Design Technology HL P1

2010 May

School Level 12th IB Diploma Programme

Board Exam

International Baccalaureate (IB Board)

Solved

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M10/4/DESTE/HPM/ENG/TZ0/XX+

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DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 1

Wednesday 12 May 2010 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

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1. A solution to a problem in one design context that is used to provide a solution to a problem in another design context is an example of

A. adaptation.

B. constructive discontent.

C. brainstorming.

D. attribute listing.

2. A design specification for a product identifies

A. performance characteristics.

B. major constraints.

C. target market.

D. criteria for a design proposal.

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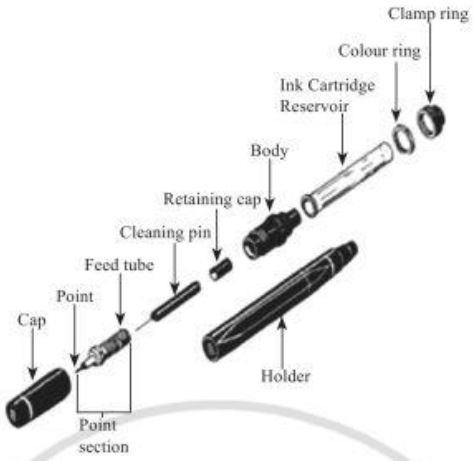
3. What type of drawing is shown below?



[Source: http://www.tpub.com/content/draftsman/14276/img/14276_175_1.jpg]

A. Perspective

B. Exploded isometric

C. Orthographic

D. Isometric

4. The design cycle represents divergent and convergent thinking because

A. it is an iterative process.

B. it is a linear process.

C. divergent thinking is at the start of the cycle.

D. convergent thinking is at the end of the cycle.

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5. Incremental design contributes to which corporate strategy?

A. Market penetration

B. Market development

C. Product development

D. Diversification

6. Why do mobile phones tend to have short product cycles?

A. They are in the mature stage of development

B. Planned obsolescence

C. They are sold in a competitive market

D. The market is saturated

7. Printer cartridges are designed to fit specific models of printer. Which strategy would optimize the use of existing manufacturing capability?

A. Designing the cartridge so it can be refilled

B. Using standard cartridges for all printers

C. Designing the cartridge so it is easier to use

D. Reducing the amount of packaging

8. What is **not** influenced by data from life cycle analysis of washing machines?

A. Water usage

B. Energy consumption

C. Pollution

D. Planned obsolescence

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9. What contributes to hardwood being considered less renewable than softwood?

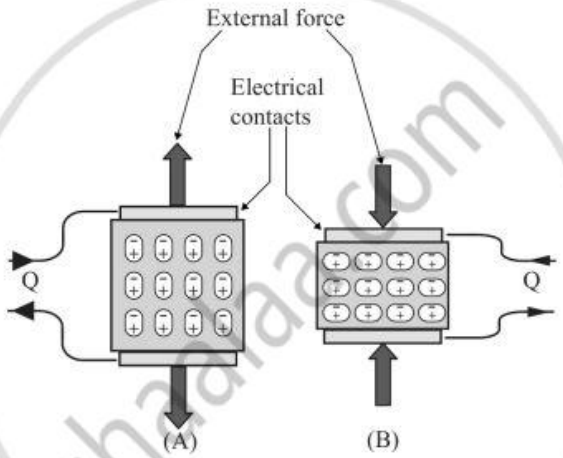
A. Time to reach maturity

B. Soil erosion

C. Greenhouse effect

D. Extinction of species

10. Which term describes the blue material in the diagram below which if stretched or compressed it gives off an electric charge?



[Source: http://archives.sensorsmag.com/articles/0203/33/main.shtml]

A. Magneto-rheostatic

B. Electro-rheostatic

C. Piezoelectric

D. Shape memory alloy

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11. Which characteristic is more important for a Pyrex oven dish than for a glass fruit bowl?

A. Thermal expansivity

B. Colour

C. Transparency

D. Unreactivity

12. Which material group can be divided into "natural" and "composite"?

A. Metal

B. Ceramic

C. Timber

D. Plastic

13. What is a property of urea-formaldehyde?

A. Low stiffness

B. High brittleness

C. Low hardness

D. High toughness

14. Which manufacturing technique can be used with metals, timber and ceramics?

A. Fusing

B. Moulding

C. Casting

D. Stitching

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15. What enabled mechanization to be introduced during the Industrial Revolution?

