

2-1

Game: Algebra 1-Step

Solving One-Step Equations

The caller will need the following questions and answers in order to run the game.

1. $\frac{1}{5}t = 10$

Answer: 50

2. $80x = -640 - 8$

Answer: -8

3. $a + 5 = 9$

Answer: 4

4. $b - 7 = -19$

Answer: -12

5. $5d = 35$

Answer: 7

6. $-4x = -24$

Answer: 6

7. $\frac{1}{4}z = -1$

Answer: -4

8. $30x = 90$

Answer: 3

9. $12 = -\frac{1}{3}t$

Answer: -36

10. $8 + n = 13$

Answer: 5

11. $10 = g + 17$

Answer: -7

12. $10r = -60$

Answer: -6

13. $5t = 10$

Answer: 2

14. $-\frac{m}{9} = 1$

Answer: -9

15. $y + 18 = 28$

Answer: 10

16. $y - 17 = -28$

Answer: -11

17. $-15x = 90$

Answer: -6

18. $100k = 100$

Answer: 1

19. $-\frac{a}{5} = \frac{1}{5}$

Answer: -1

20. $3p = -9$

Answer: -3

21. $8 + w = 20$

Answer: 12

22. $u + 12 = 23$

Answer: 11

23. $-10x = 100$

Answer: -10

24. $j + 19 = 28$

Answer: 9

25. $5g = 40$

Answer: 8

26. $8x = 104$

Answer: 13

27. $2x = -10$

Answer: -5

28. $x + 156 = 154$

Answer: -2

29. $\frac{1}{10}q = -5$

Answer: -50

30. $9 + b = 18$

Answer: 9

31. $-\frac{t}{7} = 2$

Answer: -14

32. $s - 19 = 24$

Answer: 43

33. $-2x = 28$

Answer: -14

34. $a + 5 = -10$

Answer: -15

35. $27 = y + 20$

Answer: 7

36. $-11r = -33$

Answer: 3

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Game: Algebra 1-Step

Solving One-Step Equations

This is a game for three or more players. Your teacher will provide you with a blank scoring card.

- Players use the scoring card to place the integers from -12 to 12 in the twenty-four squares in any arrangement they choose. A sample is shown. Each integer is used once; do not use 0 .
- A student or the teacher can serve as the game's caller.
- The caller randomly announces one of the exercise numbers to the left of an equation below. Players solve the equation called. If the solution is one of the numbers on his or her scoring card, then the player marks an X in the appropriate box. The equation is then crossed out.
- The first player to have Xs in all boxes in any row, column, or diagonal wins the game. The caller checks to be sure the scoring card is indeed correct. **See Teacher Instructions page.**

1	S	T	E	P
6	-12	-1	1	7
-2	11	-5	12	-3
3	-6		9	2
-7	8	-8	10	-4
5	-11	-9	4	-10

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2-1

Game: Algebra 1-Step

Solving One-Step Equations

Scoring Card

1	S	T	E	P

2-2

Game: Equation Challenge

Solving Two-Step Equations

This is a game for three or more players. A student or the teacher can serve as the host.

The host calls out a combination from the table at the left below and a combination from the table at the right below. For example, the call “A3 T2” gives the following equation.

$$4x + 5 = 6$$

Each player writes the equation, solves it, and records the solution using the score sheet below.

At the end of Round 6, the host polls the players to agree upon the correct solutions for each round. A correct solution earns 3 points, while an incorrect solution earns no points. **Check students' work.**

	1	2	3
A	$2x + 5$	$-3x + 1$	$4x + 5$
B	$-3x + 4$	$10x + 1$	$-9x + 2$
C	$-x - 3$	$6x - 5$	$-2x + 7$
D	$3x + 7$	$11x + 3$	$-2x + 1$
E	$-x - 3$	$6x - 4$	$-2x + 5$

	1	2	3
P	-7	-6	-5
Q	-4	-3	-2
R	-1	0	1
S	2	3	4
T	5	6	7

My Score Sheet	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
Equation						
Solution						
Points						

