

JUST DRILL IT

STANDARDS

See summary of National Science Education Standards.

Original: <http://books.nap.edu/readingroom/books/nse/>

Standard Concept	General standard	Specific standard	General standard	Specific standard	General standard	Specific standard
Grade Level		K-4		5-8		9-12
Science as inquiry (A)	Abilities ... to do ... inquiry	A.1.4.1	Abilities ... to do ... inquiry	A.1.8.1	Abilities ... to do ... inquiry	A.1.12.1
		A.1.4.4		A.1.8.4		A.1.12.4
		A.1.4.5		A.1.8.5		A.1.12.5
				A.1.8.6		A.1.12.6
				A.1.8.7		
				A.1.8.8		
	Understandings about ... inquiry	A.2.4.1	Understandings about ... inquiry	A.2.8.1	Understandings about ... inquiry	A.2.12.2
		A.2.4.2		A.2.8.2		A.2.12.6
		A.2.4.4		A.2.8.3		
		A.2.4.5		A.2.8.5		
		A.2.5.6				
Science in ... social perspectives (F)	Types of resources	F.3.4.1			Natural Resources	F.3.12.1
		F.3.4.2				F.3.12.2



JUST DRILL IT

INTRODUCTION

You are an exploration geologist assigned to find the big gold orebody on the company's mining claim block. Your boss says the budget will only allow six drill holes in the claim block. If you are successful in hitting ore, you will be paid according to how much ore you hit in each drill hole.

MATERIALS, per group

- Grids included below. Notice that some of the grids are for the teacher only.
- Rulers
- Pencils
- Calculators

PROCEDURE (student instructions)

You gather the exploration reports from the claim block and decide to assemble the "clues" on a map of the claim block. The map of the claim block is set up so north is at the top, and the area of the claim block has been subdivided into a grid of rows and columns. The rows and columns identify specific "blocks" just like a city map. Here is what you know:

- 1) A geophysical survey using magnetic and electromagnetic detectors over the mining claim block indicates rocks that might host an orebody are not present south of Row 7 and west of Column E. You mark off this area by drawing diagonal lines from NE to SW in the "blocks".
- 2) Aerial photographs show an east-west fault that would cut off any possible mineralization at the south boundary of Row 4. You mark the boundary with a heavy solid line.
- 3) A geochemical survey testing for minute quantities of metal found high values of gold in soils in the contiguous area west of Column F, south of Row 3 and north of Row 9. You mark this area by drawing a heavy dash line around its boundary.
- 4) Old drilling records indicate drill holes found no gold in blocks G6, D3, C9, F8, A6, B2, and D1. You mark these blocks with the symbol B with a circle around it for barren drill hole.
- 5) You remember talking to Prospector Pete and he showed you a couple of gold nuggets he said that he found in a stream on blocks E5 and D6. You mark these blocks with NUG for nugget.
- 6) Your friend at Geostakers, a claim staking service, reports there is a BIG claim staking rush going on just to the northwest of your mining claim block.
- 7) A competitor company has sent you a letter offering a deal for blocks F1, G1, F2, and G2. You mark these blocks by drawing diagonal lines from northwest to southeast within this area.



- 8) Your field crew found old abandoned prospects in B6, D7, and G10 and samples from the waste rock dumps contain gold. You mark these blocks with an “X”, which looks like a hammer and pick.
- 9) You identified a northwest-southeast trending geologic structure from the northwest corner of B5 to the southeast corner of G10. You mark the structure on your map as a dot-dash line.
- 10) A creek runs through block F2 and G2 and has a high concentration of prince plume plants growing nearby. Prince plume grows well in soils high in selenium, and selenium can occur in association with gold deposits. You mark these blocks with PP for prince plume.

Now you must decide which six “blocks” you think might contain ore. Mark six blocks by placing a dot with a circle around it in the middle of the block. It is time to “**Just Drill It.**”



JUST DRILL IT

DRILLING RESULTS TABLE

Determine the drilling results from your six drill holes in the table below. **The instructor will use the key to tell you whether you hit ore or came up blank!** The drill hole location is the block in which you chose to drill. The grade is the amount of gold you found in the rock in ounces per ton. The thickness is the length in feet of the drill hole that intercepted ore. Exploration geologists multiply the grade times the thickness to determine where the “high-grade” ore is located within the ore body. For this activity, we’ll assume that the samples used to determine our grade came from “HQ” sized core (2.5” in diameter) and that the rock cored has an average density of 121ft³/tn. Using πr^2 divided by this density gives us a density factor of 0.00284 tons per linear foot of drilled HQ core. The grade thickness can then be multiplied by this factor and then by the price of gold (we are using \$500 per ounce, but you may substitute the current price) to get a value for the drill hole. **This is your pay!**

Drill Hole Location	Grade (in ounces per ton)	Intercept Thickness (in feet)	Density Factor (in tons per linear foot of HQ core)	Price of Gold (in dollars per ounce)	YOUR PAY!
		x	x	x	equals
TOTAL					



EVALUATION

1. How did you do relative to the other members of your class? (How much gold did you discover?)

2. What clues did you use to help you find gold (or what should you have used)?

3. If you were to drill a second round of three holes, which blocks (indicate row and column) would you drill in?

4. If the gold grade were uniformly distributed throughout each square you successfully drill tested and each square was 100 feet by 100 feet, what would be your new total pay?