A. Increasing labour costs

B. Assembly lines

C. Steam power

D. Cheap electricity

16. What is true of both just-in-time (JIT) and just-in-case (JIC) manufacturing?

A. They are examples of mechanization

B. They are volume production systems

C. They require no manual labour

D. They manufacture products to order

17. Which percentile range would be used in designing a seat for a mass-produced car?

A. 5^{th}

B. 5^{th}–95^{th}

C. 95^{th}

D. 50^{th}

18. What is a characteristic of planned obsolescence but **not** fashion?

A. Predictable product life cycle

B. Selection of material

C. Product quality

D. Aesthetics

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19. Which strategy is most likely to generate quantitative data?

A. User trial

B. User research

C. Performance test

D. Expert appraisal

20. What would enable a manufacturer to confidently provide a guarantee on a product?

A. Value for money

B. Cost-effectiveness

C. Quality assurance

D. Consumer pressure

21. What was true of the introduction of electricity to manufacturing?

A. The need for labour was reduced

B. Production costs were reduced

C. Product quality was increased

D. Geographical distribution of manufacturing was increased

22. What is an advantage of clean coal technology?

A. Reduces resource consumption

B. Reduces energy usage

C. Reduces carbon dioxide emissions to the atmosphere

D. Reduces production costs

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23. What is **not** a limitation to the increased adoption of solar heating?

A. Government support

B. Cost

C. Geographical location

D. Technology

24. Which combination of "elastic region" and "yield stress" allows paper clips to be used many times?

	Elastic region	Yield stress
A.	Long	High
B.	Long	Low
C.	Short	High
D.	Short	Low

25. Which combination of "strength" and "stiffness" is needed in the design of a plastic chair?

	Strength	Stiffness
A.	Low	Low
B.	Low	High
C.	High	Low
D.	High	High

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26. Why is an I-shaped beam more cost-effective than a solid rectangular beam of the same material?

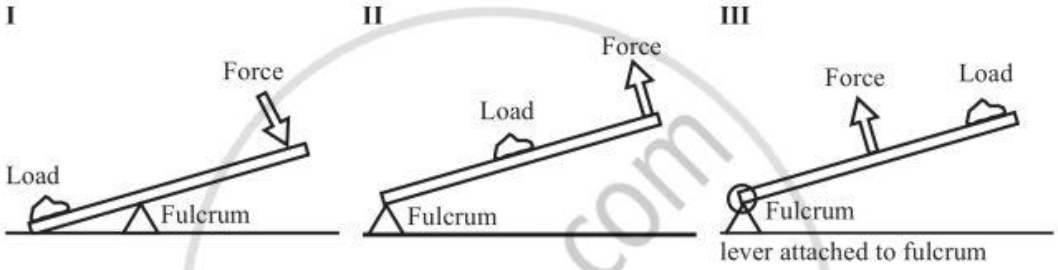
A. It is easier to produce

B. It has greater resistance to torsion

C. It has greater resistance to shear stress

D. It uses less material

27. For which lever(s) would the mechanical advantage be less than 1?



A. I only

B. II only

C. III only

D. I and III

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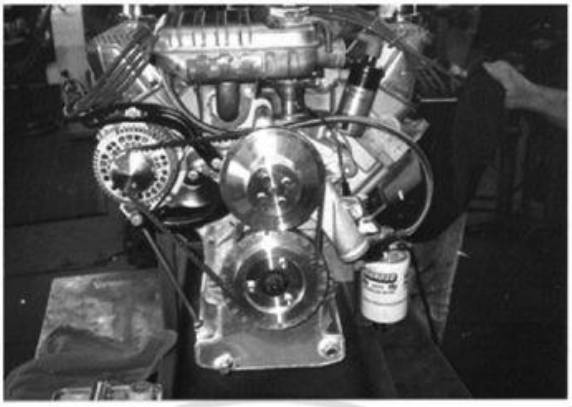
28. What type of mechanism is shown in the system below?



[Source: http://www.gessford.com/cobraparts/images/marchshelby.gif]

A. Gear

B. Belt

C. Chain drive

D. Lever

29. Which materials can be friction welded?

	Plastics	Metals
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

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30. Why do manufacturers often use standard size screw-caps for plastic bottles?