My total:

Wait—the game is not over! You can boost your score by correctly solving $10^6x + 10^5 = 10^6$. The correct solution is worth 10 points. **0.9**

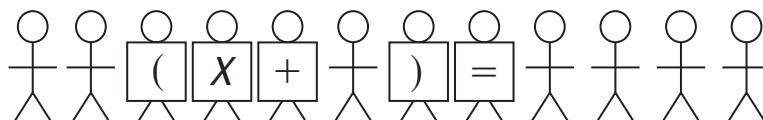
2-3 Activity: Actors and Equations

Solving Multi-Step Equations

This is an activity for the entire class. Beforehand, the students and/or teacher will need to make cards showing the following:

(, x, +, +, -, -,), =, and 0.

The sketch below shows actors (students) lined up in a row. Some actors are holding cards, and some are not. Together, they model the equation $2(x + 1) = 4$.



Students from the audience must choose operations to perform to solve the equation. In doing so, actors may be directed to leave the stage, come onto the stage, or move to another position on the stage. After instructions are given and stage movements take place, a small group of actors will be left to reveal the solution.

- **Actors:** Line up in a row to illustrate $2(x + 1) = 4$. You may need feedback from the audience in order to do so.
- **Audience:** Solve the equation by giving instructions to the actors. Be sure to use the Distributive Property.

Write the solution to the equation here: 1

Now let's try a different approach.

- **Actors:** Line up in a row to illustrate $2(x + 1) = 4$.
- **Audience:** Solve the equation by giving instructions to the actors. Instead of applying the Distributive Property, use a different method to solve.

Write the solution to the equation here: 1

Summarize what you learned about solving two-step equations in the space below.

Answers may vary. Sample: I learned that a two-step equation can be solved in two different ways. The first step can involve applying the Distributive Property, or the first step can involve division.

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Puzzle: Breaking the Code

Solving Equations With Variables on Both Sides

Solve each equation. Write the solution in the blocks in the three columns to the right of the equation. Then use the code below to translate the numbers in the *shaded* boxes to letters. The first one has been done for you. You will see a secret message when you read from the top to the bottom of the column.

A \rightarrow 1 B \rightarrow 2 C \rightarrow 3 . . . X \rightarrow 24 Y \rightarrow 25 Z \rightarrow 26

Equation	Number	Number	Letter
$2x = 3x - 8$	8		H
$-n = 2n - 3$	1		A
$-x + 5 = -4x + 71$	2	2	V
$11m - 10 = 9m$	5		E
$3x + 1 = 2x + 2$	1		A
$5x + 4 = 2x + 46$	1	4	N
$-3t = 3t - 54$	9		I
$12x - 33 = x$	3		C
$25a + 125 = 50a$	5		E
$14w + 56 = 28w$	4		D
$13b - 39 = 11b - 37$	1		A
$125 + 13x = 21x - 75$	2	5	Y
$6 + 6h = 7h$	6		F
$-2x + 12 = 2x - 48$	1	5	O
$5c - 10 = 2c + 26$	1	2	L
$-4x - 13 = -6x + 9$	1	1	K
$4x + 10 = -6x + 200$	1	9	S

2-5 Activity: Advertising Formulas

Literal Equations and Formulas

You will need poster paper and markers or colored pencils for this activity.
You may work by yourself or in small groups.

We may not think about it, but there are literal equations and formulas all around us. For example, the sample poster shown at the right involves hourly wages. Notice that the formula at the top is solved for w , while the formula at the bottom has been rewritten and solved for h .

Your job is to make a similar poster that

1. gives a simple formula,
2. describes how the formula can be used in real life, and
3. shows how a new formula can be rewritten from the original one.

Here are some ideas to help you get started.

