DTBase©

Design & Technology
AQA A-Level

Sample Set 1 Paper 1 – Technical Principles

2 hours 30 minutes

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

Good luck!

120 marks

Q1) Identify the specific material classification of titanium **(1 mark)**

Q2) Define the following metal properties **(2 marks)**

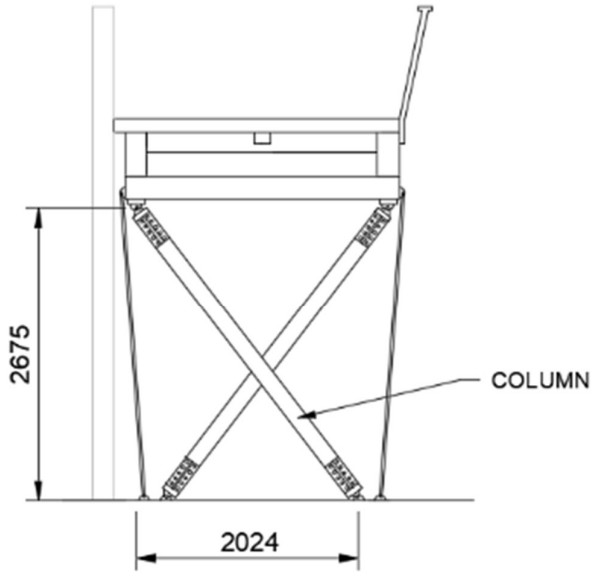
Electrical conductivity

Plasticity

Q3) PSE is a stock form of timber. What does PSE stand for? **(1 mark)**

Q4) Describe the process of forming a timber product using steam bending **(6 marks)**

Q5) The image shows a design for a footbridge. Calculate the length of the column. All measurements are in mm **(3 marks)**



Q6. Explain why glulam is a suitable material for the manufacture of the outdoor structure shown **(6 marks)**

Q7) Explain why a manufacturer may choose to use a unit production system for the manufacture of clothes **(6 marks)**

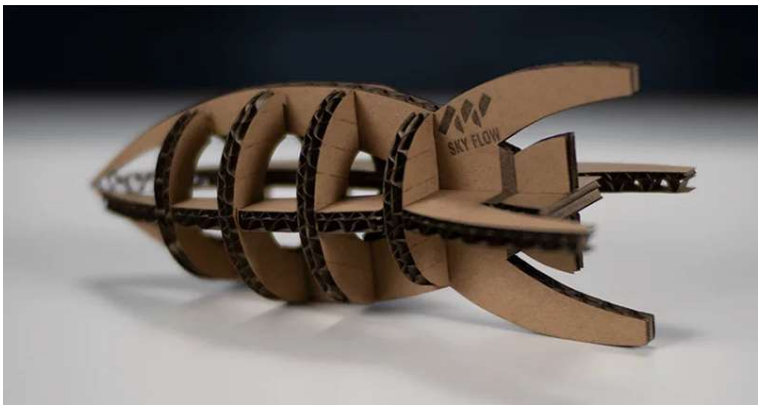
Q8) A new car has four quality control checks. The probability of failure for each check is shown below

- Fail in check A: 0.02
- Fail in check B: 0.043
- Fail in check C: 0.005
- Fail in check D: 0.012

A product will fail the quality control check if A, B and C fail together or if D fails. If 20,000 products are made, estimate how many will fail **(4 marks)**

Q9) Identify the smart material that changes colour with temperature **(1 mark)**

Q10) The design below has been cut using the laser cutter. Describe the process of creating the model using the laser cutter **(6 marks)**



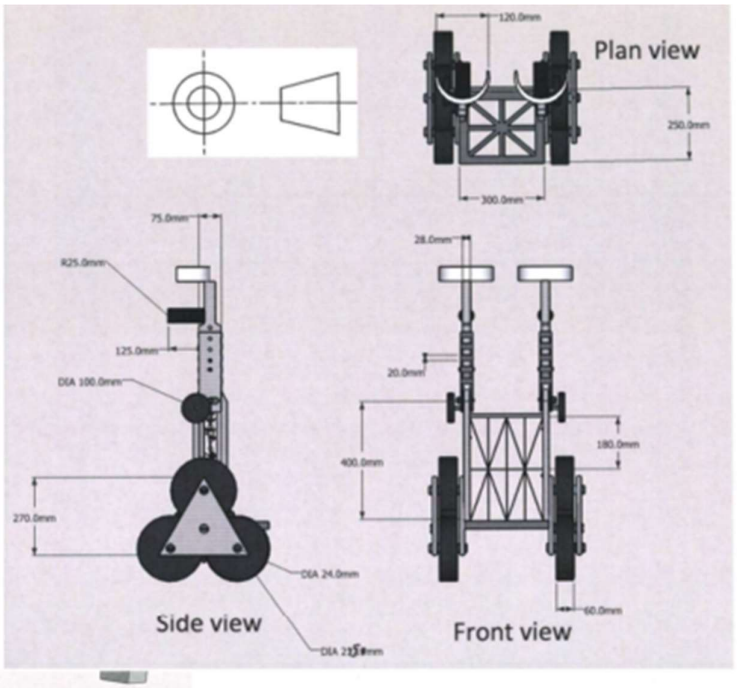
Q11) Evaluate the use of a flexible manufacturing system, compared to dedicated automated machinery, in production **(9 marks)**

