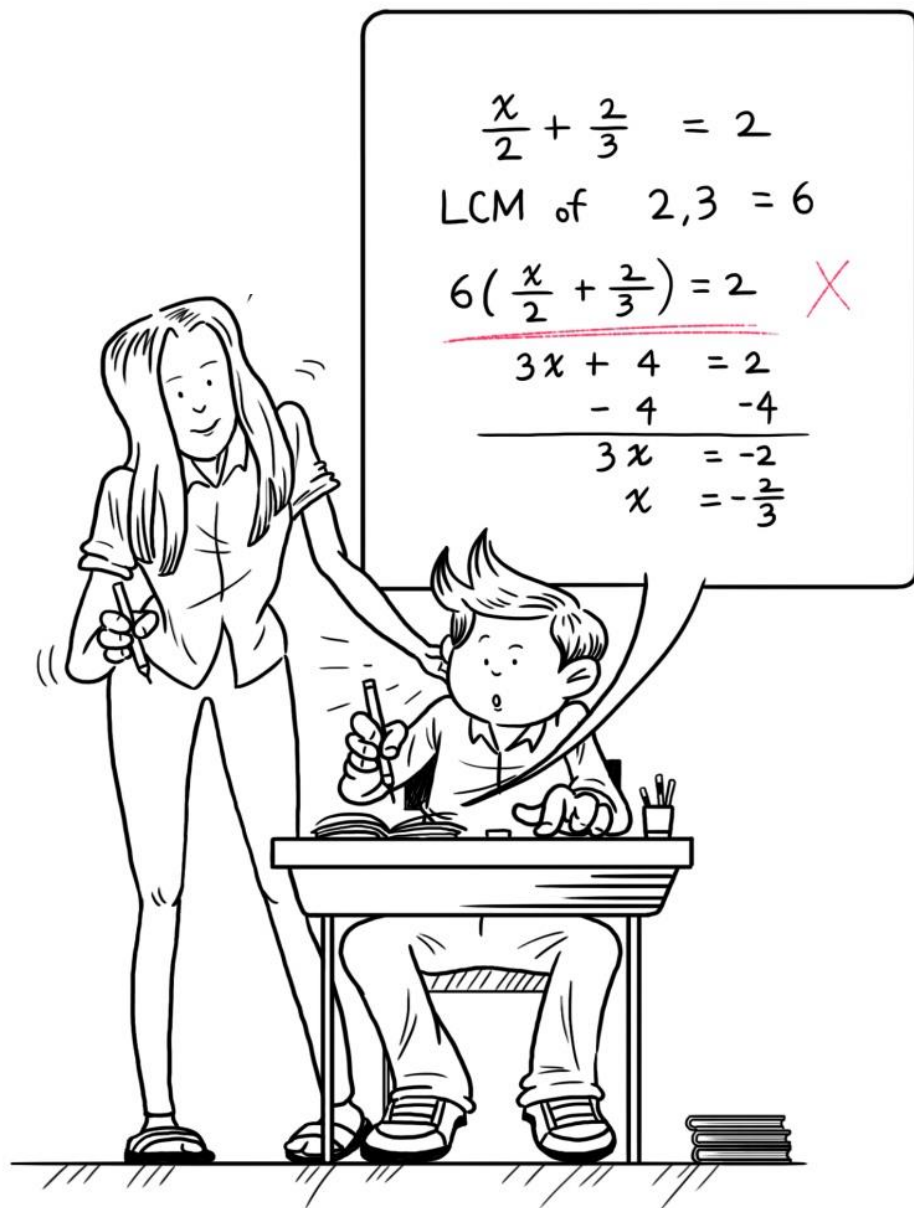
98%

Blended learning penetration in the US

What has changed in
mathematics
education through
new technology?



