



## Methodenspeicher Mit Graphen und Tabellen am Computer Funktionen untersuchen

| Ich möchte ...                                   | So geht man vor (z. B. mit GeoGebra)  |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
|--|---|-------------------|----------------|-------------|----------------|----------|--------|---------------|--------|--------|-------------|-------------------|---------------|----------|-------------|----------------|-------|---|-------------|---------|---|---|--------|--|--|---|-----|--|--|--|---|---|---|---|---|--------|---------------|---|-----|---|-------------|-------------------|--|--|---|---|---|---|---|---|--------|-----|--|--|---------------|---|-------------|----------------|-------|---|-------------|-----|---|---|--------|--|---|---|-----|---|----------|--|--|---|---|---|--------|--|--|---|-----|---|----------|--|--|
| Terme für Funktionen eingeben und Graph zeichnen | <ul style="list-style-type: none"><li>Der Malpunkt ist ein „*“ und das Divisionszeichen „/“. Für <math>x : x : 2</math> gibt man <math>x*x/2</math> ein.</li><li>Den Malpunkt darf man manchmal nicht weglassen: Für <math>3x</math> gibt man <math>3*x</math> ein. Eine Potenz schreibt man mit „^“. Für <math>x^2</math> gibt man <math>x^2</math> ein.</li></ul>   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| zu einem Wertepaar einen Punkt erzeugen          | <p>im Tabellenfenster in eine Zelle einen Punkt eingeben: Wenn z. B. der <math>x</math>-Wert in <b>A3</b> steht und der <math>y</math>-Wert in <b>B3</b>, lautet der Punkt (<b>A3</b>, <b>B3</b>).</p> <p>Immer wenn man zwei Zahlen oder Variablen in Klammern mit Komma schreibt, erhält man einen Punkt im Koordinatensystem.</p> <div><div><p><b>Tabelle</b></p><table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr><tr><td>1</td><td>Läufer</td><td></td><td></td><td></td><td>Fahrradfahrer</td></tr><tr><td>2</td><td>Zeit x in s</td><td>Strecke y in m</td><td>(x,y)</td><td></td><td>Zeit x in s</td></tr><tr><td>3</td><td>0</td><td>0</td><td>(0, 0)</td><td></td><td></td></tr><tr><td>4</td><td>0.5</td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td>1</td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td>1.5</td><td></td><td></td><td></td><td></td></tr></table></div><div><p><b>Tabelle</b></p><table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr><tr><td>1</td><td>Läufer</td><td></td><td></td><td></td><td>Fahrradfahrer</td></tr><tr><td>2</td><td>Zeit x in s</td><td>Strecke y in m</td><td>(x,y)</td><td></td><td>Zeit x in s</td></tr><tr><td>3</td><td>0</td><td>0</td><td>(0, 0)</td><td></td><td>0</td></tr><tr><td>4</td><td>0.5</td><td>1</td><td>(0.5, 1)</td><td></td><td></td></tr><tr><td>5</td><td>1</td><td>2</td><td>(1, 2)</td><td></td><td></td></tr><tr><td>6</td><td>1.5</td><td>3</td><td>(1.5, 3)</td><td></td><td></td></tr></table></div></div> <p>Der Punkt heißt wie die Tabellenzelle, im Beispiel heißt der Punkt <b>C3</b>. Wenn man eine solche Zelle nach unten kopiert (mit der Maus Zelle anklicken und die Ecke herunterziehen), werden die Zellbezüge mitgeändert: Aus <b>C3</b> wird in der Zeile darunter z. B. automatisch <b>C4</b>. Man bekommt so eine ganze Liste von Punkten zur Tabelle (s. rechtes Bild).</p> |                   | A              | B           | C              | D        | E      | 1             | Läufer |        |             |                   | Fahrradfahrer | 2        | Zeit x in s | Strecke y in m | (x,y) |   | Zeit x in s | 3       | 0 | 0 | (0, 0) |  |  | 4 | 0.5 |  |  |  |   | 5 | 1 |   |   |        |               | 6 | 1.5 |   |             |                   |  |  | A | B | C | D | E | 1 | Läufer |     |  |  | Fahrradfahrer | 2 | Zeit x in s | Strecke y in m | (x,y) |   | Zeit x in s | 3   | 0 | 0 | (0, 0) |  | 0 | 4 | 0.5 | 1 | (0.5, 1) |  |  | 5 | 1 | 2 | (1, 2) |  |  | 6 | 1.5 | 3 | (1.5, 3) |  |  |
|  | A   | B                 | C              | D           | E              |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 1  | Läufer  |                   |                |             | Fahrradfahrer  |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 2  | Zeit x in s   | Strecke y in m    | (x,y)          |             | Zeit x in s    |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 3  | 0   | 0                 | (0, 0)         |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 4  | 0.5   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 5  | 1   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 6  | 1.5   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
|  | A   | B                 | C              | D           | E              |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 1  | Läufer  |                   |                |             | Fahrradfahrer  |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 2  | Zeit x in s   | Strecke y in m    | (x,y)          |             | Zeit x in s    |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 3  | 0   | 0                 | (0, 0)         |             | 0              |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 4  | 0.5   | 1                 | (0.5, 1)       |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 5  | 1   | 2                 | (1, 2)         |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 6  | 1.5   | 3                 | (1.5, 3)       |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| einen Punkt oder einen Graphen färben            | <div><div><p>(x,y)</p><table><tr><td>(0, 0)</td><td></td><td>Zeit x in s</td><td>Strecke y in m</td></tr><tr><td>(0.5, 1)</td><td></td><td></td><td></td></tr><tr><td>(1, 2)</td><td></td><td></td><td></td></tr><tr><td>(1.5, 3)</td><td></td><td></td><td></td></tr></table><p><b>C3:C6</b></p><ul style="list-style-type: none"><li>Kopieren</li><li>Einfügen</li><li>Ausschneiden</li><li>Lösche Objekt</li><li>Erzeuge<ul style="list-style-type: none"><li>Werte in Tabelle eintragen ...