

An analogy to understand the Word Accuracy

The accuracy of the answer depends on the accuracy of the question.

A teacher simply asked his student- **what is the population of India?**- A straight answer comes, 125 billion.

Is it a correct answer? Probably yes, because when we talk about figures like population, the default assumption is a rough estimation in billions. But is it exactly the population of India?

Now the teacher changed the question- **what is the population of India in 2016?** – The answer would be 127 billion 38 million 7 lakhs.

There is substantial difference in figures of both the answers. But, both answers are correct in light of their respective questions.

Unless the purpose of the question and the range of expected outcome is set, the responses are based on obvious default.

Apply the same to the case of OMR reading.

The accuracy of response depends upon policy of evaluation.

We come across many queries asking about the accuracy of OMR Software. It is most important to understand that OMR Software accuracy is not a fixed property of the software. Perfectness of accuracy obtained is subject to your definition of accuracy expected and the policy behind judgement.

On the same OMR sheet different users might expect the software to behave differently.

Some user is strict and wants to read only bubbles filled as per norms while other user is considerate to read even small responses. This software has both types of users. So if the software has a fixed accuracy setting to respond to only big marks, it will be accurate for one type of user but inaccurate for the other. So it has feature to adjust its response settings to deliver 100% accurate results according to user expectation.

Example: If one same sheet has properly filled bubbles and partially filled bubbles. Then what do we expect from the software?

- If it is expected to read all the bubbles big or small, we make the settings accordingly, and it reads all. **So it is 100% accurate.**
- If it is expected from the software to ignore improperly filled bubbles, we make the settings accordingly, and it reads only the properly filled. **So it is 100% accurate.**

Approach for Accurate Reading

It is important to understand that **preparation for obtaining accurate data starts right at the stage of planning the sheet layout.** Choosing a correct mode of scanning is also important as per the need of that sheet design. All steps put together lead to accuracy.

The Addmen OMR Software, IS DEFINITELY 100% ACCURATE.

Depending upon the sensitivity settings made by the operator, an OMR block is either read accurately or it is alerted/prompted/tagged, but there is no scope for an unattended or skipped by chance bubble.

A user **should definitely expect to get 100% accurate result** only if the design, printing and scanning guideline have been followed. But it is wrong to expect accuracy out of any inappropriate sheet layout that has been developed with negligence and put forth for the software to read.

Inaccuracy should be seen as inability to correspond to the set policy. If the user wants to read small marks but the setting is made for low sensitivity to read only big marks, then obviously the software will behave as per setting, and will not give accurate result, because the setting is wrong.

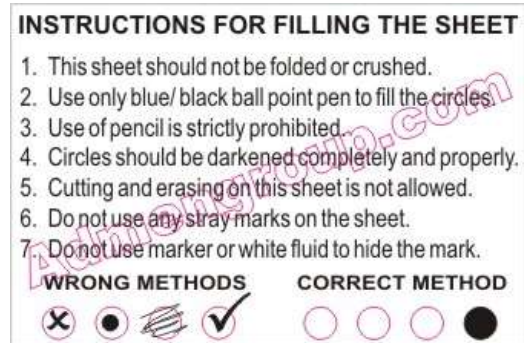
So it is **utmost important to decide the Evaluation Policy** and **make appropriate settings** in the software and then obviously it can be observed that **software is 100% accurate at all times.**

Policy for Accurate Reading of OMR bubbles on sheet

The software has flexibility to set the response sensitivity for different types of marks. It has flexibility to change the response settings to read even the smallest marks.

Also if required to read some exceptions in the lot and read even a sheet or a bubble that is not in the policy, the software settings can be changed for that particular sheet. However, the users do not prefer to change setting for every sheet.

So, a clear policy should be decided and corresponding Instructions should be written and illustrated properly with diagrams on the OMR sheet and ideally all sheets should be read according to the policy specified in the instructions to avoid any contentions.



Common Instructions for MCQ Tests

Why we need to have standard policy for different cases?

Example: The same OMR software might be used to read patient and employee feedbacks as well as to evaluate competitive MCQ examinations. The pattern of marking allowed is very different in both cases.

