

# SASES Pedology Contest Guidebook

**2026 CANVAS International Meeting  
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## **PREFACE**

This handbook provides information about the 2026 SASES Pedology Contest

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## **INTRODUCTION**

This Pedology Contest provides opportunities for contestants to test and apply their knowledge and skills in pedology, soil morphology, and geomorphology. Contestants answer questions and name horizons based on soil properties, identify different kinds of soils and associated landscape features, and interpret soil information for agriculture and other land uses. These skills are developed by studying a variety of soils formed from a wide range of parent materials and vegetation in different topographic settings. We all depend on soil for growing plants, crops, and range for livestock; building materials; replenishing water supplies; and waste disposal. If we do not care for our soils, loss of productivity and environmental degradation will follow. By understanding more about soils and their management, we stand a better chance of conserving soil and other natural resources for future generations. Each contest is an opportunity to learn more about the soils of the host region. The contest host and/or committee bases the contest questions and material on a combination of general soils knowledge as well as soil properties related to the current CANVAS meeting location.

## **CONTEST OVERVIEW**

### **Eligibility of Contestants**

This Soil Contest is open to all undergraduate students and any other participants at the SASES Spring Meeting.

### **Contest Components**

The Soils Contest provides opportunities for students (and others) to apply their knowledge of soil. The contest will consist of 2 parts, a written exam and practical exam. For the written exam, contestants will answer 30 multiple choice questions on soil formation and pedogenic processes, label horizons, identify diagnostic horizons and taxonomic classifications, and interpret soils. For the practical portion of the exam, contestants will estimate soil texture classes, determine textural component percentages, as well as identify soil structure, soil features and horizon color. The practical exam has 15 total questions. The practical exam will have a series of stations setup for each question, with some stations having multiple questions. Such as textural class and clay %.

### **Contest location, date, and registration**

The contest information can be found on the CANVAS website:

<https://www.sciencesocieties.org/canvas>

### **Awards**

Recognition and awards will be given to the top 3 overall individuals in the contest. Only undergraduate students are eligible for awards. Cash awards are typically as follows, although they are subject to change. First place will receive \$300, second place \$200, and third place \$100. Recognition of wards will occur at the SASES dinner.

## **Official Scoring**

The contest has a maximum value of 60 points for an individual. 30 points are possible for each exam component. Each multiple-choice written question is worth 1 point, and each of the practical questions is worth 2 points.

## **Breaking a Tie**

In the case of a tie for individual awards, the tiebreaker will be the estimates of clay % on the practical exam. If that fails to break a tie, the silt % and sand % will then be used in that order. If a tie still persists, the score of the practical portion of the exam will be used to break a tie. If that does not result in breaking the tie, then all contestants will share that contest placement. In the case of a cash prize, the contestants should receive equal portions of the combined prizes. I.e., if 2 people tie for 1<sup>st</sup>, the combined 1<sup>st</sup> and 2<sup>nd</sup> prizes are shared evenly; if 3 people tie for 1<sup>st</sup>, they share the even distribution of 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> place prizes.

## **Timing of the Contest**

The contest has a maximum time of 2 hours. Each host is allowed to create their own timing schedule but the general format of the contest is a split start to maximize time efficiency. Approximately half of the contestants will start on the written portion and half on the practical portion. Students in the practical exam may change stations as they complete each station on their own time and move to a new unoccupied station. Only 1 contestant is allowed at each station at any one time. Some practical stations, such as texture, will be set up for multiple people as they tend to take much longer than other stations. No talking is allowed at or between stations. Contestants caught talking will be given a single warning before being disqualified from the contest.

Once students complete on component of the exam, they may switch to the other component at will, as long as there are empty stations available for the practical exam or seats for the written exam. The contest host will identify acceptable areas to stand and wait for stations to open up.

## **Permitted Equipment**

Students should bring their own writing implement to complete the exam. Pencils are highly encouraged, as there will be no additional answer sheets provided. This guidebook is allowed, as well as a personal hand lens. Water bottles, color books, and towels will be provided by the contest hosts. Cellular phones are not allowed at any time during the competition. Use of cell phones will result in an immediate disqualification from the competition. If you need to access your cell phone during the competition for emergency use, please tell the contest hosts ahead of time.

