Reviewing for an Assessment with Games of Memory and Aptitude

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I. "I have…Who has…"

This is a great review game for any area of mathematics. You will need a set of index cards and a few colored markers. This game can be played in as little as 5 minutes, depending on concept chosen and number of cards in your set.

Steps:

1.) Create one exercise and its solution.

Example

Solve for x: 2x + 5 = 11

Solution: x = 3

2.) Decide upon the number of cards in your review set. I suggest at least one card per student.

3.) The exercise will be placed under "Who has…"

4.) The solution will be placed on the next "I have …" card.

See below:

I have x = 8	Who has 2x + 5 = 11
I have x = 3	Who has 4x = 24
I have x = 6	Who has 3x - 7 = 14
I have x = 7	Who has (1/5) x = 20
I have x = 100	Who has x + 19 = -7
I have x = -26	Who has 4x - 1 = 31

* Note: Each row makes one card (for example)

| I have x = 8 | Who has 2x + 5 = 11 |

5.) Begin the game by having one of your students read their "Who has.." portion of their card.

6.) The game will end when the person who starts reads his/her "I have …" portion of their original card.

*The next few pages are sample games that may be reproduced and used in your classroom.

*In the past I have challenged various classes to compete against one another for bragging rights. I have also used a tally board and championship banner. Most importantly have fun with it and your students. I have even had them beg to play so that they could beat one of the other classes. It is very neat to see the kids have fun playing a math game and a great way to work on mental math and review/refresh a concept.

* At the college level, I also use it as a means to earn the privilege to have a bonus question on an upcoming unit assessment.

I have 13	I have 35
Who has 5/6 of 36?	Who has 1/5 of 25?
I have 16	I have 9
Who has 4/5 of 35?	Who has 4/5 of 30?
I have 15	I have 14
Who has 6/7 of 49?	Who has 1/5 of 55?
I have 32	I have 7
Who has 5/6 of 54?	Who has 2/3 of 33?
I have 3	I have 42
Who has 3/7 of 49?	Who has 1/5 of 30?

I have 40 **Who has 3/4of 36?**	**I have 2** **Who has 4/5 of 25?**
I have 27 **Who has 2/3 of 12?**	**I have 21** **Who has 1/3 of 39?**
I have 20 **Who has 1/2 of 52?**	**I have 26** **Who has 2/3 of 15?**
I have 18 **Who has 1/7 of 28?**	**I have 11** **Who has 3/8 of 24?**
I have 45 **Who has 2/3 of 21?**	**I have 36** **Who has 3/4 of 20?**

I have 22	I have 8
Who has 1/4 of 8?	Who has 4/5 of 40?
I have 30	I have 5
Who has 3/8 of 48?	Who has 5/6 of 30?
I have 24	I have 10
Who has 7/8 of 40?	Who has 2/3 of 54?
I have 25	I have 28
Who has 6/7 of 56?	Who has 2/7 of 42?
I have 4	I have 12
Who has 8/9 of 18?	Who has 1/2 of 14?

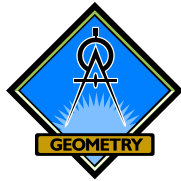| I have 48	I have 6
Who has 1/5 of 15?	Who has 2/3 of 60?

I have 12 centimeters

Who has the square feet in a square which measures 4 feet on each side?

I have 32 square feet

Who has the distance around a 4 foot square?

I have 12 square meters

Who has the area of a square measuring 3 feet per side?

I have 20 inches

Who has the area of a 5 inch square?

I have 8 meters

Who has the square feet in a rectangle 2 feet by 10 feet?

I have 9 square feet

Who has the distance around a rectangle 2 meters by 4 meters?

I have 16 feet

Who has the perimeter of a rectangle 5 centimeters long and 1 centimeter wide?