Case	Employee or a patient feedback form where they are asked to tick the appropriate rating.	MCQ exam where the students are asked to fill the bubbles properly.
Strict Policy	Accept only proper tick marks that have been made in proper location and of proper size.	Accept marks made as per instruction with reasonable variation within very tight range due to human factor. Read only bubbles that are completely or nearly completely filled, ignore others.
Relaxed Policy	Accept any mark that is understood as a response.	Accept any mark that is understood as a response.
Default Policy	Default Policy is kept relaxed to the extent possible to keep it convenient for the respondents. Generally Strict policy is not applied in case of Feedback because purpose is subjective.	Default policy is kept strict so that only clear and evident, intentional and purposeful marking is accepted to avoid contentions. Generally Relaxed policy is not applied in case of Test because objective and outcome of test is crucial.
Reason for different policy for different cases...	Why small tick marks are allowed in feedbacks? Feedback is an activity seeking voluntary participation and honest responses. If you make it compulsory or tedious for the respondent, it will demotivate a user to give honest responses. One cannot expect or dictate a sick patient or a busy employee to put in extra effort to color the circles. Their honest response is important. So to facilitate the user, he is allowed to make convenient marks on the sheet. Moreover, the user has no direct advantage of filling the sheet, so they can be allowed to mark in their own style.	Why small marks are NOT allowed in MCQ exams? Why only full bubbles filling is expected? Since there is high stake in exams, the candidates try to make all sorts of attempts to take advantage. If we have a relaxed policy to read marks of all sizes, then if the candidate is not sure of the answer, he might intentionally create ambiguity by making a small mark in one of the options. Now if he gets the answer right by fluke, he will expect the mark to be read, and will claim that this is his marked answer. On the other hand, if the answer he marked is wrong, he might argue that, the mark on his sheet was an unintentional slip, or maybe and impression of other sheet in the stack, but he did not mark it.

Example to illustrate 100% Accurate response in according to evaluation policy set by user

See the response below at **Default** Settings, **Strict** Settings and **Relaxed** Settings. The software is always 100% accurate in reading responses in all the defined cases.

Policy Instructions to candidates

Bubble fills in MCQ test sheet		Bubble fills in MCQ test sheet		Tick Marks in feedback form
Incorrect Method 	Correct Method 	Incorrect Method 	Correct Method 	
1. Use only blue/ black ball point pen to fill the circles. 2. Use of pencil is strictly prohibited. 3. Circles should be darkened completely & properly. 4. Cutting and erasing on this sheet is not allowed. 5. Do not use marker or white fluid to hide the mark. 6. Do not use any stray marks on the sheet.		1. Mark boxes like this with a thick solid black line. Hide the letter in the box completely. Do not make a thin line. 2. Use a dark HB or No.2 pencil only. 3. Rub out any errors thoroughly. 4. Mark within the given box, Do not cross margins. 5. Do not use any stray marks on the sheet.		

Variations Observed in Marks

	Bubbles - Proper Intensity (Pen/Dark Pencil Filled)	Bubbles - Light Intensity (Light Pencil Filled)	Tick Marks - Proper Intensity (Pen Marked)
Proper Impact	1A, 2A, 3A, 4A, 5A, 5C, 7A, 8A, 11A, 12A, 13A, 14A, 15A, 15C, 17A, 18A, 21A, 22A, 23A, 24A, 25C Shape Variations: 5A, 7A, 15A, 17A -Attempt to cancel response	26A, 27A, 28C	
Small Impact	2D, 4C, 9B, 10A, 12D, 14C, 19B, 20A	29B, 30A	41A, 43A, 45B, 46A, 48A, 49B, 50A, 50C Shape variation: 50D – Cross mark
Very Small Impact	3C, 4C, 6A, 13C, 14C, 16A, 23C, 24C Improper erasure: 8D, 18D	29B, 30A Improper erasure: 22D, 27D	42B, 44B, 45A, 47B, 48B

A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C			
1				11				21				31					41				
2				12				22				32					42				
3				13				23				33					43				
4				14				24				34					44				
5				15				25				35					45				
6				16				26				36					46				
7				17				27				37					47				
8				18				28					38					48			
9				19				29					39					49			
10				20				30				40					50				

Software Response at Different Settings

Strict Setting for Bubble	Relaxed Setting for Bubble	Setting for Light Intensity Impact	Setting for Very Small impact
Sensitivity : 40 /0 /10 Decreased Threshold :150 Default	Sensitivity : 30 /0 /10 Default Threshold :150 Default	Sensitivity: 15 /0 /5 High Threshold :160 Improve	Sensitivity: 7 /0 /5 Extra High Threshold :160 Improve
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
48	48	48	48
49	49	49	49
50	50	50	50

Approach for getting Accurate Results from OMR Sheets with Pencil Filling

Software can accurately read pencils too, but it is suggested to minimize use of pencil as it leads to complications because pencils have lot of variations, light pencil or dark pencil.

With use of pencil, also creeps in the possibility to erase. So a dark pencil user candidate who erases, but not properly, so that he still leaves a mark which is equal in impression of marks created by other candidate who has used a light pencil to fill.

Then if you adjust settings to read light pencil, even improperly rubbed leftover marks might be read, and if you make settings to read only dark pencil, the light pencil will be ignored. Then you will have to make different settings for different sheets. It is not suggested to increase work for management. For this reason, using pen is best and simple.

