3.3 Innovation, cost, intellectual property and ethics

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS invention • innovation • market pull • technology push • intellectual property • patent • appropriate technology • greenwashing

Objective

Build the skills to answer exam questions on **innovation** and commercial design: invention and innovation, market pull and technology push, the product life cycle and diffusion of innovations, costs and break-even, **intellectual property**, and ethical design and appropriate technology.

You must be able to:

- distinguish invention and innovation, and incremental, radical and disruptive innovation
- identify the right form of intellectual property: patent, registered design, copyright, trademark
- calculate break-even with a selling price
- explain appropriate technology, greenwashing and eco-labels
- explain market pull, technology push and the diffusion of innovations
- explain the stages of the product life cycle (sales) and extension strategies

1 Key knowledge and worked examples

Innovation

- **Invention**: a new idea, product or process. **Innovation**: an invention that is brought to market and used.
- **Incremental**: small improvements (a better camera each year). **Radical**: a big change creating something new (the first touch-screen smartphone). **Disruptive**: starts with overlooked low-end or new users, then moves into the mainstream.
- **Market pull**: users' needs drive the product. **Technology push**: a new technology looks for uses (lasers before barcode scanners).
- **Product life cycle (sales):** introduction (low sales, loss) → growth → maturity (sales level off, rivals copy) → decline. **Extension strategies:** new model, new features or colours, lower price, new markets.
- **Diffusion of innovations** (Rogers): innovators 2.5 %, early adopters 13.5 %, early majority 34 %, late majority 34 %, laggards 16 %. Firms target early adopters, who influence the majority.

Cost and intellectual property

$$\text{break-even} = \frac{\text{fixed costs}}{\text{price} - \text{variable cost per item}}$$

protection	what it protects	typical length
patent	an invention: how it works	about 20 years
registered design	appearance: shape, pattern	up to about 25 years
copyright	drawings, writing, software	the creator's life plus 50 to 70 years; automatic
trademark	names and logos of a brand	renewable while used

A patent needs novelty, an inventive step and industrial use; applying makes the invention public. **Open source** design shares designs under a licence so others can study, change and make them.

Ethics

Safety in foreseeable misuse; fair pay and safe work in the supply chain; no hazardous or conflict materials; respect for cultures; honest claims (exaggerated green claims are **greenwashing**). **Appropriate technology** suits the people and place: affordable, local materials, repairable with local skills, little energy. **Eco-labels** (EU Ecolabel, Energy Star, FSC) show a product meets stated standards.

Worked example. A lamp sells for ¥70; fixed costs ¥20,000; variable cost ¥30 per lamp. Break-even $= 20\,000 \div (70 - 30) = 500$ lamps.

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2 Practice

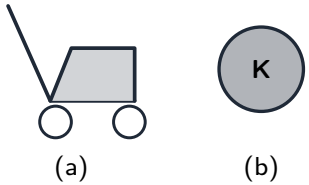
2.1 Distinguish between an **invention** and an **innovation**. [2]



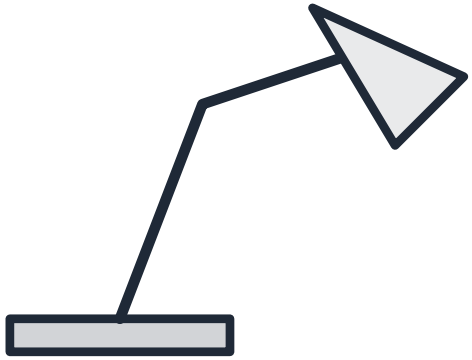
2.2 Identify the form of intellectual property that would protect:

(a) a new mechanism for a folding pushchair; [1]

(b) the logo of the pushchair company. [1]



2.3 A desk lamp sells for ¥60. Fixed costs are ¥12,000 and the variable cost is ¥20 per lamp. Calculate the break-even number of lamps. [2]

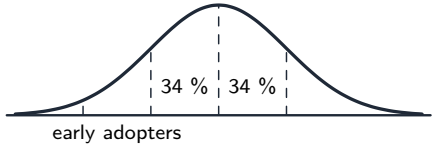


2.4 Distinguish between **market pull** and **technology push**, with an example of each. [4]



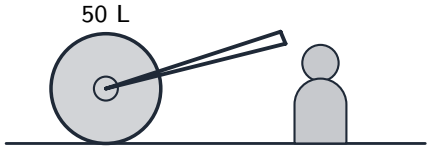
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2.5 Explain why designers and marketers often target **early adopters** when launching a new product. [3]



3 Exam-style questions

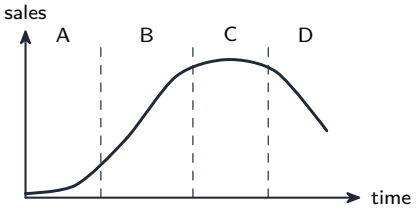
3.1 A design team has developed a rolling water container for villages where people carry water a long way by hand. It holds 50 litres and is pushed with a handle.



(a) Outline **two** features that make this an example of appropriate technology. [4]

(b) The team could patent the design or share it as open source. Explain **one** advantage and **one** disadvantage of a patent. [4]

3.2 The sales of a smart speaker are shown.



(a) Identify the stages labelled **A** and **C**. [2]

(b) Explain **two** extension strategies the firm could use at stage C. [4]

(c) Explain how disruptive innovation differs from incremental innovation, with an example. [3]

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Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

an invention is a new idea, product or process; an innovation is an invention that has been brought to market and is used

2.2

(a) patent

(b) trademark

2.3

$12\,000 \div (60 - 20) =$ **300** lamps

2.4

market pull: users' needs drive the new product; e.g. people wanted to carry music, so portable players were made; technology push: a new technology leads to products looking for a use; e.g. lasers, later used in barcode scanners

2.5

early adopters are respected opinion leaders, about 13.5 % of buyers; others watch them and follow their choices; if they adopt, the early majority (34 %) often follows, so sales grow quickly

3.1

(a) any two, outlined: affordable for families with low incomes; simple, so it can be repaired with local skills and tools; needs no fuel or electricity; made from tough local or easy-to-get materials, e.g. polyethylene

(b) advantage: protects the invention for about 20 years, so the team can earn money / license it to pay for development; disadvantage: applying is costly and makes the design public; other makers cannot freely make cheap copies, so fewer people may get it

3.2

(a) A: introduction; C: maturity

(b) any two, explained: a new model with new features, e.g. a screen, to win back buyers; new colours or a lower price to reach new buyers; new markets, e.g. other countries or business users

(c) incremental innovation makes small improvements to an existing product; disruptive innovation starts with overlooked low-end or new users and then moves into the mainstream, replacing existing products; e.g. steel mini-mills made cheap reinforcing bars, then moved into higher-value steel

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