I have 16 square feet

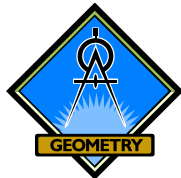**Who has the perimeter of a 2 centimeter by 8 centimeter rectangle?**

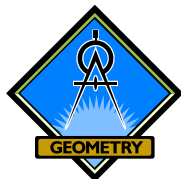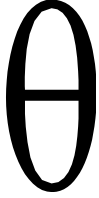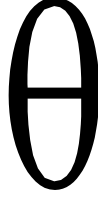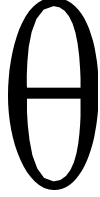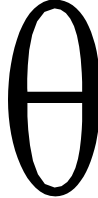|	
I have 20 centimeters **Who has the perimeter of a 5 inch square?**	**I have 20 square feet** **Who has the area covered by a 4 foot by 8 foot rectangle?**
I have 32 feet **Who has the perimeter of a 3 meter by 4 meter rectangle?**	**I have 25 square inches** **Who has the perimeter of an 8 foot square?**
I have 12 meters **Who has the area of a rectangle 4 inches by 5 inches?**	**I have 14 meters** **Who has the area of a 3 meter by 4 meter rectangle?**
I have 20 square inches **Who has the perimeter of a 1 meter by 3 meter rectangle?**	
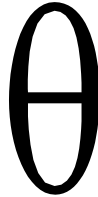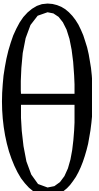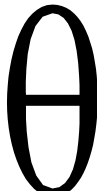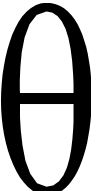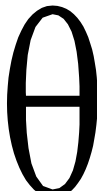
I have $\dfrac{-1}{2}$ Who has $sin\ \dfrac{\pi}{4}$	I have $\dfrac{\sqrt{2}}{2}$ Who has $tan\ \dfrac{\pi}{2}$
I have $undefined$ Who has $cos\ 0$	I have 1 Who has $sin\ ^{2}\theta+\ ?=1$
I have $cos^{2}\theta$ Who has $cos\ \dfrac{3\pi}{4}$	I have $\dfrac{-\sqrt{2}}{2}$ Who has $tan^{2}+1\ =\ ?$
I have $sec^{2}\theta$ Who has $\dfrac{1}{sec\ \theta}$	I have $cos\ \theta$ Who has $sin\ \dfrac{3\pi}{2}$

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I have -1 Who has $tan\ \dfrac{\pi}{6}$ θ	I have $\dfrac{\sqrt{3}}{3}$ Who has $sec\ \dfrac{\pi}{3}$ θ
I have 2 Who has $\dfrac{1}{sin\ \theta}$ θ	I have $csc\ \theta$ Who has $csc\ \dfrac{\pi}{3}$ θ
I have $\dfrac{2\sqrt{3}}{3}$ Who has $cos\ \dfrac{7\pi}{6}$ θ	I have $\dfrac{-\sqrt{3}}{2}$ Who has $sin\ \dfrac{5\pi}{6}$ θ
I have $\dfrac{1}{2}$ Who has $\dfrac{cos\ \theta}{sin\ \theta}$ θ	I have $cot\ \theta$ Who has $cot\ \dfrac{\pi}{2}$ θ
I have 0 Who has $\dfrac{sin\ \theta}{cos\ \theta}$ θ	I have $tan\ \theta$ Who has $sin\ \dfrac{7\pi}{6}$ θ

I have -22 **Who has -9 + 6**	**I have -3** **Who has 12 + (-3)**
I have 9 **Who has -17 - 9**	**I have -26** **Who has -5 - 11**
I have -16 **Who has -24-5**	**I have -29** **Who has 27 - 3**
I have 24 **Who has -27 - 5**	**I have -32** **Who has -4 - 20**

I have -24 **Who has -7 - (-8)**	**I have 1** **Who has 36 - (-10)**
I have 46 **Who has 6 - (-2)**	**I have 8** **Who has -3 - (-7)**
I have 4 **Who has -13 - 2**	**I have -15** **Who has 15 - (-3)**
I have 18 **Who has -14 + 17**	**I have 3** **Who has -11 - 3**
I have -14 **Who has 2 - (-19)**	**I have 21** **Who has 56 - (-8)**

I have 64 **Who has -14 - (-21)**	**I have 7** **Who has -8 - 14**

I have 36 **Who has 15 rounded to tens**	**I have 380** **Who has 74 rounded to tens**
I have 42 **Who has 6.4 rounded to ones**	**I have 40** **Who has 376 rounded to tens**
I have 230 **Who has .078 rounded to tenths**	**I have 145** **Who has 82.3 rounded to ones**

