|   |  |       | E         | LEME   | NTARY    |                |        | SECONDARY |                |        |             |           |        |
|---|--|-------|-----------|--------|----------|----------------|--------|-----------|----------------|--------|-------------|-----------|--------|
| WINTER 2023   | 4=To a Great Extent<br>3=To a Moderate Extent<br>2=To a Small Extent |       | ACR       |        |          | radition       | al     | ACR       |                |        | Traditional |           |        |
| Michigan Department of Education                            |  | Count | Column    | Maan   | n Count  | Column         |        | Count     | Column         | Mean   |             | Column    | Mean   |
| Candidate Supervisor Exit Survey                            | 1=Not at All<br>No Opportunity removed in Mean                       | Count | Valid N % | iviean | Count    | Valid N %      | iviean | Count     | Valid N %      | iviean | Count       | Valid N % | iviean |
|   | Calculations   |       |           |        |          |                |        |           |                |        |             |           |        |
| As a beginning teacher entering the profession, to what ext |  | 200   | 70.40/    |        | 00       | 75.00/         |        | 40        | 05.70/         |        | 24          | 00.00/    |        |
| connect learning experiences to a variety of backgrounds    | a) To a Great Extent   | 29    |           |        | 60<br>18 | 75.9%<br>22.8% |        | 42<br>7   | 85.7%<br>14.3% |        | 31          |           |        |
| (cultural, socioeconomic, and ethnic)?                      | b) To a Moderate Extent  | 0     |           | 2.70   |          | 1.3%           | 2.75   |           | 0.0%           | 2.00   | 0           |           |        |
|   | _ c) To a Small Extent   | 27    | 73.0%     | 3.78   | 62       | 78.5%          | 3.75   | 43        | 87.8%          | 3.86   | 32          |           | 3.97   |
| support all students socioemotional (social, emotional,     | a) To a Great Extent   | 7     | 18.9%     |        | 16       |                |        | 43        | 10.2%          |        | 0           |           |        |
| psychological) development?                                 | b) To a Moderate Extent  | 3     | 8.1%      | 2.65   |          | 1.3%           | 2 77   | 1         | 2.0%           | 2.00   | 0           |           |        |
|   | c) To a Small Extent   | 19    |           | 3.65   | 52       |                | 3.77   | 32        | 65.3%          | 3.86   | 21          |           | 4.00   |
| communicate effectively with families/caregivers to promote |  | 7     | 18.9%     |        | 24       |                |        | 3Z<br>7   | 14.3%          |        | 10          |           |        |
| individual student growth?                                  | b) To a Moderate Extent c) To a Small Extent                         | 0     |           |        | 3        |                |        | 1         | 2.0%           |        | 0           |           |        |
|   | f) No Opportunity  | 11    | 29.7%     | 3.73   | 0        |                | 3.62   | 9         | 18.4%          | 3.78   | 1           |           | 3.68   |
| build respectful relationships with every student?          | a) To a Great Extent   | 34    |           | 3.73   | 69       |                | 3.02   | 46        | 93.9%          | 3.70   | 31          |           | 0.00   |
| build respectful relationships with every student?          | b) To a Moderate Extent  | 3     | 8.1%      |        | 9        |                |        | 3         | 6.1%           |        | 1           |           |        |
|   | c) To a Small Extent   | 0     |           | 3.92   |          | 1.3%           | 3.86   | _         | 0.0%           | 3.94   | 0           |           | 3.97   |