- OMR sheet can be filled using Blue/Black Ball Pen or HB (or darker) pencil. Use of Pen/Pencil depends on the rules set by the exam body.
- In case pencil filling is allowed most candidates bring various types of pencils and make a wide range of marks from very light to dark. It is best to fill the OMR sheet with pen to avoid any variation of intensity of darkness of marks.
- The software has the capability to detect light marks and dark marks by adjusting the detection sensitivity in the settings. Data will be read accurately but too much variation in lightness and darkness of the sheets will lead to many prompts and alerts by the system. To minimize this, the scanning should be dark so that even light marks are scanned dark and the judgement policy should be decided beforehand.

OMR system works on the principle of contrast in recognizing the desired mark with respect to the background elements drawn on sheet. So if the pen is used, either on a colored or a black and white sheet, the mark created is big and dark in comparison to the background elements and is clearly identified. But if pencil is used and the background elements are also printed in black, then the relative impact of background elements sometimes is equal to the density of black generated by pencil marks.

- So if pattern allows pencil filling, a colored sheet with thin outlines and big bubbles should be used. By using color sheets we are able to minimize scanning impression of the bubble outlines and are able to clearly identify the filled mark. For the same reason the text label inside the bubble should also have thin strokes and small size.
- If black & white sheets are used with pencil, then the black outlines of bubbles will be scanned and will create conflict if we read at high sensitivity to accommodate for light pencil marks. If filling is strictly done using dark #2 pencil, and sheets are printed on coarse paper even black & white sheets are OK.

Approach for getting Accurate Results from OMR Sheets with OCR/ICR/Barcode blocks

- OMR/OCR/ICR/Barcode are different technologies. Each has its strengths or limitations.
- OCR & ICR are supportive technologies and around 90%+ accurate and used only for double check or for alerts, the OCR/ICR is never used to obtain decisive data.
- OMR/OCR/ICR has certain layout guidelines. ICR has certain additional design guidelines to OMR, so the sheet must be designed accordingly.
- Similarly with barcode, sometimes due to printing/smudging or mal-handling, the barcode gets disturbed or destroyed. Obviously if something is disturbed it cannot be read accurately. Barcode size and printing technology also has an effect on the final output of the barcode.
- So Barcode are preferably printed at two locations, so that if one is disturbed, the other can be read. 100% barcode reading can be achieved with this simple measure.

Influence of Scanner on Accuracy

- Some models of scanner are not able to scan pencil marks properly and deliver an image with rarified impressions of the bubbles. This rarified impression is formed due to effect of glare because of the angle of incidence of light from the scanner. So if the scanner itself has not captured the pencil mark properly, then the input for the software is already inappropriate and hence will have its impact on accuracy. It is to be remembered that the software reads the image, not the paper. So if the scanner has not detected the mark and formed the image properly then the software will read what is there on the image irrespective of what was there on the paper.
- Some pieces of scanners, as they get old and the drag roller gets weary, start to affect the dimensions of image. Due to irregular drag of the roller sometimes the scanner delivers skewed or distorted images. The OMR software has allowance to accept skew or distortion within a certain limit as per the settings but if this distortion becomes excessive and uneven throughout the image then the scanner must be repaired or replaced.
- Some scanners have wobbling rollers due to which even if the final dimension of the image is ok still the image is stretched from within such that along the length certain portion of the length is smaller than the actual length of the design while some portion of the length is stretched long.

These possible issues are not covered in the scanning guide because it is not related to working instructions for the user. Even though the user might be doing everything correctly as guided, still the properties or defects of the scanner might be negatively affecting the output.

If these issues are noticed, it might be required to repair or replace the scanner. Such cases can be easily identified by scanning the same sheet on a different scanner and comparing the image or output.

After correct Printing, filling & Scanning, the scanned image of the sheet should look like :

Your Institute Name & Logo

OMR ANSWER SHEET

ROLL NO.
1006

TEST ID

Name Mayur

Batch.....

Mobile No. 9755966543 Test Date 20/10/12

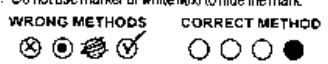
Candidate Sign

Invigilator Sign

INSTRUCTIONS FOR FILLING THE SHEET

- This sheet should not be folded or crushed
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not use any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.

WRONG METHODS **CORRECT METHOD**



A B C D		A B C D		A B C D		A B C D		A B C D	
1	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	12	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
3	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	14	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	15	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	17	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	19	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	20	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					21	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					22	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					23	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					24	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					25	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					26	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					27	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					28	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					29	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
					30	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					31	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					32	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
					33	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					34	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
					35	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
					36	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					37	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					38	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					39	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
					40	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					41	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					42	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					43	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					44	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
					45	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
					46	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
					47	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
					48	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
					49	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
					50	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>