

**DESIGN TECHNOLOGY  
 STANDARD LEVEL  
 PAPER 3**

Tuesday 21 May 2002 (morning)

1 hour 15 minutes

Name

Number

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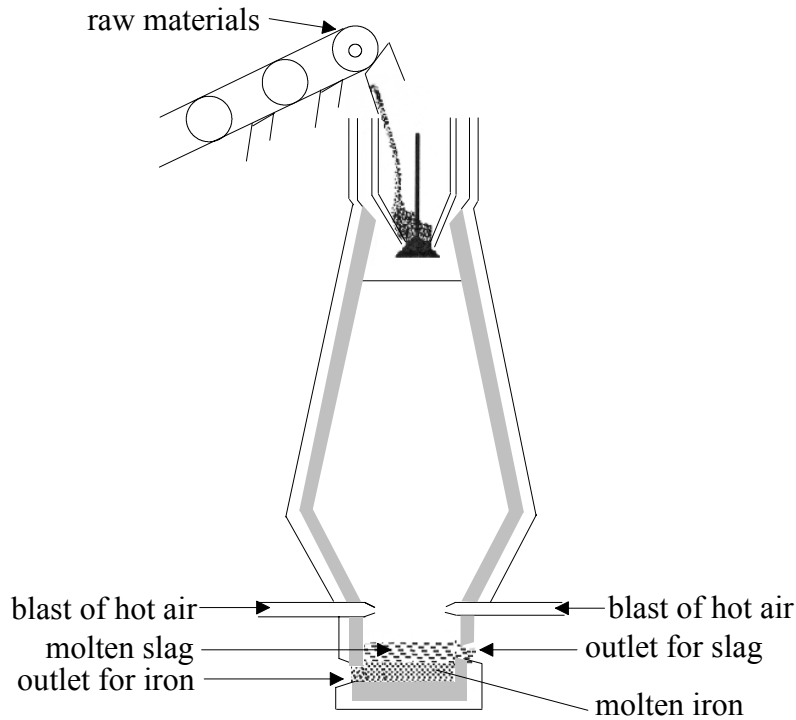
**INSTRUCTIONS TO CANDIDATES**

- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions from three of the Options in the spaces provided. You may continue your answers in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
- At the end of the examination, indicate the letters of the Options answered in the boxes below.

OPTIONS ANSWERED	EXAMINER	TEAM LEADER	IBCA
	/15	/15	/15
	/15	/15	/15
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NUMBER OF CONTINUATION BOOKLETS USED	TOTAL	TOTAL	TOTAL
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**Option A – Raw material to final product**

**A1.** The diagram below shows a blast furnace.



(a) State **one** material added to iron ore in the production of pig iron in a blast furnace. [1]

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(b) Identify **two** advantages of wrought iron over pig iron as an engineering material. [2]

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(c) Explain how the desired properties of mild steel can be altered for a named application. [3]

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**A2.** Outline the difference between toughened and laminated glass with reference to their response to impact. [2]

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**Option B – Products in context**

**B1.** The picture below shows an integrated circuit board incorporating copper.



(a) Define resource. [1]

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(b) Outline how the market can determine whether copper resources are exploited. [2]

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(c) Explain how economic issues contribute to the feasibility of recycling copper from the circuit board. [3]

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**B2.** Outline how the purpose of the evaluation of a motor car, *e.g.* a safety test, influences the nature of the evaluation. [2]

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**Option C – Mechatronics**

**C1.** The photographs below show a hand-held rotary food whisk and an electric whisk.



Hand Held Whisk



Electric Whisk

The number of teeth on the driven gear of the hand-held whisk is 30; the number of teeth on the driver gear is 6.

(a) Calculate the velocity ratio of the hand-held whisk. [2]

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(b) It takes 10 minutes to whip a litre of cream with the hand-held whisk and uses 180 000 J of energy. Calculate the power of the hand-held whisk. [2]

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(c) How long would it take to whip the cream using the electric whisk which can deliver 750 W? [2]

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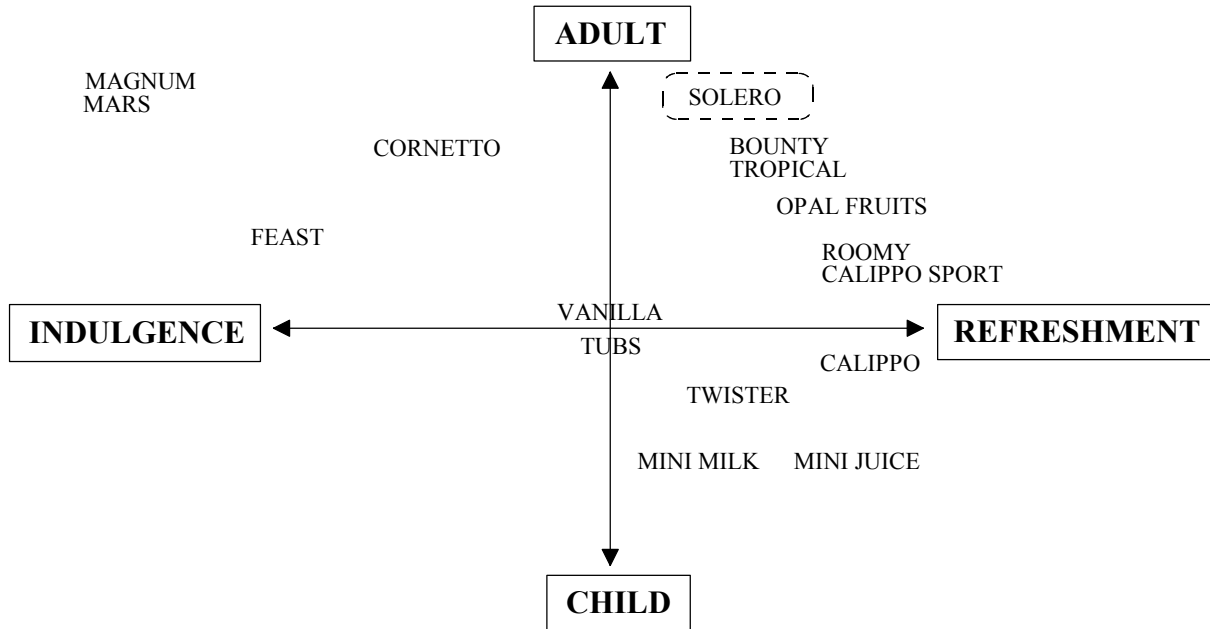
**C2.** Explain that when a lever is in equilibrium the net moment is zero. [2]