| recognize individuals' potential as demonstrated by setting | a) To a Great Extent   | 25    |           |        | 60       |                | 3.60   | 45        | 91.8%          | 3.34   | 32          |           |        |
| high expectations for each student                          | b) To a Moderate Extent  | 9     |           |        | 19       |                |        | 4         | 8.2%           |        | 0           |           |        |
| ilight expectations for each student                        | c) To a Small Extent   | 3     |           |        |          |                | 3.76   | -         | 0.0%           | 3.92   | 0           |           |        |
| As a beginning teacher entering the profession, to what ext |  |       | 0.170     | 3.33   | U        | 0.070          | 3.70   | U         | 0.070          | 3.32   | 0           | 0.070     | 4.00   |
| strategies and resources to support                         | ent can this candidate apply instructional                           |       |           |        |          |                |        |           |                |        |             |           |        |
|   | -\ T C+ F-++   | 15    | 40.5%     |        | 40       | 50.6%          |        | 27        | 55.1%          |        | 20          | 62 50/    |        |
| English learners?   | a) To a Great Extent   | 5     |           |        | 20       |                |        | 11        | 22.4%          |        | 0           |           |        |
|   | b) To a Moderate Extent  | 17    |           | 2.75   | 19       |                | 2.67   | 11        | 22.4%          | 3.71   | 12          |           |        |
| high performing students?                                   | f) No Opportunity  | 23    |           | 3.75   | 46       |                | 3.67   | 37        | 75.5%          | 3./1   | 31          |           | 4.00   |
| iligii periorililig students:                               | a) To a Great Extent b) To a Moderate Extent                         | 6     |           |        | 28       |                |        | 10        | 20.4%          |        | 1           |           |        |
|   | · · · · · · · · · · · · · · · · · · ·                                | 3     |           |        | 3        |                |        | 0         | 0.0%           |        | 0           |           |        |
|   | c) To a Small Extent   | 5     |           | 3.63   | 2        |                | 2.50   | 2         | 4.1%           | 3.79   | 0           |           | 3.97   |
| lann manifermatica attendente?                              | f) No Opportunity  | 23    |           | 3.03   | 47       |                | 3.56   | 37        | 75.5%          | 3.79   | 31          |           | 3.97   |
| low performing students?                                    | a) To a Great Extent   | 13    |           |        | 32       |                |        | 10        | 20.4%          |        | 0           |           |        |
|   | b) To a Moderate Extent  | 13    | 2.7%      | 1      | 0        |                |        | 10        | 20.4 %         |        | 1           |           |        |
|   | c) To a Small Extent   | 0     |           | 2.50   |          |                | 2.50   | 1         | 2.0%           | 2.75   | 0           | Valid N % |        |
|   | f) No Opportunity  | 19    |           | 3.59   | 41       | 51.9%          | 3.59   | 37        | 75.5%          | 3.75   | 31          |           | 3.94   |
| students from culturally diverse backgrounds?               | a) To a Great Extent   |       |           |        |          |                |        |           |                |        | 1           |           |        |
|   | b) To a Moderate Extent  | 16    | _         |        | 35       |                |        | 11        | 22.4%          |        |             |           |        |
