NEEDED MATH

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LIST OF NEEDED MATH PILOT TEST SURVEY ITEMS AS OF JANUARY 18, 2023

MEASUREMENT

1. Make conversions between units of measurement (for example, inches to centimeters)?
2. Work with ratios or rates (for example, percentages, concentrations, speed)?
3. Take measurements using physical tools (for example, calipers, micrometers, scales) or instruments (for example, voltmeters, oscilloscopes, pressure gauges).
4. Make estimates (for example, of measurements, quantities, production runs)?
5. Do work that requires accuracy to a specified tolerance (for example, +/- 5%, +/- 0.003 inches)

STATISTICS

6. Read, document, and/or interpret sensor data (for example from temperature, pressure, or flow sensors)?
7. Use sampling to collect data (for example sampling a production run)?
8. Read and interpret tables, graphs, or plots of data?
9. Make tables, graphs, or plots of data?
10. Use, interpret, or calculate statistical measures (for example, average, standard deviation, range)?
11. Read and analyze control charts?
12. Use data to optimize a production process (for example, minimize waste and costs, or maximize production and quality)?

ALGEBRA

13. Substitute numbers into formulas and evaluate (for example, given F=1.8C+32, find F when C= 37).
14. Manipulate a formula to get a new formula (for example, $c^2 = a^2+b^2$ can be changed to $b = \sqrt{c^2 - a^2}$)
15. Fit a curve to data (for example, construct a graph from a series of standards or data points)?
16. Use direct or inverse variation (for example, increase temperature to increase pressure, or increase speed to decrease time)?
17. Work with exponential functions (for example, cell growth, charging a capacitor, compound interest for money)?

GEOMETRY/TRIGONOMETRY

18. Find perimeters, areas, or volumes?
19. Work with logarithms (for example, working with pH, decibels)?
20. Use geometric topics such as parallel, perpendicular, angles, symmetry, etc.?
21. Use spatial reasoning (for example, think about and manipulate objects in three dimensions)?
22. Use angle measurements?
23. Use Geometric Dimensioning and Tolerance (GD&T)?
24. Use right triangle trigonometry (for example, sines, cosines)?
25. Work with amplitude, frequency, or period (for example, wave forms)?
26. Use blueprints, diagrams, drawings, flow charts, or schematics?

ARITHMETIC

27. Use scientific or engineering notations (for example, 5.4×10^{-2} or 54×10^{-3})?
28. Use metric (or SI) prefixes (for example, micro, kilo)?
29. Use complex numbers (such as 3+5i, 7+j4)?
30. Use inequalities to show that something is bigger ($a > b$) or smaller ($a < b$) than something else, or within a range ($a \geq b \geq c$)?
31. Make conversions between different ways of expressing numbers (for example, changing fractions to decimals, changing decimals to percents)?

USE OF TECHNOLOGY

32. Work with prepared spreadsheets (for example, read information from or input information into spreadsheets)?
33. Use spreadsheets for tasks beyond working with prepared spreadsheets (for example, interpreting data, changing formulas, producing pivot tables or graphs/charts)?
34. Use a scientific or graphing calculator?
35. Use math when using a computer numerical control (CNC) system (for example, use trigonometry to determine tool location relative to part geometry)?
36. Collect, analyze, and use information from a system that provides overall operational performance data in real time (for example, to act on production performance)?

MODELING

37. Use math to prepare reports (for example, quotes, invoices, standard operating procedures, manufacturing batch records, inventory reports, and/or productivity reports)?
38. Use graphs, tables, data, formulas or simulations to develop a model of procedures or processes to inform current decisions and/or future work?
39. Use data to troubleshoot problems?**.**
40. Use math to forecast performance measures or future outcomes (for example, use predictive analysis to find the probability of a tool failing, or using a curve of best fit to find unknown values)?