I have .075 **Who has 37 rounded to tens**	**I have** 2.9 **Who has 3.01 rounded to ones**
I have 82 **Who has 856 rounded to hundreds**	**I have** .1 **Who has 3,501 rounded to thousands**
I have 800 **Who has 5.21 rounded to tenths**	**I have** 900 **Who has .0754 rounded to thousandths**
I have 3 **Who has 42.36 rounded to ones**	**I have** 20 **Who has 85 rounded to tens**

I have 4000 **Who has .849 rounded to hundredths**	**I have 6** **Who has 2704 rounded to hundreds**
I have 50 **Who has 226 rounded to tens**	**I have 59** **Who has 49 rounded to tens**

I have 57 **Who has 763 rounded to hundreds**	**I have .85** **Who has 152 rounded to tens**
I have 90 **Who has 145.2 rounded to ones**	**I have 2700** **Who has 56.9 rounded to ones**

I have 5.2 **Who has 35.8 rounded to ones**	**I have 150** **Who has 2.88 rounded to tenths**
I have 70 **Who has 59.45 rounded to ones**	

II. Concentration/Memory with a steal

This is a great review game for a unit/chapter assessment. This game usually takes 30 minutes to play.

A. Steps/Guidelines

1.) Separate your class into teams of 3 - 4 students.

2.) Determine which group will go first; the game will begin with that team making a selection.

3.) The first group will select 2 cards from the deck.

*Note: I usually place my cards on the whiteboard so that all students can see the game from their seats. I number the cards with arbitrary numbers so that the students can select the cards by calling out a number. There is no relevance to the numbers on the front side of the cards; rather they are there for the ease of making a selection. This also keeps the students in their seats during the game.

4.) The goal of the game is to select a pair of cards which match. One half of the cards will have a question on them and the other half will have the answer to a respective question. You can also use vocabulary words and definitions.

5.) If a group selects a pair (or match) then the team is awarded one point.

6.) I follow each correct pair with a related question on the concept. I allow the team which correctly picked the pair 1 - 3 minutes (depending on difficulty) to answer the question. They will have one opportunity to provide a correct answer. If they are incorrect the first team which correctly answers is awarded one point and the chance to select the next pair.

*Note: I call this a "steal".

*Today's game is related to fractions (+,-, x, /)

Sample Steal questions:

1.) Cheryl's chocolate chip cookies call for 1/3 cup of oil. If she plans to double the recipe how much oil will she need?

Answer: 2/3 cup

2.) Steve wants to buy a new Apple I phone. He determines the cost to be $219.00 (after tax). His father states that he will give Steve one-third of the cost. What is the amount of money that Steve will need to come up with to purchase the phone with his father's help?

Answer: $146.00

3.) Simplify using order of operations: 1/2- 3/5 *2/3

Answer: 1/10

4.) Tom has spent 5 days during the last 2 weeks mowing lawns to earn money for an upcoming camping trip. Suppose his hourly rate is $10 per hour. How much money has he earned from the following days of mowing lawns?

Sunday   3 3/4 hours

Monday   1 1/2 hours

Saturday   4 hours

Thursday   1 hour

Saturday   4 1/2hours

Answer: $147.50

5.) $10 \frac{3}{7} - 7 \frac{1}{5}$

Answer: $3 \frac{8}{35}$

6.) $5 \frac{1}{5} \ x \ 2 \frac{3}{4}$

Answer: $\frac{143}{10} \ or \ 14 \frac{3}{5}$

III. King of the Hill

You may remember the outdoor game called: King of the Hill. This review game is an inside (less physical) version of the game, played with math questions and a timer.

Steps/Guidelines:

1.) Create four levels of math questions varying in difficulty form level 1 (easy) to level 4 (hardest).

2.) Determine the number of minutes needed to solve each question. I have used the following scale:

Level 1 - 30 seconds

Level 2 - 1 minute

Level 3 - 2 minutes

Level 4 - 3 minutes

3.) Write appropriate questions for each level; see the following page for a College Algebra set.

4.) Select one student to begin as King or Queen ☺

*A crown works nice if appropriate for your class.

5.) Give the student a level one question. If he/she answers the question correctly within the time frame, they are given a small prize (pencil, candy, sticker…)

*Note: The student is given only once chance to answer the question.

*Note: If the student misses the question, then I select the first student who raises his/her hand from those seated. This can sometimes be challenging so it is helpful if you have a volunteer in class to help you keep track of the levels each student earns and who answers first.

