ON-SETS WORKSHEET

1A

NAME _____

PRINCIPLES

1. Two- or three-player matches will be played. A match consists of a number of shakes (rolls of the cubes and play to a conclusion).
2. The following equipment is needed to play the game of On-Sets.
   a. 16 cards, broken down as follows.
      - One card with all four color dots (blue, red, green, and yellow);
      - Four cards with three color dots on each;
      - Six cards with two color dots on each;
      - Four cards with one color dot on each;
      - One card with no colors (the blank card).
   b. 18 cubes, consisting of the following groups.
      - Three digit cubes--these are used only in setting the Goal.
      - Eight color cubes--each face contains a dot colored blue, red, green, or yellow.
      - Four operation cubes--each face has one of the symbols U, Ω, -, or '.
      - Three Restriction cubes--each face has one of the symbols V, /\, =, or C.
   c. A playing mat which contains four sections: Goal, Required, Permitted, and Forbidden.
      Note: Many games have a section labeled "Resources." However, this section is not officially considered part of the "playing mat."
   d. A one-minute sand timer which is used to enforce time limits.

EXERCISES

Complete each statement in Exercises 1 – 6.

1. A match consists of either _____ or _____ (how many?) players.
2. Each match consists of a number of _____ .
3. The number of cards in an On-Sets deck is _____ .
4. In an On-Sets game there are _____ digit cubes, _____ color cubes, _____ operation cubes, and _____ Restriction cubes.
5. The playing mat consists of _____ sections.
6. Although in many games, the section labeled _____ is not officially considered part of the playing mat.

MORE CHALLENGING EXERCISE

7. Explain how the set of On-Sets cards is related to "Pascal's Triangle." _____

_____

ON-SETS WORKSHEET

1B

NAME _____

PRINCIPLES

1. To begin a shake, the Goal-setter rolls all 18 cubes. The symbols on the top faces of the cubes from the **Resources** for the shake.
2. While the Goal-setter rolls the cubes, the player to the *right* of the Goal-setter shuffles and deals the cards. The cards that are dealt form the **Universe** (Universal set) for the shake. The number of cards that must be dealt is as follows:
   a. 6 to 12 cards in all divisions except Senior.
   b. 10 to 14 cards in Senior Division.
3. If variations are being played, after the cubes have been rolled and the cards have been dealt, each player must select a variation, beginning with the Goal-setter and moving to the left (clockwise).
4. The player who rolled the cubes must set a Goal by transferring the cube(s) of the Goal from the Resources to the Goal section of the playing mat. The Goal consists of at least one and at most three digit cubes that form an expression that equals a whole number.
5. The player to the Goal-setter's *left* makes the first move to Required, Permitted, or Forbidden.
6. Play continues to the left (clockwise) until someone challenges or the last cube in Resources is moved to Required, Permitted, or Forbidden.

EXERCISES

Complete each statement.

1. The cubes are rolled by the _____.
2. The symbols rolled face up on the cubes form the _____.
3. The cards are dealt by the player to the _____ of the Goal-setter.
4. The cards that are dealt form the _____ for the shake.
5. In all divisions except Senior, _____ to _____ cards must be dealt.
6. In Senior Division, _____ to _____ cards must be dealt.
7. The Goal consists of one, two, or three _____ cubes.
8. The first move after the Goal is made by the player to the _____ of the Goal-setter.
9. The first move after the Goal is made by the player to the _____ of the Goal-setter.
10. Play continues until the last cube in Resources is moved to the mat or someone makes a _____.

ON-SETS WORKSHEET

1C

NAME _____

PRINCIPLES

1. In a match (round) the first Goal-setter is determined as follows. Each player rolls a digit cube. The player rolling the highest number sets the first Goal. If players tie for highest number, the tied players roll again until the tie is broken.
2. For each new shake, the player to the left of the previous Goal-setter sets the Goal.
3. Before setting the Goal, the Goal-setter may make a bonus move. A bonus move is a move to Forbidden before a regular move or before setting the Goal. To make a bonus move, a player says "Bonus," moves to Forbidden, and then makes a second move. For the Goal-setter the second move is setting the Goal.
   Note: The player who is ahead in the round may not make bonus moves.
4. The Goal-setter has one other choice besides setting a Goal. Because of the cards dealt and the Resources rolled (and, in Adventurous On-Sets, the variations selected), the Goal-setter may decide that any Goal set would be impossible. In this case the Goal-setter may say "no Goal." If opponents agree with the Goal-setter, the shake is restarted with the same player rolling the cubes. However, if an opponent thinks a possible Goal can be set, that player should set the Goal.

EXERCISES

Circle the number of each true statement.

1. To decide the first Goal-setter in the match, each player should roll a digit cube.
2. The Goal-setter may always make a bonus move to Forbidden before setting the Goal.
3. A bonus move must be played to Forbidden.
4. For each shake after the first, the player to the right of the previous Goal-setter sets the Goal.
5. After making a bonus move, a player who is not setting the Goal must move to Required or Permitted.
6. The player who is ahead in the round may not make bonus moves.
7. A player must say "Bonus" before making a bonus move.
8. The Goal-setter may declare "no Goal."
9. "No Goal" means any Goal set would be impossible.

ON-SETS WORKSHEET

1D

NAME _____

PRINCIPLE

Here are examples of all possible legal Goals.

