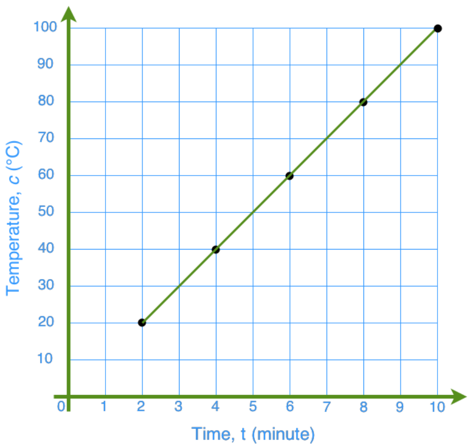
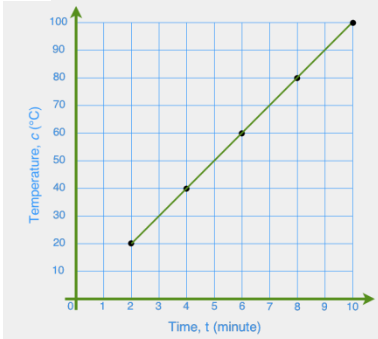
EaD Comprehensive Lesson Plans

Strand:	Algebra	**Sub-Strand:**	Patterns and Relations

BASIC 9

WEEKLY LESSON PLAN – WEEK 10

<table>
<tr><td>Content Standard:</td><td colspan="5">B9.2.1.1 Demonstrate the ability to construct tables of values for pairs of linear relations, graph the relations in a number plane and determine the intersection of the lines to solve simultaneous linear equations.</td></tr>
<tr><td>Indicator (s)</td><td colspan="2">B9.2.1.1.3 Use graphs to solve equations involving two linear relations.</td><td colspan="3">Performance Indicator: Learners can solve equations involving two linear relations.</td></tr>
<tr><td>Week Ending</td><td colspan="5">15-11-2024</td></tr>
<tr><td>Class</td><td>B.S.9</td><td>Class Size:</td><td></td><td>Duration:</td><td></td></tr>
<tr><td>Subject</td><td colspan="5">Mathematics</td></tr>
<tr><td>Reference</td><td colspan="5">Mathematics Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook.</td></tr>
<tr><td>Teaching / Learning Resources</td><td colspan="2">Graph, poster, Video</td><td>Core Competencies:</td><td colspan="2">• Demonstrate behaviour and skills of working towards group goals
• Ability to select alternative(s) that adequately meet selected criteria</td></tr>
<tr><td>DAYS/DATE</td><td>PHASE 1 : STARTER</td><td colspan="2">PHASE 2: MAIN</td><td colspan="2">PHASE 3: REFLECTION</td></tr>
<tr><td>MONDAY</td><td>Demonstrate on using graph to solve two linear equations simultaneously</td><td colspan="2">1. Assist Learners to draw graph for a relation and use the graph to solve two linear equations.
2. Discuss with Learners on how to draw a graph and find the coordinates for the intersection of the lines.
3. Learners brainstorm to plot equations on a graph.


Question 1:
A train travels at a speed of 120km/h. The equation that represents the relationship of distance (d) and time (t) is d=120t.
Plot the equation on a graph</td><td colspan="2">Learners brainstorm to solve examples of two linear equations simultaneously using graph.
Exercise;
1. The graph shows the relationship of the temperature of water, c, and time, t, as the water boils.


Find the temperature of the water after 7 minutes of boiling.
2. Plot the graph for each set of values. Then, find the equation that represents each relationship.</td></tr>
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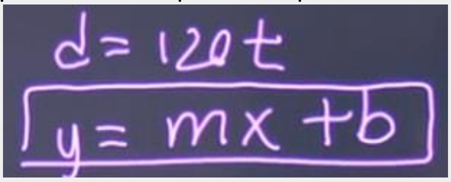
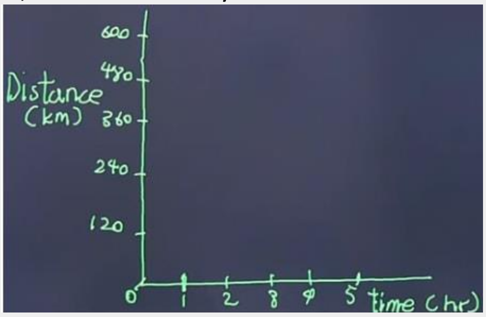
Solution:

The equation in this question is d=120t, which resembles y=mx+b. This means our equation is in slope intercept form.



