

# Bicycle Drawing Test

Memory Scoring

Name \_\_\_\_\_ Age \_\_\_\_\_ Gender \_\_\_\_\_ Ed \_\_\_\_\_ Date \_\_\_\_\_

Diagnosis \_\_\_\_\_ Ridden a bicycle? Yes  No  Drawing time = \_\_\_\_\_ SCORE \_\_\_\_\_

**Instructions:** Provide pencil with eraser. Ask to draw the best bicycle possible with all of the major parts that are typically present in a bicycle. Score 1 point unless item indicates 2 pts. If in doubt about a part ask the drawer to identify the part when finished.

PARTS / COMPLEXITY (maximum = 11 points)		Score
1	<b>Wheels.</b> One point for each wheel. Quality of wheel is not penalized. <i>Maximum 2 points.</i>	Max = 2 pts
2	<b>Spokes.</b> One point for each spoke set. Any identifiable substitute is permitted. <i>Maximum 2 points.</i>	Max = 2 pts
3	<b>Handlebar.</b> Any separate part to indicate handlebars.	
4	<b>Seat.</b> Any separate part to indicate a seat.	
5	<b>Pedals.</b> One point for each pedal. Any identifiable substitute is permitted. <i>Maximum 2 points.</i>	Max = 2 pts
6	<b>Sprocket/Ring wheel present for chain.</b> Circular shape positioned in mid area, intended for chain (chain not necessary).	
7	<b>Chain.</b> Elongated, typically oval shaped going from sprocket/chain wheel to mid-section of rear wheel.	
8	<b>Frame.</b> A discrete structure (usually top, bottom and side elements) to hold the bicycle together.	

MOTOR CONTROL (maximum = 5 points)		Score
9	<b>Most lines end at target destination.</b> No sign of frequent overshoot or undershoot that clearly indicate poor motor control.	
10	<b>No additional lines</b> that are not associated with the bicycle that clearly indicate poor motor control.	
11	<b>No repeated/perseverative elements.</b> No extra wheels, spokes or pedals.	
12	<b>No consistent line tremor.</b> Penalize if obvious line tremor in over 50% of lines. Don't penalize sketchy lines.	
13	<b>No angles in wheels.</b> Wheels should be round without obvious angles.	

VISUOSPATIAL (maximum = 11 points)		Score
14	<b>Wheels are approximately equal in size.</b> No wheel diameter is less than 67% of larger wheel.	
15	<b>Wheels are round and do not have pronounced oval shape.</b>	
16	<b>Wheels are not too small or large compared to other bicycle parts (e.g., frame).</b>	
17	<b>Spokes are present in each wheel quadrant.</b> The same number of spokes per quadrant is not necessary. If spokes are missing in any wheel quadrant score 0 for that wheel. <i>Maximum 2 points.</i>	Max = 2 pts
18	<b>Spokes have a radial type pattern.</b> No haphazard or random pattern. Score 1 pt. for each wheel. <i>Maximum 2 pts.</i>	Max = 2 pts
19	<b>Bicycle parts display consistent orientation.</b> For example, a bicycle drawn sideways should not have the seat or handlebars drawn as if looking down on that part.	
20	<b>Bicycle is not cut off, compressed or colliding with edge of paper.</b>	
21	<b>Bicycle elements are connected.</b> No elements are unattached to other bicycle parts.	
22	<b>No overlap of elements that should be separate.</b>	

MECHANICAL REASONING (maximum = 7 points)		Score
23	<b>Steering control is possible.</b> Handlebar is present and attached via shaft to front wheel center to indicate steering control.	
24	<b>At least one pedal seems functionally attached to middle of large center chain ring.</b>	
25	<b>Pedals are positioned opposite one another (not adjacent) to allow proper locomotion.</b>	
26	<b>Chain is connected from middle chain ring to center of rear wheel to appropriately transmit power to rear wheel.</b>	
27	<b>Center of front wheel is properly connected to front part of frame.</b>	
28	<b>Center of rear wheel is properly connected to rear part of frame.</b>	
29	<b>The bicycle is rideable.</b> All mechanical parts are integrated and positioned appropriately to form a rideable bicycle.	

# Bicycle Drawing - Memory Drawing Scoring Summary

Name \_\_\_\_\_ Date \_\_\_\_\_

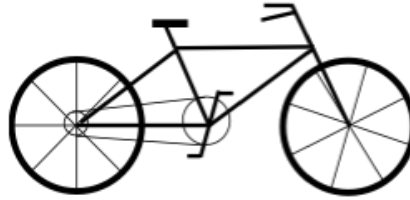
Section	Ability	Raw Score	Z score	%ile
<b>PARTS / COMPLEXITY</b>	Conceptualize, visualize and represent the necessary bicycle parts	Max = 11 pts		
<b>MOTOR CONTROL</b>	Demonstrate fine motor control and motor regulation	Max = 5 pts		
<b>VISUOSPATIAL</b>	Visually plan, organize and position the parts of the bicycle appropriately	Max = 11 pts		
<b>MECHANICAL REASONING</b>	Understand that the object is a machine that needs to have certain parts interrelate and work in a functional manner	Max = 7 pts		
<b>Total score</b>	Ability to integrate conceptual, visual, motor and reasoning abilities to represent a mechanical object	Max = 34 pts		
<b>Time to completion</b>	Amount of time spent on bicycle drawing	Secs.		

