Section 1 Part C – Computer Operations

Computing technology and software provides us with many functions and capabilities that are helpful when machining.

1. Match the computing technology or software to its purpose when machining, using an arrowed line.

Computing Technology or Software		Machining purpose
Lathe and milling machine digital read out		Controls CNC operated machines, automates machining operations, achieves precision and efficiency, supports complex geometries, optimises cutting strategies, integrates with CAD/CAM systems and enable customisation
Personal computer		Helps guide and position cutting tools to creates more accurate products and increases efficiency by reducing manual measurement
Microsoft Excel		It provides a versatile and powerful platform for data organisation, analysis, calculation, reporting. Can be used to chart data.
CNC computer software		Provides users with a versatile platform for communication, information access and production. Required to use software such as Microsoft Excel.

Computing technology and software provides us with important data outputs that are helpful when machining.

2. Match the data output to its features and purpose when machining, using an arrowed line.

Data output		Feature and machining purpose
Line graphs		Estimates trend identification, correlation assessment, prediction, modelling relationships, data interpretation and visual communication of data patterns
Digital read out (DRO)		In machining it is to enhance precision, accuracy, efficiency and control by reducing manual measurement
Lines of best fit		Is a versatile tool for data visualisation and analysis, providing a clear to understand trends, relationships, changes and patterns in machining data

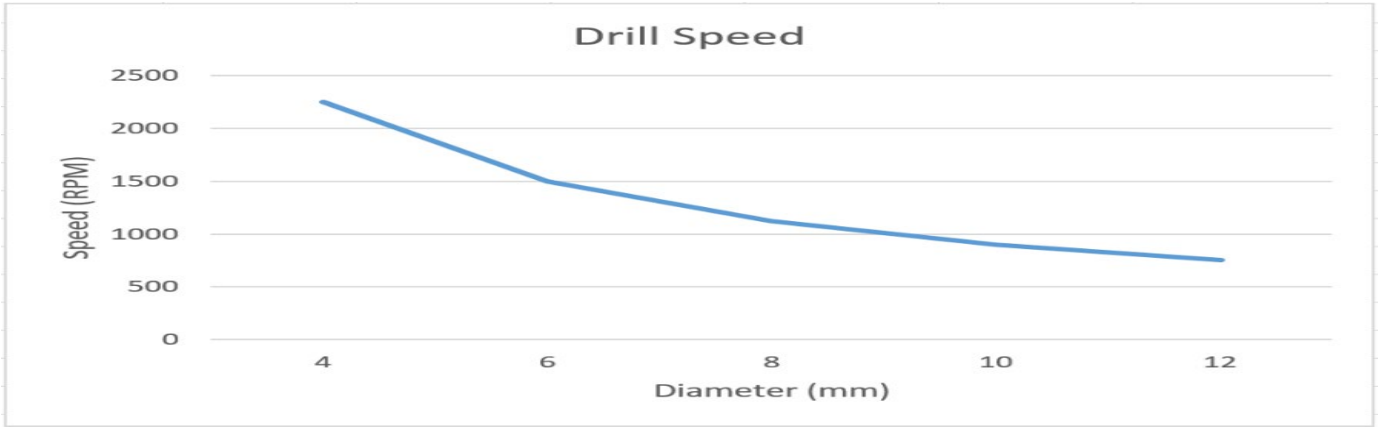
3. Types of charts and/or graphs are used when machining metal. Match the graph or chart and to its purpose during machining, using an arrowed line.

Graph or chart		Purpose during machining
Drill speed chart		Visually represents the relationship between two things, for example, drill speeds and drill bit diameters
Drill speed graph		Simple way of decoding sheet metal thickness and weight which influences machine settings and operations
Sheet metal gauge chart		Provides information & guidance for selecting, using and using thread cutting taps, drill sizes and thread specifications
Tap drill chart		Table of numbers that indicates speed and feed rates for different drill bits and metal material types

4. The x and y axes scales, within graphs, we may use when machining could include
   A. Drill bit size
   B. Tool sharpness level
   C. Spindle speed (RPM)
   D. Material hardness
   E. Tool feed rate
   F. Material size
   G. Chipping size
   H. Cleanup rate

5. Useful graph trends, we may use when machining could include
   A. Smaller or larger drill bit diameter
   B. Faster or slower spindle speed (RPM)
   C. When to sharpen tool cutter
   D. How aesthetically pleasing the job will look when it's completed.
   E. Faster or slower tool feed rate
   F. Smaller or larger material size

Use this graph information to answer question 6 to 10.



6. The trends indicated by the slope/gradient of this line graph would be
   A. Spindle speed RPM must increase when using a smaller drill bit diameter
   B. Spindle speed RPM must decrease when using a smaller drill bit diameter
   C. Spindle speed RPM must decrease when using a larger drill bit diameter
   D. Spindle speed RPM must increase when using a larger drill bit diameter