Equation in slope form

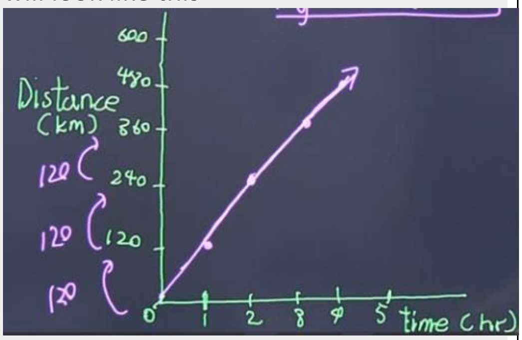
So, draw the x and y axis



Draw x and y axis

120 is the slope. =1201*runrise*=1120

Since it is 120km/hour, it means the train moves 120km every hour. So the graph will look like this



Graph of the speed of a train

Question 2:

A train travels at a speed of 120km/h. The equation that represents the relationship of distance (d) and time (t) is d=120t.

Calculate the distance that the train travels in 4.5 hours.

Solution:

Plug the number into the equation

d = 120t

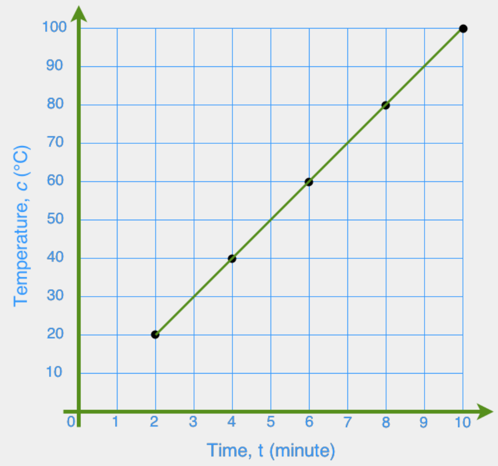
d = 120(4.5)

= 540 km

Question 3:

The graph shows the relationship of the temperature of water, c, and time, t, as the water boils.

x	Y
-2	-3
-1	0
0	3
1	6
2	9



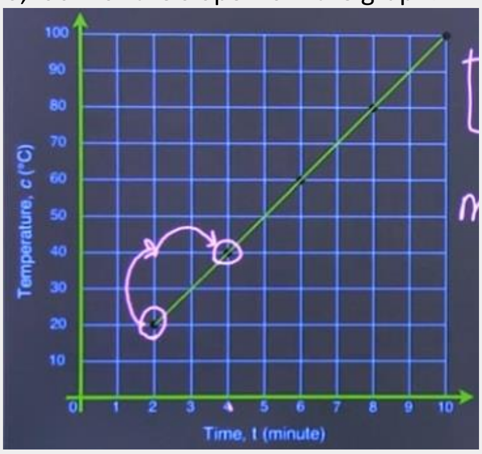
Solving linear equations by graphing

What is the equation for the relationship?

Solution:

Try to write the equation in slope intercept form y = mx + b

So, look for the slope from the graph:



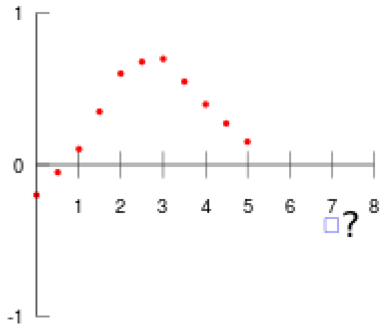
Find the slop of the graph

m = slop *runrise*=220=10

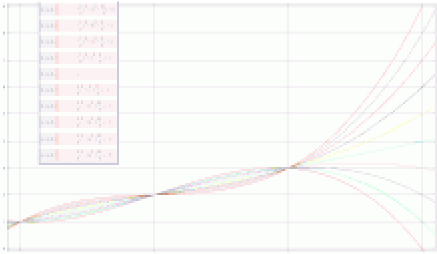
So the equation is: c = 10t

WEDNESDAY	Discuss with the Learners about the difference between interpolation and extrapolation	1. Discuss with the Learners about real world examples of extrapolation. 2. Explain to Learners on how extrapolation can be used to predict the value of a point. 3. Engage Learners to illustrate the possible divergence of an extrapolated prediction. **Geometric Extrapolation with error prediction** Can be created with 3 points of a sequence and the "moment" or "index", this type of extrapolation have 100% accuracy in predictions in a big percentage of known series database (OEIS).[5] Example of extrapolation with error prediction : sequence = [1,2,3,5] f1(x,y) = (x) / y d1 = f1 (3,2) d2 = f1 (5,3) m = last sequence (5) n = last $ last sequence fnos (m,n,d1,d2) = round (((n * d1) - m) + (m * d2)) round $ ((3*1.66)-5) + (5*1.6) = 8 **Linear** Linear extrapolation means creating a tangent line at the end of the known data and extending it beyond that limit. Linear extrapolation will only provide good results when used to extend the graph of an approximately linear function or not too far beyond the known data. If the two data points nearest the point to be extrapolated are and , linear extrapolation gives the function: (which is identical to linear interpolation if). It is possible to include more than two points, and	Through questions and answers, conclude the lesson. **Exercise;** Explain 5 uses of extrapolation in statistics.

averaging the slope of the linear interpolant, by regression-like techniques, on the data points chosen to be included.