*Note: If no one in class can answer the question, then I allow the student to stay in the "King's seat" and provide another question. You may also want to consider your question wording or the topic; it is probably not a good idea if all students miss the question or do not know how to solve it. ☺

6.) The process continues until the student misses or completes all four levels.

*I usually give a bigger prize at the end of the game for level 4 winners; such as a small stapler, highlighter, etc…

Have fun!

College Algebra

I.

1.) Describe the transformations of:

$$y = -3|x - 8| + 4$$

Answer: Horizontal shift right 8 units, vertically stretched by a factor of 3, x-axis reflection, vertical shift up 4 units.

2.) Do the following represent a function of y in terms of x?

a.) $y = |x| + 7$

b.) $x^2 + y^2 = 2$

Answers:

a.) yes

b.) no

3.) Describe the transformations of:

$$y = \frac{1}{2}(x + 5)^2 - 4$$

Answer: Horizontal shift left 5 units, vertical shrink by a factor of ½, vertical shift down 4 units.

4.) Give the slope and y-intercept of the following equation:

$$2x + 3y + 6 = 0$$

Answer: slope = -2/3 and y-intercept (0,-2)

5.) Find the distance between the ordered pairs (-2,3) and (3, -9)

Answer: d = $\sqrt{(-9 - 3)^2 + (3 - -2)^2}$ = 13

6.) What is the domain and range of $y = x^2 + 3$?

Answer: Domain (-∞, ∞) , Range [3, ∞)

1.) Write an equation for a quadratic function with the following transformations from the parent function: $y = x^2$

Horizontal shift left 7 units

Vertical stretch by a factor of 5

x-axis reflection

Vertical shift up 8 units

Answer: $y = -5(x + 7)^2 + 8$

2.) Write the equation of a line perpendicular to $x = 3$ and passing through the point (5,-6).

Answer: $y = -6$

3.) Write the equation of a line in slope-intercept form which is parallel to $3x + y - 9 = 0$ and passing through the point (4, -7).

Answer: $y = -3x + 5$

1.) Evaluate the function $r(x) = x^2 - 9x + 3$

a.) $r(0)$

b.) $r(x + 1)$

Answers:

a.) $r(x) = 0$

b.) $r(x + 1) = x^2 - 7x - 5$

2.) Determine the domain, range, y-intercept and f(0) for:

$f(x) = -(x + 2)^2 + 7$

Answers:

Domain: $(-\infty, \infty)$ Range: $(-\infty, 7]$

y-intercept = {3} or (0,3)

f(0) = 3

3.) Apply the difference quotient to: $f(x) = -2x^2 + x + 10$

Answer: $\dfrac{f(x+h) - f(x)}{h} = -4x - 2h + 1$ provided h≠0.

4.) Determine the domain, range, x-intercept and f(5) for:

$f(x) = (x - 4)^2 + 8$

Answers:

Domain: $(-\infty, \infty)$ Range: $[8, \infty)$

x-intercept: none   f(5) = 9

1.) What is the slope of a line perpendicular to the line whose equation is:

$$Ax + By + C = 0$$

Answer: $\dfrac{B}{A}$

2.) Find the value of y, given: (3,y) and (1,4); m = -3

Answer: y = -2

3.) An investment is worth $2723 in 1992. By 1995 it has grown to $3398. Let y be the value of the investment, in year x, when x = 0 represents 1992. Write a linear equation that models the value of the investment in the year x.

Answer: $y = 225x + 2723$

IV. Words of Fortune

This is another fun review game which incorporates vocabulary into a unit exam. So many times we stress the importance of understanding the language used in textbooks, so it is only practical to include such vocabulary on assessments. In previous years, I have used vocabulary books to complement a lesson and unit assessment.

I give the students 5 sheets of white paper stapled to form a booklet. The students are to leave the first page blank for a cover contest . The students use the remaining pages for new vocabulary words and their associated definitions. I suggest using 1 - 2 pages per week; possibly 4 - 8 words per week. The cover contest is a fun twist to the vocabulary book. The cover designs are all hand drawn, none are computer generated. I give a small prize to the winning student; voted on by other faculty and classmates.

Guidelines/Rules of the game:

1.) Select a list of 10 - 15 vocabulary words to focus on for the unit.

2.) Divide the students up into small groups; I suggest 3 - 4 members per group.

3.) Determine which team will go first; this can be a good time to complete a review question which can be answered quickly. The first group which answers correctly goes first; the other group numbers are selected in a clockwise or counter-clockwise order.