## REFERENCES

General soils knowledge and information can be found in a variety of soils textbooks. Information on soil morphology and taxonomy reference the following documents:

Soil Survey Staff. (2024). Field book for describing and sampling soils, version 4.0. USDA, Natural Resources Conservation Service. U.S. Government Printing Office. Soil Survey Staff-NRCS. 1996. National Soil Survey Handbook (title 430-VI). US Government Printing Office, Washington, DC 20402.

Soil Survey Staff-NRCS. 1999. Soil Taxonomy, 2<sup>nd</sup> edition. USDA Agricultural Handbook 436. Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

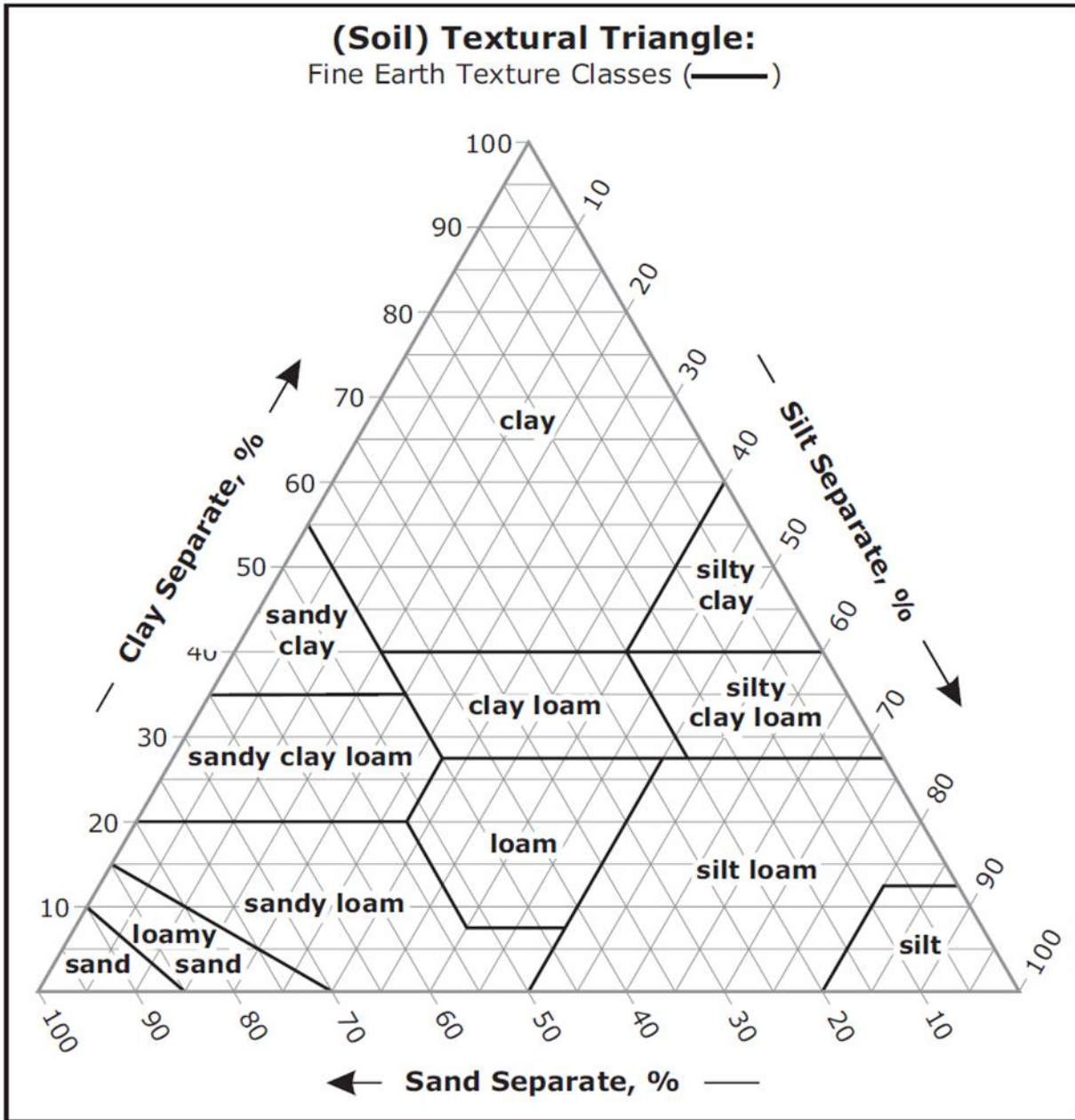
Soil Survey Staff -USDA-NRCS. 2014. Keys to Soil Taxonomy, 13<sup>th</sup> Edition. US Government Printing Office, Washington, DC 20402.

