Publisher Questions to the Western and Northern Canadian Protocol (WNCP) Mathematics Team

Foundations of Mathematics 11/Alberta Mathematics 30-2

Relations and Functions

1. Polynomial Functions

   Are students to determine the equation of the line of best fit using:

   a. algebra and the slope and a point
   b. an informal process with graphing technology
   c. linear regression
   d. all or some of the above?

   Are students then expected to use the equation to solve problems, or is the expected approach to problem solving strictly a graphical exercise using technology?

   WNCP Response: Part c is correct. The intent is for this to be primarily an activity involving technology. However, in the case of a linear function, students should be able to solve simple problems by substituting into the equation of the line of best fit and solving with or without using technology.

   Are students expected to determine the equation of the curve of best fit using:

   a. features of the graph and an algebraic process
   b. an informal process with graphing technology
   c. quadratic/cubic regression
   d. all or some of the above?

   Are they then expected to use the equation to solve problems or is the expected approach strictly a graphical exercise using technology? (We believe that it would be possible to use quadratic equations but not cubic, since students won't know how to solve polynomial equations.)

   WNCP Response: Part c is correct. The answer is similar to the one above but we would not expect students to be able to solve a cubic equation without the use of technology.

2. Exponential Functions

Are students expected to determine the equation of the curve of best fit:

a. by hand using features of the graph and an algebraic process
b. using an informal process with graphing technology
c. using exponential regression
d. all or some of the above?

Are they then expected to use the equation to solve problems or is the expected approach strictly a graphical exercise using technology? (In Foundations 12, students can only calculate the value of the dependent variable for a known independent variable, since they don't know how to solve exponential equations, however, in Alberta Mathematics 30-2 they can solve exponential equations using a variety of strategies, so students could use the equation.) Is the same true of Alberta Mathematics 30-2?

WNCP Response: Part c is correct. In the Foundations course, this is primarily an activity involving technology. Students should be able to solve simple problems by substituting into the equation of the curve of best fit and solving for an unknown. Given the value of the independent variable, they should be able to determine the value of the dependent variable using technology. They are not expected to solve exponential equations except perhaps by reading the value from the graph.
In Alberta Mathematics 30-2, students are expected to be able to solve simple exponential equations using a variety of strategies.

3. Logarithmic Functions

Are students expected to determine the equation of the curve of best fit:

a. by hand using features of the graph and an algebraic process
b. using an informal process using graphing technology (note that all models are restricted to base 10 and *e* on a graphing calculator)
c. using logarithmic regression (note that graphing calculators only use the natural logarithmic function (base *e*) – which would require a discussion around e and the natural logarithm)
d. all or some of the above?

WNCP Response: Part c is correct. It will be necessary to introduce base *e* without going into a lot of depth. Perhaps this could be done in the form of a feature that provides some of the history and significance of *e*.

Are they then expected to use the equation to solve problems or is the expected approach strictly a graphical exercise using technology? (In this case, students in both courses can only calculate the value of the dependent variable for a known independent variable, since they won't know how to solve logarithmic equations – or is this strictly a graphical exercise using technology?

WNCP Response: This is primarily an activity involving technology. Students should be able to solve simple problems by substituting into the equation of the curve of best fit and solving for an unknown. Given the value of the independent variable, they should be able to determine the value of the dependent variable using technology. They are not expected to solve equations involving logarithms.

4. Sinusoidal Functions

Does "sinusoidal" imply discussion of both the sine and cosine functions?

WNCP Response: Students should be introduced to the graphs of both the sine and cosine functions. However, regression should be limited to the sine function.

Are students expected to determine the equation of the curve of best fit:

a. by hand using the features of the graph and their association with amplitude, period, horizontal axis and phase shift
b. using an informal process of trial and error using graphing technology
c. using sinusoidal regression (graphing calculators use only the sine function)
d. all or some of the above?

Are they then expected to use the equation to solve problems or is the expected approach strictly a graphical exercise using technology? (In this case, students can only calculate the value of the dependent variable for a known independent variable since they don't know how to solve trig equations.)

WNCP Response: Part c is correct. The answer is similar to those above. This is primarily an activity involving technology. Students should be able to solve simple problems by substituting into the equation of the curve of best fit and solving for an unknown. Given the value of the independent variable, they should be able to determine the value of the dependent variable using technology.

Is it implied that all modelling with sinusoidal functions is done strictly with functions that use degrees for the independent variable, or should radians be introduced?

WNCP Response: It will be necessary to introduce radians without going into a lot of depth. Again, this could be done in the form of a feature that provides some of the history and significance of radian measure. Any of the meaningful problems would generally require the independent variable to be a real number (radians).