4.) The game begins when you (the teacher) place the number of spaces in the first vocabulary word on the board.

5.) The group which was selected to go first, picks a pocket number (on the game board). The card is revealed and the group will be given the monetary amount on the card if the letter the group calls out is in the word. If the group is correct then they continue selecting a pocket until they either miss the letter or select a "Bankrupt" or "Lose your turn" card.

6.) Once the group can solve the vocabulary word, they do so and the money they have earned will go into their "bank account".

Note: You can also create special prizes, such as: 10 minutes of extra recess, 20 minutes of extra reading time, "teacher helper" for a day, etc… to simulate larger prizes from the actual game show ☺

7.) After the group has correctly identified the vocabulary word, then they are given 3 minutes to solve one mathematics exercise. If they are correct the team earns an additional 500 points. If they are incorrect, the first group who answers correctly is awarded the 500 points and the opportunity to select the next pocket.

8.) If a group loses their turn through an incorrect letter choice or a "Lose your turn"/"Bankrupt" then the next group in numerical order is given a chance to play the game.

Note: This game usually takes 30 - 45 minutes to complete . Additionally, I did not have a wheel so I use poster board (or fabric if you are a seamstress ☺) and thus call the game "Word of Fortune" instead of "Wheel of Fortune").

Sample Game (Algebra I)

A. Vocabulary:

Constant	Numerator
Variable	Denominator
Equation	Fraction
Expression	Evaluate
Order of Operations	Solve
Coefficient	y-intercept
Independent Variable	x-intercept
Dependent Variable	Function
Domain	
Range	

B. Questions:

1.) Evaluate the algebraic expression: $x^2 - 5x + y^2$; x = -1 and y = -2

Answer: 10

2.) Solve the following equation: $\frac{13y}{20} - 6 = \frac{y}{5} + 3$

Answer: 20

3.) The formula $p = 15 + \frac{5d}{11}$ describes the pressure of sea water, p, in pounds per square foot, at a depth of d feet below the surface. If a diver was subjected to a pressure of 33 pounds per square foot, to what depth did she descend? At what depth is the pressure 113 pounds per square foot?

Answer: 39.6 feet; 215.6 feet

4.) Determine the solution of the following equation: $\frac{1}{3}(6x - 9) = 6\left(\frac{1}{3}x - \frac{1}{2}\right) + 7$

Answer: No solution or Ø

5.) Use the given conditions to write an equation using x as the independent variable. Solve the equation and find the number.

A number decreased by 203 is equal to 495. Find he number.

Answer: x = 698

6.) Solve the equation: $(3x - 6)(x + 1) = 0$

Answer: {2, -1}

7.) Solve the equation: $28x^2 + 20\,x = 0$

Answer: {-5/7, 0}

8.) Solve the equation: $x^2 + 12\,x + 13 = 0$

Answer: $\{-6 \pm \sqrt{23}\,\}$

V. March Madness FUN!!

I have found that all levels of the academic ladder enjoy a little competition, prizes and mathematics. A few days prior to the start of the March Madness NCAA tournament, I place the brackets on a large sheet of mural paper of poster boards. I explain to the students, that during the tournament they will have the opportunity to select a team to "coach" and the chance to have a bonus question on each quiz (I give daily quizzes). One you use the word bonus, they are hooked!

A. Once the teams have been determined (usually a day or so before the tournament begins) I have each interested student select a team name from a hat or a suitable container. I actually use a basketball (Easter basket) for my classes. I do not require all students to select a team: I leave it up to them.

Once all of the students have had an opportunity to select a team, I give students who selected one of the feed-in teams a chance to pick another team (if team names are still left). I encourage the students to cheer their respective team onto victory, dress in the team colors and follow the game if desired.

If you have a small class, you may want to involve another faculty member to make it a "community" event.

B. The bonus questions work as follows, on each daily quiz I give one question relating to the team scores from the previous day.

Sample questions:

Kentucky Wildcats defeated the Michigan Wolverines by a score of 92 - 74. What percent of the overall points did Kentucky earn?

The winning scores for the elite eight were: 78, 84, 92, 68, 93, 81, 77 and 85. What is the average score? median score?

C. At the beginning of each class I also announce the winning "Coaches" and given them a small prize.

D. I also use the bonus March Madness questions on the unit exam. This is a great way to review basic mathematical concepts.