|   | c) To a Small Extent   | 1     | 2.7%      |        | 0        |                |        | 1         | 2.0%           |        | 0           |           |        |
|   | f) No Opportunity  | 1     | 2.7%      |        |          |                |        | 0         | 0.0%           | 3.73   | 0           |           |        |
| students with special needs or disabilities?                | a) To a Great Extent   | 12    |           |        | 36       |                |        | 34        | 69.4%          |        | 29          |           |        |
|   | b) To a Moderate Extent  | 17    |           |        | 37       |                |        | 10        |                |        | 1           |           |        |
|   | c) To a Small Extent   | 4     | 10.8%     |        | 0        |                |        | 0         | 0.0%           |        | 1           |           |        |
|   | f) No Opportunity  | 4     | 10.8%     | 3.24   | 6        |                |        | 5         | 10.2%          | 3.77   | 1           |           |        |
| each individual student's learning abilities and needs?     | a) To a Great Extent   | 22    |           |        | 47       | 59.5%          |        | 41        | 83.7%          |        | 31          |           |        |
|   | b) To a Moderate Extent  | 9     | -         |        | 32       |                |        | 7         | 14.3%          |        | 0           |           |        |
|   | c) To a Small Extent   | 6     | -         |        | 0        |                |        | 0         | 0.0%           |        | 1           |           |        |
|   | f) No Opportunity  | 0     | 0.0%      | 3.43   | 0        | 0.0%           | 3.59   | 1         | 2.0%           | 3.85   | 0           | 0.0%      | 3.94   |

| As a beginning teacher entering the profession, to what extended |                         | 0.4 | 00.00/ |      | 0.4 | 04.00/ |      | 40 | 05.70/ |      | 00 | 00.00/ |          |
|--|-------------------------|-----|--------|------|-----|--------|------|----|--------|------|----|--------|----------|
| utilize available technology to enhance instruction?             | a) To a Great Extent    | 31  | 83.8%  |      | 64  | 81.0%  |      | 42 | 85.7%  |      | 29 | 90.6%  | <u> </u> |
|  | b) To a Moderate Extent | 5   | 13.5%  |      | 12  | 15.2%  |      | 7  | 14.3%  |      | 3  |        |          |
|  | c) To a Small Extent    | 1   | 2.7%   |      | 0   | 0.0%   |      | 0  | 0.0%   |      | 0  | 0.0%   |          |
|  | f) No Opportunity       | 0   | 0.0%   | 3.81 | 3   | 3.8%   | 3.84 | 0  | 0.0%   | 3.86 | 0  | 0.0%   | 3.9      |
| support student use of available technology?                     | a) To a Great Extent    | 29  | 78.4%  |      | 59  | 74.7%  |      | 42 | 85.7%  |      | 28 | 87.5%  |          |
|  | b) To a Moderate Extent | 6   | 16.2%  |      | 13  | 16.5%  |      | 7  | 14.3%  |      | 3  | -      | <u> </u> |
|  | c) To a Small Extent    | 1   | 2.7%   |      | 0   | 0.0%   |      | 0  | 0.0%   |      | 0  | 0.0%   | L        |
|  | f) No Opportunity       | 1   | 2.7%   | 3.78 | 7   | 8.9%   | 3.82 | 0  | 0.0%   | 3.86 | 1  | 3.1%   | 3.9      |
| practice the ethical use of technology?                          | a) To a Great Extent    | 30  | 81.1%  |      | 68  | 86.1%  |      | 46 | 93.9%  |      | 28 | 87.5%  |          |
|  | b) To a Moderate Extent | 3   | 8.1%   |      | 10  |        |      | 3  | 6.1%   |      | 3  |        |          |
|  | c) To a Small Extent    | 1   | 2.7%   |      | 0   | 0.0%   |      | 0  | 0.0%   |      | 0  | 0.0%   |          |
|  | f) No Opportunity       | 3   | 8.1%   | 3.85 | 1   | 1.3%   | 3.87 | 0  | 0.0%   | 3.94 | 1  | 3.1%   | 3.9      |
| support all students in making connections to prior              | a) To a Great Extent    | 28  | 75.7%  |      | 64  | 81.0%  |      | 44 | 89.8%  |      | 31 | 96.9%  |          |