	Goal	Value		Goal	Value
a.	3	3	b.	4 2	4 + 2 = 6
c.	3 1 2	3 + 1 + 2 = 6	d.	5 2	5 – 2 = 3
e.	2 / 3	2 x 3 = 6	f.	2 / 3 / 2	2 x 3 x 2 = 12
g.	3 / 2 1	(3 x 2) + 1 = 7	h.	3 / 2 1	(2 + 1) x 3 = 9

Rules for Goals

1. Add numbers by putting them side by side.
2. Subtract a number by placing it *upside down* next to another number. Turning a number upside down makes it negative.
3. Multiply numbers by stacking them one above the other.
4. For an L-shaped Goal like Example **g** above, **(a)** multiply the stacked numbers first, then **(b)** add the number alongside.
5. For an upside-down T Goal like Example **h** above, **(a)** add the side by side numbers, then **(b)** multiply the total by the number above them.

More Examples

Remember A negative number times a negative number equals a positive number.

	Goal	Value		Goal	Value
i.	5 1 3	5 - 1 + 3 = 7	j.	3 4	-3 + 4 = 1
k.	2 / 3	(-2) x (-3) = 6	l.	4 / 2 / 1	(-4) x 2 x (-1) = 8
m.	2 / 4 2	(-2 x -4) – 2 = 8 – 2 = 6	n.	5 / 3 4	(-3 + 4) x 5 = 1 x 5 = 5

EXERCISES

Give the value of each Goal.

1. 4 1 _____
2. 3 2 _____
3. 2 5 3 _____
4. 2 2 _____
5. 2 1 4 _____
6. 4 / 2 _____
7. 2 / 2 / 2 _____
8. 2 / 1 / 1 _____
9. 2 / 4 2 _____
10. 3 / 3 1 _____
11. 2 / 1 3 _____
12. 3 / 4 2 _____

ON-SETS WORKSHEET

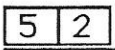
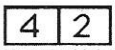
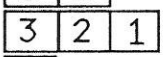
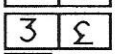
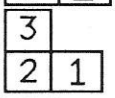
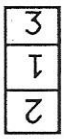
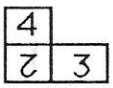
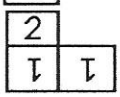
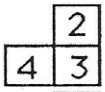
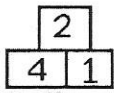
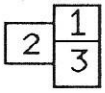
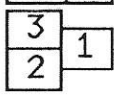
1E

NAME _____

PRINCIPLE The only possible legal Goals are straight segments (across or down), L's and upside-down T's. "Goals" like the following are illegal and have no defined interpretation.

EXERCISES

What number, if any, does each Goal represent? If a Goal is illegal, write *illegal*.

1.  _____
2.  _____
3.  _____
4.  _____
5. _____
6.  _____
7. _____
8.  _____
9.  _____
10.  _____
11.  _____
12.  _____
13.  _____
14.  _____

15. Which Goals in Exercises 1-14 are impossible in your Division regardless of the Universe? _____

MORE CHALLENGING EXERCISES

Circle the value of each possible Goal for your Division that can be made with each set of numeral cubes.

16.	1, 1, 1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
17.	1, 3, 5	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
18.	2, 3, 4	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
19.	3, 3, 5	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
20.	2, 4, 5	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

ON-SETS WORKSHEET

1F

NAME _____

PRINCIPLES

Here are some additional rules involving the Goal.

1. Any digit cubes not used in the Goal should be placed in the Forbidden section since they are not used in Solutions.
2. Once a digit cube touches the Goal section of the mat, it may not be returned to Resources or transferred to Forbidden.
3. The Goal-setter indicates the Goal is complete by saying "Goal."
4. The Goal may not be changed once it has been set.
5. Once a digit cube has been moved to the Goal section of the mat, it must be used in the Goal. However, the Goal-setter may rearrange those cubes provided he has not said "Goal" yet.
6. The Goal-setter has two minutes to set a Goal after the cubes are rolled, the cards dealt, and any variations selected. If the Goal-setter does not complete setting the Goal within two minutes, he loses a point and has another minute to complete the Goal.
7. If the Goal-setter moves a cube to Required or Permitted before or while setting the Goal, this is **illegal procedure**. The cube in Required or Permitted is returned to Resources. The Goal-setter is not penalized unless his time for completing the Goal runs out.
8. If the Goal-setter is leading in the match and makes a bonus move before setting the Goal, the cube in Forbidden is returned to Resources. In Junior and Senior Divisions the Goal-setter is penalized one point.

EXERCISES

Circle the number of each true statement in Exercises 1-8.

1. The Goal-setter may play a cube to Required or Permitted before setting the Goal.
2. A legal Goal is not changed after it has been set.
3. The Goal-setter may rearrange the digit cubes on the Goal section of the mat provided the Goal-setter has not said "Goal."
4. Any digit cubes not used in the Goal must be placed in Permitted.
5. The Goal-setter indicates the Goal is complete by saying "Goal."
6. Once the Goal-setter places a digit cube on the Goal section of the playing mat, that cube may not be returned to Resources.
7. If the Goal-setter commits an illegal procedure while setting the Goal, the Goal-setter is penalized one point.
8. The time limit for setting the Goal is one minute.