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**Option D – Food technology**

**D1.** The graph below shows two bipolar axes (indulgence-refreshment, adult-child) which can be used to identify two markets (adult, child) and two distinct types of ice cream product (indulgence products (e.g. thick chocolate and rich ice cream products) and refreshment products (e.g. fruit ices)).



(a) Identify (from the graph above) **one** ice cream product designed for children. [1]

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(b) Outline the role of tasting panels in developing the specification of new products. [2]

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(c) Explain the importance of being able to compare new food products with existing products. [3]

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**D2.** Outline **one** factor that determines a need for primary food processing. [2]

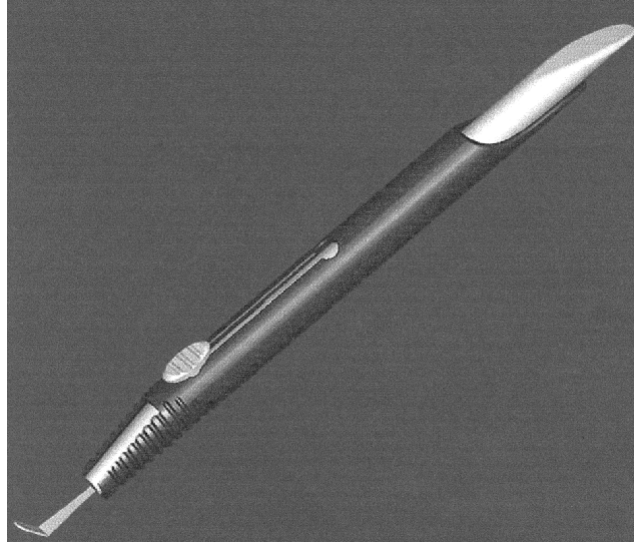
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**Option E – Computer aided design and manufacturing**

**E1.** The picture below illustrates a product developed using CAD/CAM.



(a) Identify **one** input device that can be used by a CAD system. [1]

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(b) Outline the impact of CAD/CAM on working conditions for the workforce. [2]

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(c) Explain how the application of virtual reality in the marketing of consumer products can help conserve resources. [3]

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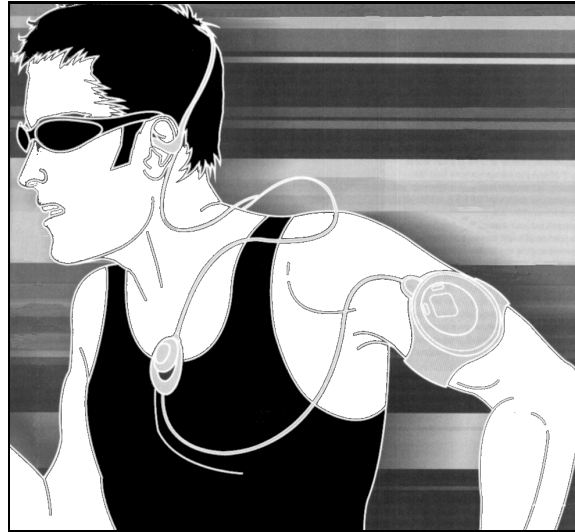
**E2.** Explain how CAD/CAM has improved choice for consumers. [2]

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**Option F – Invention, innovation and design**

**F1.** A portable sports audio MP3 player can be used to download music from the Internet. The diagram below shows a portable sports audio MP3 player strapped onto an athlete's arm so that the music can be listened to whilst the athlete is exercising.



(a) Define *innovation*. [1]

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(b) Outline the meanings of *technology push* and *market pull*. [2]

Technology push: .....

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Market pull: .....

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(c) Explain whether this design is an example of technology push or market pull. [3]

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**F2.** Draw a simple model to describe innovation. [2]



**Option G – Health by design**

**G1.** The photograph below shows an individual diabetic urine testing stick and the side of the bottle showing the colour panels used to quantify the amount of sugar in the urine.



(a) State **one** advantage of using diabetic testing sticks over earlier methods of testing. [1]

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(b) Outline how diabetic sticks work. [2]

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(c) Explain how the availability of diabetic sticks has impacted on the lives of diabetics. [3]

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**G2.** Outline **one** advantage of the “one day” disposable contact lens. [2]

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