| knowledge and experiences?                                       | b) To a Moderate Extent | 8   | 21.6%  |      | 14  | 17.7%  |      | 4  | 8.2%   |      | 1  | 3.1%   |          |
|  | c) To a Small Extent    | 1   | 2.7%   | 3.73 | 1   | 1.3%   | 3.80 | 1  | 2.0%   | 3.88 | 0  | 0.0%   | 3.9      |
| implement multiple strategies to present key content area(s)     | a) To a Great Extent    | 25  | 67.6%  |      | 57  | 72.2%  |      | 43 | 87.8%  |      | 30 | 93.8%  |          |
| concepts?  | b) To a Moderate Extent | 8   | 21.6%  |      | 18  | 22.8%  |      | 5  | 10.2%  |      | 2  | 6.3%   |          |
|  | c) To a Small Extent    | 3   | 8.1%   |      | 4   | 5.1%   |      | 1  | 2.0%   |      | 0  | 0.0%   |          |
|  | d) Not at All           | 1   | 2.7%   | 3.54 | 0   | 0.0%   | 3.67 | 0  | 0.0%   | 3.86 | 0  | 0.0%   | 3.94     |
| adapt instruction, curriculum, and assessments according to      | a) To a Great Extent    | 19  | 51.4%  |      | 39  | 49.4%  |      | 31 | 63.3%  |      | 23 | 71.9%  |          |
| individualized Education Programs (IEPs) and Section 504         | b) To a Moderate Extent | 9   | 24.3%  |      | 30  | 38.0%  |      | 13 | 26.5%  |      | 9  | 28.1%  |          |
| plans?   | c) To a Small Extent    | 3   | 8.1%   |      | 2   | 2.5%   |      | 0  | 0.0%   |      | 0  | 0.0%   |          |
|  | f) No Opportunity       | 6   | 16.2%  | 3.52 | 8   | 10.1%  | 3.52 | 5  | 10.2%  | 3.70 | 0  | 0.0%   | 3.72     |
| organize the learning environment to guide student               | a) To a Great Extent    | 27  | 73.0%  |      | 53  | 67.1%  |      | 42 | 85.7%  |      | 30 | 93.8%  |          |
| engagement during instructional time?                            | b) To a Moderate Extent | 8   | 21.6%  |      | 23  | 29.1%  |      | 6  | 12.2%  |      | 2  | 6.3%   |          |
|  | c) To a Small Extent    | 1   | 2.7%   |      | 3   | 3.8%   |      | 1  | 2.0%   |      | 0  | 0.0%   |          |
|  | d) Not at All           | 1   | 2.7%   | 3.65 | 0   | 0.0%   | 3.63 | 0  | 0.0%   | 3.84 | 0  | 0.0%   | 3.94     |
| design or select assessment tools to provide evidence of         | a) To a Great Extent    | 23  | 62.2%  |      | 47  | 59.5%  |      | 34 | 69.4%  |      | 28 | 87.5%  |          |
| student learning?  | b) To a Moderate Extent | 12  | 32.4%  |      | 30  | 38.0%  |      | 14 | 28.6%  |      | 4  | 12.5%  |          |
|  | c) To a Small Extent    | 2   | 5.4%   | 3.57 | 2   | 2.5%   | 3.57 | 1  | 2.0%   | 3.67 | 0  | 0.0%   | 3.88     |
| analyze assessment data to identify patterns and gaps in         | a) To a Great Extent    | 15  | 40.5%  |      | 38  | 48.1%  |      | 31 | 63.3%  |      | 29 | 90.6%  |          |
| student learning?  | b) To a Moderate Extent | 15  | 40.5%  |      | 34  | 43.0%  |      | 17 | 34.7%  |      | 3  | 9.4%   |          |
|  | c) To a Small Extent    | 4   | 10.8%  |      | 7   | 8.9%   |      | 0  | 0.0%   |      | 0  | 0.0%   |          |
|  | f) No Opportunity       | 3   | 8.1%   | 3.32 | 0   | 0.0%   | 3.39 | 1  | 2.0%   | 3.65 | 0  | 0.0%   | 3.93     |
| differentiate instruction based on student assessment data?      | a) To a Great Extent    | 12  | 32.4%  |      | 36  | 45.6%  |      | 26 | 53.1%  |      | 26 | 81.3%  |          |
|  | b) To a Moderate Extent | 16  | 43.2%  |      | 38  | 48.1%  |      | 20 | 40.8%  |      | 6  | 18.8%  |          |
|  | c) To a Small Extent    | 6   | 16.2%  |      | 5   | 6.3%   |      | 2  | 4.1%   |      | 0  | 0.0%   |          |
|  | d) Not at All           | 1   | 2.7%   |      | 0   | 0.0%   |      | 0  | 0.0%   |      | 0  |        |          |
|  | f) No Opportunity       | 2   | 5.4%   | 3.11 | 0   | 0.0%   | 3.39 | 1  | 2.0%   | 3.46 | 0  |        | 3.83     |