# Bicycle Copy Scoring

Name \_\_\_\_\_ Age \_\_\_\_\_ Gender \_\_\_\_\_ Ed \_\_\_\_\_ Date \_\_\_\_\_

Diagnosis \_\_\_\_\_ Time spent on drawing (in seconds) = \_\_\_\_\_

**Instructions:** Provide pencil with eraser. Ask to copy the bicycle exactly as shown in the space below it. Score 1 point for each item. If in doubt about a bicycle part ask the drawer to identify the part when finished. Record the time spent on the drawing.



LEFT Side of Bicycle		1 or 0
1. <b>Left wheel present</b> (shape not penalized).		
2. <b>Left wheel appropriately drawn</b> Rounded, not significantly misshapen, no angles, enclosed circle with no line overshoot or undershoot more than ¼ in.		
3. <b>7 spokes present.</b> Two vertical, 1 horizontal and 4 angled.		
4. <b>Small circle (chain ring) in center of left wheel</b>		
5. <b>Chain positioned on top and bottom of small circular ring in wheel center</b>		
6. <b>Rear part of frame terminates in center of left wheel</b>		
7. <b>Left triangle in bike frame is appropriately drawn</b> Three lines are present: 1) bar below seat terminating at middle gear assembly, 2) bar from middle of gear assembly to center of left rear wheel, 3) bar from middle of left rear wheel to just below seat).		

RIGHT Side of Bicycle		1 or 0
1. <b>Right wheel present</b> (shape not penalized).		
2. <b>Right wheel appropriately drawn</b> Rounded, not significantly misshapen, no angles, enclosed circle with no line overshoot or undershoot more than ¼ in.		
3. <b>8 spokes present and are slightly angled</b>		
4. <b>Straight line present from center of right wheel to handlebar</b>		
5. <b>Front frame bar is straight and connected to front wheel center</b>		
6. <b>Front steering bar angled slightly to left (and roughly parallel to bar supporting seat)</b>		
7. <b>Right most triangle in frame is appropriately drawn.</b> Three lines are present: 1) bar below seat terminating at middle gear assembly, 2) bar from middle of gear assembly to point just below handlebar shaft, 3) bar from just below handlebar shaft to point just below seat.		

CENTER of Bicycle		1 or 0
1. <b>Two pedals must be present and match model.</b>		
2. <b>Pedal shaft is slightly angled.</b>		
3. <b>Center sprocket wheel is round and correctly positioned.</b>		
4. <b>Chain is attached to top and bottom of center sprocket wheel.</b>		
5. <b>Seat is present and drawn as in model (horizontally oriented line or bar).</b>		
6. <b>Frame parallelogram shape is correctly formed with middle (seat supporting) shaft bisecting it into two approximately equal triangles.</b>		
7. <b>Frame sections and pedal shaft correctly converge in middle of chain ring.</b>		

## BDT Copy Scoring Summary

Section	Raw Score <i>Max 7 pts per section</i>	Z score	Percentile	Comments
Left Part of Bicycle				
Right Side of Bicycle				
Center of Bicycle				
Total score				
Time to completion				

## Compulsivity / Effort Indicators

A drawing that is done without regard to accuracy and concern, or, when an individual purposely tries to display impairment, yields scores that do not reflect the individual's skill on the test. The following items may help in identifying questionable performance validity. Higher scores reflect better effort.		1 pt if present
<b>1. Left Spoke Placement</b>	Left wheel has four spokes oriented at 12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock.	
<b>2. Right Spoke Placement</b>	Right wheel spokes are slightly offset compared to left wheel spokes AND the top spoke is drawn slightly to the left of the front frame.	
<b>3. Right wheel spoke positioned at 3 o'clock is obscured by part of frame.</b>	The frame is drawn to obscure the right horizontal spoke in the left wheel	
<b>4. Pedal bar</b>	Pedal bar is slightly angled as in drawing	
<b>5. Pedal foot rests</b>	Pedal foot rests are horizontal to bottom of page	
<b>6. Lower Chain Segment</b>	Lower segment of chain is approximately horizontal to bottom of drawing	
<b>7. Upper Chain Segment</b>	Upper segment of chain angles about 5-15 degree from right to left compared to lower chain segment	
<b>8. Time spent on drawing</b>	Time on drawing is not less than 2 sd of average time spent on drawing by normative group.	
		Total score
		Z score
		Percentile

## Neurobehavioral Indicators

The following Neurobehavioral Indicators are presented to aid in clinical assessment in addition to the formal scoring system.

Clinical Sign	Suggested Interpretation
<input type="checkbox"/> Reversal of drawing from model	<ul style="list-style-type: none"> <li>Oppositional behavior</li> <li>Impulsive style (drawer glances at model and draws object according to internal representation and disregards model)</li> <li>Neurologic disorder</li> </ul>
<input type="checkbox"/> Constricted in size (much smaller than model)	<ul style="list-style-type: none"> <li>Anxiety</li> <li>Personality Disorder</li> </ul>
<input type="checkbox"/> Hastily sketched despite instructions to do best	<ul style="list-style-type: none"> <li>Low motivation</li> <li>Oppositional</li> <li>Trying to appear impaired</li> </ul>
<input type="checkbox"/> Added details such as hand grips, brake parts, lights, valves	<ul style="list-style-type: none"> <li>Anxious</li> <li>Compulsive</li> <li>Bizarre elaborations may indicate psychosis</li> <li>Greater than average knowledge of bicycle</li> </ul>
<input type="checkbox"/> Bizarre elaborations	<ul style="list-style-type: none"> <li>Psychosis</li> <li>Personality disorder</li> </ul>
<input type="checkbox"/> Complains about task	<ul style="list-style-type: none"> <li>Depression, anger, irritability</li> </ul>