USDA-Soil Survey Division Staff. 1993. Soil Survey Manual. USDA Agricultural Handbook 18. Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

**Supplemental Information**

The following information may be useful as a reference for the exam. Abbreviations used below are acceptable as answers and may also be used in questions. If you use an abbreviation, make sure it is correct and not ambiguous to be perceived as another answer. I.e. ‘P’ is not an acceptable answer for soil structure, as it could imply platy or prismatic.

**Soil Texture Triangle**



Onsite Wastewater Loading Rates at 75 cm (gal/day/ft <sup>2</sup> )									
Structure shape →		SGR PL RS*	GR, SBK, ABK, WEG, PR				MA (Massive)		
Structure grade →		any	Weak (Grade 1)		Moderate or Strong (Grade 2 or 3)		None (Grade = 0)		
Moist consistence →		any	L VFR FR	FI VFI EFI	VFR FR	FI VFI EFI	VFR	FR	FI VFI EFI
Row Reference ↓	Column Reference →	1	2	3	4	5	6	7	8
	Texture ↓	NR = not recommended or not applicable							
A	Organic materials Densic materials Fragipan Cr horizon R horizon Continuous cemented horizons (B...m) Permafrost > 35% RF <sup>‡</sup>								
B	S COS VCOS LCOS LS	1	1	NR	NR	NR	1	NR	NR
C	FS LFS COSL	0.84	0.91	NR	NR	NR	0.91	0.84	NR
D	SL FSL	0.75	0.75	NR	0.84	NR	0.84	0.75	0.69
E	L SIL VFSL SCL SI VFS LVFS	0.62	0.69	0.62	0.75	0.52	0.62	0.52	0.45
F	SICL (≤ 35% clay) CL (≤ 35% clay)	0.52	0.52	0.45	0.62	0.52	0.52	0.45	0.27
G	SICL (> 35% clay) CL (> 35% clay)	NR	NR	0.4	0.45	0.4	NR	0.2	NR
H	SC, SIC, C	NR	NR	NR	NR	0.2	NR	NR	NR

\*Rock structure    ‡Rock fragments

## SITE INTERPRETATIONS

This section illustrates applications of soil information to land use. For this contest, there are six possible interpretations for a soil: 1) dwellings with basements, 2) septic tank absorption fields, 3) the local roads and streets, 4) irrigated corn, 5) hopyards, and 6) created wetlands. The interpretations involve the determination of the degree of limitation within each soil for a specific use. The most restrictive property determines the limitation rating. In cases where the depth of the description does not extend to the required interpretive depth in the table (e.g., 150 cm for some criteria), contestants should assume that the lowest horizon in the pit extends to the depth of interest (unless a lithic or paralithic contact occurs at the observation depth). Use the following tables to determine the degree of limitation and limiting reason number for each interpretation. The first most-limiting reason listed in the table should be marked on the scorecard. For slight limitations, the Reason is dashed or left blank.