| implement research-based behavior management strategies          | a) To a Great Extent    | 20  | 54.1%  |      | 51  | 64.6%  |      | 34 | 69.4%  |      | 28 |        |          |
| to maximize student engagement?                                  | b) To a Moderate Extent | 13  | 35.1%  |      | 24  | 30.4%  |      | 15 | 30.6%  |      | 3  | 9.4%   |          |
|  | c) To a Small Extent    | 4   | 10.8%  | 3.43 | 4   | 5.1%   | 3.59 | 0  | 0.0%   | 3.69 | 1  | 3.1%   | 3.8      |
| implement literacy and reading strategies appropriate to         | a) To a Great Extent    | 24  | 64.9%  |      | 58  | 73.4%  |      | 35 | 71.4%  |      | 27 | 84.4%  |          |
| your content area(s) and grade level(s)?                         | b) To a Moderate Extent | 9   | 24.3%  |      | 20  | 25.3%  |      | 11 | 22.4%  |      | 4  | 12.5%  |          |
|  | c) To a Small Extent    | 2   | 5.4%   |      | 1   | 1.3%   |      | 1  | 2.0%   |      | 0  | 0.0%   |          |
|  | f) No Opportunity       | 2   | 5.4%   | 3.63 | 0   | 0.0%   | 3.72 | 2  | 4.1%   | 3.72 | 1  | 3.1%   | 3.8      |
|  | a) To a Great Extent    | 32  | 86.5%  |      | 71  | 89.9%  |      | 45 | 91.8%  |      | 32 | 100.0% |          |
|  | b) To a Moderate Extent | 4   | 10.8%  |      | 8   | 10.1%  |      | 4  | 8.2%   |      | 0  | 0.0%   |          |
|  | d) Not at All           | 1   | 2.7%   | 3.81 | 0   | 0.0%   | 3.90 | 0  | 0.0%   | 3.92 | 0  | 0.0%   | 4.0      |

| be a reflective educator who utilizes feedback to implement                           | a) To a Great Extent                | 30 | 81.1% |      | 67 | 84.8% |      | 42 | 85.7% |      | 31 | 96.9%  |      |
|---|-------------------------------------|----|-------|------|----|-------|------|----|-------|------|----|--------|------|
| instruction improvements?   | b) To a Moderate Extent             | 6  | 16.2% |      | 11 | 13.9% |      | 7  | 14.3% |      | 1  | 3.1%   |      |
|   | c) To a Small Extent                | 0  | 0.0%  |      | 1  | 1.3%  |      | 0  | 0.0%  |      | 0  | 0.0%   |      |
|   | d) Not at All                       | 1  | 2.7%  | 3.76 | 0  | 0.0%  | 3.84 | 0  | 0.0%  | 3.86 | 0  | 0.0%   | 3.97 |
| maintain positive, collaborative relationships with                                   | a) To a Great Extent                | 31 | 83.8% |      | 68 | 86.1% |      | 43 | 87.8% |      | 32 | 100.0% |      |
| colleagues?   | b) To a Moderate Extent             | 4  | 10.8% |      | 10 | 12.7% |      | 6  | 12.2% |      | 0  | 0.0%   |      |
|   | c) To a Small Extent                | 1  | 2.7%  |      | 1  | 1.3%  |      | 0  | 0.0%  |      | 0  | 0.0%   |      |
|   | f) No Opportunity                   | 1  | 2.7%  | 3.83 | 0  | 0.0%  | 3.85 | 0  | 0.0%  | 3.88 | 0  | 0.0%   | 4.00 |
| positively impact the learning and development of PK-12                               | a) To a Great Extent                | 30 | 81.1% |      | 67 | 84.8% |      | 43 | 87.8% |      | 32 | 100.0% |      |
| students?   | b) To a Moderate Extent             | 5  | 13.5% |      | 11 | 13.9% |      | 6  | 12.2% |      | 0  | 0.0%   |      |
|   | c) To a Small Extent                | 2  | 5.4%  | 3.76 | 1  | 1.3%  | 3.84 | 0  | 0.0%  | 3.88 | 0  | 0.0%   | 4.00 |
| During the experience with this candidate, to what extent d                           | id the educator preparation program |    |       |      |    |       |      |    |       |      |    |        |      |
| make clear the expectations for this teacher candidate's                              | a) To a Great Extent                | 23 | 62.2% |      | 56 | 70.9% |      | 42 | 85.7% |      | 29 | 90.6%  |      |
| performance?  | b) To a Moderate Extent             | 14 | 37.8% |      | 19 | 24.1% |      | 7  | 14.3% |      | 3  | 9.4%   |      |
|   | c) To a Small Extent                | 0  | 0.0%  | 3.62 | 4  | 5.1%  | 3.66 | 0  | 0.0%  | 3.86 | 0  | 0.0%   | 3.91 |