1. Analyze why it is wrong and prescribe exactly what you don't know

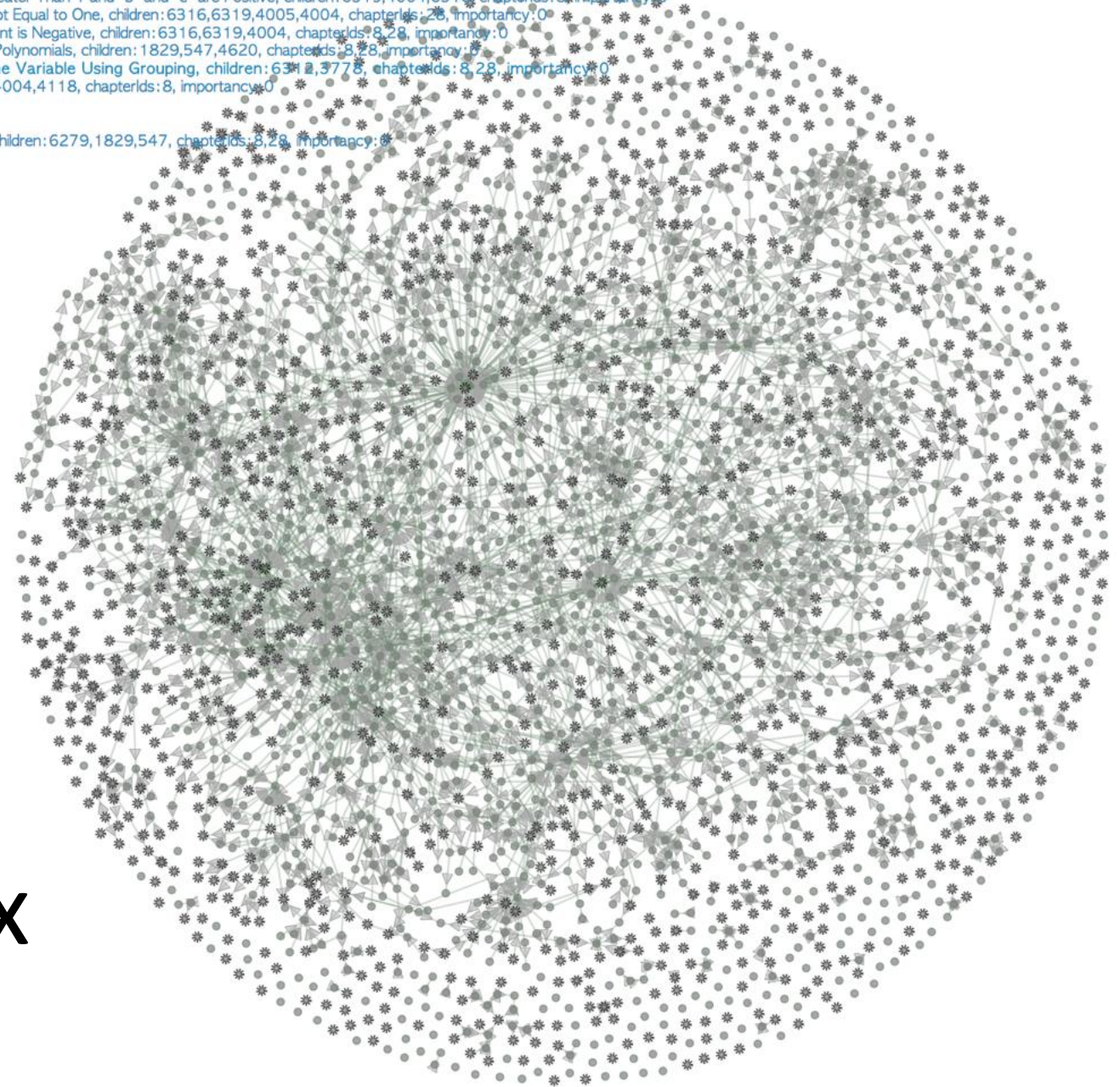


Solve: $x^2 + 5x - 35 = 3x$

Knowledge Unit	Concept	Expression
<i>Subtraction property of equality</i>	When both sides of an equation have the same number subtracted from them, the remaining are equal	$x^2 + 2x - 35 = 0$
<i>Factoring trinomials</i>	Factor into two binomials	$(x - 5)(x + 7) = 0$
<i>Zero product property</i>	If $AB = 0$, then either $A = 0$ or $B = 0$ (or both)	$x - 5 = 0$ or $x + 7 = 0$
<i>Solving the equation</i>	If $Ax - B = 0$, then $x = B / A$	$x = 5, -7$