### Dwellings with Basements. Adapted from NSSH Table 620-3.

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Flooding or ponding frequency	None		Rare to Frequent
2. Potential shrink-swell (continuous thickness of C, SIC, or SC with very high plasticity or slickensides) starting in the upper 100 cm	<8 cm	8-16 cm	>16 cm
3. Depth to seasonally high water table (cm)	>200	100 - 200	<100
4. Depth to root-limiting layer other than hard rock (R) (cm)	>200	50 - 200	<50
5. Depth to hard rock (R) (cm)	> 200		≤200
6. Slope (%)	<6	6 - 20	>20

### Septic Tank Absorption Fields. Adapted from NSSH Table 620-17.

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Flooding or ponding frequency	None		Rare to Frequent
2. Loading rate (gal/ft <sup>2</sup> /day)	0.6 – 0.8	0.2 – 0.59, 0.81– 1.0	NR loading rate
3. Depth to seasonally high water table (cm)	>150	100 - 150	<100
4. Occurrence COS, S, FS, VFS, LCOS, LS, LFS, LVFS textures (cm)	> 100	< 50	50 - 100
5. Depth to root-limiting layer (cm)	>150	100 - 150	<100
6. Slope (%)	<6	6 - 20	>20

**Local Roads & Streets. Adapted from NSSH Table 620-17.**

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Flooding or ponding frequency	None	Not a choice	Rare to Frequent
2. Potential shrink-swell (continuous thickness of C, SIC, or SC with very high plasticity or slickensides) starting in the upper 100 cm	<8 cm	8-16 cm	>16 cm
3. Depth to seasonally high water table (cm)	>50	50 - 25	<25
4. Potential Frost Action (upper 50 cm and only applicable for mesic and cooler STR)	S, LS, SL	all others	SI, SIL, SICL
5. Depth to bedrock or other continuous cemented layer (cm)	>150	100 - 150	<100
6. Slope (pct)	<6	6 - 15	>15

**Irrigated Corn.**

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Extreme cold; short growing season (soil temp. regime)	All others	Frigid	Cryic or gelic
2. Flooding or ponding frequency	Protected or None	Rare	Common to Frequent
3. COS, S, FS, VFS, LCOS, LS, LFS, LVFS surface texture thickness (cm)	<50	50 - 100	>100
4. Depth to seasonally high water table (cm)	>50	25 - 50	<25
5. Water retention difference (class)	Moderate, High	Low	Very Low
6. Depth to root-limiting layer (cm)	> 50	25 - 50	<25
7. Slope (%)	<6	6 - 10	>10

**Table 28. Created wetlands.**

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Occurrence of COS, S, FS, VFS, LCOS, LS, LFS, or LVFS textures at indicated depth (cm)	>75	Not a choice	≤75
2. Current depth to seasonally high water table (cm)	<50	Not a choice	≥50
3. Organic carbon in current surface layer horizon (%)	>1.5	1.0 – 1.5	<1.0
4. Current depth to R or Cr (cm)	≥100	Not a choice	<100
5. Current slope (%)	<0.5	0.5 – 1.5	>1.5

**Hopyards. Assume they are on drip irrigation.**

Factors Affecting Use	Degree of Limitation		
	Slight	Moderate	Severe
1. Extreme cold; long growing season (soil temp. regime)	All others	Thermic, Hyper-thermic, or Cryic	Gelic
2. Flooding or ponding frequency	Protected or None		Rare to Frequent
3. COS, S, FS, VFS, LCOS, LS, LFS, LVFS surface texture thickness (cm)	<25	Not a choice	≥25
4. Depth to seasonally high water table (cm)	>50	25 - 50	<25
5. Water retention difference (class)	Very Low to Moderate	High	Not a choice
6. Depth to root-limiting layer (cm)	>150	100 - 150	<100
7. Slope (%)	<2	2 - 4	>4

**Abbreviations**

Table 3. Soil horizon boundary distinctness category.

Boundary	Abbreviation	Boundary Distinctness
Abrupt	A	< 2 cm
Clear	C	2.1 to 5 cm
Gradual	G	5.1 to 15 cm
Diffuse	D	> 15 cm

Table 4. Structural Grades

Grade	Code	Description
Structureless	0	The condition in which there is no observable aggregation or no definite, orderly arrangement of natural lines of weakness.
Weak	1	The soil breaks into very few poorly formed, indistinct peds, most of which are destroyed in the process of removal. The shape of structure is barely observable in place.
Moderate	2	The soil contains well-formed, distinct peds in the disturbed soil when removed by hand. They are moderately durable with little unaggregated material. The shape of structure observed in the undisturbed pit face may be indistinct.
Strong	3	Durable peds are very evident in undisturbed soil of the pit face with very little or no unaggregated material when peds are removed from the soil. The peds adhere weakly to one another, are rigid upon displacement, and become separated when the soil is disturbed.