Food Prices: a formula to calculate cost based on unit price

Age: a formula to determine your age y years in the future

Cycling: a formula to determine how far a cyclist can bike at a given speed

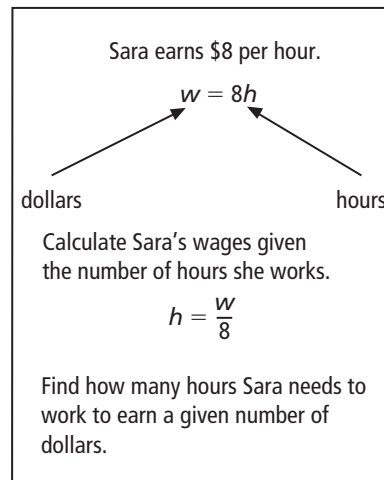
Gardening: a formula to determine the area of a garden in the corner of a backyard

Field Trips: a formula to determine how many buses are needed to transport a certain number of students given a seating capacity

Numbers: a formula to determine the n th positive multiple of 7

Sports: a formula for points scored by touchdowns and field goals

Describe the plan for your poster in the space below. Then, go ahead and make your poster. Your teacher may ask you to share it with the rest of the class, and then display it afterwards. **Check students' work.**



2-6 Activity: Everyday Ratios and Rates

Ratios, Rates, and Conversions

This activity should be done in small groups. Each group needs a newspaper. If your newspaper has several sections, you may want to give each group member a separate section to work with.

Read through your newspaper and try to find as many ratios and rates as you can. Read carefully, as a rate or ratio may not appear in the mathematical form you are used to seeing in your textbook. Try and identify more ratios and rates than the other groups in your class! Here are some places where you are likely to find examples of ratios and rates.

- bank advertisements
- car-buying advertisements
- the sports section
- the financial section
- the weather section

To complete the activity, compare your group's findings with those of the other groups. Explain why your information qualifies as a ratio or rate.

Answers may vary, Sample: The information is a ratio because it involves a quotient of two numbers. Sample: The information is a rate because the division and dividend have different units.

If time permits, have your group answer the following questions.

1. Lisa and her family plan to travel to Italy. Find the current exchange rate for American dollars to Euros (€). How many Euros will they receive for \$500?

Answers will vary depending on current exchange rate.

2. At the end of the trip, Lisa's family wants to exchange 200 Euros for American dollars. Find the current exchange rate for Euros to American dollars. How much will they receive for 200 Euros?

Answers will vary depending on current exchange rate.

The Daily Dispatch

Chock full of ratios and rates!

You will find these in:

- the news section
- the sports section
- the business section
- the weather section
- the entertainment section

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Game: Climb the Ladder

Solving Proportions

Play Climb the Ladder against a classmate. Decide who will be Player 1 and who will be Player 2.

In this game, players take turns choosing a proportion from the list below and challenging their opponents to solve it. Once a proportion is chosen, it should be crossed out. The game continues until someone climbs to the top, all the proportions have been used, or time runs out.

Use the ladders to keep score. The solution to the selected equation tells the player how many rungs to climb, or how many rungs to go down. A positive solution means “go up,” while a negative solution means “go down.” *Note:* The rungs are 2 units apart. If a player’s score goes below 0, then that player puts the player at 0 and he or she has to begin to climb again.

The player who reaches the top first wins. If time runs out, the player closest to the top wins. Choose your equations wisely in order to limit the number of rungs your opponent can climb!

1. $\frac{x}{3} = \frac{4}{12}$ **1**
2. $\frac{1}{a} = -\frac{1}{2}$ **-2**
3. $\frac{4}{12} = \frac{2}{n}$ **6**
4. $\frac{2}{14} = -\frac{c}{7}$ **-1**
5. $\frac{x}{100} = -\frac{1}{50}$ **-2**
6. $\frac{36}{24} = \frac{3}{x}$ **2**
7. $\frac{z}{15} = \frac{9}{45}$ **3**
8. $\frac{1}{6} = -\frac{h}{24}$ **-4**
9. $\frac{x}{49} = \frac{1}{7}$ **7**
10. $\frac{12}{12} = -\frac{1}{q}$ **-1**
11. $\frac{64}{32} = \frac{p}{4}$ **8**
12. $\frac{-64}{32} = \frac{p}{4}$ **-8**
13. $\frac{55}{10} = \frac{11}{-d}$ **-2**
14. $\frac{s}{2} = -\frac{11}{22}$ **-1**
15. $\frac{12}{60} = \frac{f}{15}$ **3**
16. $\frac{-3}{j} = -\frac{12}{8}$ **2**
17. $\frac{-x}{4} = \frac{4}{8}$ **-2**
18. $\frac{b}{6} = -\frac{12}{18}$ **-4**
19. $\frac{x}{-5} = \frac{-6}{15}$ **2**
20. $\frac{-x}{-20} = \frac{-1}{20}$ **1**
21. $\frac{-x}{17} = \frac{8}{-34}$ **4**
22. $\frac{16}{-10} = -\frac{8}{k}$ **5**
23. $\frac{-20}{y} = \frac{-60}{15}$ **5**
24. $\frac{12}{-33} = -\frac{v}{11}$ **4**