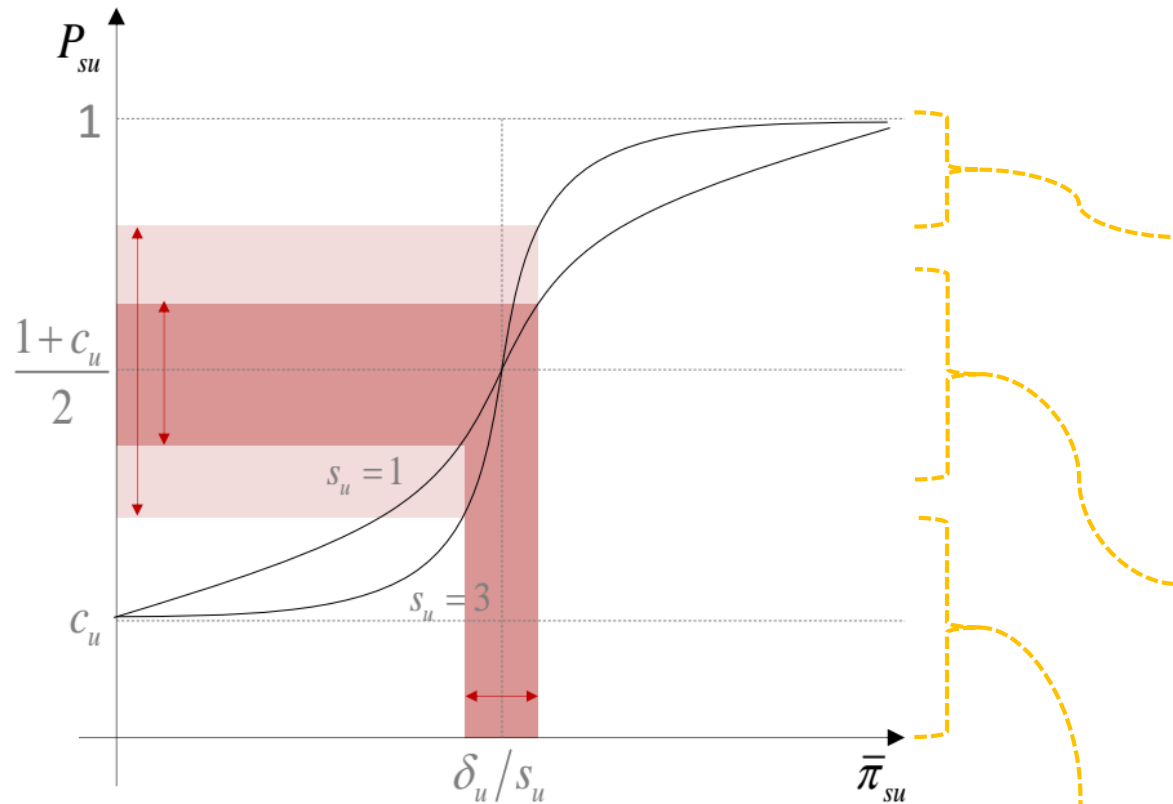
$x = 5, -7$

3745, Factoring a Quadratic When $a=1$ and b, c are Positive, children:6316,6319,4004, chapterIds:8, importance:0
3748, Factoring Quadratics When $a=1$, children:6316,6319,4004,4005, chapterIds:28, importance:0
3751, Factoring a Quadratic when " a " is an Integer Greater Than 1 and " b " and " c " are Positive, children:6319,4004,6316, chapterIds:8, importance:0
3753, Factoring a Quadratic When " a " Is an Integer Not Equal to One, children:6316,6319,4005,4004, chapterIds:28, importance:0
3756, Factoring a Quadratic Whose the Lead Coefficient is Negative, children:6316,6319,4004, chapterIds:8,28, importance:0
3778, Using GCF and a Product of Factors to Factor Polynomials, children:1829,547,4620, chapterIds:8,28, importance:0
4004, Factoring Polynomials With More Than One Variable Using Grouping, children:6316,3778, chapterIds:8,28, importance:0
4098, Factoring Trinomials by Grouping - 1, children:4004,4118, chapterIds:8, importance:0
4136, children:4004, chapterIds:8, importance:0
4137, children:4004, chapterIds:8, importance:0
6312, Factoring a Binomial GCF from an Expression, children:6279,1829,547, chapterIds:8,28, importance:0



Knowledge Matrix

Deep learning-based predictive technology



π_{su} : Proficiency of a student's understanding of a specific concept/skill

P_{su} : Probability that student will get specific concept/skill correct

Concept/Skill that student is highly likely to answer correctly

Not recommended

Working on this problem is not a good use of the student's time

Concept/Skill that student is neither likely nor unlikely to answer correctly

Recommended

Appropriate for the student's level of proficiency. If student gets wrong, further assess and recommend