Table 5. Structural Types

Type	Abbreviation	Description
Granular	GR	Spheroids or polyhedrons bound by curved planes or very irregular surfaces which have slight or no accommodation to the faces of surrounding peds. The aggregates may or may not be highly porous.
Platy	PL	Plate-like with the horizontal dimension significantly greater than the vertical dimension. Plates are approximately parallel to the soil surface.
Subangular Blocky	SBK	Polyhedron-like structural units that are approximately the same size in all dimensions. Peds have mixed rounded and flattened faces with many rounded vertices. These structural units are casts of the molds formed by the faces of the surrounding peds
Angular Blocky	ABK	Similar to subangular blocky but block-like units have flattened faces and many sharply angular vertices.
Prismatic	PR	Prism-like with the two horizontal dimensions considerably less than the vertical. Vertical faces are well defined and arranged around a vertical line with angular vertices. The structural units have angular tops or caps.
Columnar	COL	Same as prismatic but with rounded tops or caps.
Wedge	WE G	Elliptical, interlocking lenses that terminate in acute angles, bounded by slickensides. Characteristic in Vertisols but may be present in other soils.
Massive	MA	No structure is apparent, and the material is coherent.
Single-Grained	SGR	No structure is apparent, and soil fragments and single mineral grains do not cohere (e.g., loose sand).
Geogenic or Depositional	GS	These unaltered depositional layers may break out in plate-like shapes (alluvial or aeolian sand) or unweathered glacial till that breaks out with sharp corners/edges due to consolidation. Associated with a "C" horizon.

Table 9. Rock fragment modifier size and shape requirements and symbols

Size (Diameter)	Adjective	Symbol
<b>Rounded, Subrounded, Angular, Irregular</b>		
0.2 cm - 7.5 cm	Gravel	GR
7.6 cm - 25.0 cm	Cobbly	CB
25.1 cm - 60.0 cm	Stony	ST
> 60.0 cm	Bouldery	BD
<b>Flat</b>		
0.2 cm - 15 cm	Channery	CH
15.1 cm - 38.0 cm	Flaggy	FL
38.0 cm - 60 cm	Stony	ST
> 60 cm	Bouldery	BD

Table 10. Modifiers by percent rock fragment (> 2 mm) present by volume

Percent Rock by Volume	Rock Fragment Modifier
< 15%	No special term used with the soil texture class. Enter a dash or leave blank.
15 - 35%	Use "gravely", "cobblely", "stony", "bouldery", "channery" or "flaggy" as a modifier of the texture term (e.g. gravely loam or GR-L)
35 - 60%	Use "very (V) + size adjective" as a modifier of the texture term (e.g. very cobble fine sandy loam or CBV-FSL).
60 - 90%	Use "extremely (X) + size adjective" as a modifier of the texture term (e.g., extremely stony clay loam or STX-CL)
> 90%	Use "coarse fragment noun" as the coarse fragment term (e.g. boulders or BD) and dash or leave blank the soil texture class and the % clay boxes.

Table 11. Textural Classes and Abbreviations

Texture	Symbol	Texture	Symbol
Coarse sand	COS	Sandy Loam	SL
Sand	S	Loam	L
Fine Sand	FS	Sandy Clay Loam	SCL
Very Fine Sand	VFS	Silt Loam	SIL
Loamy Coarse Sand	LCOS	Silt	SI
Loamy Sand	LS	Silty Clay Loam	SICL
Loamy Fine Sand	LFS	Clay Loam	CL
Loamy Very Fine Sand	LVFS	Sandy Clay	SC
Coarse Sandy Loam	COSL	Silty Clay	SIC
Fine Sandy Loam	FSL	Clay	C
Very Fine Sandy Loam	VFSL		