</li><li>Importiere Datendatei ...</li></ul></li><li>Tabelleneinstellungen...</li><li>Eigenschaften...</li></ul></div><div><p>mit der rechten Maustaste ein Objekt (oder mehrere markierte Objekte) anklicken und „Eigenschaften“ wählen und dort das Feld „Farbe“ auswählen und die Farbe einstellen.</p><div><p><b>Grundeinstellungen</b>   <b>Farbe</b></p><div><p>Letzte:</p><p>Andere:</p></div><p>Vorschau: Blau 0, 0, 255 (#0000FF)</p></div></div></div>   | (0, 0)            |                | Zeit x in s | Strecke y in m | (0.5, 1) |        |               |        | (1, 2) |             |                   |               | (1.5, 3) |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| (0, 0)   |   | Zeit x in s       | Strecke y in m |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| (0.5, 1)   |   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| (1, 2)   |   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| (1.5, 3)   |   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| eine Tabelle mit Funktionswerten ausfüllen       | <p>zuerst in der ersten Spalte die gewünschten <math>x</math>-Werte eintragen, dann in der zweiten Spalte daneben eintragen: <math>f</math>( Zelle links daneben)</p> <p>In <b>A4</b> steht 1. Wenn in <b>B4</b> = <math>f</math>(<b>A4</b>) steht, wird dort <math>f(1)</math> eingetragen (linkes Bild).</p> <div><div><p><b>Tabelle</b></p><table><tr><th></th><th>A</th><th>B</th><th>C</th></tr><tr><td>1</td><td>Normal</td><td><math>f(x)=0.5x^2</math></td><td></td></tr><tr><td>2</td><td>Zeit x in s</td><td>Strecke ... (x,y)</td><td></td></tr><tr><td>3</td><td>0</td><td></td><td></td></tr><tr><td>4</td><td>1</td><td><math>f(A4)</math></td><td></td></tr><tr><td>5</td><td>2</td><td></td><td></td></tr><tr><td>6</td><td>3</td><td></td><td></td></tr></table></div><div><p><b>Tabelle</b></p><table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>1</td><td>Normal</td><td><math>f(x)=0.5x^2</math></td><td></td><td></td></tr><tr><td>2</td><td>Zeit x in s</td><td>Strecke ... (x,y)</td><td></td><td></td></tr><tr><td>3</td><td>0</td><td>0</td><td></td><td></td></tr><tr><td>4</td><td>1</td><td>0.5</td><td></td><td></td></tr><tr><td>5</td><td>2</td><td>2</td><td></td><td></td></tr><tr><td>6</td><td>3</td><td>4.5</td><td></td><td></td></tr></table><p>Zahl B5: <math>f(A5)</math></p></div></div> <p>Das muss man nicht für jede Zelle wiederholen, sondern kann es markieren und durch Ziehen in die Zellen darunter übertragen (<math>f(A4), f(A5)</math> usw. ...) (rechtes Bild)</p>   |                   | A              | B           | C              | 1        | Normal | $f(x)=0.5x^2$ |        | 2      | Zeit x in s | Strecke ... (x,y) |               | 3        | 0           |                |       | 4 | 1           | $f(A4)$ |   | 5 | 2      |  |  | 6 | 3   |  |  |  | A | B | C | D | 1 | Normal | $f(x)=0.5x^2$ |   |     | 2 | Zeit x in s | Strecke ... (x,y) |  |  | 3 | 0 | 0 |   |   | 4 | 1      | 0.5 |  |  | 5             | 2 | 2           |                |       | 6 | 3           | 4.5 |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
|  | A   | B                 | C              |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 1  | Normal  | $f(x)=0.5x^2$     |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 2  | Zeit x in s   | Strecke ... (x,y) |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 3  | 0   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 4  | 1   | $f(A4)$           |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 5  | 2   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 6  | 3   |                   |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
|  | A   | B                 | C              | D           |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 1  | Normal  | $f(x)=0.5x^2$     |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 2  | Zeit x in s   | Strecke ... (x,y) |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 3  | 0   | 0                 |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 4  | 1   | 0.5               |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 5  | 2   | 2                 |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |
| 6  | 3   | 4.5               |                |             |                |          |        |               |        |        |             |                   |               |          |             |                |       |   |             |         |   |   |        |  |  |   |     |  |  |  |   |   |   |   |   |        |               |   |     |   |             |                   |  |  |   |   |   |   |   |   |        |     |  |  |               |   |             |                |       |   |             |     |   |   |        |  |   |   |     |   |          |  |  |   |   |   |        |  |  |   |     |   |          |  |  |