Polynomial[edit]



Lagrange extrapolations of the sequence 1,2,3. Extrapolating by 4 leads to a polynomial of minimal degree (cyan line).

A polynomial curve can be created through the entire known data or just near the end (two points for linear extrapolation, three points for quadratic extrapolation, etc.). The resulting curve can then be extended beyond the end of the known data. Polynomial extrapolation is typically done by means of Lagrange interpolation or using Newton's method of finite differences to create a Newton series that fits the data. The resulting polynomial may be used to extrapolate the data.

High-order polynomial extrapolation must be used with due care. For the example data set and problem in the figure above, anything above order 1 (linear extrapolation) will possibly yield unusable values; an error estimate of the extrapolated value will grow with the degree of the polynomial extrapolation. This is related to Runge's phenomenon.

Conic[edit]

A conic section can be created using five points near the end of the known data. If the conic section created is

		an ellipse or circle, when extrapolated it will loop back and rejoin itself. An extrapolated parabola or hyperbola will not rejoin itself, but may curve back relative to the X-axis. This type of extrapolation could be done with a conic sections template (on paper) or with a computer. **French curve** French curve extrapolation is a method suitable for any distribution that has a tendency to be exponential, but with accelerating or decelerating factors.[3] This method has been used successfully in providing forecast projections of the growth of HIV/AIDS in the UK since 1987 and variant CJD in the UK for a number of years. Another study has shown that extrapolation can produce the same quality of forecasting results as more complex forecasting strategies **Use of Extrapolation in Statistics** Extrapolation can mean several things in statistics, but they all involve assumption and conjecture (extrapolation is far from an exact science!): 1. The extension of a statistical method where you assume similar methods will be used. 2. The projection, extension, or expansion of your known experience into an area that you do not know or that you haven't experienced yet. 3. The use of equations to fit data to a curve. You then use the equation to make conjectures. This is known as **curve fitting** or regression, which can get quite complex, with the use of tools like the Correlation Coefficient.	

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<td>FRIDAY</td>
<td>Review Learners knowledge on the previous lesson.</td>
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1. Discuss with the Learners about how to find the x-intercept in equations.
2. Assist Learners to find the y and x intercepts of an equation in standard form.
3. Discuss with the Learners about the features of a linear equation.
4. Learners brainstorm to determine if an equation is linear or non-linear.
A linear equation has the following form:

y = mx + b

where

m is the slope
b is the y-intercept.

You can also perform a vertical line test. If the line touches your graphed function in more than one spot, it is not a function.

The variable x must be either degree zero or degree 1 AND the variable y must be 1st degree in order to be a linear function.

Examples:

y = 2x - 3 (both x and y are 1st degree)

4x + 5y = 20 (both x and y are first degree)

2x - 4y = 7 + 3x (all variables are 1st degree)

y = -1 (x is degree zero and y is 1st degree; this makes a horizontal line which is a function of x)

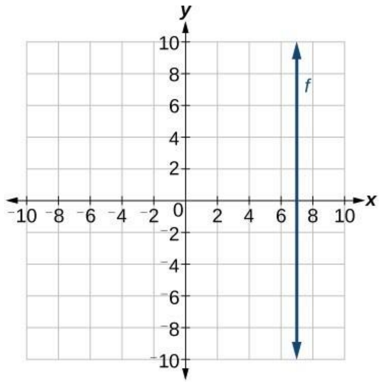
If variable x is 1st degree but the variable y has a degree of zero, it will be a linear relation but not a function of x.

Example:
</td>
<td>
Reflect on the features of a linear equation.

Exercise;

1. Find the x-intercept of
$f(x)=1/2x-3$.

2. Find the x-intercept of
$f(x)=41x-4$.

3. Write the equation of the line graphed below


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		x = 4 (the graph is a vertical line and is not a function of x) If variable y is 1st degree but the variable x has a degree other than 0 or 1, it will be a non-linear function of x. Examples: y = x^2 + 25 (x is not first degree) y = 5x + 2 - x^3 (x is 3rd degree) y = 1/x or y = x^(-1) (x is to the power of -1) y = sqrt(x) or y = x^(1/2) (x is to the 1/2 power; the graph is 1/2 a sideways parabola) y = 2^x (x is the exponent instead of the base, so the graph is exponential and not linear) If variable y is not 1st degree, the relation will not be a function of x. Example: x^2 + y^2 = 4 (neither x nor y is 1st degree; the graph is a circle with a radius of 2) x = y^2 (y is not 1st degree; this is a sideways parabola)	

Name of Teacher: **School:** **District:**