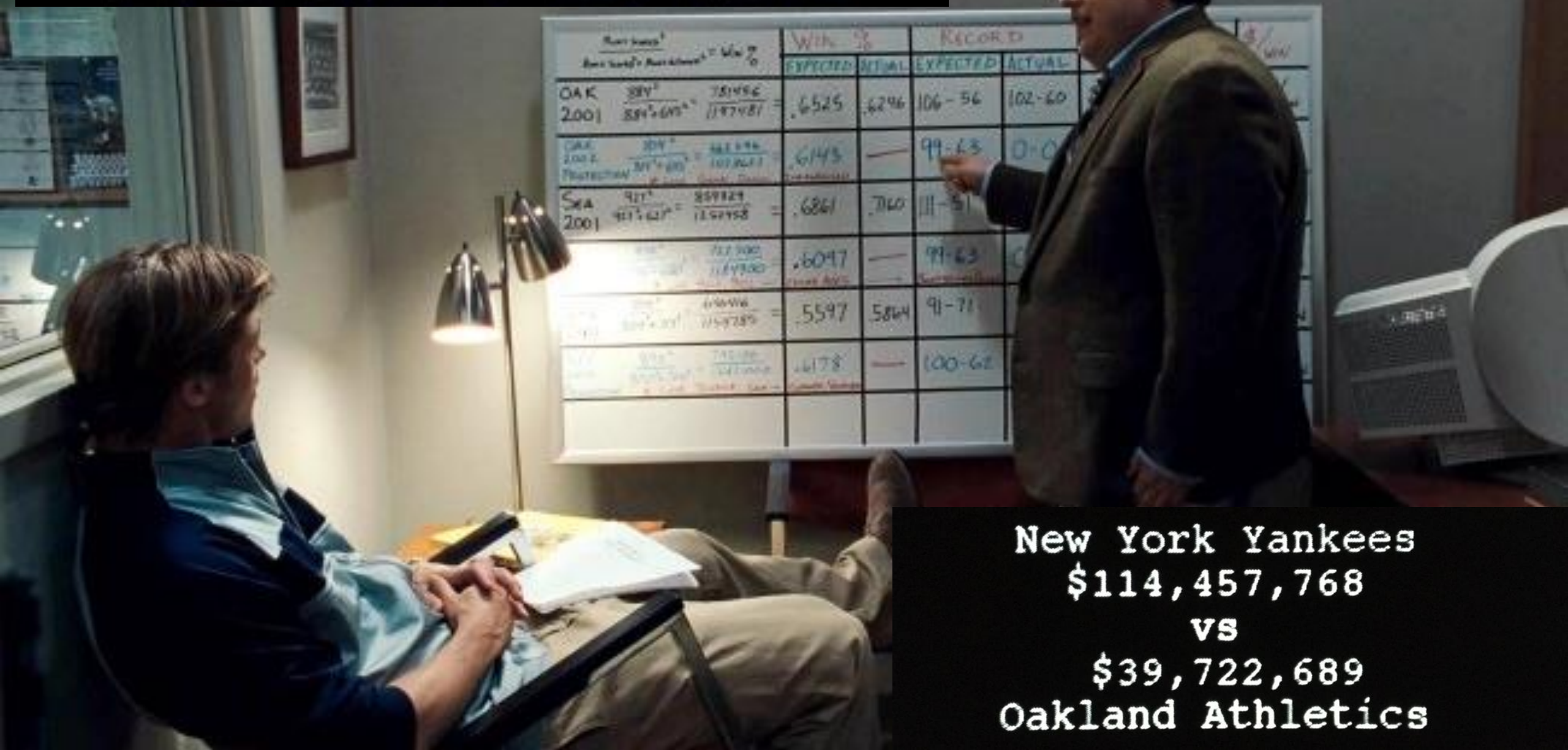
Concept/Skill that student is not likely to answer correctly

Not recommended

This problem is too difficult for the student. Better to start with an easier or prerequisite problem