| make clear the expectation for your role within this clinical                         | a) To a Great Extent                | 23 | 62.2% |      | 56 | 70.9% |      | 41 | 83.7% |      | 29 | 90.6%  |      |
| experience?   | b) To a Moderate Extent             | 10 | 27.0% |      | 21 | 26.6% |      | 8  | 16.3% |      | 3  | 9.4%   |      |
| ·   | c) To a Small Extent                | 4  | 10.8% | 3.51 | 2  | 2.5%  | 3.68 | 0  | 0.0%  | 3.84 | 0  | 0.0%   | 3.91 |
| provide training and feedback on how you could best supervise this teacher candidate? | a) To a Great Extent                | 15 | 40.5% |      | 53 | 67.1% |      | 35 | 71.4% |      | 25 | 78.1%  |      |
|   | b) To a Moderate Extent             | 18 | 48.6% |      | 22 | 27.8% |      | 14 | 28.6% |      | 7  | 21.9%  |      |
|   | c) To a Small Extent                | 2  | 5.4%  |      | 4  | 5.1%  |      | 0  | 0.0%  |      | 0  | 0.0%   |      |
|   | d) Not at All                       | 2  | 5.4%  | 3.24 | 0  | 0.0%  | 3.62 | 0  | 0.0%  | 3.71 | 0  | 0.0%   | 3.78 |
| make appropriate resources available to you?  | a) To a Great Extent                | 22 | 59.5% |      | 53 | 67.1% |      | 41 | 83.7% |      | 27 | 84.4%  |      |
|   | b) To a Moderate Extent             | 11 | 29.7% |      | 23 | 29.1% |      | 8  | 16.3% |      | 5  | 15.6%  |      |
|   | c) To a Small Extent                | 1  | 2.7%  |      | 3  | 3.8%  |      | 0  | 0.0%  |      | 0  | 0.0%   |      |
|   | d) Not at All                       | 3  | 8.1%  | 3.41 | 0  | 0.0%  | 3.63 | 0  | 0.0%  | 3.84 | 0  | 0.0%   | 3.84 |
| regularly request feedback from you regarding this teacher                            | a) To a Great Extent                | 14 | 37.8% |      | 46 | 58.2% |      | 36 | 73.5% |      | 27 | 84.4%  |      |
| candidate's performance?  | b) To a Moderate Extent             | 18 | 48.6% |      | 29 | 36.7% |      | 12 | 24.5% |      | 5  | 15.6%  |      |
| canadate 3 periormance.   | c) To a Small Extent                | 2  | 5.4%  |      | 3  | 3.8%  |      | 1  | 2.0%  |      | 0  | 0.0%   |      |
|   | d) Not at All                       | 3  | 8.1%  | 3.16 | 1  | 1.3%  | 3.52 | 0  | 0.0%  | 3.71 | 0  | 0.0%   | 3.84 |
| support you as a candidate supervisor?  | a) To a Great Extent                | 22 | 59.5% |      | 53 | 67.1% |      | 41 | 83.7% |      | 27 | 84.4%  |      |
|   | b) To a Moderate Extent             | 11 | 29.7% |      | 26 | 32.9% |      | 8  | 16.3% |      | 5  | 15.6%  |      |
|   | c) To a Small Extent                | 4  | 10.8% | 3.49 | 0  | 0.0%  | 3.67 | 0  | 0.0%  | 3.84 | 0  | 0.0%   | 3.84 |
| engage the PK-12 school as a partner in teacher preparation?                          | ,                                   | 23 | 62.2% | 3.13 | 43 | 54.4% | 3.07 | 39 | 79.6% | 3.01 | 27 | 84.4%  | 3.01 |
| engage the PK-12 school as a partner in teacher preparations                          | b) To a Moderate Extent             | 9  | 24.3% |      | 32 | 40.5% |      | 10 | 20.4% |      | 5  | 15.6%  |      |
|   | c) To a Small Extent                | 5  | 13.5% | 3.49 | 4  | 5.1%  | 3.49 | 0  | 0.0%  | 3.80 | 0  | 0.0%   | 3.84 |
| Overall, to what extent do you believe this candidate is ready                        | ,                                   | 29 | 78.4% | 3.43 | 69 | 87.3% | 3.43 | 45 | 91.8% | 3.80 | 31 | 96.9%  | 3.04 |
| •   | b) To a Moderate Extent             | 5  | 13.5% |      | 8  | 10.1% |      | 43 | 8.2%  |      | 1  | 3.1%   |      |
|   | c) To a Small Extent                | 2  | 5.4%  |      | 2  | 2.5%  |      | 0  | 0.2 % |      | 0  | 0.0%   |      |
|   | ,                                   | 4  | 2.7%  | 2.00 | 0  | 0.0%  | 2.05 | 0  | 0.0%  | 2.02 | 0  | 0.0%   | 2.07 |
|   | d) Not at All                       | 1  | 2.1%  | 3.68 | U  | 0.0%  | 3.85 | U  | 0.0%  | 3.92 | U  | 0.0%   | 3.97 |

No Opportunity removed in Mean calculations