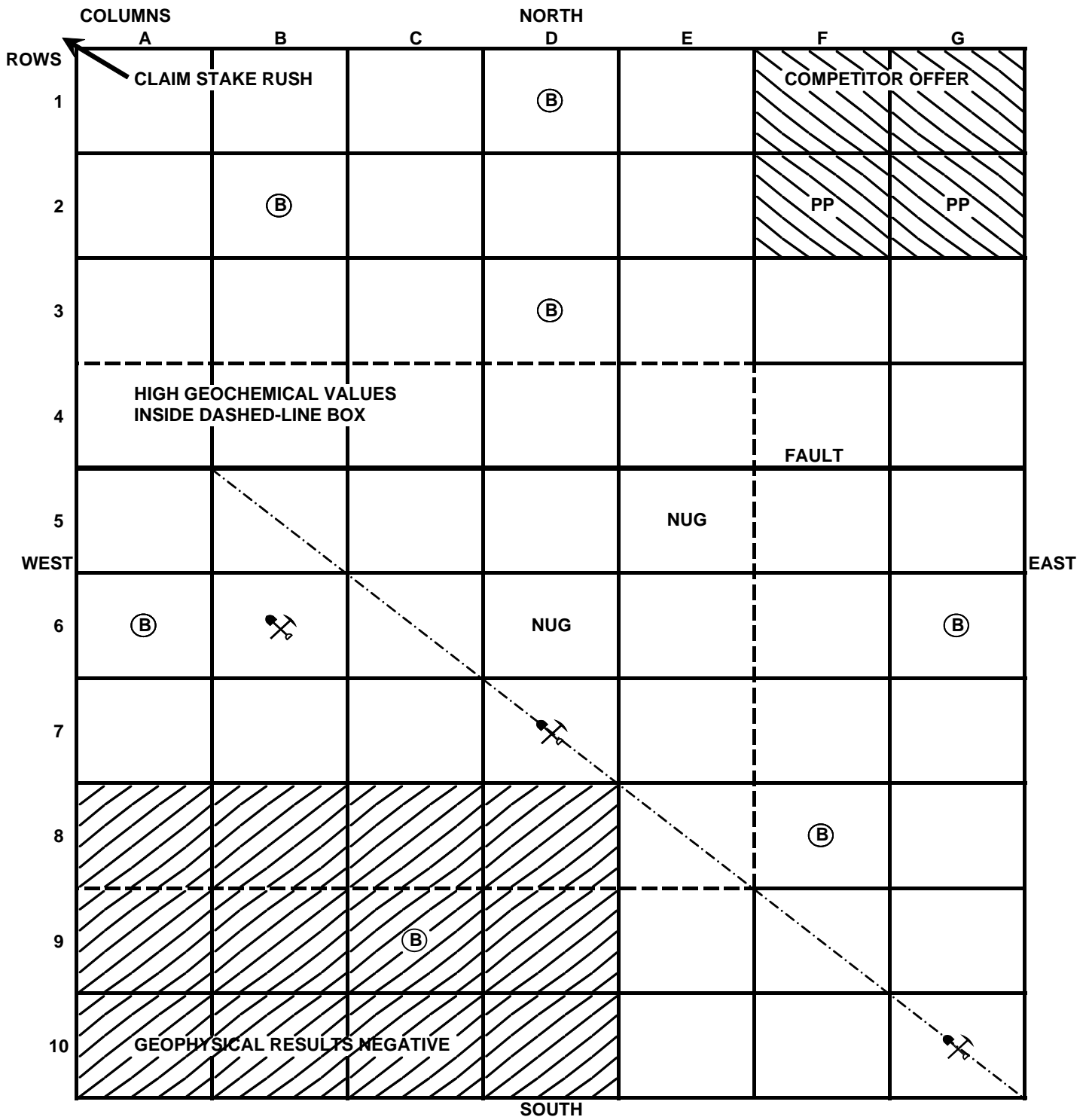


Just Drill It Base Map

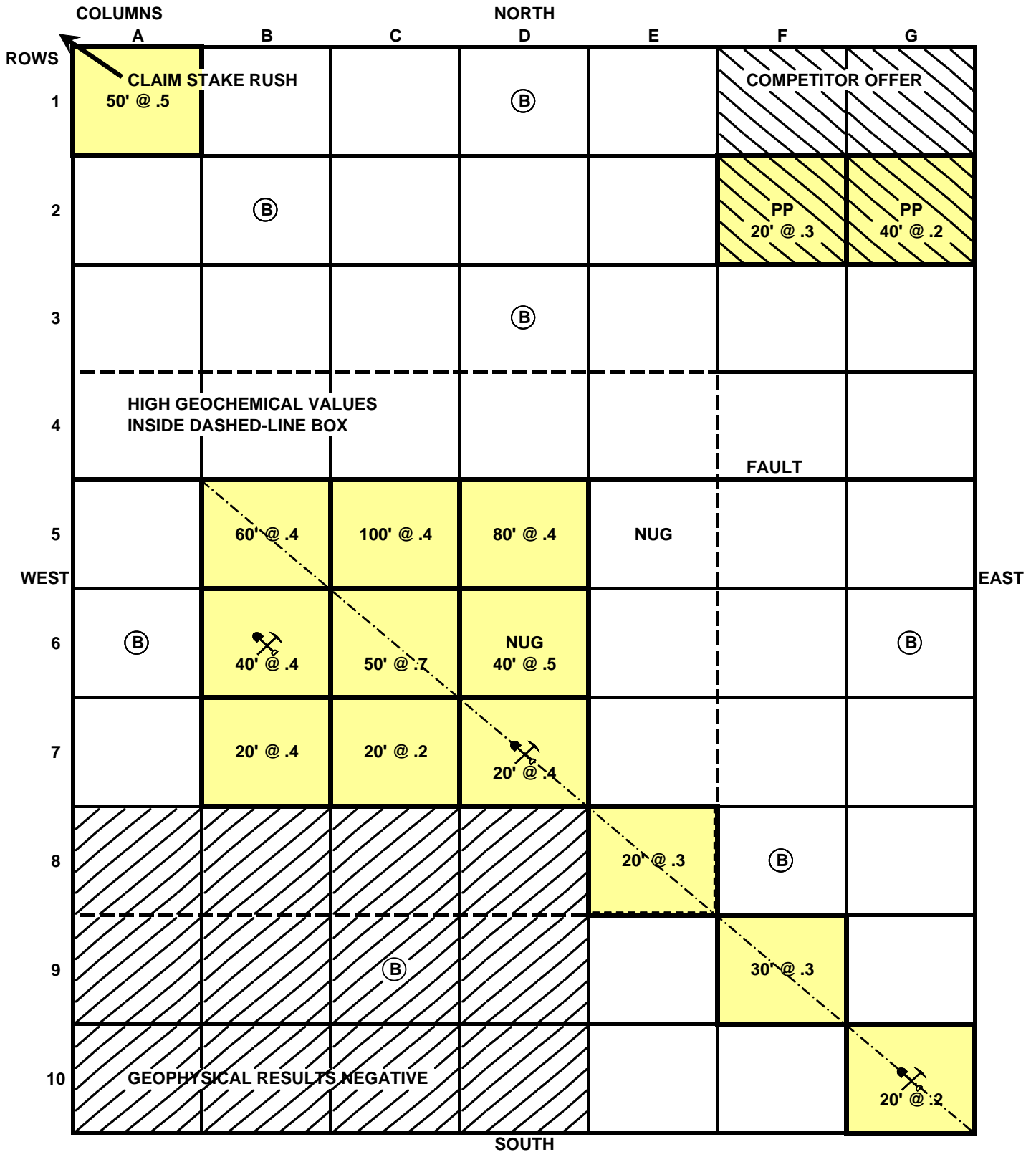
		COLUMNS						
		A	B	C	D	E	F	G
ROWS	1							
	2							
	3							
	4							
	5							
	WEST							EAST
	6							
	7							
	8							
	9							
10								
		SOUTH						






Just Drill It Base Map Answer Sheet (Teacher only)



Just Drill It Base Map Answer Sheet w/Gold Ore Intercepts (Teacher only)



Just Drill It Base Map w/Gold Ore Intercepts (Teacher only)

		COLUMNS						
		A	B	C	D	E	F	G
ROWS	1	50' @ .5			Ⓟ			
	2		Ⓟ				PP 20' @ .3	PP 40' @ .2
	3				Ⓟ			
	4							
	5		60' @ .4	100' @ .4	80' @ .4	NUG		
	6	Ⓟ	40' @ .4 	50' @ .7	NUG 40' @ .5			Ⓟ
	7		20' @ .4	20' @ .2	20' @ .4 			
	8					20' @ .3	Ⓟ	
	9			Ⓟ			30' @ .3	
	10							20' @ .2 
		SOUTH						