2. The teacher's role evolves from
instruction to coaching

MONEYBALL



New York Yankees
\$114,457,768
vs
\$39,722,689
Oakland Athletics



Overworked teacher

school.knowreapp.com/dashboard/?id=553&index=0&menu=manageStudents

knowre

Dashboard ▾ KnowRe Alg

★ 9 10441 David

Create a Class +

Overview | Student Progress | Curriculum Closeup | Assignments

Curriculum Algebra 1 Students 21 Since Feb 2014

Class Total ★ 954 115122 Class Code MFB43ZL Invite Students

Achievement Score Distribution

Class Size 21 Students

Achievement Trend

Avg Achievement 10 ▲ 0 Avg % Completed 13 ▲ 0

Work Completed

Probs Solved This Wk 0 ▲ 0 Avg Probs Solved This Wk 0 ▲ 0

Total 1860

1

0.5

0

May 9-15 May 16-22 May 23-29 This Wk

Students

Name	Curriculum Progress	Achvmt (%)	Complt (%)	Problems Solved This Week	Total Problems Solved	Last worked on	Last Seen	Assgnmts Avg	Assgnmts
Alex	<div><div></div></div>	35 ▲ 0	51 ▲ 0	0 ▲ 0	349	Lesson 5-4	Dec 16	0	
Cheung, Joanna	<div><div></div></div>	0 ▲ 0	0 ▲ 0	0 ▲ 0	0	-	-	0	
Duncker, Angie	<div><div></div></div>	20 ▲ 0	23 ▲ 0	0 ▲ 0	156	Lesson 6-2	Oct 3	0	
Grier, Ratasha	<div><div></div></div>	0 ▲ 0	0 ▲ 0	0 ▲ 0	0	-	-	0	
Heim, Michele	<div><div></div></div>	81 ▲ 0	85 ▲ 0	0 ▲ 0	587	Lesson 9-1	4 days ago	0	
Hsiao, David	<div><div></div></div>	3 ▲ 0	3 ▲ 0	0 ▲ 0	23	-	-	0	
Joo, David	<div><div></div></div>	7 ▲ 0	10 ▲ 0	0 ▲ 0	72	Lesson 3-5	May 25	0	
Kim, Elm	<div><div></div></div>	3 ▲ 0	4 ▲ 0	0 ▲ 0	-	Lesson 1-2	Feb 15	-	

노리 수학 LMS

동백 중학교

1학년 단풍나무 반 28 명

1학년 은행나무 반 30 명

1학년 통기타 반 29 명

반 만들기

반 다시 만들기

반별관리 문제 보기 전체 계정 관리

1학년 단풍나무 반 담당 이미영 선생님

단원별 성취도 실시간 현황 학습 기록 학생 정보

I. 수와 연산 II. 문자와 식 III. 함수

평답률 Low High

1. 소인수분해 1-1 소수와 합성수

1 2 3 4 5 6 7 8 9 10

속제 출제하기 출제 취소

1. 소인수분해 1-2 소인수분해

1 2 3 4 5 6 7 8 9 10

속제 출제하기 출제 취소

2. 최대공약수와 최소공배수 2-1 최대공약수와 최소공배수

1 2 3 4 5 6 7 8 9 10

속제 출제하기 출제 취소

2. 최대공약수와 최소공배수 2-2 정수와 유리수의 혼합계산

속제 출제하기 출제 취소

최대공약수와 최소공배수_정답률: 16 / 28

반별관리 문제 보기 전체 계정 관리

1학년 단풍나무 반

단원별 성취도 실시간 현황 학습 기록 학생 정보

이름 아이디 반 번호 시험성적 성취도

고아라 jjj14006 1.6 81 88

김대희 jjj14002 1.8 85 95

김용재 jjj14003 1.12 70 92

박상용 jjj14001 1.10 66 90

박서준 jjj14009 2.4 82 81

박슬기 jjj14000 2.2 92 58

이가희 jjj14007 1.11 79 100

이찬빈 jjj14011 1.19 99 95

오혁 jjj14012 3.7 84 90

오기현 jjj14006 3.1 66 62

하희라 jjj14017 1.3 88 82

반 만들기

반 다시 만들기

Teacher id

1-1 소수와 합성수 85

1-2 소인수분해 90

2-1 최대공약수와 최소공배수 -

2-2 최대공약수와 최소공배수의 활용 (1) -

2-3 최대공약수와 최소공배수의 활용 (2) -

3-1 정수와 유리수 -

3-2 정수와 유리수의 덧셈과 뺄셈 -

3-3 정수와 유리수의 혼합계산 -

4-1 문자를 사용한 식 -

4-2 식의 값 -

Teacher's Dashboard



Lecturer



Coach

3. Motivate students through enjoyable
learning experiences



iPad 6:50 PM 6% 6%

Lesson 6-8 Solving Exponential Equations

Back

I can solve it now

PRACTICE 3

Use the Power Property of Equality to find a relationship between the two exponents.

Step 1. Using the Power Property of Equality to Write an Equation

Write an equation that relates the exponents of the equation.

$$z^{\frac{-4x-3}{2}} = z^{2x+\frac{3}{2}}$$

$$\frac{-4x-3}{2} = 2x + \frac{3}{2}$$

Submit

$$-4x - 3 = 4x + 3$$

$$-8x = -6$$

$$x = \frac{3}{4}$$

Interactive

----- Forwarded message -----

From: **Lonny Cruff** <lonny_cruff@>

Date: Tue, Sep 20, 2016 at 2:28 PM

Subject: How I know it's working

To: Bara Levitt <bara@knowre.com>

Good morning Bara,

Here's how I can tell a tactic or program is working: When kids don't want to leave at the end of a class period, what you're using is working! ;)

Thanx,

Lonny Cruff, Secondary Math
Anna Tobeluk Memorial School

*“Kids don’t want to leave
at the end of a class period”*



Until we get equality in education,
we won't have an equal society.

— *Sonia Sotomayor* —

AZ QUOTES