A. Cost-effectiveness

B. Value for money

C. Aesthetics

D. Function

31. What is an advantage of high-pressure die casting over lost wax casting in volume production?

A. Accuracy

B. Quality of surface finish

C. Efficiency of production

D. Size of component

32. Which characteristic of an appropriate technology relates to economic, social and environmental sustainability?

A. Low in capital cost

B. Use of local materials, wherever possible

C. Use of local skills and labour

D. Low environmental impact

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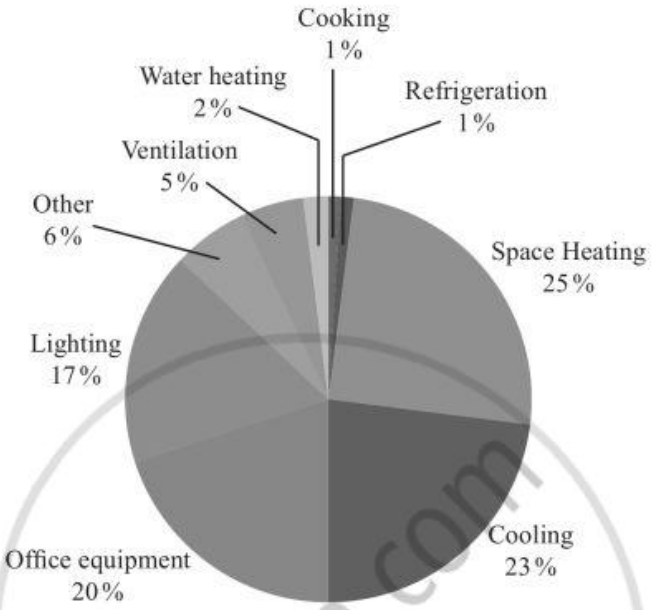
33. The figure below shows data for the average energy consumption of office buildings in the United States. Consider which aspect of the building envelope would contribute most to a reduction of energy consumption?



A. Ventilation

B. Daylighting

C. Thermal protection

D. Moisture protection

34. Which U value will be most effective in reducing heat losses from a building?

A. 1.7

B. 2.1

C. 2.5

D. 3.3

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35. Which combination of "long building axis" and "location of less-used spaces" would contribute most to reduced energy consumption in a building located at 35°S?

	Long building axis	Location of less-used spaces
A.	North-south	North
B.	East-west	North
C.	North-south	South
D.	East-west	South

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Questions 36–40 relate to the following case study. Please read the case study carefully and answer the questions.

CASE STUDY

The figures below show the britebox™ – a portable light box for the treatment of Seasonal Affective Disorder (SAD). SAD causes extreme fatigue, greater need for sleep, appetite changes and depression. SAD can be treated using light therapy but research shows that people often find it difficult to make time for treatment. The britebox™ was developed by Centreline Design using a pioneering corporate strategy and design for manufacture (DfM). Computer Aided Design (CAD) was used to produce a mould for the thermoplastic case of the britebox™. The company was able to get product feedback by developing prototypes for use in user trials.

Figure 1: Rendering of britebox™ case

Figure 2: Britebox™ in use while working

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36. Why is it important to get a product to market quickly when a company adopts a pioneering strategy?

I. It ensures a rapid return on investment.

II. It enables market testing and feedback from potential customers to inform product development.

III. It enables the company to take advantage of the research and development invested by others.

A. I only

B. II only

C. III only

D. I, II and III

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37. Which DfM consideration would facilitate the maintenance of the britebox™?

A. Avoiding sharp corners

B. Using modular design

C. Using standard components as much as possible

D. Do not specify surfaces to be smoother than necessary

38. Which combination of bond strength explains the reversible effect of temperature on a thermoplastic?

	Primary bonds	Secondary bonds
A.	Weak	Weak
B.	Weak	Strong
C.	Strong	Weak
D.	Strong	Strong

39. What is **not** true of the economic breakeven point?

A. The variable costs will decrease

B. The fixed costs are covered

C. The company will start to make a profit

D. It is determined by the manufacturer based on market research

40. What is a disadvantage of being able to use prototypes of the britebox™ in a user trial?

A. Designers can get feedback to inform product development

B. Users are non-specialists so trials are cost-effective

C. Designers can observe when products are used in unexpected ways

D. User trials can be time-consuming

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MARKSCHEME

May 2010

DESIGN TECHNOLOGY

Higher Level

Paper 1

2 pages

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1.	A	16.	B	31.	C	46.	–
2.	A+D	17.	B	32.	B	47.	–
3.	B	18.	A	33.	C	48.	–
4.	A	19.	C	34.	A	49.	–
5.	C	20.	C	35.	D	50.	–
6.	B	21.	D	36.	A	51.	–
7.	B	22.	C	37.	C	52.	–
8.	D	23.	D	38.	C	53.	–
9.	A	24.	A	39.	A	54.	–
10.	C	25.	D	40.	D	55.	–
11.	A	26.	D	41.	–	56.	–
12.	C	27.	C	42.	–	57.	–
13.	B	28.	B+C	43.	–	58.	–
14.	B	29.	D	44.	–	59.	–
15.	C	30.	A	45.	–	60.	–

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