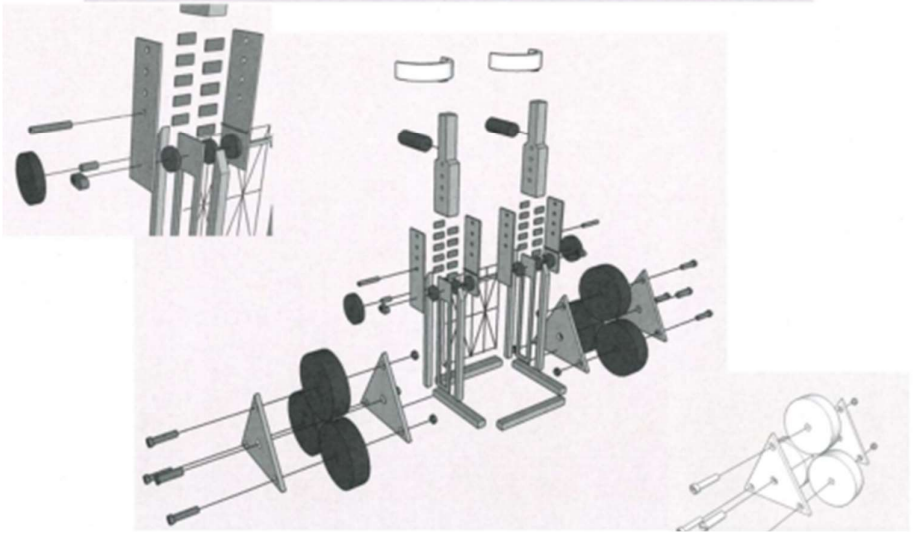
Q12) Outline the key features of AGV guidance systems. **(4 marks)**

Q13) A manufacturer is producing a concrete mix for a new building. The building requires 4 concrete beams, each 1.2m x 2m x 5m. The cement is mixed with water in a 2:4 water to cement ratio. How much water is needed for the building? **(4 marks)**

Q14) Describe the process of investment casting to produce the car part shown below **(6 marks)**

Q15) The images below show two different design communication techniques. Discuss why a designer may use each technique to communicate information **(6 marks)**





Q16) The table shows the geometry of a shape. Using the coordinates draw the shape and calculate the area bound by the external and internal paths **(4 marks)**

Internal Path	External Path
Circle with a radius of 2.5 with centre (0,1)	(5, 4)
	(5, -3)
	(-6, -3)
	(-6, 4)

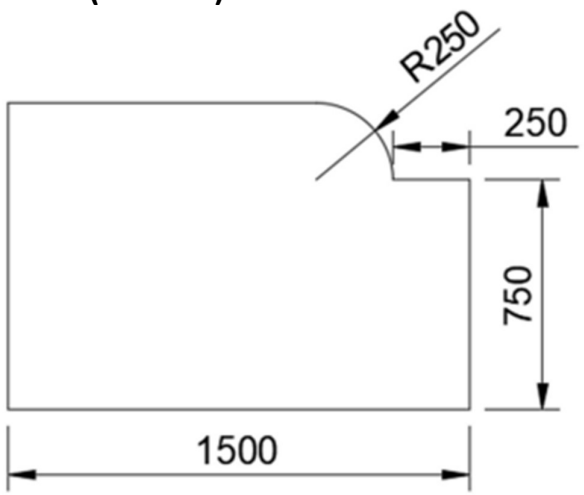
Q17) The mild steel tube for a gym rack is to be metal inert gas (MIG) welded. Outline, using notes, the features of the MIG welding process **(6 marks)**

Q18) Describe how the critical assessment of existing products can influence the work of designers and manufacturers **(6 marks)**

Q19) Evaluate the impact of Kevlar fibres on the development of sporting products **(6 marks)**

Q20) Discuss how the design and manufacture of consumer products can minimise the impact of the products on the natural environment **(9 marks)**

Q21) Some sheet metal is being cut for a car door. If the density of the metal is 2.8g/cm^3 and the metal is 6mm thick. What is the mass of the sheet metal? All measurements are in mm **(6 marks)**



Q22) Justify the requirement for risk assessments to be formally recorded and stored **(4 marks)**

Q23) The role of the British Standards Institute (BSI) is to promote safety and quality throughout product manufacture and usage.

Evaluate the advantages and disadvantages to a business of ensuring their practices and products comply with BSI standards **(8 marks)**

Q24) Evaluate the use of a patent to protect a design idea **(6 marks)**

END OF PAPER