	Player 1	Player 2
34		
32		
30		
28		
26		
24		
22		
20		
18		
16		
14		
12		
10		
8		
6		
4		
2		
0		

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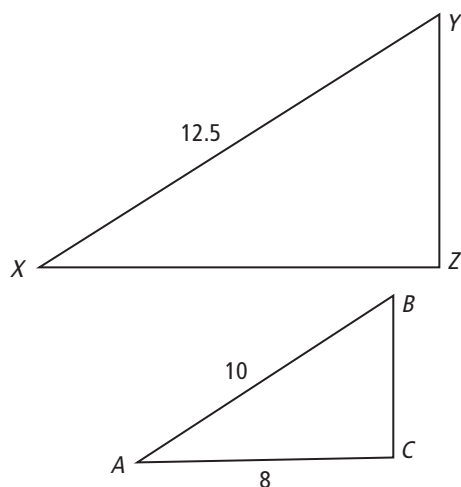
Puzzle: Constitution Math

Proportions and Similar Figures

Find the indicated lengths in the figures below. Then place each answer in its appropriate place at the bottom of the page. If your answers are correct, you will find the answer to the question below from the four numbers in the circles.

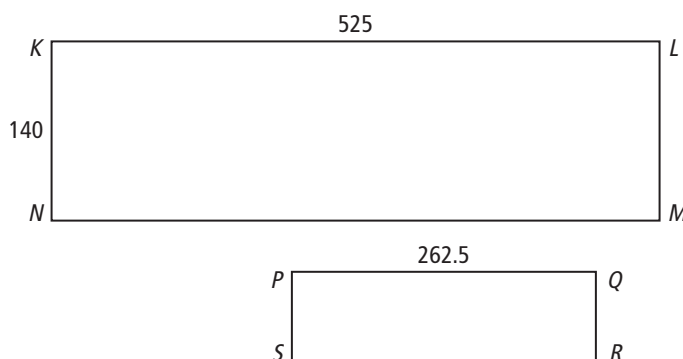
Data question: In what year was the United States Constitution signed?