7. What spindle speed RPM should be used for a drill bit 6mm in diameter
   A. 2300
   B. 1500
   C. 1000
   D. 800

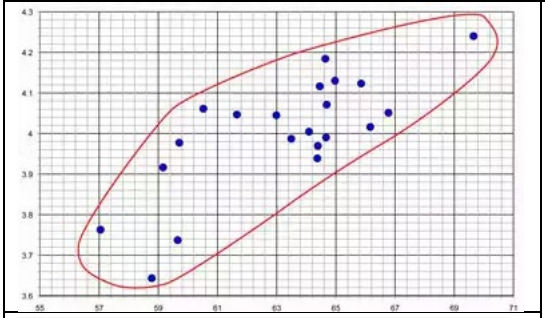
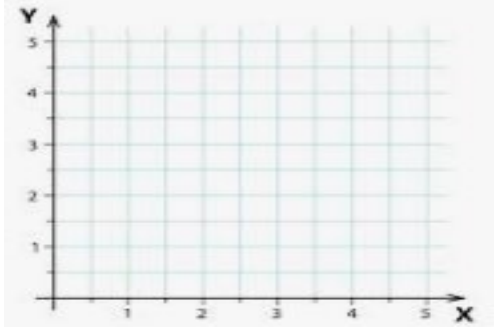
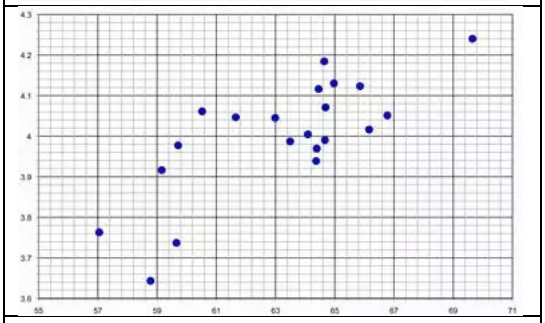
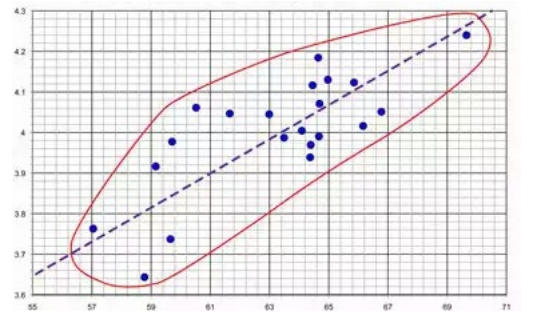
8. Estimate the spindle speed RPM used for a drill bit 14mm in diameter
   A. 800
   B. 500
   C. 200
   D. 100

9. If a drill bit 14mm in diameter is required for the task you should
   A. Use the estimate spindle speed RPM you established via sight
   B. Produce an entirely new graph with the 14mm data
   C. Use the “lines of best fit” method
   D. Discuss with the supervisor the job requirements outside of the information you have been provided

10. Data within a chart has upper and lower limits. Match the chart limit statement to an explanation of why it is occurring, using an arrowed line.

Chart Limit Statement		Explanation
Line does not go lower than 4 (mm) on the x axis (diameter (mm) of drill bit)		The data entered for this graph did not include spindle speeds below 500 RPM. This machine may not produce spindle speeds below 500RPM.
Line does not go higher than 2500 RPM on the y axis (spindle speed RPM)		The data entered for this graph did not include spindle speeds above 2500 RPM. This machine may not produce spindle speeds above 2500RPM.
Line does not go higher than 12 (mm) on the x axis (diameter (mm) of drill bit)		The data entered for this graph did not include drill bits less then 4mm in diameter. Drill bits less then 4mm in diameter may not suit the task.
Line does not go lower than 500 RPM on the y axis (spindle speed RPM)		The data entered for this graph did not include drill bits more then 12mm in diameter. Drill bits more then 12mm in diameter may not suit the task.

11. The “Lines of best fit” procedure can be used to estimate the relationship between 2 variables. Match the ‘lines of best fit” picture to its procedure order number and description, using an arrowed line.

Picture		Procedure number and description
		2. Mark out a set of points on the chart that reflect your data
		4. Draw a line through the shape you have drawn, that divides it evenly
		1. Develop a blank chart with x and y axis
		3. Draw a shape (usually an oval) that encloses all of the data points

Section 2 Part A – Drill speed graph

Student Instructions:

1. Enter the drill speed data into a spread-sheeting program such as Microsoft Excel
2. Generate a line graph showing Drill Diameter vs Speed
3. Take a screenshot of the graph
4. Paste your completed work below where indicated
5. Answer associated questions

Drill Speed Data

Drill Diameter (mm)	Speed (RPM)
4	2250
6	1500
8	1125
10	900
12	750

Paste your line graph HERE

1. What do you notice about the speed as the diameter increases?

2. Estimate the speed used for a 20mm drill bit

3. Calculate the Drill Speed RPM used for a 20mm drill bit using the following formula where: x = drill bit size and y = Drill Speed RPM
   - $x = \frac{9000}{y}$

4. What was the difference between the estimate and actual speed (if there is any)?

Section 2 Part C – Material List

Student Instructions: Develop a computer-generated material list using a spread-sheeting program such as Microsoft Excel for ONE project (identified by your trainer). The material list must include the following and look like the example below.

- Each part of the project listed and the dimensions of the material used
- A formula to calculate the total length of material for each part (Length x Quantity)
- Include a pie or column graph showing the total cost of producing each item
- Paste into the blank below page

Project:

Item #	Component Description	Stock Material	Size	Length (mm)	Quantity	Total (mm)	Cost/m $	Total Cost $

Paste your computer-generated material list using a spread-sheeting program
HERE.
Paste your pie graph showing the total cost of producing each item
HERE