A. $\triangle ABC$ is similar to $\triangle XYZ$.



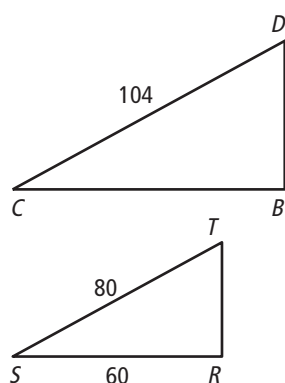
$XZ = 10$ units

B. Rectangle $KLMN$ is similar to rectangle $PQRS$.



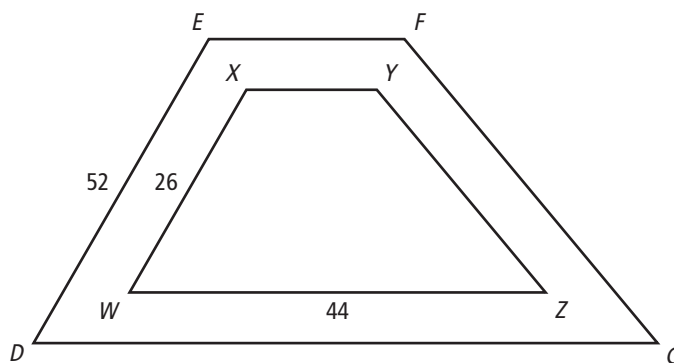
$PS = 70$ units

C. $\triangle RST$ is similar to $\triangle BCD$.



$BC = 78$ units

D. Trapezoid $DEFG$ is similar to trapezoid $WXYZ$.



$DG = 88$ units

1 0

Answer A

7 0

Answer B

8 8

Answer C

7 8

Answer D

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Game: Greater Than or Less Than?

Percents

Twenty-four percent problems are listed below. Players take turns challenging each other by choosing a question that must be answered using mental math. A problem can only be selected once. Two racetracks are provided at the bottom of the page. Players fill in a block for each correct answer. Players must agree on the correct answer. The first player to complete the course wins! If neither player completes the course, then the player who advances the farthest wins.

- | | |
|--|---|
| 1. Is 20% of 200 greater than or less than 100?
less than | 2. Is 25% of 80 greater than or less than 10?
greater than |
| 3. Is 2% of 1000 greater than or less than 30?
less than | 4. Is 75% of 8 greater than or less than 5?
greater than |
| 5. Is 80% of 20 greater than or less than 10?
greater than | 6. Is 30% of 70 greater than or less than 15?
greater than |
| 7. Is 90% of 120 greater than or less than 110?
less than | 8. Is 5% of 40 greater than or less than 3?
less than |
| 9. Is 150% of 2 greater than or less than 4?
less than | 10. Is 18% of 18 greater than or less than 9?
less than |
| 11. Is 70% of 70 greater than or less than 50?
less than | 12. Is 25% of 15 greater than or less than 7?
less than |
| 13. Is 43% of 33 greater than or less than 11?
greater than | 14. Is 55% of 80 greater than or less than 40?
greater than |
| 15. Is 20% of 18 greater than or less than 8?
less than | 16. Is 60% of 45 greater than or less than 22?
greater than |
| 17. Is 1% of 180 greater than or less than 2?
less than | 18. Is 72% of 80 greater than or less than 60?
less than |
| 19. Is 30% of 180 greater than or less than 100?
less than | 20. Is 95% of 70 greater than or less than 35?
greater than |
| 21. Is 10% of 800 greater than or less than 70?
greater than | 22. Is 66% of 6 greater than or less than 4?
less than |
| 23. Is 67% of 15 greater than or less than 10?
greater than | 24. Is 25% of 800 greater than or less than 100?
greater than |

Player 1												
Player 2												

2-10

Puzzle: Mental-Math Rounds

Change Expressed as a Percent

Round 1

Solve each percent-of-increase or percent-of-decrease problem using mental math. Record a 20% increase as 20 and a 20% decrease as -20. Write your answers to the right of each problem.

from 20 to 25 **25**from 40 to 10 **-75**from 100 to 110 **10**from 30 to 18 **-40**from 160 to 400 **150**from 220 to 330 **50**from 100 to 115 **15**from 100 to 85 **-15**from 200 to 160 **-20**

If you answered each problem correctly, all your solutions should be integers.

From your answers above, find a set of three solutions whose sum is 160. There may be more than one solution.

-40, 50, 150; -15, 25, 150

Answer: _____

Round 2

Solve each percent-of-increase or percent-of-decrease problem using mental math. Follow the same directions as those given in Round 1.

from 200 to 210 **5**from 36 to 45 **25**from 25 to 10 **-60**from 25 to 26 **4**from 44 to 33 **-25**from 100 to 300 **200**from 60 to 3 **-95**from 8 to 14 **75**from 100 to 101 **1**from 100 to 170 **70**from 100 to 140 **40**from 100 to 130 **30**

From your answers above, find a set of four solutions whose sum is 100. There may be more than one solution.

Answer: **Answers may vary, Samples: 5, 25, 30, 40; -25, 25, 30, 70** _____